

# **2003 EDEN ANNUAL CONFERENCE**

## **The Quality Dialogue**

### **Integrating Quality Cultures in Flexible, Distance and eLearning**

Proceedings of the 2003 EDEN Annual Conference,  
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Dr. András Szűcs, Dr. Erwin Wagner  
on behalf of the European Distance Education Network

and

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European Distance Education Network

# **EDEN 2003 Conference**

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## ***Introduction***

The "Quality issue" has become one of the leading concepts in modern society, economy and education. It serves different perspectives and stakeholders: providers, customers, partners and citizens. Different stakeholder perspectives give rise to different "quality cultures". In the emerging range of open, flexible, distance and eLearning settings, there is an increasing need for information and understanding to permit judgement on the quality of the educational offer, including schools, universities, vocational training and adult education. Quality frameworks and quality assurance procedures represent the priority for both the policy makers and educational providers as well as for the learners, students, trainees and the corporate sector.

Nowadays, eLearning is perceived either as new ICT media and pedagogies, making up the emergent flexible learning environments, or as the new paradigm of knowledge acquisition with related competencies in the Information Society. Whichever the perception, in order to succeed with the mainstreaming of the various ICT-supported learning solutions, it is essential to bring about dialogue between experts, academia, the ICT industry and the publishing sector as well as the education and training authorities across Europe. There is huge interest in the definition of quality assurance practice to be deployed by the broad range of stakeholders in education and training in the public and private sectors, in order to consolidate knowledge, ensure consistent approaches and to add value. The 12th Annual Conference of the European Distance Education Network organised in Rhodes, Greece in 2003 aims addressing this strategic area in the learning agenda in Europe, to raise awareness about quality and to disseminate knowledge.

During the preparation and organisation of the conference, one of the leading concepts has been the approach of involving the different user groups – representatives of the corporate sector, professionals from higher education, schools, vocational education & training, the community & informal learning – to share experience and to reflect on the various "Quality Cultures".

The EDEN Annual Conferences are recognised as major events for open, distance, flexible and eLearning professionals in Europe attended every year by a high number of experts. We are also delighted to see increasing interest of delegates from outside Europe. The inclusive nature of the conferences is consciously encouraged and maintained by EDEN in order to attract contributions from and share knowledge with interdisciplinary fields of information and communication technologies and education, policy and practice, national and institutional approaches. This helps in creating and further developing the international community of professionals for whom these conferences represent rich variety of experience and innovation, and are useful both in capitalising the knowledge of proficient actors and also assisting in introduction and professionalisation of those interested in joining as newcomers.

Local professional communities have always been important beneficiaries of international events. It was most relevant to organise the event during the Greek Presidency of the EU, which has prioritized ICT and Lifelong Learning as the means for upgrading the quality of European education systems. EDEN truly appreciated the co-operation in the preparation of the conference with its outstanding member organisations as local partners: the University of the Aegean, Lambrakis Research Foundation and Ellenogeraniki Agogi. Working in a geographically dispersed environment, with extensive experience and high level practice in distance and eLearning and modern information and communication technologies, the co-operation with these institutions has been a good example for synergies between activities of a European association and distinguished organisations with diversified professional performance.

*Dr Erwin Wagner, Dr Nikitas Kastis and Dr András Szűcs  
European Distance Education Network*

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# QUALITY IN THE DIGITAL AGE

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## Abstract

This paper examines the requirements of quality assurance of multi-media educational products and services at the levels of academic, pedagogic and media product quality. It describes processes of quality assurance in all these areas currently being implemented by the UK Open University and poses questions in relation to the impact on quality of educational technology developments such as the Virtual Learning Environment and the creation of learning objects.

**Keywords:** Academic, pedagogic and media product quality; multi-media learning material; virtual learning environment; learning object; standards; metadata.

## Introduction

Presenting this talk at this conference represents for me the completion of a full circle of function and responsibility in the area of quality assurance and quality assessment. In the middle 1990s I directed the programme for the assessment of the quality of subject provision in higher education across all higher education institutions (HEIs) in England, on behalf of the Higher Education Funding Council for England (HEFCE). I am now, as Pro-Vice Chancellor for Learning and Teaching at the UK Open University (UKOU), responsible for receiving the auditing teams from the Quality Assurance Agency (QAA), who took over the quality assurance processes from the Funding Councils 6 years ago, and I now anxiously await the results of their inspections. In that period of 6 or 7 years the nature of distance education has changed out of all recognition, with an enormous expansion in the use of single media, such as CD-ROM, DVD, email or computer conferencing systems, and the arrival of complete online learning packages, in particular the Virtual Learning Environments (VLEs) such as WebCT and Blackboard. These media are also no longer the preserve of distance education establishments but are being installed and operated in conventional HEIs all over the world.

Evaluating the effectiveness of multi-media packages has always been a difficult task, involving as it does questions both of academic accuracy, pedagogic effectiveness and media product quality. In this talk I wish to report on the developments that the UKOU is putting into place to assure that the above three aspects of quality are properly assessed within our production and presentation processes, to pose some questions concerning the impact of present ICT products, such as VLEs, on the quality of online learning and to try to look ahead to new questions that I think are inherent in imminent education technology products such as learning objects.

## Quality and Standards: defining terms

The meaning attached to the word “Quality” in higher education has been a subject of active debate for at least 10 years and has often been used in ways that blur the distinction between the two terms “quality” and “standard”. I wish to define quality as the attribute of a process or product that assures that it is “fit for purpose”. This means that whether a product (e.g. an academic text) or a process (e.g. a lecture) is of “high quality” is a judgment relative to the purpose for which the product or process is created or used. A standard, on the other hand, sets the level of achievement to be expected of a successful student of a given course or programme of study. Standards need to be defined in an absolute manner. The achievement of a given standard of performance or understanding can be stated as the purpose for which a given educational product or process is devised and then the quality rating of that product or process reflects the degree to which its use allows the student or practitioner to achieve the stated standard of performance.



In the remainder of this talk I shall focus on questions concerning the evaluation of the quality of educational products and processes, assuming that the purpose for which these products or processes are intended (the “standard to be achieved”) is already understood.

## **External Evaluation in the UK**

In most European countries, institutions of higher education (HEIs) have both to satisfy themselves of the quality of the learning experience that they offer to students and to meet the requirements of an external agency that sets standards and monitors quality on behalf of their respective governments. In the UK this function is carried out by the (QAA). The methods employed have evolved over the past 10 years from a system based on the review of subject provision and on a “fitness for purpose” definition of quality to the recently introduced system, based largely on institution-level audit of quality systems and procedures, examination of standards and the delegation of subject-based review to the HEI itself. Since the UKOU is the only large-scale HEI that delivers its entire teaching programme using a blended teaching approach, the external evaluation of the QAA often focuses on comparisons with more conventional universities and less on the intrinsic problems of evaluating online, multi-media based education, which are the subject of this paper. Suffice it to say that the UKOU has been highly rated by the QAA over the past decade, but this largely leaves us with the problem of evaluating the quality of multi-media production still to be articulated and addressed.

## **Internal Evaluation: evaluating media, evaluating applications**

What I have described as the external view of quality is the approach that is shaped by the processes of audit of the QAA. What I will now call the internal view of quality is that which is prompted by the following questions:

- is the material under discussion academically appropriate? Does the material properly reflect the academic or professional topics under discussion?
- is this an effective piece of academic or professional teaching material?
- is this a high quality media product?

The usual processes of academic discussion within a course team and with the external examiners of the course should answer the first question and therefore I should like to concentrate on the second and third questions. The usual range of academic and auditing expertise found in external audit teams does not equip them to make all the judgments that we require, since auditors or subject specialists are very rarely media specialists as well. Naturally we expect the answer to the two questions under discussion to be positively correlated but that is not always guaranteed. Whether we like it or not, the value that students or clients place on single or multi-media educational products will depend upon the combined impact of both the pedagogic and media quality of the product. Multi-media distance learning products share properties and characteristics with more general media products, such as broadcast television, video and radio, or commercially designed websites. To give one particular example, a website may contain all the necessary information and study advice to allow students to take their studies forward but if the design of the navigation is clumsy in comparison with comparable commercial websites the student will be frustrated and put off. The academic value of the educational website will be lost as a result of inadequate media product quality. The question I wish to explore is, therefore, "What processes can we use to assure with a high probability a positive response to both these questions?"

In earlier days of the UKOU our close relationship with the BBC for all media production besides print gave us the following procedures:

- for printed materials, the critique of the course team and the external assessor guaranteed the academic and pedagogic quality and the editorial guidance and critique of our specialist editors assured the text as a media product;
- for audiovisual media, the expertise of the BBC members of the course team took responsibility for assuring the high quality of UKOU media products.

Our relationship with the BBC has now evolved in a way that does not permit our reliance on their judgment of subject specific media products as we used to do. Further, our use of digital educational resources, both standalone media such as CD-ROM or DVD and online media, either singly or in combination, makes the evaluation process much more complex.

The expertise that we are presently putting into place with respect to the media evaluation function is part of the transformation that we are undertaking in all our media production processes. The division of the UKOU that is responsible for the physical production processes of all UKOU media products, including print, (called “Learning and Teaching Solutions”) has now recruited a new set of media specialists called media product managers (MPMs). These experts will work closely with course teams during the conception and development stages of course production to assure that the course elements have high media product value as well as the academic clarity generated through the usual course team process. They are expected to have expertise across a range of media and of multi-media delivery to assure that both individual media products and their blends are of high media product quality. However, because they cannot be expected to be masters of all the media we employ, we have also put into place a small number of Senior Media Specialists to whom the MPMs can refer for advice and guidance. As they grow familiar with the range of media we employ, their judgments will become ever more acute. The research base and literature knowledge on which a part of these judgments have to be founded is the particular expertise of the members our Institute of Educational Technology (IET) who will work closely with the MPMs and the Senior Media Specialists. We shall be studying these methods of multi-media quality assurance over the next few years and refining them to enhance their effectiveness.

It is clear that the UKOU is singularly fortunate in being able to devote resources on the scale described above to support and enhance the quality of the learning materials and services that it delivers to students. Individual institutions may be in the position that the ratio of the number of creators of multi-media materials to the number of media specialists and multi-media educational developers will be much larger than it is for us. It may therefore be of value for institutions to follow our progress with these initiatives to determine the degree to which they could provide a solution (or part of a solution) to their multi-media quality assurance requirements. This may become even more important as the lure of the growth of broadband delivery leads to the provision of more multi-media educational materials (not least in order to remain competitive in an expanding global educational market) while the evaluation processes for such products lags behind.

I realise that the distinction that I am drawing between academic and media quality is not a hard and fast one; the subtleties of good graphic design or of filmic approach can and do enhance the pedagogic effectiveness of the product in ways that are often felt rather than conceptualised. Nevertheless, one sees enough poor media quality in the production of academic multi-media materials to make our two-faceted system of quality assurance a necessary and valued part of our quality assurance mechanisms.

The UKOU selects, and sometimes creates for itself, the media that it uses to deliver its learning materials and services to students. This has the consequence that the mix of media utilised can, and does, vary from course to course. It is clearly the case that the mix of media at the course team's disposal shapes the range of pedagogic possibilities that are available to them. Each medium has its strengths and weaknesses as a pedagogic vehicle and has different forms of media appeal. In the UKOU and especially with the available expertise of the MPMs, the particular mix selected has to be justified on pedagogic grounds and no particular mix is seen as the obvious or unconscious choice. However, the following question comes to mind in considering these questions of academic and media quality in relation to the arrival of preset combinations of media that are provided by any one of the commercially available Virtual Learning Environments (VLEs). Does this standardised provision of media direct academic users to pedagogically unsound practices (putting course notes on the web, examining by means of multiple choice questions) because the tools provided by the VLE make it so easy to do? How do we assess the pedagogic value of such products? This question is particularly pertinent given the experience of many universities in which

the utilisation of VLEs has been added on top of already full workloads of academic staff and the pedagogic guidance available has been minimal.

### **Technological Developments and Pedagogical Constraints: who's calling the tune?**

The questions that I have posed above in relation to the pedagogic effectiveness of presently available, and pre-packaged, educational technology is a particular case of a more general question as to whether the current developments in online education are being driven by pedagogic analysis or technical feasibility. My experience over 15 years of creating multi-media distance learning materials in the analogue era (print, broadcast television, video-cassette, audio cassette, multiple choice questions, occasional standalone computer simulations, problem-solving and essay format examinations) suggests that the range of pedagogic possibilities (or limitations) of a given medium cannot be predicted in advance but will emerge only through experimentation; this is even more true of combinations of media. Therefore it is only in experimenting with the tools of today that their strengths and weaknesses, and hence the quality of the learning materials and services that they provide, will be properly exposed. But some predictions of the pedagogic effectiveness and the inherent limitations of particular technological developments can be thought through in advance, and this is especially true of online technologies that are just becoming available, such as the construction of learning platforms embodying "learning objects". It is to the possible impact on quality of learning of these objects that I finally turn.

### **Learning Objects: the ultimate online learning technology**

Over the past 20 years and more, the high cost of producing high quality distance learning materials has become more and more evident. Even by the late seventies, the UKOU estimated that it took between 50 and 100 hours of production time to produce 1 hour of study material, and this was without the complications of "learning platforms" and online delivery. In a manner very similar to the objectives of "object-oriented computing", the search began for standards to which all learning materials production should conform in order that these materials could run on a range of platforms and also for a system of metadata that would allow any finite amount of learning material to be characterised sufficiently that such learning material segments, or learning objects, could be traded or sold for reuse. The metadata labels on each object would sufficiently characterise its input assumptions, content, and its expected learning outcomes to allow such objects to be assembled in an intellectually consistent sequence to create a new package of learning material, on the basis of the information provided in the metadata. The high cost of production of high quality learning objects could thus be spread over the many consumers of these tradable objects and duplication of effort avoided.

The problems encountered in the attempt to develop these standards and metadata systems have been enormous. [It is also true in the much more tightly constrained field of computer science that the production of "objects" that perform particular functions and can be linked together to build larger programmes has proved to be much more problematic than was originally predicted.] However, the response of the standards agencies (IMS, SCORM) has been to specify the design of learning objects in such a way as to avoid the interlinking problem, i.e., by stipulating that no learning object can refer to any other learning object, or even to any piece of information outside the object itself. A course built from such learning objects consists of a set of completely isolated sets of activities or information with no cross-referencing, much like a book written under the rule that nothing written on any one page can refer to anything written on any other page. There clearly are enormous pedagogic assumptions built into any learning platform that embodies such a structure. It would seem to be fair to say that in this instance the technological imperatives have driven the pedagogic stance of the product.

From the point of view of assuring the quality of learning materials and services, the philosophical stance and the practical intention behind the learning objects specification pose significant problems. Since part of the motivation is to be able to create small packages of learning materials that can easily be traded or shared in order to reduce the costs of acquisition by any individual course producer, there must be a mechanism to assure the quality of the learning object that does not require the purchaser of the object to examine it in detail to verify its input assumptions, its content and its expected learning outcomes. At present there does not seem to be a way of doing this since assuring the fitness for purpose is closely

related to the problem of specification of the input assumptions, the content and the learning outcomes (even before determining the effectiveness with which the object achieves these outcomes on the basis of the specified inputs) which the standards and metadata agencies have stumbled over in the last 5 years. Secondly, it is clear that for many disciplines (Science, much of Technology, Mathematics, Computer Science) in which sequential teaching is absolutely vital, a learning object-based platform seems to work against the pedagogy rather than supporting it, reducing the intrinsic “fitness for purpose” of the learning materials that it carries.

These are early days in the development of learning objects and platforms based upon them. Also the standards industry is not standing still and future developments may allow sequencing of learning objects through the use of metadata. At present the UKOU is presenting its first course based on learning objects, “Learning in the Connected Economy”, as part of its MSc in Online and Distance Learning. We shall be monitoring the progress of this course closely to enhance our comprehension of the interaction of technology and pedagogy in relation to the quality of the learning experience for students, the understanding of which is central to the development of high quality online learning in the future.

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# E-LEARNING AND THE QUALITY OF KNOWLEDGE IN A GLOBALISED WORLD

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## 1. Introduction

E-learning is here to stay. Futurists expect that all facets of education will change due to the impact of the internet and globalisation. It is likely, in the future teaching will take place in a truly interconnected global and virtual classroom. The production and exchange of knowledge will be affected by this globalisation process. The safeguarding of the quality of the knowledge production and distribution process is far too important to be left to ICT specialists.

In this paper the knowledge offered in the virtual classroom is considered, in particular in higher education. The homogenisation of knowledge in the internet-era is discussed in Paragraph II. To what extent are educational institutions free producers or users of knowledge? What are the ethical implications of commercial driven e-learning of higher education? To what extent are higher education institutions free producers or users of knowledge on the web and who defines the quality? In Paragraph III the impact of the internet on higher education is analysed. The article concludes with an outlook towards an ethical approach on globalisation (Paragraph IV).

## 2. Homogenisation of knowledge

*What is knowledge?* In this paper the concept of knowledge is discussed in its international and virtual context. The large amount of available information in various societies and on the internet provides building bricks for knowledge. Whether information is considered knowledge or not depends on the context where knowledge receives its significance. Knowledge can be legitimised from within the context of a certain organisation, e.g. research undertaken in a university. Research can create meaningful knowledge within and outside the context of the university. On the level of the individual person, knowledge is a composition of experience, information and skills. More often, knowledge is not explicitly perceptible and is rooted in the history and soul of a person. Implicit norms and values influence the personal perception of what valuable knowledge is about. On the one hand, knowledge is considered organised knowledge, e.g. in the setting of training and research. On the other hand, implicit or tacit knowledge supports the way knowledge is perceived.

*Knowledge traditions endangered.* What counts as knowledge in higher education? This question has been raised decades ago by Foucault (1979, pp.27-28). He critically stated that we should abandon the traditional image that knowledge exists only where the power relations are suspended. We have to become aware that there are more possible freedoms and knowledge traditions than we can imagine. Foucault is interested in how individuals in modern western society become utilised by the state to live, to study, to produce and to consume. In this power process, people in the western society are dictated by the state or another authority such as companies or commerce. In such a society economic laws reinforce what counts as knowledge and what doesn't. The great challenge of current educators is to capture and further explore the heritage of knowledge traditions. This ongoing and challenging investigation has been described by Confucius (551-479 BC) in the following way "To know that we know what we know, and that we do not know what we do not know, that is real knowledge".

*Metaphor of the entertainment industry.* Will the increased globalisation lead to a homogenisation of available knowledge? The metaphor of the western entertainment-industry is illustrative here. For commercial reasons the music industry pre-selects the music people can buy in shops. The sales prospect is the leading principle in the selection process. Global distribution firms such as Virgin or HMV only adopt products that are commercially of interest in their world-wide shop-assortment. These distributors are highly dependent on producers such as EMI, Philips and Sony. The small music producer has to

compete with the big producers and retail industry. Often, the small producer is excluded because his music is not of commercial interest. The end-customer does not know what one is missing because he never hears the music and he will never find it on the shelves in the music store. Similar pre-selection processes can be found in other entertainment branches e.g. in the theatre and film world. Artisans who try to sell their products locally are ignored by global economic trends. Barlow (2000,a) shows the cultural effects of China's inclusion in the WTO. China is bracing for the invasion of the American Motion Picture industry. Already the 10 American films allowed in every year totally dominate the market. Zhang Hui Jun of the prestigious Beijing Film Academy fears that the 'unprecedented' USA invasion will induce Chinese producers to slavishly follow Hollywood's formulas at the expense of innovative Chinese productions.

*Is knowledge for sale?* It is likely, that a similar market principle as described above (entertainment industry) will also influence the selection of knowledge on the internet. Valuable knowledge might become very expensive. Especially nowadays knowledge is distributed through the internet and the new distributors define 'what is on the shelves'. Only an entrance-code, a credit card number, or an expensive private training might give access to meaningful knowledge. If the sales prospect becomes the leading principle for knowledge-selection, the same might happen in higher education. In the context of globalisation, higher education may no longer be considered a social activity. The ideal of 'Bildung' is replaced by the ideal of an efficient preparation for jobs. Higher education becomes a commodity and part of economic life. More and more companies will consider higher education as an investment in people to perform better and to improve the economic productivity in a particular region.

*Commodification of education.* In the coming years, the spectrum of education on the web might change fundamentally, due to the international trade agreements formulated by supranational organisations. The objective of the World Trade Organization (WTO) is to make an agreement concerning the trade in public services, the so called General Agreement on Trade and Services (GATS). GATS considers public services such as health care and education economic commodities. If the GATS agreement will be signed, a considerable part of the global society will become of business interest to companies. In western countries about 70% of the economy consists of various services. What will happen with (higher) education? Within the framework of GATS, educational curricula, content and ideas will be considered economic commodities. Currently, GATS negotiations are going on on liberalisation of education and health care. The United States, New-Zealand and Australia already proposed a further liberalisation of education. As a result of these developments, more and more schools and universities will be privatised and study costs will increase. The available content more often will be a selection of commercial "knowledge brokers". It is unclear and difficult to foresee where the interest of the companies will start and the right on academic freedom will stop. Except for the United States where the corporate-school relationship has a history of many decades, in other countries knowledge was considered as a public domain, and not an economic unit with a price-label. Schools expressed democratic values rather than corporate values. Education was considered as a social, cultural and ethical process (see the earlier mentioned Bildung-ideal). Only the general costs were calculated. These values will now be replaced by an educational commodity system where students are considered 'human capital'. In the commercial commodified courses students learn to choose. It is not a choice for values important in a society and to the fulfilment of a human being. More and more, it will be a choice for an efficient product to acquire an effective career.

### **3. The internet era**

*In search of knowledge on the web.* In the current society there is a lot of information available. Information instead of knowledge has become the great mass product of the current economy. This process affects higher education as well. Students have access to various unstructured information sources on the internet. However, to distinguish relevant knowledge from unsorted information is becoming increasingly valuable. Exclusive knowledge is becoming more and more scarce, and likely to be expensive in the future. Illustrative is the current trend in university libraries to replace the printed editions of journals by electronic editions. The library shelves are almost empty. The librarian of the Vrije Universiteit of Amsterdam even took one step further. A questionnaire form is added to the few printed journals that are left on the shelves. The users are kindly requested to jot the dot when using this journal

for reference, copying or reading. In the end, also these last printed journals might disappear from the shelves.

*ICT monopoly.* The developers and providers of knowledge have increased control over the various ICT applications in higher education, in particular through e-learning. In the near future these developers and providers may obtain a powerful monopoly over knowledge distribution and knowledge production. Some universities signed contracts with internet-companies to develop a free university website. In return, the companies get the opportunity to advertise on the university website and produce direct mailing for marketing purposes to students and staff.

*Only the latest update counts.* According to Bard and Soderqvist (2002, p.78-91) the technology itself has become the focus of attention in education. The actual content of the information is paid relatively little attention and is often reduced to “infotainment”. The information must be sifted, organised and interpreted by the reader against the background of a coherent world view. Only then it could become a source of knowledge and not a source of confusion. The absence of any meaningful context of the current information flows is illustrated by the concept of The Very Latest: “Instead of The Truth, we have to do with The Latest. The masses, poor in knowledge yet over-informed, at the bottom of all low-status networks, are completely at the mercy of The Latest in its vulgar and trivialised form. The frequent showers of contradictory information have one single coherent message: don't trust your experiences and perceptions – listen to The Latest instead. But The Latest is quickly succeeded by The Very Latest, and it is practically impossible to imagine any information, any combination of new facts that could affect the status quo to any noticeable degree: partly for practical reasons, because facts are so fickle and their rate of replacement so high, partly purely theoretically, because there is an absence of any context that is valid for the whole of the social collective, from which the implications of these facts could be determined.

*The multi-media irony.* There is an irony in the large amount of available information. The increased quantity does not mean that there is thus an increased quality of information and knowledge. People are used to perceive information from different channels such as TV, mobile phones, internet, CD roms, printed media and libraries. The impact of modern multi-media such as internet is expected to be similar to the impact of TV on people. Many people may think “it is true, because I saw it on TV”, or “it is true, because I found it on the internet”. According to Kubey and Csikszentmihalyi (1990) “The answer to why we see what we see on television lies in a combination of how audiences have come to conceive of the medium, what audiences want to watch (or have grown accustomed to watching), and what the people who control and sponsor television believe needs to be created and broadcast in order to maximise profit.” (in: Taylor, 1999). This last element of control and sponsoring is crucial in the debate about knowledge and globalisation. This phenomenon can be illustrated by the cable industry. The privatisation of the cable infrastructure created a monopoly position for cable companies. Thus, for example UPC is a monopolist on the cable, offers very bad services, and simply neglects the frequent complaints of customers. Cable companies pre-select the programmes and channels available and the price to be paid to watch these channels. Citizens have very little say in the selection of programmes and channels. The selection is driven by economic profitability with parameters such as frequent commercials, and a certain proportion of violence, sex and main stream music. Paradoxically, it was the citizens who paid for the construction of the cable networks in their region. A few large companies control the content of TV channels, driven by the interests of the shareholders. These companies do not feel any responsibility for the cultural heritage, civilisation or protection of norms and values in society. Green (2002) shows how big corporate money is a threat for democracy in the USA and elsewhere. Broadcasting companies control the media and subsequently influence the elections. The US government gives broadcasters free licences to operate on the public airwaves on the condition that they serve the public interest. During the campaign season before the political elections, broadcasters sell access to these airwaves to candidates at inflated prices. Or like Minow Newton, former Federal Communications Commission chairman said “We’ve got a real irony here... We have politicians selling access to something we all own - our government. And then we have broadcasters selling access to something we all own - our airwaves. It’s a terrible system.”

*Textbooks and academic de-skilling.* Over the last decades, textbook publishers such as Prentice-Hall and Reed Elsevier have been successful in the higher education market. However, in the internet age the intensity and impact on the educational process of these publishers increased rapidly. Global publishers have a serious market share in knowledge intensive courses and offer universities exclusive contracts to use the publishers textbooks, journals or databases. By contract, the range of available knowledge is

limited to a menu provided by the publisher. If the institution does not fully subscribe to the courseware, a fee may be assessed for its use. Pietrykowski (2001) considers the control over textbook choice as a determinant of academic de-skilling. He shows how the interests of cost-conscious administrators and publishers may intersect. At the same time there is a source of conflict between the earlier mentioned boardroom versus the classroom, the university administrators versus the faculty members. Faculty members may complain because the publisher menu may lock in their educational choices and thus the freedom of knowledge gathering. If a critical mass of faculty members adopt a certain menu provided by the publisher, this may lock higher education institutions into resource commitments, e.g. decisions on ICT support and computer expenditures.

*Electronic encyclopedia.* Most users trust search engines as independent from the sites included in their indexes. However, silently and more explicit, search machines may become a medium for advertisers to target consumers. Through the use of intelligent agents, advertisers can easily target consumers through their search criteria. Users looking for a new car might enter the requested data in a popular search engine. Subsequently, the user might see a banner advertisement for a specific car brand above their research results. These are relatively obvious ways of reaching the customer (Henshaw, 2001). Usually, the ads might be more hidden messages or wrapped e-mails. Thus, some search engines have become increasingly entrepreneurial, rather than being neutral electronic encyclopedias. Commercial search engines may offer additional services to companies. First, search engines offer paid placement, by selling increased brand visibility in the directories of the search machine. Second, 'paid inclusion' does interfere with search hits, as results from commercial sites are interspersed with true editorial results. There is an ethical dilemma. Higher education users may not realise that the results they are viewing are a commercial selection of data. Users of search engines need to develop an awareness that the internet holds quality information that is becoming increasingly difficult to uncover.

#### **4. Towards an ethical debate**

The economic interest in higher education enhances an ethical debate. How far can universities go with commercialisation? Is the lack of money the major cause of this development? Weiler (2001, p.36) mentions causes such as the increased costs of knowledge production and, hence, the dependence of knowledge producers (e.g. universities) on external financial sponsorship. Furthermore, the current global economy has become increasingly dependent on complex and up-to-date knowledge. Thus, for example, in pharmacy the influence of international industry is manifest and some scientists express scepticism concerning the objective outcomes of pharmaceutical research. Berkeley University made a contractual agreement with the bio-pharmacy company Novartis for \$ 50 million. Novartis takes part in university committees and, in the case of discoveries, has the first negotiations rights for patents. Economic and financial problems may enforce universities to go into business. Many American universities depend on donations of alumni and companies. These donations are often linked to certain business interests and threaten the freedom of knowledge exchange. The freedom of speech and independent knowledge gathering is threatened by this development. For example, the Nike company, headquartered in Oregon, promised 60 million dollars to the University of Oregon. However, one of the departments of the university expressed some criticism on how Nike produces sport shoes in developing countries, namely with the help of child labour. The ethical disapproval expressed by this department resulted in a withdrawal of the proposed financial contribution.

Paradoxically, globalisation and ICT offer a lot of opportunities to higher education institutions and at the same time creates new limitations to the freedom of knowledge. The information exchange and access to information has never been easier. On the other hand, the core knowledge permitting information exchange seems to be kept in the hands of major private enterprises. Modern technology could give a tremendous boost to a further qualitative growth of higher education through e-learning. To safeguard cultural and academic traditions, an ethical approach towards globalisation is needed. Or like Guy Verhofstadt (Business World, 2001) stated: "the challenge that we are facing today is not how to thwart globalisation but instead how to give it an ethical dimension. I would call this ethical globalisation, a triangle consisting free trade, knowledge and democracy; alternatively, trade, aid and conflict prevention."

Even from the above far from comprehensive analysis of e-learning and the quality of knowledge in a globalised world, it might become clear that higher education faces some fundamental challenges for the



future. Education lies at the heart of any community and, from an ethical point of view, should not be driven by purely economic rules. However, this paper is not a plea for anti-technology. The current trend towards globalisation is not evil. This paper is a plea for critical thinking. It is about the value added of the human teaching that should not be undermined. Real faculty members are critical to the success of students. Real teachers can teach students to think. Students should be able to be constructors of knowledge instead of consumers of knowledge. In this respect, knowledge is not a product, but a process of real teaching and learning. This paper is not about a conspiracy between international companies and higher education administrators. It is about the international marketing of learning. If higher education and e-learning would be empowered predominantly by the educational industry, teaching may end up as the poor end product of power-pointed knowledge.

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# QUALITY IDEOLOGIES – CONSENSUS OR CONFLICT IN THE GLOBAL CLASSROOM?

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## **Preamble**

The education systems are undergoing large changes. Institutions who have been working for centuries in more or less the same manners are in few years time organising their functioning and performance differently. Courses and programmes are shaped in new ways and with new content. Concepts like openness and flexibility characterise both the changes on system level and the situation for teachers and learners. In the old systems criteria for quality were more or less inherited from generation to generation and an amount of consensus was reached between the actors. To a certain extent quality issues in the old systems and in the new ones are the same and some criteria still valid. Large changes have to be expected though. Today when education systems more and more are used as instruments for realising political ambitions and with the new possibilities technologies are giving to perform education, the concept of quality has to be widened.

The education systems at all levels in Sweden are highly decentralised. The different institutions work within a wide framework of regulations and they decide e.g. about buildings, teacher salaries, syllabus and to a large extent also on curriculum themselves. The introduction of changes in the systems is very much up to local decisions. The government thus has to inflict on the systems in more subtle ways. One way of doing that is to work via change agents. Recent years the government has set up agencies with that role. The roles of the agencies are to stimulate, promote and support change in directions decided by the political system. In a spending authorisation<sup>1</sup> the authorities and agencies under the different ministries of the Swedish government are guided in these directions.

In such highly decentralised systems issues around quality must be in focus. To act in that direction Swedish Agency for Distance Education (Distum), followed by Swedish Agency for Flexible Learning (CFL)<sup>2</sup>, invited international experts and researchers to elaborate on the theme quality and flexible learning. Eight contributions were collected and presented in a book<sup>3</sup> to be input during seminars and discussions between the agency and different institutions.

This paper will briefly present those contributions and in a following chapter reflect upon the outcome of this exercise. During the presentation at the EDEN conference we will allow more of meta-reflection than has been possible within the framework of this document.

## **Eight authors on the concept of quality**

The task we gave to the invited experts were to advance the discussion of quality especially as it relates to technology-assisted learning. The group was international in nature, coming from Australia, Denmark, Norway, United Kingdom and Israel. Their contributions cover quality issues from historical, national and international perspectives, from a macro-perspective to a micro-perspective around the concrete dialogue between students and teachers. Others cover institutional perspectives, quality with regard to course production and course content, methods of measuring quality or are elaborating on the concept of quality itself.

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<sup>1</sup> Official instrument/government document placing appropriations at the disposal of the spending authority.

<sup>2</sup> Distum was set up 1999 and acted until 2002. From 2002 and onwards it is replaced by CFL and the Swedish netuniversity.

<sup>3</sup> The book (ISBN 91-973907-5-5) is presently out of print but will most probably be reprinted in an updated version. In its earlier version it can be downloaded from <http://www.netuniversity.se/Default.asp?c=109>

### *National perspectives*

Erling Ljoså and Torstein Rekkedal<sup>4</sup> have been imparting knowledge about the preconditions and conditions of distance learning through articles and lectures for a number of years. Ljoså in his contribution brought up the 100-year battle of distance learning to be recognised and socially acceptable as a form of education. Therefore quality development in this sector is highly advanced, simply because its quality so often been questioned. Ljoså describes methods that have been used to evaluate quality of education over the years in Norway. He also problematises the concepts of quality and quality assurance and states that an overly mechanistic application of quality control measures actually can hinder genuine quality development as it can reduce motivation and the potential for innovation and change.

Rekkedal describes the background to the development of the “Quality Standards” adopted by NADE<sup>5</sup>. He also lists some of the reasons why there has been a particular emphasis on quality-related issues in distance education. In doing so he stresses the links between development, evaluation and research and discusses the various objectives and methodologies of quality evaluation.

The Goodisons<sup>6</sup> describe the attitude to date of the British universities to ICT in higher education, and the national policy that has been implemented in order to promote technology-assisted education. They provide a critical picture of shifting national policies and institutional resistance. The authors also describe the venture supported by all 77 universities – UK e-university. Alliances with private players are one of the important ingredients in the e-university venture, in particular with Sun Microsystems, who are generating a common platform for all universities. The universities are also conducting a common international marketing campaign with the aim of making the UK as a world wide knowledge exporter. This new thinking and the aggressive ventures apply not only to the higher education sphere, but to educational measures targeting educationally disadvantaged groups through the project known as Learn Direct, which has developed out of the University for Industry project.

### *Institutional perspectives*

Mike Keppell<sup>7</sup> writes about the process of bringing about a fundamental change in a “traditional medical university”. The ambition was to make it a place of learning with far-reaching use of IT and flexible education formats. He describes not only the carefully thought out technology and management solutions formulated and tried out in practice, but the way in which the huge mental adjustment occurred – the absolutely vital cultural change on the part of the teaching staff, involving a changed attitude towards learning and teaching. The radical and successful process of change at the medical faculty at the University of Melbourne has placed it very much on the international front line in this sphere.

Bjørn Stensaker and Synnøve Skjersli<sup>8</sup> state that the question is not whether ICT should be used in education, but rather, how quickly the technology can be successfully implemented. Introducing ICT into education involves far more than simply providing a tool – organisational changes, new duties, management and support are all aspects that need to be highlighted to a far greater extent than is the case at present. Identity and previous history of a university is special and affect both how introduction of ICT is implemented and how successful it is. The question of whether to change or adapt to the traditional formats is a key issue. They discuss the introduction of ICT at two major universities, the University of Lund in Sweden and the University of Aalborg in Denmark. The implementation is viewed as a learning

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<sup>4</sup> Erling Ljoså was when he contributed to the book Head of Education and Product Development at NKS Fjernundervisning (NKS Distance Education), and Torstein Rekkedal, is Head of Research at Norsk Kunnskaps-Institutt, NKI (the Norwegian Institute of Learning). They represent two major Norwegian distance learning organisations. Both organisations specialise in distance learning and have eagerly adopted new technologies.

<sup>5</sup> NADE stands for the Norwegian Association for Distance Education.

<sup>6</sup> Terry Goodison, Senior Research Fellow at the National ICT Research Centre at the University of Wolverhampton, and Ruth Goodison, consultant and evaluator of higher education – when she contributed to the book employed on a UN project focusing on quality-related issues at Arabic universities.

<sup>7</sup> Mike Keppell, Head of the Biomedical Multimedia Unit, Faculty of Medicine, Dentistry and Health Sciences, at the University of Melbourne, Australia.

<sup>8</sup> Bjørn Stensaker and Synnøve Skjersli are researchers at Norsk institutt for studier av forskning og utdanning, NIFU, (Norwegian Institute for Studies in Research & Higher Education)

process for those involved. ICT policies from the central administration of universities are redefined during the implementing processes. Persons active in the processes change the policy content to be in line with their own values and interests.

### ***Course development, teaching and learning process***

Steve Ryan<sup>9</sup> writes about course development from three perspectives: the virtual environment, sharing and reusing material, and the planning and development process in the form of interdisciplinary course teams. The establishment of a carefully thought out and well-supported pedagogic strategy before choosing a suitable platform in order to enable both the reuse of material and the functioning of the teams has to be thought of constantly.

Elsebeth Korsgaard Sorensen<sup>10</sup> raises the question of quality in net-based asynchronous dialogue between teacher and student. She discusses problems associated with generating active and genuine motivation in the virtual discussion environments. Students are keen to steer and control their learning as far as possible and to adapt it to their lifestyle – work requirements, family obligations, social lives, etc. Korsgaard Sorensen states that a new pedagogic design that is especially developed for the virtual environment is required, rather than more or less directly transfer the traditional methods used in face-to-face situations.

Aharon Aviram and Orit Comay<sup>11</sup> write about evaluation of e-learning programmes. They claim that ICT systems in general and education in particular affect our lives in a profound and revolutionary way – the way we socialise, work, consume etc. The determinations made of quality are usually restricted to parts of the ICT systems. It can be software, interface, course objectives or teacher-student activities. Quality of an e-learning program should also be assessed with regards to long-term effects like personal development that go beyond the scope of a course/education programme. Of particular importance in this context is the development of autonomy, a concept that incorporates increased self-awareness, increased personal initiative/ability to act, self-determination and control, and increased self-confidence. In far too many e-learning programmes, the activity of a student has been reduced to follow linearly a pre-determined sequence of tasks. Instead the student's freedom of choice and independence should be promoted to a more central position and that should be assessed as quality. The authors also stress that education is a powerful agent for forming individuals, not simply in terms of *what* is taught, but in terms of *how* it is taught. Flexible education is currently fumbling around, trying out different formats – and the way in which this affects and changes students is an interesting and new research field.

### **Competing values and multiple goals for politicians, teachers and learners**

Information and Communication Technology (ICT) is predicted to have a substantial impact when applied to the education sphere. Core themes in the prediction are to reach more students, to recruit untraditional student groups, to adapt studies in line with individual requirements and to cut costs etc. Maintaining or rising educational quality with the aid of ICT would, however, seem to be one of the key objectives of the majority of European education ministries, according to their policy document<sup>12</sup>.

Quality and quality development are critical in all operational spheres. But what does the concept mean? How do we measure it? In whose interests/to what ends? How will the results be administered and disseminated? These are all questions that have no simple answers. The concept of quality entails values and norms – what is and what is not desirable and good. In his book, *Improving Higher Education – Total Quality Care*, Ronald Barnett formulates that as follows: “*The identification, the assessment and the improvement of quality cannot be conducted purely as a technical exercise. Matters of judgement, of taste and rightness inescapably come into play.*” It is important that an ongoing dialogue is conducted about

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<sup>9</sup> Steve Ryan is the Director of the Centre for Learning Technology at the London School of Economics and Political Science.

<sup>10</sup> Elsebeth Korsgaard Sorensen, Associate Professor at the Dept. of Communication, Aalborg University, Denmark.

<sup>11</sup> Aharon (Roni) Aviram, The Center of Futurism in Education, Ben Gurion University, and Orit Comay of ETE (Empowerment Through Electronics Ltd.) in Israel.

<sup>12</sup> ICT@Europe.edu: Information and Communication Technology in European Education Systems. 2001, 186 pp. (EURYDICE Survey 4). ISBN 2-87116-324-3

the desired results with regards to design, implementation and results of network-based education. Quality-related aspects where an international consensus can be reached do exist, but because quality of education embodies values, there is also a very wide range of different perceptions from one country, culture, group and individual to another.

Network-based education recognises no national boundaries, and therefore established control systems are not directly applicable. The new technology can be used to facilitate fraud and forgery in tests and examinations, to create fraudulent online universities, etc. at a rate, with a degree of sophistication, and on a scale never seen before<sup>13</sup>. There is thus every reason to pay particular attention to quality-related issues in the context of network-based education in order to separate the wheat from the chaff and to continue improving the operation into something about which all those involved – students, teachers, administrators and employers – can be both proud and pleased.

## **The EDEN Seminar**

During the presentation at the EDEN conference we will present a meta-analysis of the eight articles shortly presented above. The presentation will also bring in a number of other studies and observations showing that goals and therefore perceptions of quality and quality achievement cannot be taken for granted or seen as an objective entity. The different goals and ambitions with new technology in education hold by various stakeholders will be discussed. The changes and improvements are difficult to achieve if these differences are not acknowledged, identified, discussed and negotiated.

There are different political interpretations about the benefits and use of the new media in education. Political ideologies liberal, communitarian etc influence national policy and accordingly emphasise different overall values, e.g. promoting excellence or improving equality. We will try to illustrate how different national policies on information and communication technology in education have these effects.

What quality in technology mediated learning is can be discussed at the above mentioned macro level – national policy/political level –, but also at meso levels – academic institutional leadership – and micro levels – teachers and students and others involved in the teaching and learning processes. The perceptions of what quality values to promote are in some cases significantly in conflict when discussing quality at the macro, meso and micro levels. These value differences are not only dependent on at what level and in what position in an organisation the individuals are, but also on different perspectives of what knowledge is, on the profession of individuals and their own educational history. So if you are a student, teacher, politician, technician or belonging to the administrative staff you see education systems from different viewpoints and look at it from different social positions and with varied power to influence it. Of course there are also other factors that contribute to a multidimensional quality concept such as, cultural differences, gender differences, age group differences and “maturity”. We are looking forward to an interesting discussion around these themes.

## **Titles of the eight contributions**

1. Erling Ljoså: *Credibility, Legitimation and Quality Assurance in Open and Distance Learning. An Outline of Different Approaches Seen from a “Back Door” Perspective.*
2. Torstein Rekkedal: *Quality Assurance in Norwegian Distance Education – the Background of NADE’s Quality Standards with Reference to some European Initiatives.*
3. Terry & Ruth Goodison: *Institutional Autonomy and Central Control: Quality Assurance and the Deployment of Communications and Information Technology in UK Universities.*

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<sup>13</sup> Distum (Swedish Agency for Distance Education) drew attention to and warned of “Fake online universities” in February 2001. Harold Noah and Max Eckstein, in their book., *Fraud and Education – the Worm in the Apple* (2001), write about educational dishonesty and the scale thereof throughout the education system.

4. Mike Keppell: *Creating Quality Multimedia and Online Learning: Blending Management, Design, Development, Evaluation and Training.*
5. Steve Ryan: *Developing Using Managed Learning Environments: Three Quality Issues.*
6. Bjørn Stensaker & Synnøve Skjersli: *Organising ICT Initiatives in Higher Education: - A Reflection on the Critical Factors.*
7. Elsebeth Korsgaard Sorensen: *Designing for Collaborative Knowledge Building in Online Communities of Practice.*
8. Aharon Aviram & Orit Comay: *AOE Oriented Evaluation of e-Learning Programs: An Attempt at Bridging Two Cultures.*

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# QUALITY AND QUALITY CULTURE IN ODL DEFINING, ASSURING AND MAINTAINING QUALITY IN WEB BASED MASTER PROGRAMS IN CONTINUING EDUCATION

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## **Web based ODL – a challenge to universities**

European societies today need universities even more than before. New ways of producing depend on access to competencies at the highest level developed through educational programs offered by universities and to new knowledge created through research and development activities in universities. Therefore in many European countries today we see strong efforts to build up close links between universities and business and industry to improve the transparency and accessibility of what is going on in universities to the outside world and to make universities better understand what are the actual needs in society which they have to relate to in both education and research.

Information and communication technologies (ICT) form an integrated part of these efforts. Internet and intranets are being used extensively as means for sharing information, for communication and collaboration between university and different players in society. Educational activities in universities are, however, much more reluctant to taking up the challenge of ICT. This may to a high degree be understood by looking at the status of teaching in universities compared to doing research. Since what counts in the professional life of a university professor is primarily his research activities and results he is not motivated by university culture to invest a lot of time and energy in doing new time-consuming things to improve teaching like for instance implementing ICT.

Also ODL is something new and extra in the life of most university professors, since on campus teaching is the traditional mode of delivery which university professors are used to both from their own study time in university and from their professional career so far. However, continuing education delivered as ODL is one of the biggest challenges for all European universities today. The future of Europe simply depends on staff in business and industry being able to update their own knowledge on a continuous basis while working. To traditional universities this means that they have to change into dual mode institutions giving both on and off campus educational programs – and it also means that they have to start using ICT as a delivery tool in both modes to cope with the new situation as such but also to support the development of relevant and compulsory competencies in modern working life such as being trained to share information, to communicate and collaborate virtually with others in diversified and complex production processes and being trained to use ICT for lifelong learning driven by the needs of the individual citizen and employee.

So web based ODL in continuing education has become a major issue in many universities today. Introducing and running this new mode of delivery calls for many changes and initiatives from both university management and university staff to overcome the traditional low status of university teaching as such and to implement new ways of teaching and new tools. Key issues in order to succeed implementing web based ODL in universities will be to agree on what characterizes good web based ODL and how quality may be implemented, assured and maintained. These are the questions analysed and discussed in the following article.

## **Defining quality in university ODL**

From experience and theory we know that university ODL is faced with many challenges – simply because it is something new and different from traditional on campus educational programs for young students. Looking at these challenges more systematically in the field of continuing education two main groups of challenges appear, one consisting of challenges caused by dealing with a new target group, the other consisting of challenges caused by dealing with a new mode of delivery. In the following these two groups of challenges will be analysed in order to understand better what is the context of ODL in



continuing education in universities and in order to – on the basis of this – define quality parameters for this delivery mode. After this analysis based on theory in the field we will turn to an empirical survey on quality and quality culture in ODL carried through as part of an EU project within the European University Association (EUA). So based on theory, experience and statements from university people involved in ODL we hope to reach a multi-faceted picture of what defines quality in university ODL in the field of continuing education.

### ***Challenges caused by new target groups***

Fundamental to ODL in continuing education in universities is that we are here dealing with a target group that differs from the traditional one in universities to such a degree that universities need to approach this new target group in a fundamentally different way that they are used to. When young students study in universities the main objective is that they become assimilated with the academic culture given in universities. For adults this is not an appropriate approach. Adults have full lives of their own with job, family, experience, prior education etc. Universities therefore need to approach adults in a way that recognizes this world as equal to the academic world in universities. So in the case of ODL in continuing education we are talking about integration of two worlds. That makes it important to universities to get a profound knowledge of the world of the adult target group and to invent methods which succeed in integrating the two worlds.

Three parameters are crucial when trying to characterize the world of adults coming to ODL in modern European universities: their job situation, their personal approach and their lack of time.

The working life of adults is very important for their identity and for their choice of study program in ODL. Job related needs and ambitions form both the reason for starting at all, but also serve as motivators to carry on with the study program and as background for formulating personal objectives within the study program. Therefore ODL in continuing education needs to relate both explicitly and methodologically to the jobs of the adults in question.

In continuing education today in universities we are often dealing with leaders, managers etc., i.e. people who are used to acting on their own and to solving problems through more action oriented approaches than analytically oriented approaches. This makes out a challenge for universities and calls for new ways of delivery.

Finally lack of time is a major challenge for universities when dealing with adult learners in continuing education. Modern working life is so time consuming that it leaves little time for other activities. Still adults also have to develop their competences in a lifelong learning process. So both universities and the adults themselves are left with a serious problem which must be worked on by both parties.

On the basis of the characteristic above of the world of adult learners in universities we may deduce four important quality parameters for ODL in continuing education at university level. High quality ODL in universities should be able to:

- focus on and satisfy the needs and objectives of individual learners
- integrate theory and working life
- develop a delivery mode which makes use of the prevailing mode of working within this target group (independent action oriented approaches aiming at concrete problem solving) through for instance experimental approaches, action research inspired approaches, product oriented approaches, but at the same time extends, challenges, combines such approaches through simultaneous application also of more collaborative, analytical and reflective ways of working
- handle time consciously and professionally (focusing on efficient use of time by the target group through time management, just-in-time learning etc.)

### ***Challenges caused by new modes of delivery***

Web based ODL which is the prevailing new mode of delivery in ODL in the field of continuing education means many challenges to universities because it is so different from traditional on campus university teaching mainly based on transmissive face-to-face sessions.

The fundamental difference is grounded in the fact that the synchronous face-to-face mode has been left here in favour of a delivery mode characterized in most cases by both distance and an asynchronous way of communicating. Both characteristics cause communication and interaction between students and teacher and among students to happen on conditions quite different from what most university professors and students are used to. Neither can the traditional ways of creating structure and flow in teaching activities be applied in this new context. In traditional face-to-face teaching structuring and flow often happens on the basis of unspoken, culturally inherent and rather loose mechanisms. This does not work in web based ODL. Here a high degree of explicit structuring is needed, and norms, values etc. have to be stated explicitly like in any new culture which is what we are talking about here.

From this we can deduce at least three important quality parameters for ODL in continuing education at university level. High quality ODL in universities should:

- be conscious that web based ODL is a totally new teaching and learning culture where new norms of behaviour, values, expectations etc. have to be defined, stated explicitly and supported by tools, so that the adult learner senses that he is in a professional virtual learning environment
- support students – and teachers – through application of methods and use of tools in communicating and interacting successfully in this virtual environment
- create structure and flow

### ***Quality in ODL – an empirical approach***

In order to secure a multi-faceted picture of quality in ODL we cannot rely on theory as our only frame of reference but must also turn to concrete experiences from actual ODL programs. Therefore we now turn to a survey on quality and quality culture in ODL which has been made recently at Aalborg University Denmark. Here 13 interviews have been made with leaders of ODL programs, mainly web based master programs in continuing education, on how they define quality in ODL in continuing education and what they consider important when trying to define quality cultures related to teaching and learning in universities especially in the field of ODL.

The survey has been made as part of an EU project financed by the EU Socrates program. The project will be finished in the middle of 2003. 50 universities are taking part in the project managed by EUA (the European University Association). The project is divided into 6 networks all dealing with quality and quality culture in universities. Aalborg University is taking part in the network on quality in teaching and learning. Within this network 9 universities from EU countries, incoming EU countries and a few more distant countries are working on their own quality culture related to teaching and learning. Aalborg University has decided to concentrate on quality and quality culture in ODL in continuing education within the project. As part of these efforts a survey has been made based on interviews with 13 leaders of ODL programs. Themes of the survey were quality and quality culture in ODL.

All respondents agree that quality in any university teaching and learning is primarily based on two parameters:

- quality of contents
- quality of delivery, including quality of the physical surroundings and the infrastructure

The interpretation of these general quality parameters differ, however, in different kinds of educational programs in universities – for instance in on campus education for young students compared to web based ODL for adults in continuing education. In the following the respondents of the survey explain how they interpret the general quality parameters in ODL based on many years of experience in the field of ODL on both management and teaching level.

### ***Quality of contents in ODL in continuing education***

Quality of contents in university education is based on contents being at a very high level and being relevant to the target group. Both ‘high level of contents’ and ‘relevance of contents’ takes on a new meaning in ODL according to the respondents, and quality of ODL is very dependent on the actual ODL programs being able to respond to this.

In ODL in continuing education the areas of study normally also form an integrated part of the daily working life of the students. This gives the students in ODL in continuing education a much better background for judging the level of the contents in the program and for formulating expectations to the contents of the program than is the case with young students. So it is not enough in ODL to equal contents at high level with contents based on research as such, which is what normally happens in universities when quality of contents is defined. Both ODL students in a Norwegian survey (Støkken et al. 2002) and the respondents in our survey claim that it is crucial for the quality of contents in ODL that contents represent the newest findings in the field and very deep knowledge of the field, since the target group in general has profound preknowledge of the field and already a lot of experience in the field from their working life.

The demand for relevance of contents as a quality parameter in university teaching and learning is also sharpened in ODL in continuing education according to our respondents. In ODL relevance of contents does not mean living up to general standards of relevance as is the case normally in universities but it means being able to respond to actual concrete and individual needs from adult learners. High quality ODL therefore should be able to integrate theory and practice profoundly, having both theory and practice influence and inspire each other, which is something fundamentally different from application of theory which is often talked about in traditional educational programs for young students in universities. In high quality ODL in continuing education academic and work related competencies should be developed together and as integrated parts of a whole according to our respondents.

To sum up one might say that quality of contents in ODL in continuing education to a much higher degree than in traditional university education is based on, as it is said in one of the interviews, ‘what is experienced as quality by the target group’.

#### *Quality of delivery in ODL in continuing education*

According to our survey quality of delivery in ODL in continuing education is dependent primarily on the pedagogy/didactics applied and on a good infrastructure different from the one in on campus programs.

As the relative investment of adults (in time, energy, money etc.) in educational activities is bigger than by young students and as adults are not used to ODL in its nowadays prevailing virtual modes as delivery modes for education demands on pedagogy and didactics are sharpened in ODL according to our respondents. A higher professionalism is needed and much more planning a must. By professionalism our respondents understand that the pedagogical concept of the program is well thought through and that the teachers/professors – as individuals and as a team – are able to implement it successfully, which again means that they need to possess competencies for reflecting on pedagogy/didactics on a continuous basis and need to be willing to collaborate with other teachers to a much higher degree than in traditional university culture characterized very much by individual professors working on their own. As for planning our respondents emphasize that an important quality parameter for ODL in continuing education is that it is well planned and that the organization of the delivery is capable of handling contradictory demands for structure and flexibility at the same time – both needed by the target group to navigate and survive in a chaotic world with many simultaneous demands.

Quality of delivery in ODL is also very dependent on a good infrastructure. Especially the creation of a virtual infrastructure and virtual services become important to modern ODL. In this field much work needs to be done in universities.

#### *Defining quality based on theory and empirical studies – a summary*

To sum up one could say that the quality parameters for ODL in universities which we have outlined above on the basis of theory and empirical studies compel us to understand ODL as a totally new learning culture, which universities must be able to define, implement and provide in order to succeed in delivering high class ODL in continuing education. This new learning culture should, as we have seen, be able to combine and integrate personal and traditional academic approaches, individual and collaborative approaches, independent and interactive/communicative approaches – in new ways which universities are not used to from traditional on campus education for young students.

The new culture is very dependent on delivery of the programs – including a virtual infrastructure – having become highly professional. This means for instance that the chosen delivery mode should be able to provide both structure and flexibility, both individually tailored competence development and collaboration, both just-in-time competence development and coherent educational programs.

Like in all educational programs in universities ODL is also dependent on contents being of the highest quality. Continuing education of good quality therefore demands a teaching staff consisting (mainly) of very good researchers in the field, who also take an interest in working with this new target group and delivery mode and who possess the competencies to do so.

We must therefore conclude that a big need exists for developing methods and tools for ODL in continuing education as a new virtual learning culture and infrastructure. Themes to be dealt with in the methodological part are for instance: how to integrate individualized and collaborative learning, how to create successful virtual communication and interaction, how to organize problem based learning based on actual problems of learners, how to integrate academic analytical methods with more action oriented ways of solving problems in daily working life, how to define and implement a successful balance between structure and flexibility etc. Tools to be delivered to secure successful implementation of these new methods are for instance virtual portfolios, information portals, collaborative tools, communicative tools, tools for sharing information and files, structuring tools.

### **Developing and maintaining a quality culture in ODL in universities**

Above it became clear that quality in ODL is not a preset concept but something to be defined and – in this definition process – to be supported by methodological research and development of appropriate tools. Next step after this is to implement, assure and maintain this quality in the actual educational programs you offer as a university.

Most universities have established quality assurance systems to some degree in the traditional study programs. What must be analysed in this context is therefore if the same systems are applicable in ODL and if not how the systems must be changed, improved, extended etc. to assure appropriate quality in ODL.

The analysis of the empirical data in the above mentioned survey on quality and quality culture in ODL at Aalborg University Denmark, shows that quality culture related to teaching and learning in universities is dependent upon two factors:

- that procedures and responsibilities exist to put quality on the agenda on a current basis
- that mechanisms exist how to maintain and further develop quality in teaching and learning

In most universities procedures exist for assessing quality in educational programs on a current basis. ODL – with its extended demands on a highly professional delivery mode and a very strong applicability of the contents in the actual working life of the target group – makes it necessary to further develop and sharpen these quality assurance procedures. More formalized procedures are needed in ODL, and students and their employers – and representatives from business and industry as such – need to be consulted much more in quality assurance procedures related to ODL than is the case today in most universities.

In the above mentioned survey respondents stress that it is fundamental for developing and maintaining a quality culture in universities related to ODL that universities have a strategy in the field which is followed by action plans describing what the university in question actually intends to go for and to do in the field of ODL. The respondents also stress that it is vital that the changes in organization, culture, pedagogy, infrastructure etc. that are necessary to secure quality in ODL are carried through. Changes are needed in many respects but three main areas for change are mentioned by the respondents in the survey.

Firstly a change in university culture in general is needed both concerning the status of ODL compared to teaching young students in the traditional way and concerning the status of teaching compared to doing research. The often lower status of ODL compared to traditional teaching in many traditional universities and the precedence of research over teaching do not invite university professors to invest time in new teaching and learning initiatives such as web based ODL in continuing education.

Secondly the financial priorities of universities must change in the sense that much more money and manpower must be invested in advertising and promoting these new ODL initiatives in continuing education. Investing in building up much closer relations to representatives from the target group and from business and industry as such is mentioned as crucial for the success of new ODL initiatives in universities both by the respondents of the above mentioned survey and by respondents in a national survey in all Danish universities concerning the creation of a Danish virtual university portal in the field of continuing education (Lorentsen 2003a).

Thirdly all respondents in the above mentioned survey call for more support from university concerning the development and implementation of the appropriate methods and tools for ODL in continuing education. Offering competence development for teachers in ODL might be one part of appropriate support measures.

To sum up successful ODL in continuing education call for institutional efforts on both strategic, organizational and financial level to secure that the right incentives are present for individual university professors to engage in such new but for modern university as such very important initiatives and for a more general and profound pedagogical and technological change to happen in universities.

### **How to improve university ODL in continuing education in the future**

As seen above it is no easy task for universities to offer high quality ODL programs, but universities need to be able to do so if they should live up to the responsibility that modern society defines for universities. As we have seen a fundamental precondition for universities to be successful in playing an active role in competence development measures in modern society is that they become better themselves at implementing internal change. Universities are not used to changing. Therefore exploring methods for change and in this respect getting the mixture of top down and bottom up initiatives right will be a very important aspect of developing modern university organizations. Universities need not act on their own, however, when facing the tough job of changing contents, pedagogy, infrastructure etc. In many cases networking among universities have proved to be a promising way to go (Lorentsen 2003b).

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## THE GLOBAL CHALLENGE TO BUILD HIGH QUALITY, ICT RICH, PROFESSIONAL DEVELOPMENT ENVIRONMENTS FOR TEACHERS

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In the small teachers' room of a primary school on the edge of Maseru, the capital of Lesotho, is the visible evidence of the global challenge to provide universal, primary education. The school roll, neatly printed by hand, shows the first and second grade classes with 210 and 212 children. The third grade has 97. Three years ago Lesotho introduced free primary education, and enrolments doubled. The school continues to await for extra classrooms. The 212 six-year-olds in grade 2 cram into a space that would, uncomfortably, take 40 in many parts of the world. Two teachers are allocated to the grade, neither is qualified.

Two and a half thousand miles to the north, in Rwanda, enrolment in primary education barely tops fifty per cent in many parts of the country. The buildings are poor and the classrooms crowded. Children sit five or six on a bench designed for three. They have no shoes. There are no books. Dog-eared cardboard 'slates' serve as writing paper. The teacher has no qualifications. Her education finished at the end of primary school.

Only 7% of the Rwandan population goes on to secondary school. Sister Josephine, the headteacher of a girls secondary school in Rwamgna, sixty kilometres from the capital Kigali, speaks quietly. She has 230 girls in her school. Half of them are orphans. Many saw their parents killed by machete in the genocide that ripped through Rwanda in just 100 days in 1994. Some of the girls were raped. 'We watch the girls carefully', she says, 'sometimes the memories become too much. But our support has to be on an individual basis. Every girl responds in a different way. And now we have HIV/AIDS. On top of everything, some of the girls are testing positive.'

In a stuffy, dim classroom twenty miles north of the luxurious Luxor Hilton on the Nile in Egypt, three nine year old girls sharing a single desk, excitedly answer questions about the time, working with small clocks they have each constructed out of scraps of cardboard carefully saved by their young teacher. Her teaching has encouraged more pupils than usual to attend classes at the school this term. Egypt's population is 71.1m; it is one of nine high-population countries targeted for improving literacy under an international initiative. More than 30 million of its adults are non-literate and 1 million girls are estimated to be out of school. Although the official net enrolment rate is 80% for boys and girls, household surveys tell a different story. In Upper Egypt school attendance rates vary between 67% in Assuit/Sohag and less than 55% in the surrounding rural areas<sup>1</sup>.

In the East End of London, George Green secondary school has 800 pupils and amongst them over a hundred different mother tongues. Many have just arrived in the country; from Somalia and Kosovo. A few from the refugee camps in France have made perilous trips to gain entry to the United Kingdom. Twelve-year-olds study eleven or twelve different subjects through a curriculum prescribed by national laws. Only two of their teachers are permanently based in the school. The remainder come and go, sometimes on only a daily basis.

Four schools in four places, places rich, poor and very poor, places of political and social instability, in Europe, in the Middle East, and in sub Saharan Africa. Places like this exist across the globe in rich and poor nations, in rural and urban communities. And these places have teachers, usually poorly paid, often unqualified, and frequently without any form of support to grapple with the huge challenges they face. This paper is about those teachers and millions of others who, on a daily basis, carry out their work in, often, undignified circumstances. In looking at these teachers we have three arguments to make.

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<sup>1</sup> The data is drawn from Watkins, W. [2000] *The Oxfam Education Report*, Oxfam International

First, the importance of seeing the worldwide challenge to educate all our children is a challenge for us all, not just a mission for those in the so-called 'developing world', or those working in the urban inner city areas of London, Los Angeles, New York, or the 'banlieu', of Paris or Marseilles.

Second, if we are to educate all our children, then we also need to educate all our teachers. More attention, we suggest, needs to be given to this complementary challenge to providing universal primary education. And, to do this, we argue, it is necessary to formulate models and practices that are conceptually strong, confident, and, whilst sensitive to the inevitable complexity and contrariness of local circumstances are capable of establishing discourse across and between communities. To this end we point to the enormous significance of communication technologies for transforming the models and processes of teacher development and professional support.

Finally we want, in the context of education and teacher education in particular, to suggest that inaction is not an option if we wish to see the sort of justice and freedom emerge that will improve our world. A central purpose of this paper, therefore, is to contribute to the establishment of a global debate around educational futures, a debate central to all the significant educational communities of practitioners, policy-makers, researchers, and politicians.

What is clear is that the institutions of teacher education created in the twentieth century will be unable to cope with the scale and urgency of demand required in the twenty-first (Moon, 2000). These were mostly 'bricks and mortar' institutions, heavily modelled on the universities of the nineteenth century, and relatively resource rich. These institutions did, and do, concentrate on pre-service, initial training with only limited involvement in the career-long development of teachers (many of whom, in many parts of the world, have received no initial education and training). In making this point we are not suggesting the redundancy of such institutions. We want to suggest, however, if they have a role to play in meeting the development challenge, they will have to change their role and function. Teacher educators, whatever their institutional base, will need to address the needs of teachers throughout their working lives. It is inevitable that provision will become more school based, the resources just do not exist to take millions of teachers away from their classes. Provision, therefore, will also need to be more flexible with teachers acquiring the knowledge and skills, individually and with others, to develop their own professional learning. In responding to these needs teacher educators can exploit the potential offered by contemporary understandings of the learning process and the new forms of communication technologies that can assist us in our learning. We are achieving greater understanding of that age-old interrelation between learning and teaching. Most importantly we are trying to appreciate the social context of learning and that has significant implications for professional communities such as teachers.

There is, of course, a vast literature around this theme. The purpose here is to point up its significance for teacher learning and development. We want to point to the connections that have to be made about these new insights and the new tools that extend, to use a Brunerian concept (Bruner, 1996), the toolkit of meaning making and reality construction the creativity which allows us to better adapt to the world in which we find ourselves. And that is as true for the unqualified teacher in Sowetho or Lesotho as the highly qualified teacher in Bonn or Boston.

Such creativity in learning is as true of teacher learning as it is for children, students or any other learners. The curriculum of teacher education therefore, needs to be imaginative and open-ended and capable of being accessed in a variety of ways. In this context we believe strongly that the moment is timely to argue that emergent technologies, interactive and multi-media in forms hitherto unthought of, are providing an opportunity to revolutionise both access to, and the quality of, professional learning.

We are aware in making such an assertion of past disappointments with technologies. However, the reach of the new forms of communication, as we will try to demonstrate is enormous. When before have teachers had the opportunity to interact with other teachers and experts on a literally daily, even hourly, basis? Above all, the new interactive forms of communication allow us to build into our models of teacher education the characteristics we know contribute hugely to the establishment of an effective

learning and teaching setting, ‘pedagogic settings’ (Leach and Moon, 1999), that build identity, personal dignity and above all self-esteem. As Jerome Bruner (1996) has said:

Only two things can be said for certain and in general: the management of self-esteem is never simple and never settled, and its state is affected powerfully by the availability of supports provided from the outside. These supports are hardly mysterious or exotic. They include such homely reports as a second chance, honour for a good if unsuccessful try, but above all the chance to discourse that permits one to find out why or how things didn’t work out as planned. (p. 37)

Two case studies, from the UK and South Africa, illustrate through contrasting examples the ways in which new technologies can enhance, even transform, the pedagogic settings of teacher education.

## Future Directions for Teacher Reform: Two Case Studies

### *Crossing the digital divide: Inkanyezi<sup>2</sup>*

Setting: South Africa

Population: 41.4million      Size in sq.km: 1,221,040      GNP per capita: \$3,310

Internet use: 2,400,000 (5.53% of population)<sup>3</sup>

*‘Inkanyezi has raised my standards and my dignity’ (School Principal Emjanyana SP School)*

Dongwe School is perched on top of rolling hills, on the outskirts of a sizeable village, 15 kilometres from King Willamstown, Eastern Cape, comprising five classrooms and over two hundred learners. Across a scrubby path in a separate classroom, with views across the valley, a meeting of teachers from a cluster group of primary schools is working on the Inkanyezi project. Seated on low pupil benches they share battery powered lap-tops with their project partner; each teacher is also working with a state of the art hand held computer<sup>4</sup>. The purpose of the meeting is to evaluate their progress on the project, as well as to share ideas about pupil achievement and progress. A young teacher from Dongwe shows an animated intsoni (folk tale) he has created in Xhosa and English to support literacy work, whilst his colleague discusses issues of classroom organisation when using a single lap top with a large class. Colleagues from a nearby school demonstrate power point presentations, spreadsheet on animals classification, and illustrated poems produced by their pupils in literacy and science lessons.

Inkanyezi [glow worm] is the Xhosa name for the research and development project in which these teachers are participating. It is part of DEEP [the Digital Education Enhancement Project], funded by the Department for International Development [DFID], UK, which focuses on the use of Information and Communications Technology (ICT) in primary schools. Jointly co-ordinated by three partner institutions<sup>5</sup>, the DEEP project is currently working in twenty four schools across Egypt and South Africa. All twelve of the South African project schools are situated in Eastern Cape Province, one of the former homelands,

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<sup>2</sup> Inkanyezi sisinambuzane esincinane, esikholisa ukuqapheleka ebusuku ngenxa yokudanya-danyaza kwaso. Udanya-cimi esiye simenze uthi “Ndileq’ undibambe!”. Kokukukhanya okuye kubenomtsalane ebantwaneni. Ayibobungakanani bayo obubalulekileyo, koko ligalelo layo ekukhanyiseni nakwintunguzi yobusuku. Umntu ongaziyo kuye kuthiwe usebumnyameni. Nantsi inkanyezi engu-DEEP isiza nolwazi lwe Computer ebantwaneni. Masiyileqe siyibambe ingekathi “swaka!”  
A glowworm is a small insect that is noticeable at night by flashing. It is the flashing that makes it attractive especially to children. Somehow you are drawn to chase and catch it because you want to capture the glow. It is not its size that is important, but it’s impact in illuminating even the darkest nights. In our culture, a person lacking in knowledge is said to be in the darkness. This glowworm (DEEP, is enhancing the use of computers in learning to children. Let us catch it before it disappears. (e-mail from Adi Kwelementini, DEEP/Inkanyezi Co-ordinator)

<sup>3</sup> Source:2000 World Development Indicators <http://www.worldbank.org/data/>

<sup>4</sup> One laptop per school has been provided for Inkanyezi by Microsoft SA’s division of social responsibility. The laptops, manufactured in South Africa, are the latest XP models. Each teacher has also been provided with a state of the art, colour 32MB PDA with 206 MHz processor, funded in part by the research project and in part by Hewlett Packard.

<sup>5</sup> Fort Hare Institute of Government, Eastern Cape, SA; Programme, Planning and Monitoring Unit, Cairo, Egypt; Centre for Research and Development in Teacher Education, Open University, U.K.



where poverty is at its severest<sup>6</sup>. Two thirds of the schools are in rural locations, including two without telephone connectivity [one has no electricity].

The project is particularly focusing on the ways in which new forms of ICT can improve teaching and learning in literacy, numeracy and science in the 9–13 age range. The DEEP study materials [including Study Guide, Professional Activity Cards, web site and other electronic resources], focus on the theme of endangered animals and the local environment. They incorporate lively case studies in local settings, of the way ICT can scaffold a variety of subject concepts and facilitate a range of graduated classroom activities [e.g. from simple web search activities on local animals to e-mailing findings to pupils in other schools]. A web environment links the research sites, and the teachers, so they where they have internet access, they can share experiences, resource difficulties, ask questions, or discuss pupil outcomes.

The majority of the 24 project teachers [two project partners per school] had never used computers prior to the project. After only a few months they are already integrating them into their work:

- to provide resources to support pupil learning;
- to access a far wider variety of texts than otherwise possible from their remote locations;
- to stimulate pupil creativity;
- to enable collaborative work amongst pupils;
- to develop literacy and scientific research skills- both their own and their learners.

*Going to scale – the Learning Schools Programme*

Setting: Northern Ireland, United Kingdom

Population 1,694,800m      Size in sq.km.      GNP per capita \$21,410

Internet use 55.32% of population<sup>7</sup>

*‘our children are now able to decide for themselves when ICT can help – or not- in their learning’;  
School Principal, Bushmills School, Northern Ireland*

Bushmills Primary School has 168 pupils, aged from 3-11 yrs. The school is situated in the village of Bushmills, just a few miles southwest of the Giant's Causeway, drawing its children from farm, town and seaside communities. Together with colleagues at St. Patrick's and St. Bridgid's Primary School, the staff have planned a collaborative, cross curricular project, which crosses all areas of the curriculum and aims to increase the self-confidence and self-esteem of all their young students. Pupils work closely with members of their own class, but also across the sectarian (Catholic/ Protestant) divide, collaborating with children from a different community on a range of activities based on field trips to the seashore. Their absorbing and fascinating research among the rock pools and on the shore, using notebooks and digital cameras, requires them to discuss, give opinions, and draw conclusions in an atmosphere of co-operation and friendship.

Two years ago none of the teachers involved in this coastal project would have been able to work in this way. The project depended, both for its planning and implementation, on the use of ICT. The teachers have directly attributed this new approach to teaching and pedagogy to their involvement in the Learning Schools Programme (LSP: <http://www.open.ac.uk/lsp>). LSP is part of a U.K. wide, government funded professional development training initiative available for all teachers and librarians, which focuses on developing a more deep-seated pedagogic knowledge and understanding of how new technologies can be used in teaching and learning. Such a national initiative is ambitious in scale and scope and at an international level, probably unique. In Northern Ireland alone, LSP is being used for whole school professional development by the majority [98%] of schools [1,134] – some 16,295 teachers (across the U.K. as a whole 166,000 teachers participate in LSP).

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<sup>6</sup> Data shows that the provincial share of the poverty gap [i.e. the combined measure of numbers in poverty and their depth below the poverty line] nationally is greatest by far in Eastern Cape. The comparative provincial data is: Gauteng 4%, Northern Province 16.5% Kwa Zulu Natal 19.9%; Western Cape 3.4% Northern Cape 1.9% Free State 9.9%; Eastern Cape 24.9%

<sup>7</sup> Source: 2000 World Development Indicators <http://www.worldbank.org/data/>

In common with DEEP, the Programme provides supported, school based self study, incorporating a range of CD, web and print resources focused on case studies of classroom activities. All staff in a school are invited to undertake the training together using a common self assessment framework, and encouraged to see the professional development process as integral to the development of the school overall. Teachers share a common framework or e-curriculum of professional, classroom based tasks. There is also a common entitlement to face to face support, provided by local advisers and a web site customised by country and subject specialism. The Learning Schools Programme's (LSP) virtual community is widely used by a variety of those working and studying on the Programme.

Bushmill's own school web site, which has been created by one of the staff members together with the pupils, presents the outcomes of the work done on the field trip, as well as interactive follow-up activities for pupils and their own photo gallery (see <http://www.lsp.open.ac.uk/spotlightarcv/dec01.htm>; <http://www.bushmillsp.org.uk/MYWEB77/Index.htm>). The site provides evidence of the way in which both teachers and learners in these schools see ICT as integral to the work they do:

- as a resource to support learning;
- as a medium for the publication of work;
- to make learning interactive;
- to encourage and enable communication in different ways;
- to engage the imagination in a powerful way.

### **Conditions for programme success**

Eight factors are enumerated that suggest why these development projects were successful, and which, in the case of LSP, have enabled it to go to scale effectively.

- *Vision and sustained commitment on the part of government, educational leaders and policy makers, to professional development, including ensuring effective technological infrastructures that can support ICT components.*
- *Clearly identified Outcomes for teachers, linked closely to their individual, as well as school's, ongoing professional needs.*
- *A curriculum of school based professional activities, adaptable to local context, progressively structured and providing a common framework and discourse within and across school.*
- *Access to high quality multi media resources that utilise ICT, use teachers' own language(s) and which integrate exemplars that reflect local culture, education and practices.*
- *Clarity of roles, responsibilities and modes of communication between different actors whether at school, regional or national level.*
- *Strong support, that is rooted in local contexts and existing structures, which is closely monitored to ensure its effectiveness for teachers in differing settings.*
- *Provision of carefully planned, well managed online environments, allowing for the collaborative development of professional knowledge.*
- *Rigorous quality assurance processes, operating at every level and dimension of practice, seen to be responsive to teacher feedback and external evaluation.*

### **An architecture for teacher development**

This is not the first time that rapid changes in forms of communication have had a significant impact on our ambitions for educational and social progress. The printing press, the telegraph, the telephone all, in an earlier age, changed conceptions of the world. The end of the nineteenth century, for example, was a moment of rapid change. Not only was the world in the nineteenth century coming to be united in a net of steel, telegraph wires, and ideologies of progress, but also, and perhaps more significant, for the first time

in history growing numbers of people in societies around the world – societies that differed greatly in structure, cultural practice, and historical experience – were coming to the realisation that their daily experience and the structural conditions of that experience were drifting apart. It was in the nineteenth century that, for the first time, self and society were beginning to be interrelated in a global milieu, one in which people's understanding of themselves and sense of the social world could no longer be identified as exclusively tied to only one place, only one tradition (Erlmann, 1999). Such changes in everyday perceptions of time, place and identity were so sweeping that Robertson (1992) speaks of it as a 'take-off phase' of globalisation in which the 'globalising tendencies' of earlier ages gave way to 'a single inexorable form'. On the ground, however, Erlmann (1999) has suggested that emergence of a singular conception of something called humankind and an increasingly interconnected world, was beyond the conceptual grasp of any one individual living under its sway. In the individual's imagination, wherever they were located, this 'global system' took a wide range of forms of symbolic meanings. Thus emerged a new form of sociospatial, imagination that inscribed itself in the very syntax of language itself, the 'intersections of absence and presence' as Giddens (1991) has called them.

Into these new spaces created by rapid changes of technology came, in Pierre Bourdieu's terms, 'new cultural intermediaries' and new roles for intellectuals and artists. This is a process that we suggest is also characterising the new revolution in communications today. Within our modern forms of consciousness, however, Erlmann (op. cit.) has pointed to the way in which contemporary changes in turn engender and are expressed in a mirror dance between both Europe and Africa's images of the 'other', each retaining many of the legacies of the 'global imagination' that developed during the late nineteenth century. Most notable among these is the intertwined, persistence of fantasies of an abused and defenceless Africa and, inextricably, symbiotically linked with these, a certain heroic image of Europe and the individual.

If we detect something of this view of 'otherness' in the way the issue of developing teachers to meet the challenge of providing universal education is both perceived and framed, then the new forms of communication and our capacity to reconceptualise traditional divides and new practices, in turn offers an opportunity to think in new, and more realistic ways about what is humanly possible. In this paper we have made a number of propositions:

- that the worldwide challenge of UPE has a concomitant challenge to provide teachers and teacher education to make the experience of schooling meaningful and productive;
- that there is a need to build new, flexible, effective, school based forms of teacher education at a reach hitherto undreamt of;
- that to do this emergent models of development that exploit new forms of technology, need to be examined, in order that new practices of teacher education might be shared, experienced and evaluated globally.

We have looked in some detail at the building of new programmes, analysed the conditions of their success and explored the conditions under which identity, self esteem and dignity could characterise future directions for teacher reform.

Across the world, many internationally recognised institutions and groups drive the improvement of teacher education, attracting scholars and ideas from every part of the globe. Few of these are situated in the developing world. Few are driven by the real agendas of the poor and the dispossessed. We believe that a task for teacher education, in parallel with UPE, is to create a new and imaginative 'architecture' for discourse and debate that is truly international, drawing on wide ranging practices and scholarship, and one that embraces the challenge set out in this paper. The form of that architecture, the roles of individuals in creating and working together in this, as well as its many globally and varied related communities, provides an agenda for the next stage of development.

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## QUALITY IS IN THE EYE OF THE BEHOLDER

*Nikolaos Mylonakis, Cedefop*

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### **Survey on quality and e-learning**

This presentation highlights some of the findings from the recent European survey on quality and e-learning.

It is based on a web-based survey that was carried out in five European languages (English, French, German, Spanish, Italian) in April 2002. The survey was hosted through the European Training Village (ETV [www.trainingvillage.gr](http://www.trainingvillage.gr)) at Cedefop, the European Agency for Vocational Training. In recent years, the ETV has built up an impressive base of thousands of registered users who regularly come to consult its pages for qualitative research into training, statistical data, information on training structures in Europe, e-learning, Train the Trainer resources and a variety of other information services. Most of these registered users are training professionals from both the public and private sector in the European Union.

The survey asked European training professionals their views on the quality of e-learning. Registered ETV users were mailed at the start of the survey and similar mailings were also sent to other European databases. The composition of the respondents is to a large extent a reflection of the current reach of the ETV. The survey aimed to collect a snapshot of views from the full range of players in the training field across Europe concerning quality of e-learning – it can be described as indicative and makes no claims for scientific validity. Given that it was conducted through the Internet, one can safely assume that all respondents are familiar with using the World Wide Web and probably represent a type of early adopter.

82% of the 433 respondents came from EU countries, and all EU countries were represented except Luxembourg. The highest numbers of EU respondents were from the UK, then Germany, followed by Spain, France and Italy.

As the results show, all types of respondents were represented, including HR/training managers in both public and private enterprises, managers in higher and further education institutions, teachers or trainers in further and higher education institutions, trainers from private and public training companies and training and organisational development consultants.

This report is aimed at a range of decision makers. For policy makers, the results should provide some food for thought when planning public sector investment. The author hopes they find the responses useful on the types of criteria that are considered to be the most important as well as the evaluation of e-learning experiences to date.

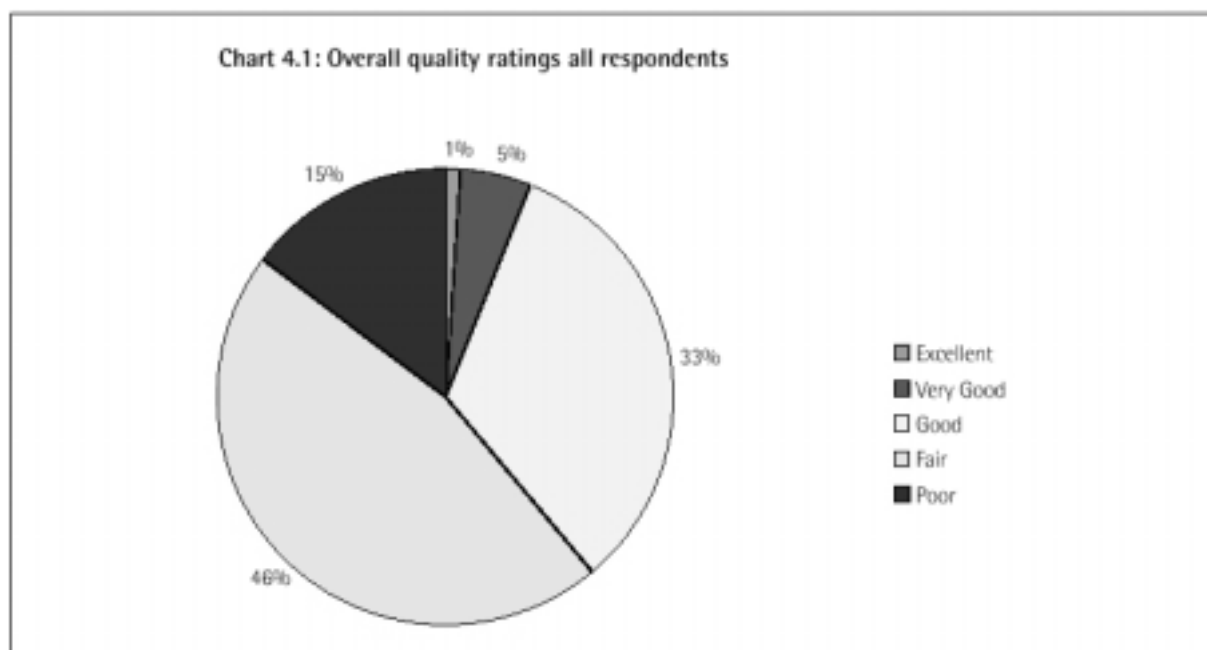
For suppliers, the results provide a rather stark message most respondents gave negative ratings to e-learning supply to date. The report highlights not just what they think about the overall quality of e-learning, but perhaps more importantly, the types of quality criteria that are most important to training professionals.

For users – both training managers, vocational teachers and trainers – the author hopes this report provides some guidelines on the criteria for quality that their peers consider important and perhaps some comfort and confidence to their doubts and concerns. She hopes it also gives them some indications as to what to focus on when planning their e-learning adoption in the future.

There is no simple and easy way to adopt e-learning. It's complex and to a great extent doing it absolutely right is still an unknown process. This report is intended to provide a small window on some of the issues for consideration as experienced by European training professionals and to add to the intelligence of the education and training community as they scan the horizon for information to support their decision making.

## Key findings

### Overall quality of e-learning



61% of all respondents rated the overall quality of e-learning negatively – as ‘fair’ or ‘poor’. Only 1% rated it ‘excellent’ and only 5% rated it ‘very good’. The picture for EU only respondents is even more negative at 64% ‘fair’ or ‘poor’. ‘Fair’ and ‘poor’ ratings were given by 59% of the EU public sector respondents and 72% of the EU private sector respondents.

### Criteria used to evaluate quality

The most important criteria for evaluating quality in e-learning are in order of priority:

- Functions technically without problems across all users
- Has clearly explicit pedagogical design principles appropriate to learner type, needs and context
- Subject content is state of the art and maintained up to date
- Has a high level of interactivity

For each of these criteria, only a minority of respondents said that in their experience, quality had been ‘excellent’ or ‘very good’. Two thirds or more said that in their experience of e-learning to date, all of these above criteria rated the bottom two boxes – only ‘fair’ or ‘poor’.

### United Kingdom

For 99% of UK respondents the criterion ‘Functions technically without problems across all users’ was considered to be of the highest importance in judging quality. In contrast, only 28% of the UK respondents attributed the same level of importance to ‘Is technically interoperable with our organisation's ICT systems’. This may reflect experiences with stand alone programmes utilising technologies such as CD-ROMs and/or e-learning being delivered either through the Internet and/or on discreet networks. It may also be a reflection of the longer use of e-learning in the UK by comparison to most other EU countries, and the legacy of older technologies. 23% of UK respondents considered it important that content should be linked to occupational profiles and competences and slightly more, 28% rated ‘linking assessment of e-learning with formal accreditation and recognition’ of high importance.

## France

A large majority (81%) but rather fewer than German, Spanish and UK respondents gave highest importance to 'Functions technically without problems across all users'. 59% of French respondents gave top ratings to the criteria 'Is technically interoperable with our organisation's ICT systems', and 16% rated 'linking assessment of e-learning with formal accreditation and recognition' of highest importance. Only 12.5% said it was very important that e-learning be linked to occupational profiles and competences.

## Germany

98% of German respondents said it was very important that e-learning 'Functions technically without problems across all users' and 80% said that it was of the highest importance that e-learning 'Is technically interoperable with our organisation's ICT systems'. 24% rated links to formal accreditation systems as very important and the same number considered it very important that 'e-learning be linked to occupational profiles and competences'.

## Spain

Similar to Germany and the UK, 98% of respondents it was very important that e-learning 'Functions technically without problems across all users', though 10% fewer (70%) than Germany gave the same level of importance to 'Is technically interoperable with our organisation's ICT systems'. With regard to 'linking assessment of e-learning with formal accreditation and recognition', 28% of Spanish respondents gave this indicator the top two ratings, and the same percentage considered it important that content should be linked to occupational profiles and competences.

## Italy

76% of Italian respondents rated 'Functions technically without problems across all users' of the highest importance, the lowest number for this criteria of all the large countries. 52% gave the same rating to 'Is technically interoperable with our organisation's ICT systems', and 28% gave the same rating to the importance of 'linking assessment of e-learning with formal accreditation and recognition'; the same number that also rated as highly important the need 'to link content to occupational profiles and competences'.

## Overall quality ratings

Respondents were asked their views on current quality in e-learning and provided with the same list used for identifying important criteria for judging quality.

A very small number (4) of respondents from only three countries gave an excellent rating. These were Germany, Ireland and UK. A somewhat larger number of respondents from nine countries rated overall quality 'very good'.

At the bottom end, respondents from 10 EU countries included overall ratings of 'poor', and 50% or more of respondents from the UK, Italy and Germany rated overall quality only 'fair'.

75% of French respondents gave responses of 'fair' or 'poor' to overall quality. Only 2 German respondents gave a rating of 'excellent' and 'very good' (one for each), although nearly 28% rated overall quality as 'good'. Similar to total respondents rating overall quality 'poor' or 'fair', 61% of Germans also gave this rating. Similar to France, over 75% of Italian respondents rated overall quality as 'poor' or 'fair' and there were no ratings of 'excellent' or 'very good'.

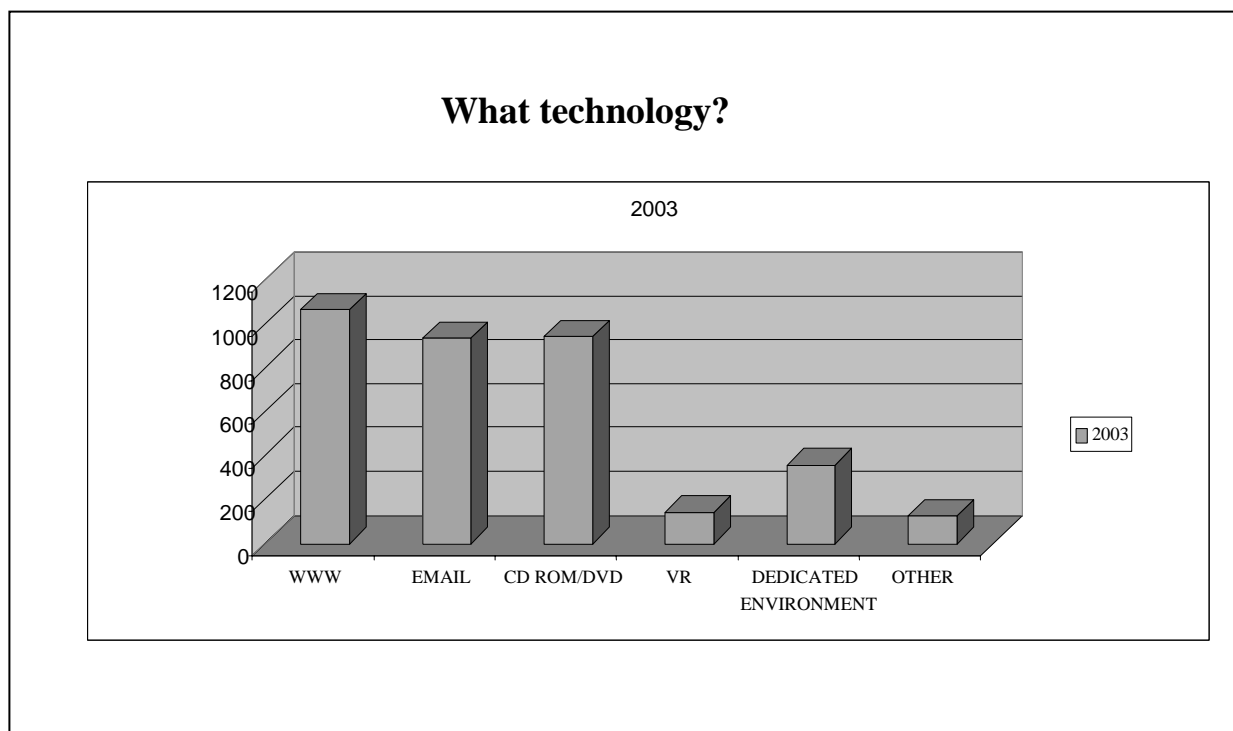
Spanish respondents also gave very negative ratings with 74% stating 'poor' or 'fair'. More positively, the 'poor' or 'fair' ratings in the UK came from 57%, with 12% giving a 'very good' or 'excellent' and 28% giving a rating of 'good'.

On the three criteria of ‘technical functionality’, ‘pedagogical quality’ and ‘state of the art content’, respondents from a very limited number of countries gave the highest positive ratings. These included Denmark, Portugal and Spain (1 each), Greece and Ireland (2 each) and the United Kingdom (4), for highest ratings in ‘technical functionality’ and ‘pedagogical quality’. For ‘State of the art content maintained up to date’, respondents from Austria, Denmark, Italy and Portugal numbered 1 each, Greece and Ireland 2 each and UK and Spain 4 each.

To conclude I would like to present the results and conclusions of a survey carried out by Cedefop on the use of technology-supported learning. The survey initially conducted in January 2000 was repeated in January this year to get a snapshot of developments over time. This survey ‘technology-supported learning’ provides the views of training practitioners and policy-makers on technology use and information requirements.

I wish to stress again that the surveys are not a statistical analysis of developments but a collection of quantitative information providing some insight into the state of certain aspects of e-learning. The survey has just been completed and results compared with the original survey of 2000. If I confine myself to one remark on the results it is the following: the data show that technology is becoming an increasingly integral part of training provision throughout the European Union and beyond.

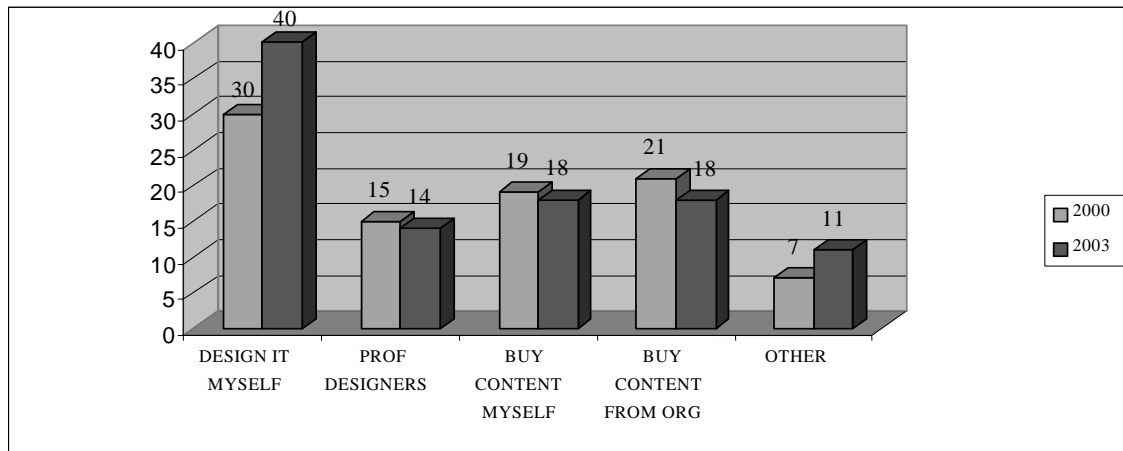
The second most clear indication is an urgent and desperate need among practitioners and policy-makers for information on technological developments and research on the use of this technology.



The world wide web and e-mail remain at the top of the list. 89% of respondents use the world wide web; 77% claim e-mail is important for their work and the same percentage state CD-ROM or DVD are important technologies. Interesting to note is the predominance of e-mail as a communication channel despite the growth of increasingly sophisticated technologies which integrate other communication tools in their platforms. Dedicated learning environments such as Lotus learning space or top class account for only 29% of the technology used by the training community and this has remained stable over the three-year period. Here the message seems to be that while e-mail and CD-ROM applications have lost in importance, new technologies in the form of learning platforms will be used.



## Where do respondents find learning content?



One issue of particular importance to many of you shows surprising results. In responding to the question of where you source your e-learning content for training purposes, by far the largest group stated they designed it themselves. When compared to the results from 2000 there has been an overall 10% increase in the number. It has risen from 30 to just under 40%. While overall most content continues to be sourced externally the rapid rise in homemade solutions could indicate that the market is not responding adequately to the content needs of the trainer and that the most satisfactory solution is simply to do it oneself. Here the message appears to be one of caution towards the market.

Should it be true that trainers are forced to design their own content, this could be a major obstacle to developing e-learning solutions and a possible reason for reluctance and caution on switching to technology-supported learning solutions. While the reasons for this trend of producing do-it-yourself content solutions are unclear, they nevertheless need to be explored.

The final question our survey put to the training community concerned the need for information. Was there a need and if so what for. Here the responses echoed almost identically the answers provided three years ago. There is a lack of satisfactory sources of information, or, at best, of knowledge of where these sources can be found. What remains clear is an urgent need for news on technological applications. This is stated by learners, trainers and administrators alike.

Secondly, there is an equal need for research on use of technology and for case study examples of implementing technology. The message is again one of warning. In other words, the preceding three years have done little to satisfy this need for information and until this is done it is obvious that reluctance to implement e-learning solutions will remain.

In my view we should pay very careful attention to this last message. Without good and impartial sources of knowledge and research on technology-supported learning, the customer will shy away from market hype and sales talk. We need to keep the training community and all its stakeholders abreast of such developments and good examples of practice in introducing technology to the learning environment: The European e-learning portal of the European Commission being launched here at Learntec 2003 is a similar important initiative.

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# QUALITY AND FLEXIBILITY IN HIGHER EDUCATION

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## Abstract

Fast and profound changes in the social and economical context, in the way to live and to learn, contrast with the structured systems in the academic and professional area. Education with emphasis on technology becomes wide-open with regard to the perspective of flexibility of educative projects based on the enlargement of the autonomy and different time/space sets, with the alterations which these can promote in teaching and learning. Institutions of higher education give a new aspect to the offer with an increasing list of innovating projects to a continuous, lifelong learning. The implementation of these projects, however, enrolls in the complexity of communication and negotiation of senses between production and reception. A reception whose profile mainly evolves and includes working adults, in a day-by-day marked, and with difficulties of qualified progression in academic studies. Facing this scene, this study presents a revision of concepts of quality and flexibility which involves a discussion and consideration on implementation of innovation projects with support on digital technologies in higher education.

## Introduction

An increasing pressure for changes in higher education points towards a higher flexibility of learning possibilities in a context marked by fragmentation, multiplicity, fastness and simultaneity. The search for *quality*, as a reference, in times of globalization, leads to a commitment to the *user's satisfaction*. This notion, at times understood generically as consumer/client of educational products and services, changes the perspective by revealing the different user-learners that it implies. The increasing use of communication and information technologies in higher education support innovative projects towards the personalization of learning, as well as a higher degree of interaction between the different actors and authors. The circulation of these discussions contributes to a *conformity of the educational products*, sometimes different from the initial project. This study resumes the concepts of quality and flexibility in order to examine some of the implicit challenges in the process of adjusting the offer to the worker-student's expectation.

### 1. The meaning of quality: orientation to user-learners

*Quality is 'the totality of features and characteristics of a product, process or service that bear on its ability to satisfy stated or implied needs'*<sup>1</sup>

The concern about quality – *as dynamic solution* –, according to Teboul (1991), is intensified in a context with growing international competition, acceleration of innovation (diversification of the number of products and services and reduction of their lifecycle, increase of the complexity (technology and process), the client's sensibility at risk, costs and quality, cultural changes.

The quality concept can be considered, according to Shiba, Graham and Wladen<sup>2</sup> under diverse points of view and evolve along history. These authors point out to four quality levels: adequacy to the standard (in accordance with the project), adequacy to the use (in accordance with the market's needs), adequacy to the costs (high quality and low costs), and adequacy to the latent needs (satisfaction of the client's wish

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<sup>1</sup> The English definition that includes the French definition for quality. Teboul, 1991, p. 56.

<sup>2</sup> Shiba, Graham and Wladen, 1997, p.8.

before he gets aware of it). The focus on the *client* is expressed in many definitions<sup>3</sup> of quality and has been suggested by various authors<sup>4</sup> as Crosby – ‘*quality is meeting the requirements*’; Pat Townsend – ‘*quality is what the client perceives when he feels that the product/service corresponds with his expectations*’ (promise of the offer)<sup>5</sup>; Juran – ‘*quality is fitness for use*’. Taguchi amplifies the concept, and for him – ‘*quality means minimizing the losses caused by the product, not only for the client, but also for the society in the long term*’. According to him ‘*the reason for the losses for the client and the society signifies dispersion, variability, absolute evil*’. Quality loss, according to Taguchi, Elsayed and Hsiang (1989, p.3), is defined as ‘*the losses imposed on society from the time a product is released for shipment [...] by deviation in a product’s functional characteristics from their specified nominal values (desired target values)*’.

On distance education there are a number of different ways of defining the term, but a consensus appears to be forming around the view of quality as ‘*fitness for purpose*’ (Calder, 1995, p. 36). The basis of the European pilot guide on quality for open and distance learning (Saturn, apud Calder, 1995, p.39) was formed by two quality measurement systems: the British Standards Institutions system (BS5750)<sup>6</sup> and the total Quality Management system (TQM)<sup>7</sup>.

All these definitions presume different understandings about the notion of *consumers, users and clients*. According to Paladini (2000, p. 77) and Feigebaum (1998, p. 9) *consumers/users* are today’s buyers of a product (consumers) or a service (users), and *clients* are potential consumers/users.

These terms, in the educational context with the support on the technologies of information and communication – TICs, were used to distinguish the production and reception, the conception and delivery stages in order to improve the connections between them. According to Jacquinet (apud Glikman, 1997, p. 23) it is important yet to distinguish different *states of user-learners*: the *consumer-learner* of the ‘educative products’; the *user-learner*, the beneficiaries of the learning system, device or net<sup>8</sup>; the *user-learner* – user of educative technologies (*user* in opposition to *producer*); constructive-learner or citizen-learner – the *receptor* of a message. It is the final state. The citizen-learner is likely more conscious of value than the precedents ‘*user-learners*’ and he is more vocal and negotiator.

The extract above reports how complex could be quality control from the engineering standpoint. The producer challenges are not only to consider the profile of the *target users* but also their different states in order to *meet the users requirement’s, to fit for purpose, to reduce losses for the individuals and the society*. The approaches, methodologies, issues on quality control change based on this comprehension. The continuous researches on the *user point of view* are motivated by a reduction of distances between production and reception.

## 2. Quality in the formulation and implementation of flexible devices

*Former “have not” consumers not only want merchandise they never had before, they want **good** merchandise for their money – not junk or shoddy – they are rapidly developing the discrimination to select the good from the shoddy and to be proud of the difference<sup>9</sup>*

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<sup>3</sup> Ex. International Standart Organisation – ISO: the quality is a set of properties and characteristics of a product, process or service that provide the capacity to satisfy the explicit and implicit needs. AFNOR: the quality is the capacity of a product or service to satisfy the needs of its users. (to maximize the perception of the offer and minimize the defects/faults). Teboul, 1991, p. 54.

<sup>4</sup> Ibid., p. 56-59.

<sup>5</sup> The quality of project requires 5 steps to its fixing: identification of needs, creation of needs, adaptation to use, conceptual mode of the product, structuring of the project. Teboul, 1991, p. 56.

<sup>6</sup> The BS system and the International (ISO9000) and European (EN2900) series are designs to enable manufacturers to produce goods to a measurable, controlled specification set by them selves (Calder, 1995, p. 39).

<sup>7</sup> The informing assumption is very much the formative one of continual quality improvement of the products and processes in order to meet customer requirements. It has been described as aiming to *meet the customers ‘defined’ requirements at lowest cost, first time, every time* (Underwood apud Calder, 1995,p. 40).

<sup>8</sup> The distinction between consumer and user is the relationship with time. The user is insert in a social micro-group and this relation with time is longer than the consumer. The *user, stricto sensu* according to Boullier (apud Jacquinet, p. 27), is the opposite of *responsible, public State-service, privet marketing-service*.

<sup>9</sup> Feigebaum, 1998, p. 30.

Although the quality of the product is fixed *a priori* by the quality of the project, its implementation may reveal modifications of diverse natures and profundities and many variables interfere in the *conformation* of the product in relation with what was foreseen in the original project says Paladini (2000, p.82). According to Feigebaum (1998) today's consumers insist not only on producer quality to be performed properly but also that they expect to be heard if, in their opinion, product quality and safety are not satisfactory. This *citizen-consumer*, says Payeur (in: Glickman, p.30) do not accept anymore to be exclude as *final user*.

According to Jacquinet (in: Glickman, p.30), in some educational projects the *citizen-learners* are supposed to be vocal, but sometimes their participation are restricted to reactive attitudes (satisfaction indices, feedback studies at posteriori, via questionnaires or interviews) or, in the case of co-production, the stress is more on the producer than on the user. Jacquinet highlights the negotiation between both the user-tutor and the user-learner, together at the same educative project but with specific objectives – sometimes in contradiction.

The strategies of communication, according to Fausto Neto (2001, p. 66), put into operation the circulation of the discourse between production/reception. Displacements between these two poles – although they are in the interior of the same system (educational) and associated with common interests – connect “[...] two realities which meet at the point of their differences, followed by the institution of disputes and processes of negotiation of meaning. We are talking about two fields that move as a result of different logics, rationalities and postulates”, According to this author, this negotiation occurs between two groups of actors “that are different between themselves on account of their belonging to different perspectives of cultures, identities and experiences”<sup>10</sup>. They are, according to Fausto, “actors, associated and agglutinated with distinctive symbolic and situational networks that change the positions of production/reception starting from where they construct, address, appropriate and negotiate messages and discourses”.

The formulation and implementation of innovative educational projects would consider *the adequacy to the latent needs of the user* in a context of fast and profound social and economical changes. Education with emphasis on technology becomes wide-open with regard to the perspective of flexibility of educative projects based on the enlargement of the autonomy and different rhythm/time/space sets.

The inevitability of the ‘flexibilization’ process of the devices at the universities, according to some authors (Collis and Gommès, 2000; Incarnation, Leidhold and Reuter, 2000; in: Collis, 2001, p.30) is associated with four big tendencies of these modern times: the virtualization, the personalization, as well as the globalization and permanent education. Nevertheless, Collis and Moonen (2001) alert that the practice offers the involved agents some challenges and it is a multidimensional and complex process.

The notion of device, even though subject to variations due to the areas of knowledge, historical and institutional contexts, stabilizes, according to Hugues and Charlier<sup>11</sup>, the meaning of *between-two*, that is, it establishes connection between two poles. The practice places it within a logic of *means* with view of an *end* (there is a kind of intention).

The ‘flexibilization’ of the devices – more autonomy, plural rhythms/times/spaces – is a polemic discussion, according to Hugues and Charlier, and concurs to the substitution of the *technocratic classic regulation* by a *new management of changes* as far as it aggregates supports for a *delegation and decentralization*. These changes of paradigm imply the displacement “of the logic of *transmission of knowledge* by a logic of *experience an experimentation of knowledge*” sounded “*on the human action of the individuals, actors/authors of its construction, and on the intentional dimension*”<sup>12</sup>. It supposes a process of continuous negotiation between producers and citizen-learners. In this case, quality could be the adequate “*conformity of the product*” – modifications of diverse natures and profundities in relation with what was foreseen in the original project – as the result of this negotiation.

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<sup>10</sup> Ibid., p. 18.

<sup>11</sup> Hugues, P.; Charlier, P. 1999, p. 15.

<sup>12</sup> Verhaegen, Weiss Berg, apud Hugues, Charlier, 1999, p. 18.

### 3. Flexibility in higher education: new challenges

*“...flexible learning is becoming somewhat of a buzzword: everyone is for it, but often people have not thought further about it, except perhaps that means something about distance education.”<sup>13</sup>*

The increasing number of worker-students in higher education is not a Brazilian<sup>14</sup> phenomenon. This profile mainly evolves and includes working adults in a day-by-day marked and with difficulties of qualified progression in academic studies. This situation contrast with the structured systems and Institutions of higher education gives a new aspect to the offer with an increasing list of innovating projects to lifelong learning. According to Rowntree (1992, p. 26) more flexibility in higher education would improve de quality of learners’ learning. The university of the future, according to Peters (2001), should be *“flexible and variable exemplarily”* and be *“open to everybody who may participate in the education successfully”*.

There is a considerable pressure for evaluation to become an instrument of quality control. According Paladini (2000, p. 82) the evaluation – in a minor scale<sup>15</sup> – observes the essential properties related to the nature of a product or service named *‘quality characteristics’* which can be observed by attributes and by variables. Among the *essential properties* foreseen in the flexible devices, in this study, are: major autonomy, rhythms, times and multiple spaces that are designed for those client/consumer/user-learners. These *characteristics* add flexibility to traditional programs of study in order to reach a target value: the adequacy to the ‘latent’ students needs to minimize the losses caused by *‘structured’* programs. A *structured* teaching/learning program, according to Michel Moore (in: Peters, 2001, p. 86) is previously fixed, planned step by step, and controlled in order to avoid deviations in its implementation.

Therefore, both the conception and the implementation of flexible devices add new challenges to the universities.

*We cannot expect any one institution to be wide open to all potential learners in every aspect. We are all limited by what our budgets and talents enable us to offer. Besides which we may be daunted by certain tensions and contradictions within the ideal of openness. Opening up what may make the system more user – friendly for some learners may make it less so for others<sup>16</sup>.*

In this sense, Rowntree (1992) points out some questions: *“flexible in what ways, and to what degree, compared with what?”* Albero (2001) highlights the relevance of the students’ autonomy and, for this researcher, the device could be evaluated considering three dimensions: ideological – references for the action; architectural – the device design; pedagogical – the learning project.

The degree of flexibility, according to the discussions on the Congress of Consensus<sup>17</sup> is, mainly, examined throughout the degree of *autonomy of the learner* – in making decisions on his own learning project inside the device; *the device itself* – in improving learner control on rhythms/times/spaces, communication and interaction with actors and authors, methodologies, modalities of mediation/regulation/evaluation; *the institution* – the degree of flexibility is associated to openness of the institution in negotiating in different levels.

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<sup>13</sup> Collis, B., Moonen, M., 2001, p. 16.

<sup>14</sup> They are the majority (80%) at the Jesuit Universities in Latin America integrated in AUSJAL (Associação das Universidades confiadas à Companhia de Jesus na América Latina).

<sup>15</sup> The evaluation on a large scale encloses the quality of project and conformation and, the evaluation on a minor scale, the specific characteristics of the product. Paladini, 2000, p. 82.

<sup>16</sup> Rowntree, 1992, p. 26.

<sup>17</sup> Formations Ouvertes et à Distance: l’accompagnement pédagogique et organisationnel. Conférence de Consensus. France, 27, 28, 29 March 2000. Projet réalisé avec le soutien de: l’APRIEF, la DGER, le FFFOD, l’ORAVEP

The flexibility is the result of an agreement between the institution, managers and learners in terms of: defining the objectives, development and implementation, forms of regulation and evaluation of educational programs. And the process of “flexibilization” of the device, according to Collins and Moonen (2000) must consider four components: technology, implementation strategies, pedagogical project and institutional framework.

Some challenges, therefore, could be mentioned: to professors and tutors – new competencies, skills and knowledge are required to deal with contents, methodology, citizen-learners; to learners – new choices and new responsibilities, more independence and confidence are needed (and some students, in some circumstances, are not prepared for that); to the institution: different versions of the program and its components are required, what means difficulties in getting the return on investment and efforts.

Besides of this, Collins and Moonen (2000, p. 17) alert “if higher education institutions do not respond to this changing demand from students, other service providers will”.

#### **4. Conclusions**

The concentration on the quality and the higher education *user* increases within the sphere of a wider discussion of changes supported by a transdisciplinary vision of education and its offer through life. The perspectives mentioned by Bates, Peter, Mason, Pretti, Hall and others of a public of different age ranges, with an university course of progressions, interruptions and resumptions, simultaneity between study and work, professional mobility, fragmented time between multiple involvements, continuous need of new knowledge, skills and abilities, challenge the thoroughly structured educational systems.

In the same way, the contributions of Jacquinot, encourage a reflection that surpasses the description of the profile or type of user (client, consumer, user) and take notice of the users’ different states, that is to say the different users implied in the same person. This comprehension is not only relevant to the process of personalization of learning, but contributes to a focusing and qualification of more flexible educational projects.

The validity of this categorization is also expressed in the interest of reducing distances between production and reception. The constructive-learner or citizen-learner, according to the extent of his consciousness and participation, plays an important role in the discursive displacements stressed by Fausto Neto and results in the conformity of the product/service often diverse from the initial project, as Paladini points out.

The perspective of enlargement of the learner’s autonomy and choice with regard to different aspects of learning experiences, among others time, space and rhythm of study, proposes to attend learners’ expectations reducing losses imposed on them and on the society. The communication and information technologies add sustainability to these innovative projects. However, Rowntree, Collins and Moonen, among other authors, point out that not everything may be flexible and highlight the new challenges contained in these new set-ups specially for the teacher, the learner and the institution, but call attention, at the same time, to the inevitability of this process in higher education.

Furthermore, the concern about quality *as adequacy to the user* points on the one hand to a perspective of democratization of educational possibilities with commitments regarding decentralization of power and knowledge, and on the other hand to the risk of commercial exploitation and marketing of education. An education that, at distance or at school/university, with or without technology, more or less flexible, proposes the promotion of the citizen-learner’s development and depend, therefore, on the coherence of his project and on the role of the different actors in this setting.

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# A PRELIMINARY FRAMEWORK FOR A THEORY OF OPEN AND DISTANCE LEARNING – THE EVOLUTION OF ITS COMPLEXITY

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## Abstract

The aim of this paper is to formulate a research framework of some logical systems, which may compose a theory for open and distance learning based on a philosophical approach. These logical systems might be formed scientifically and consist of axioms, which compose a framework for a theory of open and distance learning. The fundamental characteristics of such a framework and its identity are the existence, the argumentation, the development and the evolution of its complexity, just as is the case with any theory.

## Is it possible to give one single definition for open and distance learning (ODL)?

Before anyone attempts to give a definition of ‘*what is ODL*’ or answer the question ‘*how ODL is structured and practised?*’ first he/she should fully understand, and make the others understand, that the sense of ‘*distance*’ is taken and explained in many different ways. The notion of ‘*distance learning*’ has been applied to a number of research programmes and academic activities by following different paths of practices and implementation. On the one hand, there are thousands of users, who use forms and models of educational applications, which they call ‘*distance learning*’, so as to suit their own work and research. On the other hand, there are many others, who define the means of transportation of knowledge and information as ‘*distance learning*’, so as to suit their own needs and answer their own preconditions. In most cases, both these outlets and choices are legalized methodologically each time by using different types of alibis.

What emerges from this complex situation is not a concrete definition of “distance learning”, but the preconditions and the parameters that someone might use in order to reach and create a definition. It is not enough to give a definition without analyzing the parameters, the preconditions and the criteria. For methodological reasons, we should focus on all these elements, which can function as points of reference for the creation and growth of an ODL definition.

There is no doubt, that each time someone attempts to give a definition of the notion of "distance learning" he/she does it in a way such as to satisfy his/her own educational needs and by fixing parameters that have to do with his/her own methodological approaches. He/she has already formed a framework of necessities and aims, which shape a personal interpretation of the notion of distance learning. As a result, we have definitions of ‘*what distance learning is*’ given by academics and researchers about which part of those involved disagree, while others are satisfied simply because their needs meet a particular definition. In this case, there is no right or wrong: what happens is that their point of reference and their criteria for an ODL definition are absolutely answered by their prior position. There is something more important, however: from the moment a definition is not delimited in a framework of objective data, it will have subjective and relative. The essential point then is to have and use the necessary infrastructure of criteria in order to argue and prove each time any subjective ODL definition. This subjectivity should be clear, transparent and explicit to the recipients.

In order to comprehend this position, it is important to realize that the term “*distance learning*” has been differentiated during the last decades. In the 1970s, the term ‘*correspondence education*’ was used initially, while the term ‘*education at a distance*’ was introduced later on, until in the 1980s and 1990s the term ‘*Open and Distance Learning*’ was adopted. Actually, the term ‘*distance learning*’ or ‘*distance education*’ does not determine by itself any educational data. We should not interpret educational data, learning and teaching procedures or any educational tools by words like ‘*distance*’, because there is neither definition nor any framework of theoretical choices, which could use and adopt the abstractive and undetermined notion of ‘*distance*’.

## The framework of the theory

In his Dictionary, Babinotis (1998) defines the notion of ‘theory’ as ‘the knowledge of how something happens’ or, more analytically, as ‘the total of statements and proposals, hypotheses, principals, ideas which are organized in a logical system, which describes or/and explains a phenomenon, fact or way of action’. Therefore, a total set of positions, which derives from theoretical and empirical approaches has the dynamic of a constructive theory – a theory which has the possibility to compose hypotheses, principles, ideas and propositions in order to be able to determine a framework for ODL.

Thus, in what follows, first we will try to establish the elements that can compose a theory – any educational theory –, then we will search for the characteristic elements of ODL and, finally, we will make the synthesis of the two. Our approach cannot be static and one-way, but rather it should be dialectical and bi-directional. The notion of axioms and their use in forming the theoretical framework could not be replaced by dogmatic determinations. At the same time, through the analysis of the elements for a theory will emerge a continuous and dynamic complexity, which is characteristic of any effort to outline a theoretical framework of educational or pedagogical interpretation.

A scientific theory cannot have the form of a dogma (Russell 1971). It is shaped through ranks of axioms and syllogisms, which all together compose the evidence needed for it to function empirically and theoretically. Simultaneously, a theory is disputed permanently by every scientific point of view and it is tested in practice until a new improved theory is proposed which will replace or change the existing one. Dimou (1990), in explaining Popper (1980) and Herrmann (1978), stresses the fact that “only if a theory has been established, it is possible to be applied, so its methodological practices can be discovered”.

In the case of ODL, during the last decades, with the exception of the theoretical analyses of Holmberg (1986), no analytical and philosophical approach has been developed for the construction of a theory. The reasons for this perhaps also explain the lack of more general and systematic philosophical analyses for a theory of ODL. These reasons have to do with the nature of ODL itself, since the birth and particularly the growth of this discipline came to us as a corollary of several scientific and philosophical fields and other disciplines. It appears, indeed, that potentially the growth of ODL began in the fields of education and pedagogies, it was developed in parallel with the theories of communication and mass media, it was enriched in the 1960s and 1970s with the development of the ‘radical’ approaches in education (counselling, adult education, non-authoritarian and collaborative learning, lifelong learning, new approaches of teaching and learning) and, finally, it received a new identity with the technologies of information and communication (Figure 1).

The total unification of ODL as a discipline has not happened yet. The main reason is the lack of continuation and enrichment of a thematic convergence, as well as the lack of delimitation and determination of its entity in a structured, explicit, theoretical and empirical manner.

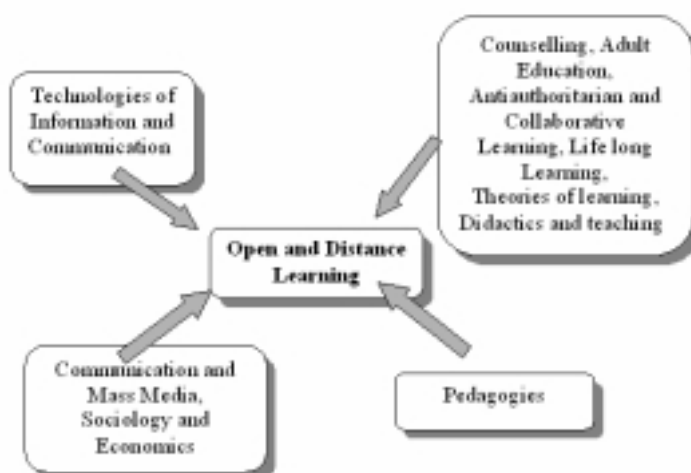


Figure 1

Since the 1980s, theorists of education and particularly of distance education (Bääth 1979; Perraton 1981; Peters 1983; Stewart 1981; Holmberg 1986; Keegan 1983) have tried to create such data, so that they could shape a platform for a theory of ODL. Particularly Holmberg (1986), stressed that “a theory for open and distance learning can be fixed as a series of hypotheses which are related logically among them in a way that they are able to explain and calculate facts. These hypotheses are of the type ‘if A then B’ or ‘as long as more A, so much more/least B’ ”.

The rapid growth of distance learning in the following years (1985–2000) anticipated such efforts, since it did not allow any time for more theoretical analyses. Indeed, the academic and research population involved in ODL increased dramatically during those years with the parallel growth of technologies and the development of a much closer relationship with education. The fact that a number of researchers and academics from parallel or relative scientific fields considered ODL as their own “child” or, in a sense, as the continuation of their academic activities, created a new microcosm with a huge lack of concrete scientific identity. As a result, a large number of scholars involved in ODL come from different academic fields and doctrines, apart the traditional pedagogy.

The new academic map has led ODL to the search of a well-argued, structured and explicit theory in order to establish its own identity. Another reason that has prompted the search for a theory of Open and Distance Learning is the fact that the three key-terms in the field of ODL, ‘open’, ‘distance’ and ‘education’, and particularly the first two, are used with a wide significance, without their users being forced to concentrate on particular applications and theoretical frameworks. A number of people indeed refer to these terms with particular facility and without any scientific reference. Enacted academic bodies do not have any mechanisms of control for the irrational use of scientific terms, nor do they have such a role. Some proposals for the change of the terms ‘open and distance learning’, or at least for the adaptation and explanation or interpretation of these terms, have not received a suitable answer and, as a result, the problem with the misunderstandings continues and often causes misinterpretations (Lionarakis 1998).

## **The action of teaching**

One of the most commonly accepted matters in education was and, to a great degree, still is the fact that teachers and learners consider learning as a product, which is transported and transmitted via the teaching action from one source to another or from one region to another or even from an empirical–philosophical dimension to another. Under this logic, it is often believed and declared that the teaching process is simply a ‘*transportation of knowledge*’ or a ‘*transfer of knowledge*’. Moreover, most of the time, the system mechanism decides, under this perception, how an entire educational system will function. Thus, educational and social reforms, thousands of written pages from the hands of wise educators, philosophers and politicians, lead a total of human potential in the field of education to the zero point. The apotheosis of the perception of ‘*transportation of knowledge*’ and ‘*transfer of knowledge*’ defines today the human potential of many educational systems. This simplified perception, which assumes an almost mystical, metaphysical dimension in the process of knowledge, constitutes the main character of education. And not only this: the infiltration of this perception into the backbone of the educational action for decades has created roots, which define all facts of education.

The exceptions to the rule do not do anything else than to gaze at the mess, at the undetermined and intolerable nature of a problematic educational process. It is well known that, from time to time, ‘painkillers’ are proposed in order to make the transport and transfer of knowledge more creative by means of likeable methods, which give a pretty monotony to the monologue of the teachers and create hallucinations of teaching effectiveness. Presumably there is satisfaction from both parts, that of the teachers and that of the learners. Perhaps there are also marginal results out of the method of enriched memorization used by the learners. No one can doubt this. Only some objection voices could confirm it. Nevertheless, some could claim the evaluation results of the learners together with their satisfaction. But is it indeed a transport and transfer of knowledge that has taken place in these cases?

## **There is no ‘transportation of knowledge’, nor any ‘transfer of knowledge’; so, what is there?**

The German Educational Psychologist Ausubel (1968) states characteristically about the principles of teaching and learning that ‘if I should focus all principles of educational psychology in one, I would say

*the following: the most important and only factor that influences the learning process of the learner, is all these that the learner already knows'.*

The learning process is not a product which is transported via didactic means from one source to another or from one region to another. It is not a transported nor a transferable product. It is a product, which is discovered by the one who is interested in it by using concrete methods and practices. This educational axiom is the key to any scientific approach of ODL. The teaching action strengthens, supports, helps, stirs, fixes, composes, interprets, reflects, argues, proves and, in the end, teaches, but it does so autonomously, because without any specific action nobody learns. Learning is not a product of the teaching action but a product of the learning process. The distinction between these two types of processes, the process of learning and the process of teaching, the methodological particularities of ODL and its convergence with other scientific fields lend a relatively new methodological material, which seeks its own scientific identity. The years when sciences had an evident and clear bisector frame set between them and gave the impression of separate scientific microcosms have ended. This does not constitute an essential and necessary clue of academic or scientific independence. ODL now claims its own scientific ground, as well as the essential conditions and criteria for the configuration of a founded scientific field and a theory.

### **ODL: a founded scientific field**

During the 1980s, theorists of education (Holmberg 1986; Keegan 1983) reported and argued for the existence of a structured and founded scientific field with the name 'Open and Distance Learning'. The term 'open' is mainly used in the operation of open universities, each time with a different application, strategy and policy. The scientific field of distance learning is defined by two academic coordinates:

- the scientific research in the particular field, as well as
- the study programmes of Institutions of Higher Education in the same field.

When a scientific field is described, it is essential to locate the aims/objectives and the outline of its research. Particularly, as far as its integration in an academic programme of study is concerned, it is also essential to describe its educational and pedagogical dimension for the teaching process in Higher Education Institutions.

Holmberg (1986) states that in 1982 fifteen academic research fields and programmes were recognized in the field of Open and Distance Learning, which were the following:

- An analysis of distance learning, philosophy and theory
- Graduate and Postgraduate studies, as well as motives for the students
- Planning of the study programme and its objectives
- Development and creation of study programmes
- Means
- Periodically interactive courses
- Face to face courses
- Counselling
- Planning, organisation and administration of educational institutions
- Economics of distance education
- Evaluation
- History of open and distance learning
- Open and distance learning in developing countries
- Directives to tutors – teachers of distance education
- Research in the field

It would be interesting to conduct research in the above cognitive fields under today's prism, by taking into account a number of new elements, especially from technology, which since 1982 have enriched the scientific field of ODL. Certainly, these cognitive fields have been shaped and new ones have resulted

multi-dimensionally and even common points have been elected with separate roles. In the above points, a number of other cognitive fields have played an important role. Approaches from the fields of education, pedagogies, sciences of education, psychology, sociology, economy, communication, information technology have given an impulse to Open and Distance Learning, as well as to its research and educational applications.

### **Are there any criteria for a theory of ODL?**

According to Popper (1980), the aim of the theorists and researchers is to locate and investigate explanatory theories based on genuine logical syllogisms. That is to say, to investigate theories, which describe structured attributes of the world and which, with the help of certain initial conditions, will allow us to arrive at meanings that require interpretations.

Dimou (1990), in interpreting the models of Popper (1980), Albert (1972) and Opp (1972), states the necessity of certain conditions and elements for the founding of a scientific theory; thus, a theory has to be 'true', to 'inform', to be 'explicit' and to have the form 'if this – then that'. On the other hand, Holmberg's approach interests us, because it allows us to examine the particular characteristics of open and distance learning. With these characteristics in mind, we should approach the conditions and elements mentioned by Dimou, in order to form a framework ready to be defined. A crucial point in the two approaches is the cohesion of hypotheses of the type 'if A then B' and 'as more A so much more / least B'. Holmberg's lack of reference to the issue of the use of the technologies of information and communication in the process of distance learning is characteristic. The lack of reference not only to the interaction between teacher and learner, but also to the interaction between learners and the learning material, is also characteristic but not understandable. While he himself refers to the characteristics of the developing countries, he does not mention the preconditions and criteria for the interactive learning material and its methodology for a ODL study programme.

The academic environment and the educational background have a significant importance. The infrastructure and the necessary methodological criteria for the planning and development of the learning material in ODL fix and define any approach of quality. If we use all the above issues without any attempt to quality control and clarify criteria and preconditions, we shall not be able to develop any preliminary framework for a theory of ODL.

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# ADJUSTMENT OF THE HIGHER EDUCATION SYSTEM TO TERMS OF INFORMATION SOCIETY

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## **Introduction**

### ***Definitions***

1. “Higher education system” will describe educational institutions, teaching programs, teachers’ career, education practice, knowledge and skills certification system, legal system, etc., that is, the whole of activities undertaken by the society to secure higher level of knowledge and skills for its members.
2. “University” will describe all the higher education institutions unless the specific educational institution is indicated, e.g. “technical university”.

### ***Background***

A member of the information society must be able to absorb and select incoming information and learn what they think is useful as fast and easily as possible, and process this information into the knowledge about the world. At the same time, such a person should be perfect and effective in specific application of the gained knowledge.

They should have broad general knowledge in the scope of taking and processing various information and, at the same time, they should develop detailed skills needed for successful functioning in the society. Rapid civilisation changes create additional difficulties. Keeping up with these changes requires external assistance, thus expanding the tasks assigned to the educational system to organising the system of updating and gaining new knowledge and skills. Therefore the educational system will have to be thoroughly reorganised to meet such demands.

It is important to remember that present higher education system is the result of slow evolution from a tribal (witch) doctor and his apprentice to the first European university established in Bologna in 1158 [1]. Since that time the principles of functioning of universities have survived to our times [2] in the majority of Old and New World universities. The quintessence of these principles is: knowledge is received directly from the master, despite that since the 11<sup>th</sup> century a number of teachers (“masters”) and students have been multiplied, same as quantity of the general knowledge possessed by the humanity.

It is also worth noticing that the time of gaining knowledge has been gradually expanded and divided into stages. The right to study on particular level and regulations governing the teaching staff have become more and more formalised. At the same time education has been progressively reoriented from studying to gaining skills, which will or may be needed for the purposes of future jobs. The sublimite of this trend was a system of so called “job order” in communist Poland and other Soviet countries. “Job order” made graduates to get job complying with their acquired professions. Even now it is heard that a person who has a degree in, for instance, sociology, has wasted their education as they work as a shop-assistance or is manufacturer of toys.

## **Short description of a contemporary university**

First of all, most of contemporary universities are crowded with students. Except few universities upholding their reputation of exclusive schools with high level of education, majority of universities extends the number of students thus seeking the earnings; this trend is intensified by the pressure brought by the society, which believes in the slogan of widespread higher education. In many countries, governments also have their share in this pressure as they take part in the race for the highest possible

“schooling rate”. In consequence, universities educate thousands of students, and “mega” universities have even hundred thousands of students.

I think that the next significant feature of contemporary universities is an increasing gap between the reach of the knowledge which is the subject of interest of scholars and scientists and volume of information needed for recognition of this reach, not to mention a share in its expanding. This brings several consequences.

Firstly, average time needed to come to the point of creative production is longer and requirements of potential mental abilities of a creator increase. Therefore even taking into account a higher “supply” of potential creators as higher studies have become much more available, a number of best scholars and scientists per 1000 students seem to decrease and they are less available for the learners.

Secondly, students of junior years are not able to get in contact with scholars and scientists, because they are not available or communication is difficult because of the difference in knowledge possessed by students and scholars/scientists. The result is that there is a faint chance for fruitful co-operation between the learner and the master often substituted with co-operation with a lower grade “master”, someone like a journeyman if described with craft guild vocabulary.

Thirdly, teacher’s career is more and more dependant on meeting formal requirements. “Publish or perish” is generally applied. This sidetracks and divides the research field into a lot of minor specialisations and creates demand (and consent!) for secondary works, repetitions, not original low value works. Desire to shoulder one’s way through the crowd of rivals often leads to plagiarisms and even deception. At the same time scholars/scientists who are active in related but different fields of research are not able to communicate with each other.

Initially universities were a community of students and scholars practically independent from any other authorities (king, municipality, church). Contemporary universities are strongly attached to corporate model of organisation, where university teachers are in fact sovereign in managing of their university and absolutely independent within the field of their research. This adversely affects objectivity of decisions and significantly limits ability of the university to optimal utilisation of their poor financial means. Financial means given by the society for the needs of the universities are and will be more and more limited because of other needs, particularly those connected with security of the state and citizens. The increased number of education users limit development opportunities of universities and adds to frustration of teachers, scholars and scientists. Rich countries are less affected, but it is a problem in developing countries, such as Poland and other CEEC. Development of these countries is strongly interconnected with education of the society, so each misassigned euro adversely affects education of new generations and upgrading of the educational level of adults and is disadvantageous for a country itself.

## **Information society seen from the university**

The most visible features of the information society are:

1. volume of available information and enormous computer and net supported abilities to transfer, collect, store, process, sort, present, and use for explaining and forecasting the future in almost all fields of human activities
2. accurate allocation and professional implementation of assignments
3. projects completed by teams working in the virtual space of computer nets
4. formalisation and stabilisation of project completion methods through standardisation of procedures and quality control (more and more general use of ISO 9001:2000 is a good example)
5. taking care for optimisation of decision-taking based on formalised procedures frequently utilising various fields of mathematics
6. globalisation of all fields of human activities, education included



7. a part of educational tasks have been taken over by commercial organisations (suppliers of various educational services and so called corporate universities)
8. rapid changes in service, production and trade. New specialisations have appeared and certain specialisations have disappeared.
9. knowledge and creativity have become one of most profitable products
10. mobility of people in multilingual and multicultural real and virtual environment
11. the source of civilisation progress has been shifted from universities to large multinational corporations or specialised governmental agencies, or “non profit” organisations

Simplifying we can say that the above-mentioned phenomena result in or originate from rapid development of hard- and software within last 10-15 years. This business is still rapidly developing and all the time new and better inventions are placed on the market. This trend of technological changes does not seem to slow down!

This certainly is revolution in information technology and at the same time it is the turning point of old and new education. University communities slowly and not without difficulties become aware of this revolution.

It should be highlighted here that consequences of IT revolution in education are not only changes in information transfer (multimedia package instead of books, chat or e-mail instead of conversation, or Internet used instead of libraries, etc.). I will try to prove that this change is much deeper and comprises the whole educational system.

### **Requirements to be met by higher education system**

1. The most visible is the demand that universities educate as many persons as possible. It would be best if 100% of the society has higher education! At the same time it is important to explain what is understood by “higher education”. Basically it means completion of university studies, but the level of university is not taken into consideration.
2. The second requirement is an active part in continual updating of the knowledge of members of the society and supporting them to adjust to the changeable civilisation environment.
3. The third requirement is assistance (share) in solving of particularly difficult problems, future forecasting and creating civilisation progress. Although these demands are gradually ceasing, because many outstanding scholars and scientists are employed beyond universities, for instance in corporate laboratories, governmental agencies, military forces, etc., answers to the most difficult problems are still requested from university workers as they are supposed to have sufficient competencies.
4. Last but not least is “production” of the highest quality minds.

These four basic requirements are followed by other demands, which are probably less important and may be treated as derivatives from the above. Among others, these are:

- A. Continual updating of teaching programs oriented at the latest achievements in knowledge
- B. Internationalisation of studies understood as learning to function in any culture and communication in various languages (at least 2 plus native language). It may be defined as learning to be a citizen of Europe and the World but not a cosmopolite
- C. Mobility in virtual space and skilful functioning in all e-fields, and particularly, intensive use of e-education. It is important to mention here that contemporary educational system utilising digital technique and computer net is much broader than so widely known and discussed “distance education”.
- D. Highly efficient teaching. More and more voices are heard demanding intensification of learning (more knowledge and skills in shorter time) and reduction of costs in order to make education available for financially handicapped groups.

## Discussion on postulates in the context of characteristic features of the information society

The postulates listed above may be divided into two groups: postulates referring to research, that is postulates 3 and 4, and other postulates directly connected with the educational function of universities, that is, postulates 1, 2, A, and D. Demands presented in items A, B, C referring to adding new elements to the programs, and postulate D referring to organisation and broadly understood management of educational process should be treated separately.

Comparison of conditions required for completion of tasks show significant differences between the groups. Research work and development of scholars and scientists (creators) require freedom and independence of university workers, broadly understood social security, and learning through participation in the master's research. In other words, a scholar/scientist works just the same as their predecessors have studied for centuries. Technological revolution does not add here anything particular. May be ability to work in groups, very often in virtual space, is more needed than it was in the past.

Conditions needed for meeting requirements concerning the other group are different. Demand for universality and continuity (education of adults) and economical effectiveness at the same time, practically make it impossible to maintain freedom of teaching and learning which has been an ineliable right and privilege of an academic teacher so far. Educational process in the environment of an university teaching crowd of thousands must be similar to mass or at least large series production. It is even more clearly visible when referred to the above listed features 1-6 of the information society and consider more and more intensive competitive position of educational business (feature 7 of the information society).

Certainly there are more differences in functioning of contemporary universities in both fields taken into consideration. Though character of this paper does not allow presenting the detailed analysis, it possible to formulate the following hypothesis:

*In near future the existing higher education system will split, and a new type of institution educating the intellectual elite will start to exist (it will probably cover education on the level of post graduate studies), and at the same time this institution will overtake all privileges and features connected with so called Paris or Humboldt's type universities. Parallely academic freedom of other universities will be reduced in order to achieve higher (educational and financial) effectiveness of lower level education (it will be probably the level of the first 3-4 years of contemporary studies). Because of the teaching methods (teaching through common research) this new institution will not be called a "university" but a new name describing essential functions of this institution will be created. It will be, for instance, "civilisation centre" or "laboratory of knowledge", etc. Future institutions, however, will an emanation of new element of superior quality from the current institutions.*

Division in educational work originated in broad utilisation of digital technique will attribute a lot to industrialisation of education at lower levels.

So far, the only external assistance in teaching has been an editor of handbooks. All other tasks connected with teaching has belonged only to a teacher who did not need any other assistance.

Digital technique has significantly complicated and individualised this process. Practically, **every** teacher (if they only want and are able to) may be an author, illustrator, technical editor designer, and performer of virtual experiments, film operator and editor, distributor of handbooks designed for that one and only one student. And all these is achieved with the help of only one device: properly equipped computer. If a teacher does not want or is not able to do it, they may employ specialised service providers, who will create the whole teaching supporting system on the grounds of information about volume and content of the knowledge and skills to be taught. A teacher will only have to assist students in understanding the problem, checking progress of learning, demonstration of skills, certification of the level reached by the learners and deliver all that **cannot be written, recorded and drawn**. In this respect teachers will be assisted by knowledge suppliers (teaching content), educational authorities responsible for institutional education environment, manufacturers of tools needed for production and supply of didactic materials (tools for production of teaching and learning aids), suppliers of knowledge management systems (tools for management of didactic process), producers of teaching supporting hardware and software (suppliers of virtual didactic aids). This list of specialists and specialised companies will be probably much longer in

future. This is one of the features of the information society consisting in professionalisation and globalisation. Just now a teacher may get these services from the entire world neglecting the state boards.

The next very important problem which seem to be overlooked is the consequence of growing volume of the useful knowledge (postulates A, B, C). In this connection, the academic freedom of choosing methods and detailed scope of the delivered knowledge and low flexibility of the existing organisation in terms of changes elongate the time of studies, reduce quality or leads to teaching not very useful or even useless knowledge and in all these cases decreases the demanded effectiveness (postulated D). In consequence the universities may loose candidates who will choose commercial providers of knowledge (feature 7 of IS).

The above mentioned problem is strictly connected with the second postulate (assisting members of the society to comply with varied civilisation environment). Contemporary universities are more or less oriented to teach "everything" in a given field of knowledge. This results from the university tradition. Only few programs are created in such a way that certain rarely used parts of knowledge are taught on request as FOLLOW-UP of specialist courses. Lifelong learning of specific skills should be a standard for the knowledge-oriented society! This will be reached thanks to wide application of digital techniques.

## Conclusions

Certain features of the contemporary higher education system discussed at the background of information society indicate that it is necessary to adjust the system to conditions of knowledge oriented information society. The existing system of higher education seems to be out of date and too static when compared with dynamically developing other fields of social activities.

It seems that the process of adjustments should be focused on three fields:

1. Adjustment of teaching programs and organisation of universities to supply POSTGRADUATE specific educational services in the form of separate paid courses provided on request. This system supported by computers which will be widely applied in management, delivery of information, communication between teachers and student will result in reduction of time required for teaching and learning not very useful knowledge and increase (economic and didactic) effectiveness of studies. It must be underlined that the choice of teaching methods and communication between teachers and students should meet the target, characteristics of the receiver, predispositions of the teacher, etc. and certain solutions cannot be treated *a priori* as the best for the purpose (i.e. distance education).
2. In case of large universities, standardisation of teaching, control of effects and management of the process connected with internationalisation and individualisation of undergraduate studies, institutional separation of junior courses (the first 3-4 years of studies) from exclusive education.
3. Both types of education require different methods of management, different predispositions and qualifications of the staff, different predispositions of the learners. Mixing of such different types of activity within one institution is irrational. However, these comments do not refer to all the universities to the same extend.

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# DIDACTIC MODELLING OF LEARNING OBJECTS: EVOLVING STANDARDS AND METHODS OF EVALUATION IN METADATA-BASED COURSE DEVELOPMENT

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## The changing reality of teaching and learning scenarios

“The half-life of professionally relevant knowledge has shrunk to an estimated 20 years for school knowledge, 10 years for academic knowledge, 5 years for professional knowledge, 3 years for technological knowledge and only 1 year for knowledge in IT technology.” This statement by an IBM trainer underscores the fact that life-long learning has become a defining characteristic of professional activity in today’s knowledge society (Swertz, 2001). Learners in professional contexts are increasingly required to expand their knowledge base and skill repertoire “on the job” and “on demand”.

Computer-supported learning systems have freed learners from the place and time constraints of face-to-face instruction and made it possible to provide professional education and training with a high degree of personalization. The growing performance demands on learning management systems have, however, quickly exceeded the possibilities of traditional, more static forms of computer-aided learning such as first generation educational software, CBTs or WBTs. Moreover, traditional methods of generating teaching/learning materials have proven very costly and labor-intensive. Problems arise if content cannot be easily ported to other systems (interoperability) or updated and adapted to different purposes. This holds especially true in fields which are characterized by extremely short innovation cycles and heterogeneous user populations as in Information Technology where learning materials are an important production factor and therefore have to meet high quality standards. Content has to be adaptable to different application contexts on short notice to respond to continuing changes in the “state-of-the-art” (Caumanns & Hollfelder, 2001). The use of modern I&K technologies therefore has not only changed learning requirements and the way learning is conducted, but has also had an impact on how learning materials are developed, designed, distributed and administered. To meet these demands, learning materials have to be modularly designed, stored in a media-independent format and made dynamically accessible via interconnected knowledge repositories.

The goal of modular distributive approaches is to “provide access to the highest quality education and training, tailored to individual needs, delivered cost-effectively, anywhere anytime (Advanced Distributed Learning Network).<sup>1</sup> In order to achieve this, content as well as form and method of presentation have to be exchangeable, re-combinable, and reusable independent of system environments, authoring systems or application context” (Pawlowski, 2002). Only by making content units recyclable, can the considerable conceptual and administrative effort and cost of creating and maintaining *media objects* be justified and serve as a motivating factor for content authors and other stake holders of modular learning systems.

Modular content development has advantages for all concerned: *Organizations* can develop content more effectively by reusing existing modules and developing new materials on an as-needed basis. Being able to port content between different Learning Management Systems reduces the cost of development, distribution, and maintenance of such resources. The *Learner* benefits in that s/he can chose individual learning paths and select an individual, skill-based rather than course-based curriculum. *Trainers* can tailor content to specific learning requirements or user groups.

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<sup>1</sup> <http://www.adlnet.org>

## Metadata Standards for Learning Objects

Media objects can differ in kind and granularity and must not be restricted to content only. As the all-inclusive definition of the *Learning Objects Metadata Working Group* underlines, **learning objects** can also include tools, persons or institutions.<sup>2</sup> Wiley (2001) defines learning objects more narrowly as “any digital resource that can be reused to support learning.” Other common terms such as „reusable information object, shareable content object, nugget, lego, modular building block, chunk<sup>3</sup>, illustrate what is at the core of this modular concept: a self-contained unit which can be selected on the basis of various metadata specifications to be dynamically combined with other learning objects to form meaningful learning sequences.

The **Metadata** standards for learning objects, which are currently being developed and supported by different initiatives (e.g., IMS, IEEE LTSC P1484.12.1 LOM standard for Learning Object Metadata or the Sharable Content Object Reference Model (SCORM) of the Advanced Distributed Learning Network (ADLNet)), provide a number of specifications for annotating various technical, content- and application-related aspects (Greenberg, 2001). Although the LOM Standard includes also a category for *educational* metadata, the provided specifications (Fig. 1) do not allow for an adequate representation of didactic concepts.

InteractivityType
<b>LearningResourceType</b>
InteractivityLevel
SemanticDensity
IntendedEnduserrole
Context
TypicalAgeRange
Difficulty
TypicalLearningTime
Description
Language

Especially the diversity of educational object types and their didactic functionality cannot be appropriately represented. The LOM category *Learning resource type* only provides a very limited vocabulary which confounds functional typology “How can I use this learning object,” e.g. as an example, experiment, and presentation typology “How is this learning object presented?” e.g. as a table, picture, etc.

However, these distinctions *are* important if the potential of distributive approaches is supposed to be utilized in didactically meaningful ways. The mere annotation and organization of learning objects in form of subject matter-specific concept ontologies follows a content logic which is not sufficient for use in pedagogically motivated applications. Or as Wiley (2001) has put it: information does not equal instruction!

Fig. 1: LOM educational

We thus propose an extension to the current standard in the form of two classifications denoting a) the didactic function a specific learning object may serve, and b) the form of representation of the learning object (Brenstein, 2003). The *ontology of didactic building blocks* provides for several types of units: overview, explanation, procedure, practice, communication, interaction, notes, and reference units. These can be assigned to several generic learning tasks (Fig. 2): getting an orientation regarding the content and the learning task (1), obtaining support information (2), acquiring core knowledge (3) as well as supplemental, more in-depth or transfer (4) knowledge. Irrespective of didactic functionality, each learning object can take on different forms of representation which can be described with the *form of representation ontology*. Thus a **content overview** could be represented in form of a table of content, in graphical form or as an index. A **case example** can be presented as a text, a flow-chart or in form of a simulation. An **additional resource** can be provided in form of an URL, a literature reference or as details for getting in touch with a person. The representational ontology distinguishes between several representational types: text (lists, tables, indices, plain text), graphic (realistic, analogical, logical), items (multiple-choice question, fill-in the blanks, statement), objects (tool, computer program), person (tutor, peer learner). Each category is further divided into subtypes.

<sup>2</sup> Learning Objects are defined here as any entity, digital or non-digital, which can be used, re-used or referenced during technology supported learning. ... Examples of Learning Objects include multimedia content, instructional content, learning objectives, instructional software and software tools, and persons, organizations, or events referenced during technology supported learning ([http://ltsc.ieee.org/doc/wg12/LOM\\_1484\\_12\\_1\\_v1\\_Final\\_Draft.pdf](http://ltsc.ieee.org/doc/wg12/LOM_1484_12_1_v1_Final_Draft.pdf))

<sup>3</sup> ASTD & SmartForce (<http://www.learningcircuits.org/2002/jul2002/smartforce.pdf>)

## Didactic Modelling

Traditional didactic models are of limited usefulness for modeling learning in virtual environments, since they are concerned with structuring a course of learning in a concrete topic-related teacher-student interaction (didactic triangle) as well as with the operationalization of objectives, the selection of learning materials and social forms. Teaching methods which have been developed for classroom learning (Flehsig, 1996) can therefore not directly be translated to the didactic structuring of learning objects.

Didactic methods for web learning must proceed in reverse in that they should provide an optimal learning environment und support individualized learning paths. The methodological challenge thus consists in conceptualizing courses of learning which are highly configurable, self-organized, adaptable, and searchable. Meder (2001) describes the affordances of a new didactic approach as follows: „It has to be noted that learning in the 21 century will be radically different from what we know as school or course-oriented learning from the 19th and 20th century. This “new learning” is rather a making-available of information and knowledge resources when faced with a problem, it is a kind of updating of knowledge which is stored in machines.

And such new learning requires a new didactic approach which can not be school didactics or even course didactics in the sense of professional training. It must be a didactic of availability. It must be suitable for the acquisition of specialized knowledge, for learning in short intervals which are integrated into the work process.”

Whereas teachers were traditionally held responsible for the didactic structuring and guidance of the learner, the new educational vision of the self-determined und self-organized life-long learner requires learners to take a more active part in structuring their learning experiences in open learning environments with a high degree of self-regulation. In order for individual knowledge management to be successful, selective access to information has to be facilitated and didactic structures have to be made transparent. The question remains, which instructional dimensions are relevant for different users of a metadata-based system such as content authors, course authors, and learners. Unfortunately there is no “genuinely media-didactical theory discussion, which would provide an overarching frame of reference from an educational science point of view” (Kerres, 2001).

Aspects of didactic design of learning objects are relevant at the macro, meso, and micro level (Schulmeister, 2001): A learner should not only be able to *select materials* with the help of metadata specifications (e.g. media type) at the macro level, but also be able to put together a learning unit according to didactical criteria (e.g. collaborative versus receptive learning). Moreover, it has to be determined which *didactic models* can be applied at the meso level. Finally, at the micro level, the question is *which aspects* can be modeled and how such modeling can be achieved with the help of metadata annotations within existing standards (e.g. LOM) or whether extensions are necessary to implement specified didactic designs.

However, didactic structuring is not only a matter of selecting and sequencing learning objects. Different methodological approaches also differ in their epistemological foundations. As Allert, Dhraief & Nejdil (2002) stress, there are no didactically neutral design approaches. Even the technical implementation of learning environments is tightly interwoven with basic epistemological beliefs. For example, the change from an acquisition-oriented teaching approach to a more multiply determined notion of learning is reflected in the design of multifunctional learning environments where teachers, tutors, peer learners as well as context factors play a significant role in shaping the learning experience.

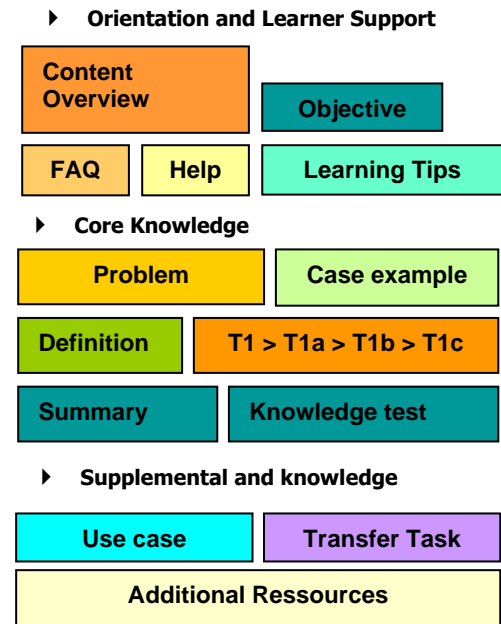


Fig. 2: Didactic building blocks

Didactic dimensions can therefore be represented at different levels of abstraction: At the highest level are **didactic models** which are implicitly or explicitly grounded in a larger epistemological context. Paradigmatic differences between behaviorism, cognitivism, and constructivism are clearly reflected by a fundamentally different understanding of the role the learner plays in the learning process and therefore have far-reaching consequences for the conceptualization and design of learning environments.

On the next level, **instructional principles** can be derived (see also Merrills (2001) “set of underlying principles”) such as Ausubel’s concept of *Advanced Organizers*, *learning transfer through problem-solving*, *problem-based learning*, *situated learning*, *communities of practice*, etc. These basic models and theories can then be operationalized with specific **learning methods** in the form of typical learning sequences or **templates**. Finally, at the lowest level, learning objects can be assigned to didactic functional units with the above mentioned classifications.

Allert et al. (2002) refer to such templates as **instructional roles** (see also Guarino (1994)) which provide a defining framework for other LOM attributes. These role descriptions have provisions for different actors, intentions, themes/skills, processes and methods. For example, they propose a process model for traditional expository learning with various phases of learning: Advanced organizer, progressive differentiation, practice as well as integration and synthesis. The method can be varied in that *inductive*, *deductive*, *spiral*, *elaborating* und *differentiating* approaches are distinguished. Situated learning, on the other hand, implies a methodology consisting of peer tutoring and multiple perspectives. Thus it becomes apparent that a change from the didactic principle of *expository learning* to *collaborative learning* requires a shift in a number of LOM categories such as IntendedEnduserRole, Interactivity Type, TypicalLearningTime, etc. Different method variants can thus be schematically represented in form of more or less differentiated templates and serve for the course author as a starting point for the adaptation of didactic strategies to different learning scenarios.

#### Didactic Metamodels: The IMS Learning Design Model

Meta models provide a unified limited vocabulary for describing different approaches and learner- and context-specific operationalizations. Meta models can be used to model numerous combinations of different forms of learning as required by current blended learning concepts. Explicit modeling of educational and didactic criteria enables instructors as well as learners to become more aware of the didactic possibilities of different approaches and helps these to use them more actively and creatively.

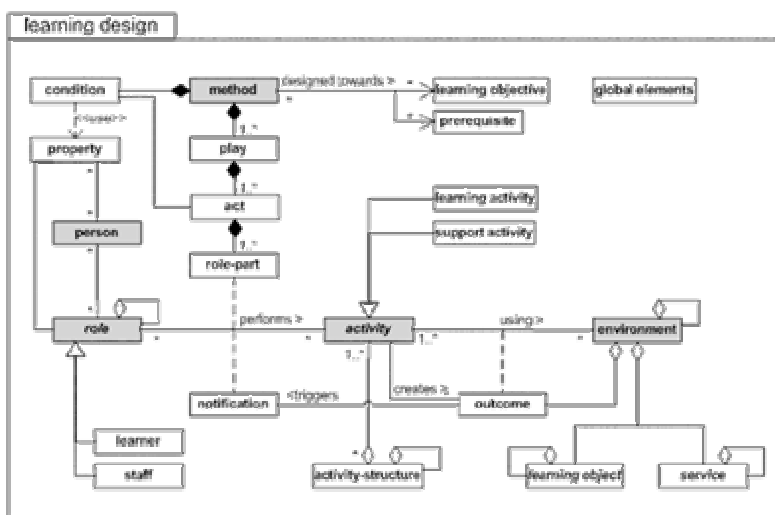


Fig. 4: IMS Learning Design Model

One very promising meta model is the new release of the IMS Specification for the „Learning Design Model” (Version 1, October 2002) which is based on Koper’s Educational Modeling Language. The Learning Design working group has defined their goal as „the development of a framework that supports pedagogical diversity and innovation, while promoting the exchange and interoperability of e-learning materials<sup>4</sup>”.

The IMS meta model (Fig. 4) which places not content but **learner activities** at the center of attention, consists of 1. **learning and teaching**

**theories** which describe theories, principles and models of teaching and learning (e.g. behaviorist, cognitivist, constructivist, socio-constructivist or eclectic) 2. a **learner model** which describes possible

<sup>4</sup> <http://www.imsglobal.org/learningdesign/>

interactions in specific learning situations, 3. the **domain model** representing the content of the application domain, and finally 4. the **model of learning units** which specifies, how learning units can be designed given different learning theories, learner models, and domain models. The model provides specifications at different levels of complexity: A generic A variety (Fig. 4) or more differentiated B and C varieties, with more possibilities for personalization. All representations allow to model learning activities of one or more participants working independently or collaboratively within different epistemological approaches.

In addition to the learner model, IMS also offers templates for „Reusable Definitions of Competency or Educational Objective” which allow for modeling individualized learning sequences since objectives for skill-based learning can be adapted to existing competencies. Finally, the sequencing of learning steps can be modeled and controlled with the **IMS Simple Sequencing Specification**.<sup>5</sup>

The German Working Group on Didactic Standardization<sup>6</sup> at the German Institute of Standards<sup>7</sup> is currently evaluating the IMS approach. Some changes have already been suggested on theoretical grounds, e.g. expanding the “role” definition to include agents other than learners and staff.

### Metadata-based course design evaluation

In order to evaluate the practical feasibility of metadata-based course design, the approach outlined above is also being evaluated within the framework of the Teachware on Demand project<sup>8</sup> in which methods and tools have been developed for 1. computer-supported production, metadata annotation, and administration of learning objects and 2. agent-supported course development and presentation of adaptive learning materials in the area of Information Technology Instruction. The tools which have been developed as part of the project (Karosseit & Wendt, 2002) allow content authors to either fragment existing materials or create new modular content units which can then be combined to new learning units on the basis of different didactical templates. In order to facilitate reuse on a broad basis, information regarding content, formats, methods, and sequencing are stored independently.

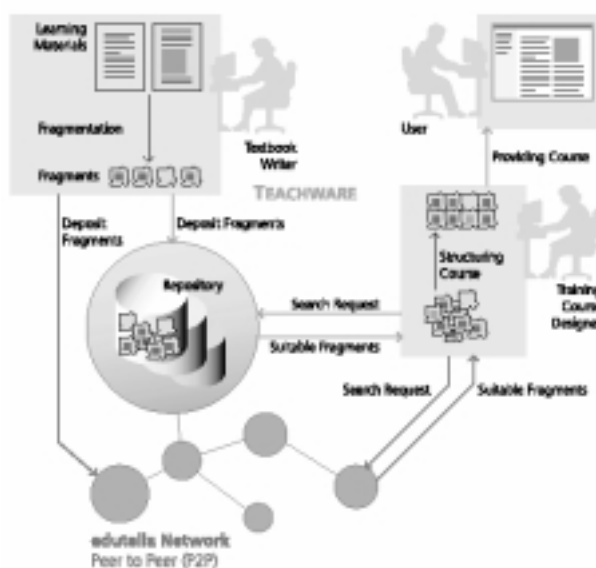


Fig. 5: Teachware On Demand Work

An evaluation of this approach was conducted with two use cases: a) with IT trainers preparing and using materials in the area of telecommunication science in a distance learning context, and b) with school teachers preparing and teaching an online course in psychology in secondary school. The evaluation focussed on several aspects of working with metadata-based learning systems:

*1. Developing modular learning materials:* In a first step, we evaluated how satisfied course authors were when using the tools for fragmenting existing materials. Secondly, we looked at what problems occurred when authoring new learning objects. We examined especially how well authors were able to assign functional descriptors to learning objects. One of the observed problems was that authors had difficulties thinking and writing for a modular system. Among other problems, they had difficulties reducing the granularity to screen-sized units.

Most problems arose with metadata annotation. While most authors were happy with the automated support features, many found the manual metadata annotation process very time-consuming and not

<sup>5</sup> [http://www.imsglobal.org/simplesequencing/v1p0pd/imsss\\_info/v1p0pd.html](http://www.imsglobal.org/simplesequencing/v1p0pd/imsss_info/v1p0pd.html)

<sup>6</sup> <http://elm.wi-inf.uni-essen.de/en/standard/din.html>

<sup>7</sup> <http://www.ebn.din.de/>

<sup>8</sup> <http://www.isst.fhg.de/english/projekte/>



always easy. The examination of inter-rater reliability coefficients showed that the annotation practice of different content authors varied considerably. It became also quickly apparent that the provided ontologies for classifying didactic functionality and form of representation needed to be modified and expanded in response to subject matter-specific demands. As a result, recommendations are being formulated for a more elaborate automatic handling of metadata annotation. At the same time, a detailed guide is being developed for content authors with examples on how to handle problem cases.

2. *Structuring learning units*: In a second step, the use of didactical templates for putting together larger learning units or courses was evaluated. It was examined whether the automatic retrieval functions and selection procedures were indeed able to identify suitable learning objects from a pool of materials stored in a repository. The authors provided also valuable feedback regarding the possibilities for customizing templates by inserting or deleting components or modifying the content of the slots provided by the template.

3. *Learning with a flexible learning system*: Finally, the approach is currently being tested with different course implementations. The materials for this investigation do not come from a repository but have been especially developed in order to ensure that a large enough variety of different types of learning objects is available both regarding didactic functionality as well as different forms of representation. The goal was to identify to what extent students utilize the additional information provided by metadata annotations to consciously select information suitable to meet task demands and whether they do this in accordance with their learning orientations. The learning tasks were varied to cover learning facts as well as learning concepts and procedures. The results show clear differences in depth and breadth of material covered and the use of metadata information between students with high or low metacognitive abilities and different learning orientations. Details of the results will be presented at the conference and be available for further reference as part of the project report to be published in June 2003.

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# METACAMPUS: QUALITY BROKERAGE SYSTEM OF COMPETENCY-BASED TRAINING

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Before we talk about quality, we must talk about compatibility. Quality enters the equation once the technical compatibility issues are solved (just think of the disconnection between the owner of a VHS player and a now-useless BetaMax film library). Standards, as the basis for ensuring this compatibility, are key to channelling the convergence of e-learning technologies just like video (and now DVD) standards have been key to globalising the reach of those mediums.

This paper will present MetaCampus' recommendations on specific e-learning specifications and standards, in particular in the areas of competencies and instructional design, which may then contribute to the long-term e-learning quality. We will briefly describe MetaCampus, a European Commission-funded IST programme, with emphasis on its metadata scheme and competency model, and then show some real world uses of the MetaCampus competency model. Conclusions will round out the presentation.

## The MetaCampus Project

MetaCampus aims to be a unique lifelong-learning marketplace, providing Learning Citizens with a number of state-of-the-art features and services that are designed to help fulfil ongoing educational and training needs, in particular competencies.

Driving the development of MetaCampus are *three principles*: 1) follow the many innovative and relevant undertakings regarding metadata standards, competency models and competency standards; 2) create standards-conformant software to meet the needs of Learning Citizens and, by doing so, maximize added value to content providers in the knowledge economy; and 3) develop a workable competency model that contemplates learning objectives (and competencies) and resources, which is replicable for other competencies and resources.

As of this writing, MetaCampus has produced on one hand the publicly available body of documents delivered to the European Commission and on the other hand the prototype, currently at the validation stage. This validation involves testing the integration of the various modules and software applications concerning *four main innovations*: the catalogue and search methods; the training consultant expertise on competencies; the standards-conformant competency model; and the intelligent offering of reusable learning objects for teaching competencies, including raw data, or assets. These four innovations respond to what we consider *weak points in current metadata standards* and the advisability of *distinguishing generic competencies* from more from more job-specific, tool-specific or company-specific *competencies*. We will talk about this in more detail regarding MetaCampus' recommendations.

## Learning Objects and Competency Models

Underpinning the entire MetaCampus system are the building blocks of e-learning – learning objects (LOs) and the metadata that describes them. LOs can be described narrowly or more broadly. Whereas LTSC defines a learning object as "any entity, digital or non-digital, that can be used, reused or referenced during technology-supported learning..." (<http://ltsc.ieee.org>), this definition does not specify the possibility of describing these learning objects by separating content and format or media, a lack of distinction which may result in restricting process-oriented Instructional Design considerations.

The IEEE definition, however, appears to be both more inclusive and, potentially, divisible. Its definition includes a broad range of content and applications "that only have to be object-oriented pieces of a course to be considered as learning objects". This would include media (graphics, video, audio, animations), instructional components (lessons, modules, units), and technology supported learning opportunities such as message boards, chat rooms, virtual seminars and discussion forums (<http://ltsc.ieee.org>) [1].

In short, for MetaCampus, LOs would belong to a larger whole (a course, a module...); focus on particular learning objectives; prepare for possible futures; chunk non-sequentially; allow for surplus and variations; and allow to separate the generic from the specific [2].

The larger picture is that such *LO “content” can be independent of its “container.”* This means that in the greater “learning ecosystem” such content can be stored in databases and referenced “via Web-enabled index structures commonly built in XML”, XML being a key component in SCORM (versions 1.2, 1.3 and 2.0). The elements comprising this ecosystem, ranging from a common taxonomy for repositories of LOs and competencies to Mentoring and Support tools, can be integrated within an architecture using these LOs [3].

For MetaCampus, building its system upon this concept allows the previously-discussed possibility of *differentiating two kinds of competencies*, as well as creating the metadata scheme that allows *searches for LOs of various granularity [4] and sequencing* applications.

Looking deeper into LOs and sequencing involves questions of 1) how to relate these LOs to satisfy individual user’s specific learning and competency needs, learning styles and preferences, while at the same 2) enabling the use of different pedagogies and instructional design strategies. In order to comprehend the bridge that MetaCampus has built between these questions, it is useful to track two leading initiatives – in Europe, the Educational Modelling Language, and in the United States the developments in the Customized Learning Experiences Online (CLEO) Project ([www.cleolab.org](http://www.cleolab.org)).

The *European Educational Modelling Language* defines an EML as “a semantically rich information model and binding describing the content and process within ‘units of learning’ from a ‘pedagogical perspective’.” EMLs are intended to focus on process not content, allowing teachers to describe their teaching practices using their own vocabularies. Being descriptive not proscriptive, EMLs aim to standardise the description of teaching and learning, not the teaching and learning themselves. Nor do they aim to describe the production and authoring of resources, instead they focus on describing the educational process [5].

In the United States, *CLEO* is currently developing specifications for learning objects and their sequencing rules under a formal architecture, *based on SCORM 1.3 IMS Simple Sequencing [6]* In this model, a learning object is built around a single enabling objective, with content structured following an instructional template. Whereas in the SCORM model, “there can be no interrelationships between learning objects, CLEO will allow for complex rules for interactions between objects” [7]. With Simple Sequencing, there can be “a mechanism for defining the way a set of objects are presented, including branching, iteration”, adding a great deal of additional functionality and flexibility [8].

Both of these initiatives mean that it should be possible to add information in IEEE-LOM and IMS metadata schemes to separate content from media and context and to allow referencing of LOs as components in a learning process for reuse and instructional design sequencing [9].

This discussion brings us to the question of the MetaCampus competency model, a model that is not only *flexible* enough to conform to IEEE-LOM Version 1484.12.1-2002, and IMS specifications, but can *accommodate extensions* as regards competencies.

The metadata scheme for MetaCampus conforms with the specifications laid out in the IMS Reusable Competency Definitions working group, the LTSC Competency Definitions working group and the HR-XML Consortium [10], whose combined efforts may produce best practice for a reusable competency definitions standard. It “allows the capture of information about evidence used to substantiate a competency and ratings and weights that can be used to rank, compare, and otherwise evaluate the sufficiency or desirability of a competency” [11]. It allows linking the many separate parts of e-learning and training such as learner information, content, practice and assessment, sequencing and instructional design.

However, a problem arose during the design for MetaCampus’ inference engines and databases. If the project’s software remained at an abstract level, the intelligent system would be incapable of finding the relevant competency-related resources for the final user according to his or her specific needs, knowledge

and competency gaps. This problem directly involved all the previously made considerations regarding LOs and sequencing in the system.

For purposes of solving the problem of ensuring accurate referencing, cataloguing and searching, it was **necessary to separate** generic competencies (meaning those that could become industry-recognized standard), and those that were more context dependent and/or situation- or tool-specific, competencies that could evolve over time, as the environment in the marketplace evolves. MetaCampus refers to these as “concrete competencies”.

For example, whereas an generic standard in ICT sector might be “programming languages”, a concrete competency may be “software programming using Java”, MetaCampus thus sets levels of competency granularity via two parallel schemes, generic and concrete: a) Competency Standard; b) Competency field (Technical, Business and Technical); c) Competency; d) sub-competency, an element comprised of LOs that when aggregated may fulfil a learning objective related to either scheme.

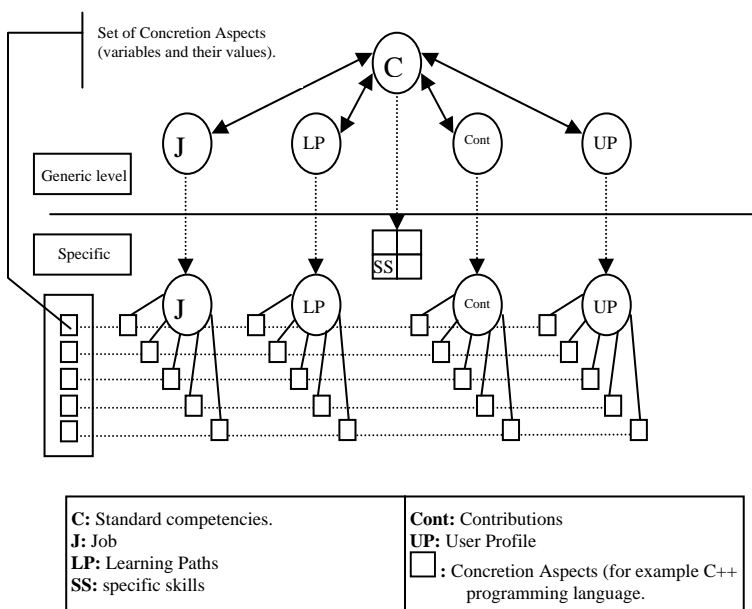
Tackling this problem of accuracy, MetaCampus took **two approaches**: 1) deconstructed the units of competencies in two possible ways so that relations among different competencies and their internal parts could be established; 2) provided for additional information in the metadata scheme to concretise the competencies.

1) **Units of Competencies**: MetaCampus related units of competencies to a set of smaller elements comprised in the unit. These more specific abilities, skills or knowledge, when aggregated into a whole, address an industry standard competency or a more generalized, personal, less technical competency, were called sub-competencies. Competency C, therefore, is comprised of a finite set of sub-competencies.

Within this line of action, a second area included “**contributions**”. A contribution is what one resource or a set of resources provides for the acquisition, partially or totally, of a determined competency, ability, knowledge, skill, etc. To select these contributions appropriately, so that they do not superimpose or repeat themselves concerning content or training already received, required rules to establish semantic and structural relations between the learning objects. The setting of these rules form part of the recommendations MetaCampus proposes to standards bodies (given that different combinations of words can produce a practical user’s manual or a work of art).

2) **Concretise Competencies**: each generic competency definition could be related to a multitude of specific relations (in jobs, in user profiles, in resources, in learning objectives). The only way to increase accuracy is by adding specific information to concretise the competencies. This information would use the same keywords or derive from common taxonomies. Like rules, the determination of the taxonomies was beyond the project’s scope, but is likewise a topic for recommendations to specifications bodies.

Below is a visual description of the relations that can be established between concrete and generic competencies and contributions:



What we have presented thus far describes the **solutions for the prototype**.

The **next step** involves conformance testing and certification of the MetaCampus product, entering the area of standards and specifications.

After a brief description of standards and specifications, we will identify the **recommendations** MetaCampus can make regarding them.

## Market Applications

Before talking in more detail about specifications and MetaCampus' recommendations, it could be helpful to consider some real-world applications in order to envision the working whole of the MetaCampus competency model. The table below details the different usages by actors, each with different core businesses.

Actors	Application in Function of User's Needs
Learning Citizen	Provides opportunity to obtain certificates and competencies
Human Resource Department	Facilitates applications such as matching, recording, offering, searching for training resources, personnel and career progress
Traditional Publishers in Education/ Training Materials	For entities that want to channel content on-line; sell certificate courses; sell specific courses on competencies
E-Learning Content Providers	For entities that sell certificate courses; sell industry specific competency training; sell reusable modules/units
Traditional Universities	For universities with needs to organize and describe contents for e-learning, reusability of content and improved knowledge management
Public Administrations. Ministries of Labour. Vocational training and reinsertion	For public entities that have publicly available content to teach either their own staff or the public at large but want to use MC competency model and intelligent catalogue services
Private Corporations and SMEs	For private entities that have corporate or company-specific content to teach employees but want to use MC competency model and intelligent catalogue and data base services (scalable)
Professional Bodies/Unions	For entities that only recommend competency-based guidance and training to their constituencies
Corporate Universities	For corporate universities that have private competency scheme but lack intelligent storage, search and delivery services
Cultural Organizations/Media	For entities that want to channel content on-line, and want new distribution lines

## Standards and Specifications: What is MetaCampus Proposing?

Broadly speaking, e-learning standards and specifications deal with interoperability among diverse Learning Management Systems, "software that automates the administration of training events", and interoperability between different types of content, media and delivery platforms to enable wide-ranging re-usability and sharing of content [12]. Current standards, which are in effect "*marketing weapons*" in the hands of primarily either American or European hands, aim to predominate in the production and usage of e-learning tools. Differing practices in pedagogy on either side of the Atlantic and different capacities of investigation and investment are critical factors in the development of standards. The dominant *defacto* or *dejure* standards, born from evolving specifications over time, will affect the technological, commercial and/or pedagogical futures of academic institutions, businesses and governments.

Currently topping the list of vanguard e-learning actors in standards is *ADL's Shareable Content Object Reference Model (SCORM)*, backed by the United States Department of Defence. SCORM is a reference model (hence the name), not a standard, and "serves to test the effectiveness and real-life applications of a collection of specifications and standards" [13]. Based on the work by IMS committee that created the Learning Object Model, it takes off where the AICC left off in the 1990s, improving the AICC standards to enable the re-use of multimedia content within the Web's complex technical constraints. In brief, it is a "unified set of core specifications and standards for e-learning content, technologies and services" [14], directed to facilitating the five main abilities for e-learning: interoperability, re-usability, manageability, accessibility, and durability.

To begin with, in Europe, there is the EC funded project, Alliance of Remote Instructional and Distribution Networks for Europe. *ARIADNE*, overcoming its original hostility to IMS, is now collaborating with IMS on metadata. Other major European initiatives include: *PROMETEUS* and the *CEN/ISSS WS-LT*. The former, which is involved in trial projects, best practice and evaluation, devises requirements for specifications and delivers these to CEN/ISSS WS-LT. The latter, Centre of European Normalization / the Information Society Standardization, Workshop Learning Technologies, is working on internationalising metadata, but is also involved in Intellectual Property Rights, Educational Modelling Language and Quality.

E-learning specifications and standards are needed to keep track of learners' "states", their enrolments, the outlines of courses, the type of resources made available to them, the descriptions of these contents, tracking user interaction with resources, monitoring results, and maintaining learners' profiles. Two main areas of standards and specifications can be identified: Content and Systems Integration. Regarding Content, these standards and specifications apply to content vendors who produce lessons, learning objects, tests, etc. and who would like their products to be discovered, used, tracked and referenced on all systems. For System Integration, these standards and specifications apply to the different learning environments made up of multiple systems. This set deals with information mapping and formats, metadata, Application Program Interfaces and Transport Protocols, etc.

In recent years, the main focus has been on specifications centred on infrastructures, content and training. More recently, though, the *concept of "training" has broadened* due to new demands in information-based societies, to include lifelong learning and continuous education schemes. Education vendors have also broadened their horizons, staking out their share in the new market by leveraging technology to create and deliver their resources in more efficient and productive ways.

The focus on content has likewise shifted towards *process*. Processes that, via technology, can support multiple pedagogical approaches, different learning activities, various roles (teachers, tutors, learners...), as well as multiple ways to associate content and other resources to the process of learning (through messaging, discussion groups, availability of tools and applications) [15]. Because the MetaCampus system can contemplate all of the above, it makes the following *e-learning recommendations* regarding specifications:

- Differentiate resource type and presentation (via the contributions) so as to allow greater personalization of learning paths, and better search applications for resources that include instructional design models handling sequencing;
- Distinguish generic competencies from more job-specific, tool- specific or company-specific competencies, adding specific information to IEEE-LOM existing fields, while making them compatible with the HR-XML competency scheme and SCORM;
- Work by consensus to define rules to establish the relationships between resources and competencies, both generic and specific ones.

## Conclusions

Having a conformant competency model and LO metadata scheme, MetaCampus is prepared to adapt to the next round of developments in e-learning, sequencing, EML, and other initiatives. It has been developed to conform to reusable competency definitions and its model is capable of incorporating existing corporate, national or industry competency standards. The beneficial applications of using this system, shown in the table above, allow all stakeholders to keep pace with the latest developments in the field of training and education.

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# METADATA-BASED DISTRIBUTED ARCHITECTURE FOR PERSONALIZED INFORMATION ACCESS

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## Abstract

In this paper we propose a novel architecture for the provision of a personalized service for information discovery and retrieval where we shift the paradigm for personalization from the information creator, who may not produce truly personalize-able information, to a search service that associates users and their needs to specific information. Our architecture uses metadata, based on existing standards, to describe information objects, content providers, and user needs. The work here presented has been undertaken in the framework of IST project GUARDIANS which addresses issues related to the support of on-line discovery and delivery of digital information objects over multiple platforms such as the web and iDTV. The application domain chosen for the experimental part of the project is the educational domain. Here, we first analyze the state of the art of content personalization; we then describe the data models and the architectural model, showing how several metadata standards and technologies can be combined to support content personalization in future information management systems. Finally we describe the project approach to content personalization, emphasizing the need for appropriate metadata models.

## Introduction

This paper describes research work on metadata models for content personalization, which has been done within the European project GUARDIANS [1], under the Information Society Technology (IST) Programme of the European Union 5th Framework Programme of scientific and technological research. GUARDIANS (Gateway for User Access to Remote Distributed Information And Network Services) addresses issues related to the support of on-line discovery and delivery of digital information objects over platforms such as the web and iDTV (interactive Digital Television). The application domain chosen for the experimental part of the project is the educational domain. The project consortium includes both academic and industrial partners from Italy, United Kingdom, Ireland and Greece. GUARDIANS has defined and experimented an advanced service architecture for the management and delivery of digital information. The architecture gives users access to a wide range of distributed information, which can be delivered to diverse media devices such as a personal computer and iDTV. In order to describe the information available to the end user, GUARDIANS introduces the concept of information objects, which are not necessarily learning domain objects but more generically electronic content deliverable through several possible channels. We agree that delivery of personalized information service goes far beyond the design of advanced architectural solutions for information discovery and retrieval, and entails changes in the design of both the information and applications that target users with different needs. We are also aware that the great majority of information objects available today have not been designed with personalization in mind. The latter holds true for the vast amount of static Web pages user access every day and the numerous resources that are available through the Web in general. As it stands, such content cannot be serviced to users in a personalized way. New design methodologies, can help design truly personalize-able content, while new approaches to personalization, such as those based on web mining technologies, can help applying personalization to legacy content. While the former can provide a difficult though long-term solution, the latter has produced a number of different and not integrated forms of personalization that hinders user's seamless access to the wealth of information potentially available. In this paper we propose a novel architecture for the provision of a personalized service for information discovery and retrieval that builds upon content-based

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personalization and search service capable of matching content description with user needs. The architecture proposed has a number of advantages:

- it does not require new design approaches to information objects to take care of personalization;
- it is based on the use of standards and therefore lays the foundation for an integrated approach to personalization that is future-proof;
- it provides a single mechanism to locate and retrieve legacy content which would otherwise require ad-hoc and not inter-operable personalization solutions;
- it provides a way to give access to information objects developed for alternative delivery platforms as opposed to just web and wireless technology, thus providing a personalized service to meet diverse access needs.

The main contribution we present in this paper is the architecture we propose for content personalization. Here in particular we describe a framework for the provision of a personalized service in the education domain which can then be easily extended to any other domain. The architecture itself has in fact been designed to support search and delivery of cross-domain information objects to match user needs. The rest of the paper is organized as follows. In section one we provide a classification of the different types of personalization and discuss traditional approaches that are used to achieve it. We also justify the approach followed in our architecture, which is the content based one. In section two we list current standards on which content based personalization can be built. In section three we give a brief overview of the GUARDIANS architecture. In section four we present our framework and identify the main components and their role in the provision of a personalized service. Finally, section five contains evaluation of our own work and some concluding remarks with pointers to future work.

## **Defining personalization**

The most recent interpretation of personalization seems to be to provide users with what they need without requiring them to ask for it explicitly. Based on this definition, we identify the three following types of personalization:

1. Personalization of content, based on the user knowledge, experience and preferences. With this type of personalization different information is presented to different users based on their needs;
2. Personalization of delivery of the content, where the content of the information object stays the same but it is delivered according to the user specific device and therefore adapted to the device capabilities. Adaptation not only refers to software/hardware capabilities but also to different format the content is available in. The same information for instance, may be available in html or simple text and delivered according to user needs;
3. Complete personalization based on content and delivery, which provides a combination of the previous two approaches. As the Web is currently the most used medium for the publication of information objects, most of the research in the domain area of personalization is centered around how to customize and personalize the information to different types of web users and how to transform it from a web-based format to non web-based format.

As far as content personalization is concerned, a number of possible approaches can be identified:

1. User-controlled personalization, based on direct user input using for example a questionnaire or a number of check boxes to specify some preferences. This approach is usually adopted by a website to provide personalized news or shopping recommendations to users and is also usually localized within the website itself;
2. Content-based personalization based on content metadata and user profiles. With this approach the content retrieved has to match the preferences and other information kept in the user profile. Such approach depends heavily on the use of metadata for the description of content, which can be argued to be a serious knowledge engineering problem;
3. Collaborative filtering personalization based on associations made between different but neighboring (in terms of needs) user profiles. The traditional technique looks for correlation between users in

terms of their ratings assigned to items in their user profile. If the correlation is strong then content that matches one user profile can also be suitable for all neighboring users too. This approach allows the user to change their profiles through collaborative experiences;

4. Observational personalization largely based on web mining techniques and on the observation of user navigational behavior.

As far as personalization of delivery is concerned, most of the research interest has concentrated on the adaptation of web content to wireless devices such as mobile phones, Personal Digital Assistants (PDA) and palm computers with little or no attention to alternative communication technologies such as iDTV. What's more alarming is that no solution seems to exist to provide an integrated personalization between different technologies and within the same technology (the web technology for instance). Most of the existing personalization services are offered on a per-website or per-domain basis, which means that a user profile is not maintained across sites and that the user can experience different forms of personalization as his/her needs are not kept consistently across domain boundaries. We claim that an important prerequisite for an integrated solution to personalization has to be the use of standard technology and in particular of standard data models for the description of content, user profiles and other entities as described later on in the paper. The benefit of content-based personalization is that it can benefit from the standardization efforts of both content and user profile data models. While enforcing a content description can be a daunting task not appealing to many, it can provide an immediate solution to clad legacy content into an open architecture able to service it to a number of different users. The type of personalization that we claim to achieve with our architecture is the one we refer to as complete personalization.

## **Standards for personalization**

Much of the standardization effort for personalization currently being done regards the personalization of delivery. In this context, two standards exist and they are the W3C Composite Capabilities/Preferences Profiles (CC/PP) [3] and the Wap Forum User Agent Profile (UAProf) [2]. The CC/PP is an RDF-based framework that allows to describe the user agent capabilities such as a web browser along with user preferences associated with it. The agent capabilities and user preferences are kept in a profile which is sent by the user agent along with the request for resource to the server hosting the content. Based on the received profile the server can then decide on how to meet the needs of the user agent client. Using CC/PP content personalization can be provided through selection or transformation. In the first instance the server selects an appropriate representation of the requested web content from a finite set of existing representations to meet the user profile. With transformation, the content is created on the fly, based on the properties expressed by the user agent profile. The User Agent Profiles (UAProf) is a specification by the WAP Forum to capture mobile device capabilities (e.g. hardware and software) and preference information to be used for content formatting purposes (that means no content personalization in the sense above described). The UAProf represents the Wap Forum characterization of the CC/PP based on the assumption that the mobile environment is different from the traditional web environment, and that mobile devices are expected to have an ever-divergent range of input and output capabilities, network connectivity, and levels of scripting language support. As for content metadata a number of industry standards already exist. Every domain has developed its own standard for the description of its domain specific content. The base standard upon which all other initiatives base their work is the Dublin Core Metadata Element Set (DCMES) [4]. The latter comprises a set of 15 descriptors, which represents an international consensus on the core elements that are necessary to uniquely describe and/or discover a "document like object" (DLO) on the web. As the content used in the GUARDIANS demonstrator is of a learning/educational nature, the project has adopted the IMS Metadata Information Model (MIM) for Content [5]. Other content metadata models are those proposed by MPEG-7 [6], SMPTE [7] and TV-Anytime [8]. These offer a single cross-domain structure for audio-visual content and are considered relevant to delivery and usage of digital content over multiple delivery devices, which is the basis for personalization of delivery. As far as the User Profile is concerned, this should not be applicable to a single application (i.e. proprietary), nor should it be designed only to function in a single domain e.g. education, finance, travel, entertainment, etc. This is especially important if cross-domain and integrated personalization is to be supported. GUARDIANS architecture adopts the IMS Learner Information Profile (LIP) [9] as a basis for the user profile data model. Although the LIP is targeted to on-line learners it has been extended and modified for multiple-domain use. This extended LIP profile has been called the

Generic User Profile (GUP). User profiles are an essential brick of a content-based architecture but also contain private information users don't want to disclose to every content provider and ultimately not in the same way. In this context the Platform for Privacy Preferences (P3P) [10] is a W3C standard, currently at version 1.0, designed to inform Web users of the data-collection practices of Web sites. It provides a way for a Web site to encode its data-collection and data-use practices in a machine-readable XML format known as a P3P policy. As such it can be used to automate the process to control the access to the user profile. For an example see [11].

## GUARDIANS architecture

The GUARDIANS architecture builds upon the results generated by the GESTALT project [12] under the 4th Framework ACTS Programme. GESTALT has defined a flexible, component-based architecture for the discovery and delivery of modular training and education services. In GUARDIANS the architecture has been expanded from a purely learning/training domain to encompass more generic information management issues. Figure 1 shows the actors identified in the architecture.

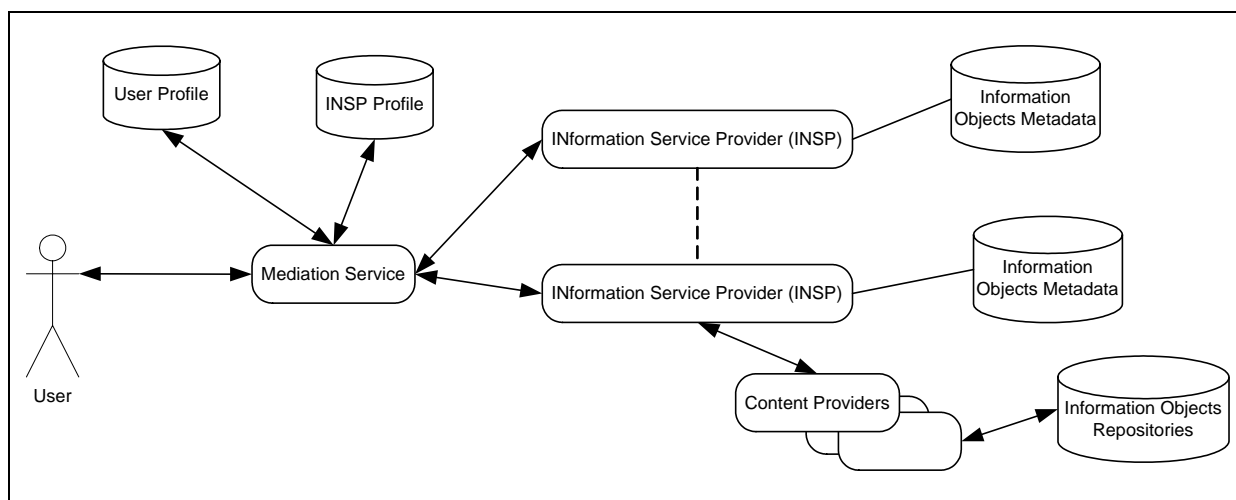


Figure 1 - GUARDIANS Architecture

- User - a user searches resources s/he is interested in, and then accesses them, obtaining a personalized delivery. The user access device can vary, from user to user and for the same person. Examples include Personal Computer, or Personal Digital Assistant (PDA), interactive Digital TV etc. The type of resources and service the user has access to will vary according to which device is currently being used. This is obvious if one compares for example a PDA to a PC and thinks about the different type of resources that is possible to run on them. The service will also vary according to the type of network connectivity the user has and this needs to be accounted for;
- Content Provider – this can be a publisher, a university or any other entity whose main activity is the creation and possibly delivery of digital resources. A content provider takes care of appropriately describing the resources using metadata. The latter needs to account for what we previously referred to as personalization of content and personalization of delivery;
- Information Service Provider (INSP) – this entity collects Information Object metadata from a number of content providers and organize them to provide a service both to the end user and to the content providers themselves. An INSP can be considered as the middleman between a content provider and the end user. It can be specialized, although this is not required, in collecting only domain-specific resources and/or services. For example there could exist an INSP that only gathers metadata of resources that fall within the sport domain collecting them from appropriate content providers. A user wanting to find a specific resource on a particular sport could for example connect to such an INSP and make a localized search. Once the resource has been found the user can then be directed to the relevant Content Provider.
- Mediation Service (MS) - in the general scenario, the mediator acts as a broker between the user and the available resources, matching user query and preferences with appropriate INSPs from which the user can eventually select relevant content. It is at the mediation service level that the

first mapping with information kept in the user profile occurs. It is expected that Information Service Providers are able to register their offerings for discovery by the Mediation Service.

- GUARDIANS architecture extends the content-based personalization model to three levels, which are the User Profiles, the INSP Profiles and the Information Object Metadata. The end goal is that of providing complete personalization of the content to match the needs of a user. In order to achieve this goal metadata for personalization is organized into two parallel strands that are then reflected in all three levels envisaged in the architecture. The first strand contains metadata to allow a personalization of content based on user preferences, history etc.; the second strand contains metadata to allow the personalization of delivery based on the user access platform. This strand has been further extended to cater for QoS-aware end-to-end delivery of content.
- User profiles – User profiles are metadata containing user personal information, needed for the personalization of content, but also all the technical preferences that are required to achieve personalization of delivery. The User Profile may also contain choices of preferred media and format. Every time a search query is performed, the Mediation Service maps user profiles with Information Service Providers profiles in order to eventually find a relevant Content Provider.
- INSP profiles – these contain a description of the INSP and aggregation type metadata of the resources managed by the INSP. With regard to personalization the INSP should also hold a general description of the technical requirements of the resources it manages so that it is possible to match them with technical specifications of the access devices of the user. Since the INSP is only interested in providing a description of aggregation of resources and is not involved in the end delivery of the resource, its profile will not need to hold QoS metadata related to each specific resource. It will only classify resources according to high-level technical requirements. By looking at an INSP profile it may be possible to identify the type of resources supported, the access devices supported, in which media and format are the resources available in, etc.
- Information Object Metadata - this metadata describes the information object according to a specific data model, which in the GUARDIANS demonstrator stems from the educational domain and is based on work by the IMS. Besides the technical requirements of the access device needed for the delivery of the resource, the information object metadata also contains all the necessary QoS parameters that are necessary for the end-to-end provision of QoS at network level. These parameters are the ones required by user application to reserve the necessary network resources, following an Int-Serv QoS approach for example, as experimented in [13]. Both user profiles and information object metadata have been designed to contain QoS related metadata that could be matched to achieve a complete personalization, as it will be described in the next section.

## **A framework for content personalization**

In this section we discuss the interactions between the various components of the proposed architecture and discuss how this can achieve content personalization during retrieval and delivery of learning resources. According to the classification given in the previous section, personalization of content and personalization of delivery, have been accomplished by differentiated subsets of information encapsulated in the User Profile Metadata and the Resource Metadata, and finally in the INSP profile metadata. The User Profile Metadata contains several user preferences both in terms of domain specific fields and in terms of technical accessibility, and these are matched against equivalent fields inside the INSP profile. With a similar approach a subset of technical information has to be matched between the QoS parameters in the User Profiles and those contained in the Resource Metadata. This information is required to achieve what we refer to as personalization of delivery and although a small interaction between users and system is necessary, GUARDIANS aims at making these information exchanges as more automated as possible. The steps of this typical scenario are the following:

1. User logs onto the system. At this stage the Mediation Service will retrieve the user's profile that will be used in the search/delivery process. This profile contains personal information, cognitive and technical preferences;

2. A session profile is created to reflect possible changes to user information and preferences that occur during the search phase. A user interaction is required at this stage to confirm initial changes. In this phase the Mediation Service reminds the user of his current profile and allows the user to make changes;
3. User performs a query specifying the domain over which the search is to be performed and a number of keywords that may help locate suitable INSPs. Query fields are combined with user preferences by the Mediation Service, which then proceeds to perform the query;
4. The Mediation Service returns a list of available INSPs to the user;
5. The user picks the INSP over which the search will be performed and specifies the query fields;
6. Information kept in the user profile is closely matched with the content meta-data and a list of suitable resources is returned to the user;
7. The user picks one resource from the list which happens to be a video stream with embedded sound. Before this resource can be delivered QoS metadata will have to be retrieved from the Mediation Service. This metadata will be used to negotiate quality of service with the network and assure a correct fruition of the Information Object itself. At this stage in fact, the user has chosen what is believed to be a suitable resource, which is in the correct media and format and which is suited for the access device in use. In order to assure the correct delivery though it is necessary that the resource will receive appropriate QoS provision on the end-to-end delivery network. The traditional approach to QoS requires the user to be aware of technical issues. An example is represented by those services where the user is prompted with a list of the different digital formats the desired resource is available in;
8. By checking the content QoS Metadata the user application checks if the QoS requirements can be met. In our proposed model for content QoS metadata, we include a simple resource characterization that would allow an RSVP aware user client to reserve the required network resources. This model is by no means exhaustive and could be extended or modified to support an Int-Serv-Diff-Serv [14][15] integrated approach to QoS. If the user application cannot reserve the necessary network resources the user is notified and another resource may be chosen instead or the user can compromise the expected quality;
9. The user retrieves the chosen resource with the required QoS;
10. The user logs out and the profile is saved to be used on a following session.

## Conclusions

In this paper we have presented an open architecture for accessing personalized information. The architecture is based on the traditional approach of content-based personalization, and extends it to introduce a new entity called the Information Service provider. The architecture draws upon the standardization work on metadata for content description and existing standards for user profiling. The demonstrator for this architecture is based on the educational domain and as such all metadata standards that have been used come from the educational domain.

While a considerable amount of solutions nowadays are often characterized by non-standard approaches and ad-hoc solutions, whose greatest disadvantage is the lack of integration for a seamless “learning” experience and continuous access to digital information, the architecture here presented draws heavily on the use of metadata to describe resources. Although the creation of effective and quality metadata can present a challenging task, even more challenging with the presence of embedded QoS information, we believe our approach constitutes a viable alternative to content reengineering for personalization.

The architecture presented is currently a prototype and a large metadata pool has been created to describe resource aimed at a number of diverse access platforms, mainly interactive and non-interactive digital TV, and Web. A fundamental issue faced during the design phase of the architecture and of the three data models is the one of vocabularies used to populate metadata elements. The management of such vocabularies is key to correct creation of metadata and maintenance of the governing data models. With regards to the IMS MIM used in our architecture it was found necessary to enrich the vocabulary of some of the elements in the Technical category to account for the different types of delivery platforms. The same applies to the User Profile which we have based upon the IMS LIP.

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# ROADMAPS – NAVIGATIONAL AIDS AND TOOLS FOR REUSING CONTENT IN DISTANCE EDUCATION

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## Introduction

Because in the production learning material is very costly to create, the aim of providing reusability is as important as it is for any software as well. But additionally reusability in e-learning also covers reuse of organisational structures (manifests) including course syllabus and other navigation vehicles as roadmaps, which we will discuss in particular. We focus on the IMS content package standard (as a convenient example) and, based on it, we discuss other possibilities, e. g. how a simple treelike and therefore hierarchical structure can be enriched by additional paths. The result is a general acyclic digraph and we present examples, why it makes sense that a learning path starting with a lesson S and ending with lesson F not necessarily should be unique. It is exactly this possibility of providing alternatives, which offers reuse of content. Through small additional metadata this also allows reusing a course in the sense of easily creating several different versions from it, e. g. for different audiences. As a proof-of-concept at the end we briefly present the extensions to an existing tool for creating an offline view from manifests: Visual roadmaps and deriving subversions from a single manifest.

## Standards for assembling content in distance education

There are (too) many standards being developed and hopefully they will converge in the future. Among the involved institutions and/or standards are of particular importance the Dublin Core Metadata Initiative (DCMI) [3], Institute of Electrical and Electronic Engineering (IEEE) [4], IMS Global Learning Consortium (IMS) [5], Alliance of Remote Instructional Authoring and Distribution Networks for Europe (ARIADNE) [6], Aviation Industry CBT Committee (AICC) [7] and the Advanced Distributed Learning Initiative (ADL) [8]. Currently there are working groups active in order to promote standards for e-learning or to contribute to a “standardization of standards.”

At the time being it seems that a wide agreement on standards for content packaging will be reached, respecting the demand for backwards compatibility. However, concerning metadata, this seems to be much more difficult because metadata also refers to domain related semantics. Even within the same domain currently particular local (national) interest influence content initiatives<sup>1</sup>.

In this paper we use the IMS Content Packaging Specification (CPS) as an example and base for the prototype. The reader is referred to [2] and we recall here only what is necessary to understand the concepts “manifest”, “submanifest”, “metadata” and “organization” (of which the navigation is an essential part). The IMS CPS consists of two major components: A so-called “Package Interchange File” and the resources (the physical files) as such (which we will not discuss here; we are “only” concerned with navigation between them). Figure 1 illustrates these components. In the sequel the “physical files” will be of no concern and therefore we skip any further explanation.

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<sup>1</sup> See e. g. the Austrian metadata standard for electronic teaching material [9].



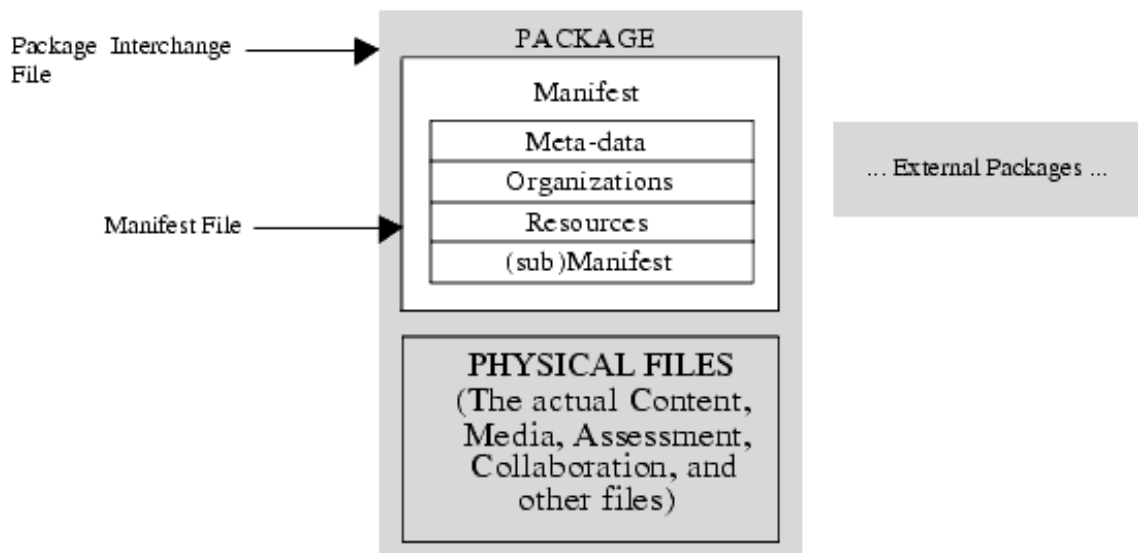


Figure 1: IMS Content Packaging scope [2]

The Package Interchange File is an xml file (imsmanifest.xml) including at least one manifest. The top-level manifest describes the package itself and may also contain (sub-) manifests. Each manifest consists of metadata (information describing the manifest as a whole), an organizations section (structure of the course and usually source for creating navigation within actual content), a resource section (references to actual data elements; the course content) and optional submanifests. Through this the IMS CPS separates physical learning resources from their actual use and organisation.

The original specification however explicitly forbids recursive references. In the simplest case, the organisation either does not contain any other submanifest at all or only submanifests that are entirely disjoint. In that case the underlying abstract course navigation is described best by the familiar decimal classification and current viewing tools handle this as expected. In terms of graph theory this is just an (oriented) tree. An advanced navigation (using a slightly relaxes specification) however should provide an acyclic digraph, which allows figures as shown below. Here the navigation suggests implicitly to the learner to make a decision either to follow the “informal” path or just jump into a strict “definition of the subject”, before approaching to have a look at some examples. But both branches can be visited in any order anyway, as it would be possible in a decimal notation as well.

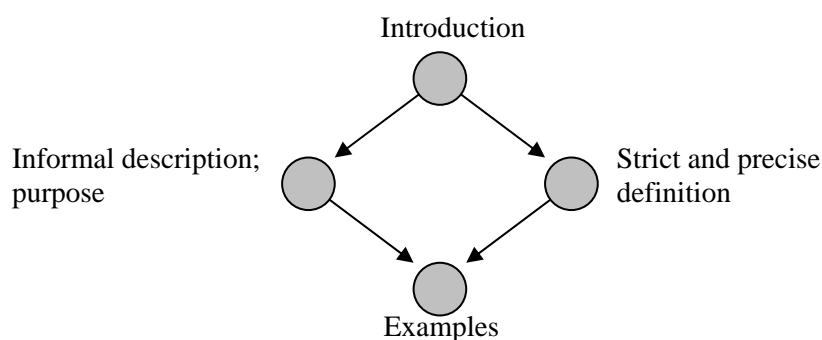


Figure 2: Sample of different navigational paths

In the general situation, however, the resulting navigation graph could contain cycles, in particular if submanifest are being used recursively. In other words: if somewhere within the organization a reference to a submanifest is made, which has been included on a “higher level” before already. We do not discuss here whether this concept is useful from a pedagogical perspective or not. Current editors (e.g. the one included in [12]) are not able to cope with recursion. While parsing the manifest they are locked in an endless loop or produce a recursion stack overflow.

## Roadmaps in e-learning material

By a “roadmap” we understand a graphical representation of the general structure of the content. The concept of “roadmaps”, e.g. using an underground network, which is familiar to many people, is being used already in many courseware products as an alternative to the traditional standard decimal (or hierarchical) classification which we see in books and as it is implied by the simple IMS manifests. The point here is however, that we want to separate the underlying logical structure (graph) from its visualisation for the learner (decimal–classification shape, tree, underground map...). This issue is ignored very often and therefore it is worth underlining the difference between a graph and any of its many possible graphical representations.

The following example describes why there is a need to separate both concepts. Think of the complex structure of London’s underground system. It is logically best described by a graph. If train lines are crossing at different levels etc., then this is intrinsic to the graph structure. However this is of no concern to the passengers. If it would be shown on the tube diagram it would confuse passengers. The visualisation of the underlying graph follows an overall design principle: apart from the yellow circle line every line is shown on the map in a way that either “Northbound/Southbound” or “Eastbound/Westbound” can be perceived immediately. This exactly is the “master strategy” for orientation within London’s subway system.

At this point we add, that basically also a three dimensional visualisation is possible, but we omit a discussion of such general spatial models here.

There is an intrinsic meaning associated with the nodes and links of such a graph  $X=V(X),E(X)$ . This semantic is expressed by labelling the nodes  $V(X)$  and the links  $E(X)$  by words from using an appropriate metalanguage:  $\langle u,v \rangle$  obviously suggests to proceed from node  $u$  to  $v$ . Nodes  $u$  from  $V(X)$  represent either a reference to a simple resource, e.g. a html file, a pdf document etc., or (recursively) reference the organizational part of a submanifest. In order to simplify the notation in the following and being aware that nodes are pointers to a content, we can avoid this indirection and just state that nodes represent resources. It must be clear, that this simplification does not imply that the physical files (see Figure 1) are now part of the organizational structure of a manifest; the necessary separation still exists.

If we put all the above arguments together, we can distinguish between two loosely connected aims: (1) automatically extracting a formal graph definition (e.g.: adjacency matrix) out of the organisational structure of a given manifest, even if the manifest is more complex than just a hierarchical structure resulting in a tree, and (2) a convenient drawing and labelling of the graph, so that the resulting “picture” together with the semantics of the labels helps the learner finding his or her way through the available material easier. It also should be clear that some kind of hidden additional information may be brought in by the overall layout of the drawing, e.g. similar topics could be drawn close together, whereas rather different issues might be drawn further away.

This additional information is very hard to encode in a text and reveals at the same time an interesting dilemma. Either the person who draws the roadmap must possess extensive knowledge about the covered subject or the metadata specifications should contain additional elements describing e.g. the relevance of the content of submanifests compared to the main theme.

### *Role in reusing content*

As far as reusing material is concerned we focus here on an advanced level only, namely reusing entire manifests as submanifests within another one, which we call a “metamanifest” then. This possibility is provided to some extent by the IMS CPS. In this case navigation is presented by combining the navigation structures of the parts. In terms of graph theory it means that nodes can be replaced (“expanded”) by another graph, which becomes a subgraph. A restriction implied by CPS however is that a general network structure is not possible in the following sense: if a reference to a submanifest or a reference from a submanifest to a sub-submanifest etc. is made, then all this sub-...-submanifests must be a priori part of the same metamanifest. If strictly adhering to the specification, manifests can only reference manifests contained within them (but not on any other level, neither above nor siblings). For this discussion we do away with this restriction and allow more

freedom<sup>2</sup>. The specification of the CPS is similar to restrictions in some operating systems supporting only static linking (the concept of DLLs is not provided for). With respect to reusability this means that on the one hand somebody else's manifest "A" can be (re) used because "A" is copied entirely into the metamanifest "M". But on the other hand, if the original author modifies the manifest "A" to "B", this has no effect on "M" because "M" still contains "A" statically.

The first conclusion with respect to reusability is, that submanifest can easily be used and because everything is assembled into the metamanifest's file together, this file can be easily parsed without needing any other files and the resulting graph structure calculated. The latter covers acyclic digraphs and therefore cycles (recursions) are in particular forbidden. Apart from this, reusability is restricted in terms of static linking as stated above.

A challenging application of reusability however is the design of a course addressing e.g. two different target groups, but which at the same time contains chapters (submanifests) which are of interest for both groups and should be made visible for both of them. All other chapters should be visible and accessible only by the target group in question. In this way only a single (albeit a bit more complicated) manifest must be maintained and modified for changes to appear in all related courses.

### *Using IMS and LOM specifications for implementation*

While it may seem tempting to include the information for a roadmap as a new organisation into a manifest, this leads to several problems. Changes in the (sub-) manifests or the main organisation must be manually transferred to the roadmap-organisation (or the editing tool must do this automatically; currently none such exist). This also models the roadmap as something completely different and independent from the parts (a property pertaining only to the whole metamanifest), while it actually is a logical consequence of the individual parts and their arrangement. Therefore it should be represented either as metadata within the submanifests, or as metadata of the references to them. As whether a submanifest should be a roadmap item or not depends more on the combination of several of them, respectively the kind of integration of the submanifest into the metamanifest, this information should be put into the reference. As the actual metadata element for deriving the roadmap, the "aggregation level" of the LOM specification [1] can be used. It ranges from 1 (atomic element) over 2 (lesson) and 3 (course) to 4 (higher elements). A roadmap typically shows items of level 2 (see next chapter for an example). The visual annotation can be anything, but using the associated title seems sensible. The person rearranging the resulting graph for visual presentation could always change it later.

The reuse of submanifests for several courses at once in a single file can best be implemented by introducing "taxonomy" metadata. These can be incorporated to both the submanifest itself as well as the reference. As the most appropriate purpose-element we selected "Educational Objective". For describing different courses, this element might be subpart of either an official or private (e.g. course numbering system within the institution; see example below) taxonomy.

Another issue is including submanifests from separate files instead of having to import (and re-import upon changes) them physically as mentioned above. This is included in the specification only as a suggestion for further development (most probably using XInclude [10]). Ways around this are tools already supporting this construct or using standard XML methods (e. g. external entity references; they are however not really suited, or intended, for this). A related problem is that organisation IDs must be unique only within a single manifest. If several manifests are included into a metamanifest (regardless whether statically or dynamically), collisions might happen. This requires rewriting IDs upon inclusion or other provisions (e. g. namespaces). For the rest we assume this problem solved.

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<sup>2</sup> Resulting in more responsibility by the creator: He/she must now ensure that all referenced submanifests are actually contained somewhere in the metamanifest. Simple copying the main manifest into it will not suffice any more because other manifests (not physically contained) might be needed.

## Sample Implementation

For the use within the WeLearn framework [11, 13] (Web Environment for Learning; an online learning platform) developed at the institute a converter for offline viewing was created as well. It receives one or more IMS manifests as input and creates one or several offline views. Through this the content of the platform can be used very similarly offline too (and is in practice distributed on CDs). This converter understands and handles submanifests either according to the standard or in way more compatible to the Microsoft LRN viewer [12] (user configurable). Previously, only minimal metadata was used (title, keywords, description). This was enhanced to also understand parts necessary for the reuse of submanifests for different courses and the automatic creation of roadmaps. As currently no editor (short of textually editing the XML source) is available to us, this is used only for testing and a second mode was introduced. In this (functionally equivalent) mode the metadata required is incorporated into the “parameter” value of items or references (and extracted to identical metadata).

The offline version of the roadmap is somewhat restricted in the sense that it does not show the current position graphically, but only allows navigation within the course (no “active” graphic). This is intended as an optional addition for later versions. The online version to be introduced into the WeLearn system itself will offer this feature right from the start.

See the following abbreviated snippet from a sample manifest for the two possibilities of specifying the additional information in a reference to a submanifest: Either in the parameters of the item or as associated metadata.

```
<item identifier="METAMANIFEST_ITEM" identifierref="SUBMANIFEST_ORG"
      parameters="taxonomy=353.001,353.002;aggregationlevel=2">
<classification>
  <purpose>
    <source><langstring xml:lang="x-none">
      LOMv1.0</langstring></source>
    <value><langstring xml:lang="x-none">
      Educational Objective</langstring></value>
  </purpose>
  <taxonpath>
    <source><langstring>JKU course numbering</langstring></source>
    <taxon><entry><langstring>353.001</langstring></entry></taxon>
  </taxonpath>
  <taxonpath>
    <source><langstring>JKU course numbering</langstring></source>
    <taxon><entry><langstring>353.002</langstring></entry></taxon>
  </taxonpath>
</classification><title>Submanifest 1</title>
</item>
```

## Conclusions

In DE reusability of learning material is essential, as it is very cost-intensive to create. In order to avoid stranded investments, it is necessary to follow standards. Also, the learning material itself must not be structured rigidly, but as flexible as possible. Nowadays this flexibility is most often not given; therefore nearly the same learning material must be developed several times. E.g. parts of a course in object-oriented programming could be reused in special programming courses on C++, JAVA or C#, and be adaptable to other target groups as well (e.g. a beginners course in computer science, in schools, etc.). The use of submanifests, although requiring some additional effort, is a step in this direction.

Integrating small additional metadata or using the existing structure of submanifests can then produce the additional benefit of a different way of navigating the content which is (at least for some learners) superior to a tree-like structure. Such a roadmap enhances orientation within the course, eases remembering certain parts and allows globally planning a way instead of requiring individual decisions at each point (with very limited range of sight: next page or subitems). In an online version this roadmap can also show the current position, the previous way, or also the location of other learners, in this way enhanc-

ing awareness. Through this all, results of learning can be improved, while incurring only very small additional costs through adding at some places pieces of special metadata.

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# QUALITY THROUGH STANDARDISATION: SETTING OUT FOR BACK-OFFICE INTEGRATION AND TELEVISION-BASED DISTANCE LEARNING

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## **Introduction**

The ICTO (ICT and “Onderwijsinnovatie”) expertise centre of Erasmushogeschool Brussel is a regional e-learning encouragement and training centre for Brussels and Flanders. Through close collaboration with VUB, it is a research centre for new technologies for information management and e-learning. ICTO applied change management to use ICT as leverage for innovation of higher education. The e-learning platform Blackboard is extensively used by all departments, although the course structure chosen by the lecturers is not always adapted to the possibilities of the new medium. Therefore today’s ICTO’s training activities are centred on the creation of pedagogically sound course material. Driven by the cinematographic department and the engineering department, the use and integration of video for course construction gets full attention.

ICTO cooperates in a study on digitisation and integration of the VRT back-office, a necessary move towards digital, interactive TV. This integration is part of the MPEG project, a research project in collaboration with VRT (the Flemish radio and television company), IMEC (Interuniversity MicroElectronics Centre) and VUB (Vrije Universiteit Brussel), which relies on the use of standards. The different data formats are standardised to XML and the framework for using and storing metadata is enforced. The central messaging system – JMS in our study – allows all applications to communicate with each other, while keeping the data consistent. The use of standard technologies ensures the future compatibility and the use of a platform independent programming language contributes to the expandability of the developed solution. The expertise gained from the VRT MPEG project paves the way towards television based learning, a technique that can be of use for organising distance learning for Erasmushogeschool Brussel; for example for the advanced training of nurses, a project funded by the Flemish government in which ICTO is involved.

This paper highlights the importance of standards to insure quality, shows the role of standards for back-office integration and draws some lessons for the integration of e-learning.

## **Quality through standardisation**

### *Different approaches to quality*

Quality is very important in business and education alike. Apart from the obvious possible restraints (mostly financial) on developing top quality products, there seems to be no obvious reason for the difference in quality between similar end products. One should take the differences in defining quality into consideration. People have different priorities and as such evaluate the quality of a product differently, due to the different evaluation criteria and the different weights attached to these. One can identify a few major groups of quality evaluators, being the management of the institution commissioning the development, the developers and the end users.

Management is concerned with how the product will be perceived by the end users, the time to market, and other factors with direct influence on the return on investment. The developers are often more concerned with technical issues, like security, fault-tolerance, etc. The end users, the most important group, tend to be focused on ease of use, availability, etc. and they decide whether the management and developer group made the right decisions. Longer-term technical issues like future extendibility, maintainability, reusability and interoperability are often neglected because of short time to market and

short-term vision. Although they can be crucial for the survival of the product, they do not guarantee to pay off the extra development cost.

For e-learning platforms or back-office applications, the need for extendibility and interoperability cannot be ignored and standards will have to be used. In the next paragraph we discuss the standards used for integrating the back-office of a media company and their usefulness in distance learning.

### ***The eXtensible Markup Language***

The eXtensible Markup Language (XML) is a World Wide Web Consortium (W3C) recommendation since October 2000. In the few years since then, its use became widespread for storing and sharing textual data. Apart from the fact that the standard is backed by some key players in the industry (i.e. Netscape, Microsoft, Sun Microsystems, etc.), there are some specifics inherent to its design why XML can not be neglected when looking for a format to encode textual data with.

Because XML is a subset of SGML (Standard Generalized Markup Language), parsers and editors were already available. Besides that, most of the design goals focused on making it easy to create tools for using XML in general.

Since the tags themselves are also textual data, the format is human readable and platform independent. This makes it the ideal solution for sharing data among legacy systems or to encode data that should be accessible on a wide range of platforms.

### ***Java and the Java 2 Enterprise Edition framework***

While Java is not a formal standard, it is a de facto standard which has been developed by Sun Microsystems. The big strength about Java is that it is a fairly open standard, platform independent (for those platforms for which a Java Virtual Machine (JVM) exists). Java has a big developers community, which helps spreading the language and development of JVM's, becoming a circular stimulus.

An offspring from the Java language is the Java 2 Enterprise Edition (J2EE) framework. This is both a technical and business framework for developing enterprise software, which incorporates some paradigms like the Java API for XML Processing (JAXP), Enterprise JavaBeans (EJB), Java Message Service (JMS), etc.

This can serve as a framework to model integration of existing applications and the development of new applications alike. This is used to integrate the different applications and the framework can facilitate the development and deployment of distributed applications across different platforms, as is the case with all e-learning implementations.

## **Implementation and views for the future**

### ***Overview***

VUB cooperates in the MPEG project with the public Flemish broadcasting company. In this context, we studied ways for integrating the back-office, in order to streamline all different legacy applications and to obtain a homogenous system for publishing to different media. The storage of metadata is also very important, and as most legacy applications do not store any, this poses quite a challenge.

The storage of the raw data streams, like video and audio streams, is a topic in its own right. Content management is needed to transparently couple the data streams, its metadata and other related data.

On the other side of the supply chain remains the issue of getting the content efficiently to the end user. When data is well managed content can be delivered via interactive television, for which tests are being conducted at the moment. Other possibilities exist concerning e-learning; via the World Wide Web as well as via television-based learning (t-learning).

In the following paragraphs we will start by taking a closer look at the integration of the different legacy applications and later on we will explain why this viewpoint is well suited to develop e-learning activities through different channels.

### ***Back-office integration***

Metadata is hugely important when editing audio and video streams, how else could we know what part of a video had been cut, by whom, why, etc.? These and other data have to be communicated between applications and the central data store. A common data format is needed and XML was used for this purpose.

The JMS is especially suited to distribute these data. A central system (the message broker) distributes the received messages to the applications of interest in a persistently. Because JMS is part of J2EE and because it is platform independent, Java is used to implement the interfaces between the legacy applications and the JMS. The communication between those interfaces and the actual proprietary applications is done via Remote Procedure Calls (RPC). In this way, all proprietary applications can communicate with the central system and each other.

On figure 1 the different legacy applications are depicted on the left; they have been provided with Java interfaces. They communicate through XML messages via the JMS standard to the message broker, which distributes the messages.

Another application, which listens on the JMS system, is the database. It stores all relevant data to make it retrievable later on. The database systems are perfectly interchangeable with others, thanks to Java DataBase Connectivity (JDBC).

There is also a common data format needed to encode the retrieved data for publishing to different media. For obvious reasons XML was used here as well. These application servers, depicted on the right on figure 1, use the data to broadcast television or radio, put data on the web, etc.

Some applications are able to produce output or receive input in some sort of markup language. In this case a style sheet is used to transform to and from this format and XML. The eXtensible Stylesheet Language Transformations (XSLT) language is used for this purpose. Document Type Declarations (DTD) or XML Schemas are used to validate the XML documents.



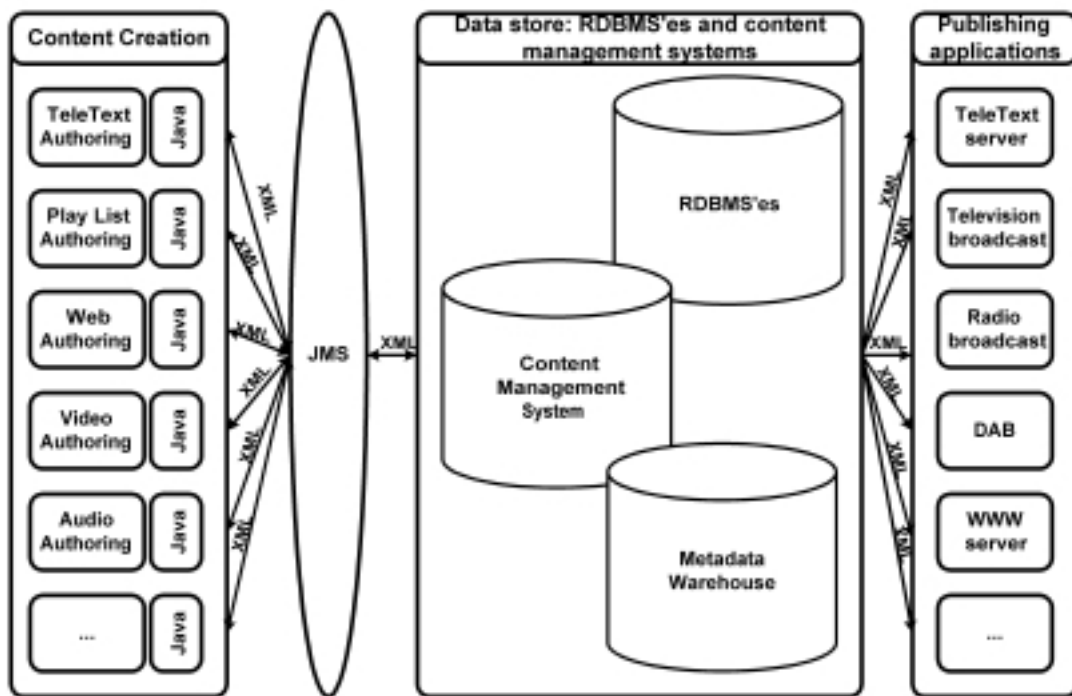


Figure 1 The textual data flows in the back-office of a media company.

### *Extending towards e-learning*

Once application and data formats have been standardised, extendibility and interoperability are within reach. Much content is already published to the web, which is traditionally the pre-eminent medium for e-learning. Now it is possible to explore and exploit the possibilities of interactive television and looking at its different uses, especially for distance learning. One important use would be t-learning, making distance learning available to a much broader public. The target group is especially broadened towards people with lesser financial means or lesser technological background and interests. These people cannot or will not use a computer and are therefore withheld from distance learning at the moment.

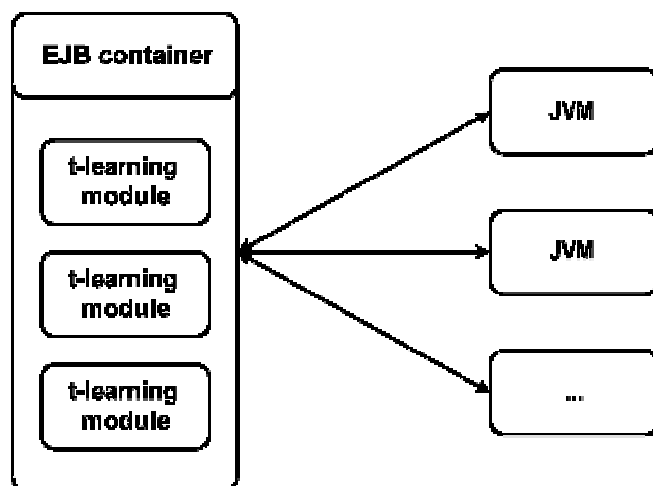


Figure 2 T-learning as one of the application servers.

Television-based distance learning can be implemented without modifications to the back-office being needed. An application server for the t-learning system should be put in place to communicate with the different clients. This is visualised on figure 2.

Other extensions are possible as well, since the quality is being guarded by the use of standards. The system can be extended and amended without jeopardising the functioning of the system as a whole or breaking any applications.

## Conclusion

This paper shows the strengths of standards like XML and Java/J2EE for application development and integration. The standards can be applied to integrate the applications in the back-office. The use of these standards facilitates the extendibility and interoperability of the proposed solution. Possible extensions of the considered media system are the integration of e-learning and t-learning.

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# THE USE OF LEARNER OBJECTS FOR BUILDING A FLEXIBLE E-BLENDED LEARNING COURSE

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## 1. Introduction

During the last years we developed e-learning courses in the domain of information management. We evolved to the adoption of the e-blended learning model. We developed a learning content management system or a Warehouse of learning materials. Those learning materials have been defined as learning objects by extending the learning content documents with the definition of the metadata of the content. In the next months we will develop a first prototype learner object. The architecture as proposed in this paper, has still to be discussed and will be improved taking into account the reactions on this paper.

## 2. Organisation of an e-blended learning course; an example of a learning process scenario

### 2.1 E-blended learning

E-Blended learning is a new methodology that associates different learning tools to offer a better follow-up, a tailor-made course, matching the needs of the participants and an effective learning process. Different learning activities are organised along the learning process.

A blended learning solution consists of a mix of ICT supported learning activities: making basic course texts available, putting the assessments online, making reference materials, organising online coaching, organising discussion sessions, creating help facilities and job-aids, ...

Recreating learning online and determining the right blend isn't easy or can't be taken lightly. To create interactions that meet the same standards as traditional programs and to get the right blend, the audience and the technology tools have to be invested.

### 2.2 Adoption of live sessions in the e-blended learning model

The adoption of live sessions in the learning process is a new evolution in e-learning technology. Those synchronous events are key to the learning process design because they give learners the opportunity to ask questions, interact with peers and practise skills in a more realistic environment.

In a virtual classroom questions and answers can be put on the whiteboard.

During a live presentation the learner can interrupt it and if permitted can ask questions.

Voice medium can be used for this interaction.

Student teams can "meet" in synchronous chat rooms. Real time events are best handled using this medium. Some best practices for student interaction:

- Chat rooms are supporting brainstorming sessions very well. Often the chatting will be combined with document sharing.
- Weekly tutoring session can be organised as a chat session too. A student can enter the chat room and ask questions. He/she can share a prepared text with the tutor or other students.

### 2.3 An e-blended learning scenario for distance learners

In an e-blended learning solution the traditional classroom activities are part of the learning process activities. To organise lectures for distance learners, being as much interactive as face to face classes can be, we have introduced virtual class sessions or live sessions. In the following scenario you will find a real e-blended learning solution. Live sessions are included for distance learners.

An example of an e-blended learning process, including live session:

- a) The introduction into the topic: a power point presentation by the teacher in a live session (voice over IP)
- b) Interaction between students and teacher about the topic
  - During the presentation students can ask questions through the option of 'hand raising' & chat writing
  - The instructor can stop presentation and give feedback on questions (voice)
- c) Questioning at the end of the introduction (Simultaneous writing on whiteboard)
  - Instructor writes question about presentation in middle of whiteboard
  - All students are able to write their answer on the whiteboard at the same time
  - Instructor comments (voice) on all the inputs of the students
- d) Assignment as part of the session (Screen sharing & coaching room)
  - Introduction of 15' by the instructor
  - Instructor puts some questions on the whiteboard
  - Students have 30' to write down an answer in a word document; meanwhile students and instructor stay connected to the LS live session
  - After 30', course starts again; students will share their documents (screen sharing)
  - Students can give additional comments/explanation through voice over IP
- e) Assignment organised as an assimilation activity to be done within a short time period (discussion board)
  - Instructor explains assignment at the end of the presentation (voice)
  - Students have to post their task on the discussion board before the next class
- f) Online tutoring of the self paced activity
  - Once a week an online questions and answers session is planned
  - Students can connect to the live session and get in contact with

### **3. Learning materials management system**

To support the e-blended learning model, we developed a learning materials management system, our warehouse. In our warehouse we split the physical storage of the document on one hand and the definition/characteristics of the document on the other hand.

The metadata or the characteristics of the document are stored in a database-table. The documents themselves are centrally organised in a directory/subdirectory structured in a hierarchical and multilevel way. The documents are belonging to a domain/discipline and have to be published in the corresponding discipline directory. The directory organisation is following the well-known library catalogue system UDC (Universal Decimal Classification) complemented with some home-defined UDC codes. The document is linked with its metadata in the database table.

An author/user can decide to centralise his files/documents on the warehouse server and to publish them immediately or later on. The UDC code is one of the metadata items and will force the storage of the file/document in the corresponding UDC directory.

Once the file/document is published it will be accessible for other users through the Internet. A user will query the warehouse of the specific knowledge pool to become some selected required information. A query interface in the browser (as an ASP based application) has been built for all staff members and students. A query is executed on the metadata table and a query report of the corresponding linked documents has been generated by this application.

Another kind of use is the integration of the warehouse learning documents in the e-learning platform, the delivery point of the student courses. The independency of the learning materials from the learning

process path itself is set forward. Our warehouse guarantees this independency. The documents are stored as html-files in our warehouse and the most advanced learning systems can create linkages to those html-pages. We are using LearningSpace5 (Lotus-IBM).

#### 4. Learning objects and learner objects

##### 4.1 A learning object

Traditional learning objects have been defined as a learning content item, in which is included the content document itself (or an URL of it) and the characteristics of the document formulated as metadata. By this way learning content has been organised and managed and can be made accessible for learners. The individual learner or the teacher, developing a course, can select those learning materials fitting their requirements. This level of personalisation of e-learning is a famous topic in several ongoing e-learning development projects. A discussion is still ongoing on point of standards, to guarantee the implementation of the learning object in most learning management systems.

##### 4.2 A learner object: the learner is the centre of learning materials management

In the learning object context the learning activity has been organised starting from the learning content. The individual learner and the course developer have been selecting the most relevant content from the warehouse of materials.

In our new vision of learner objects, we will change the model on this point and will start from the learner. A learning process fitting the characteristics of the learners can be developed including the required learning content documents.

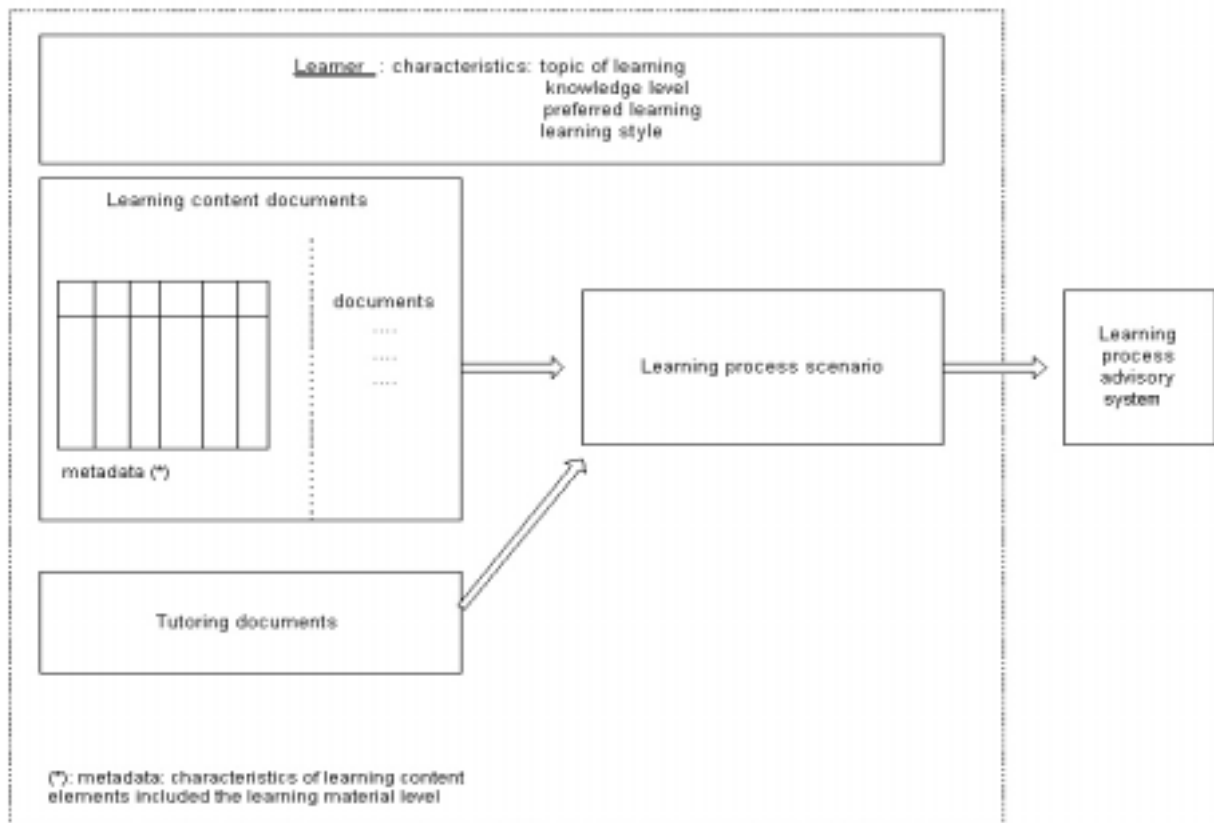


Figure: learner objects: internal structure and information flow

### 4.3 Learning process advisory system

An object oriented warehouse system of learner objects will be built, as an extension of the warehouse of learning objects. A learning process advisory system will be developed to create the learning process scenario for the learner. This planned learning path of the course including all activities and content documents has to be imported into the learning platform or learning management system

## 5. Conclusion

E-blended learning is the solution in which we can take now full advantage of ICT based e-learning combined with some traditional classroom activities. Dependent on the course topic and on the knowledge level of the learner, a scenario of the learning process has to be developed and entered into the Learning Platform. The learning materials/content or learning objects have been managed independent of the course itself in a warehouse of learning content.

Many research projects are ongoing on point of the creation of learning platforms based on open standards and reusable learning objects. In this paper we introduced the idea of learning process scenario based learning objects.

We defined an architecture for the learner object model. A learner object can be seen as an extension of the learning object, by integrating characteristics of the learner from one side and the content and tutoring documents from the other side. An advisory system will support the building of a personalized course. The architecture has still to be discussed. The development of a first prototype will be built in the next months.

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# DISTANCE EDUCATION – A BATTLEFIELD FOR STANDARDS

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## Introduction

Distance Education (DE) has been evolving over the last three decades, starting from mainframe based learning systems, bulletin boards, CBT systems, authoring systems, to web-based learning platforms and Learning Management Systems.

A key factor of Distance Education in combination with the Internet is the possibility to learn anywhere and anytime. On the one hand learners want to find content as easy as possible, they want to incorporate it into their courses and they want to move between institutions taking their learning bulletin with them [5]. But most times learning environments and especially learning materials were developed individually. Thereby many excellent learning materials are underused or were developed not only once, but again and again and again. The reasons for these redevelopments are manifold, e.g. proprietary formats, lack of interoperability or simply because nobody knew that they exist.

The demands mentioned can only be guaranteed by products (learning material, learning environments, etc.) that adhere to standards. On the other hand companies and product developers want to increase the return of investments, to eliminate redundant developments and to deliver learning material across multiple media (online, CD-ROM, print, etc.). “As organizations make significant investments in digital learning content, there is a strong desire to have greater assurances, portability, and re-usability. As organizations focus on providing learners with the “just right” content and activities, there is a strong desire to have the ability to more easily store, search, index, deploy, assemble and revise content. All of these hopes are part of the story of “learning standards” [15]”.

## Expectations in Distance Education Standards

It is agreed that standards are needed. We can find standards everywhere in our daily life: electricity, telephones, cars, etc. are all examples of systems based on standards. Also in Distance Education standards are relevant for various reasons. Svensson [16] points out four major advantages of standard development and use in DE:

- “Durability – no need for modification as versions of system software change.
- Interoperability – operability across a wide variety of hardware, operating systems, web browsers and learning Management Systems.
- Accessibility – indexing and tracking on demand.
- Reusability – possible modification and use by many different development tools.”

The most obvious benefit of standards in DE (especially when talking about metadata standards) is that learning material can be found much easier. Because of this content-openness the quality and breath of learning materials get enhanced.

The use of standards also ensures that content can be reused easily. In DE the reusability of learning material is essential, as the development is very cost-intensive and time-consuming. In order to avoid stranded investments, it is necessary to use standards and that the learning material itself must not be structured rigidly. There is also a need to organise it as flexible as possible. Nowadays, this flexibility is most often not given; also therefore nearly the same learning material has to be developed several times. E.g. parts of a course in object-oriented programming could be reused in special programming courses like C++, JAVA, C# and can be adaptable to other target groups as well (e.g. a beginners course in computer science, in schools, etc.). The example shows that learning material gets not only flexible by



using standards, but could also be re-purposed. So standards and specifications facilitate interoperability, exchange and dynamic content delivery.

Another advantage is that the quality of course material also improves. When there are standards for organization, format, indexing, etc. of resources, experts can concentrate to work in the area of their core competence.

From the didactical point of view standards in DE are needed as well. In this area standards provide opportunities to construct and offer individual learning models [17]. They meet diverse learning needs and learning styles, support a number of different pedagogies and allow customized learning-models.

Finally, using standards in development also allows consistency across courseware. The increased interoperability and reusability allows developers to protect their investments. Also mass customization is possible when adhering to standards and in the end standards create a potentially global market for DE products developed domestically.

## **Today's Distance Education Specifications and Standards**

Many organisations, consortiums, etc. are working in the area of DE standards. For instance organisations like the Dublin Core Metadata Initiative (DCMI) [7], Institute of Electrical and Electronic Engineering (IEEE) [11], IMS Global Learning Consortium (IMS) [13], Alliance of Remote Instructional Authoring and Distribution Networks for Europe (ARIADNE) [2], Aviation Industry CBT Committee (AICC) [3], Advanced Distributed Learning Initiative (ADL) [1], etc. have working groups in order to establish DE standards. This list could be easily continued. It is not possible to mention all organisations working in the area of DE. The following chapter provides a brief summary about today's approaches.

### ***Organisations and their Distance Education Specifications and Standards***

**Dublin Core Metadata Initiative (DCMI):** The Dublin Core (DC) standard for metadata can be regarded as the "grand father" of today's metadata specifications (e.g. IEEE's LOM, IMS Learning Resource Metadata, ...) or as the lowest common denominator. DC consists of 15 elements, which are all optional (none are mandatory) and syntax-independent. These elements are grouped to content, intellectual property and instantiation. DC suits well for archives or libraries, but for practical use within learning environments (assembling of content, searching for suitable courses) it is not convenient.

**Institute of Electrical and Electronic Engineering (IEEE):** The IEEE Computer Society Standards Activity Board chartered the Learning Technology Standards Committee (LTSC) in 1998 in order to develop accredited technical standards, recommended practices and guides for learning technology. LTSC consists of 9 groups working in different areas: General (Architecture and Reference Model, Glossary), Learner-Related (Competency Definition), Data and Metadata (Learning Objects Metadata, Semantics and Exchange Bindings, Data Interchange Protocols), Management Systems and Applications (Computer Managed Instructions, Platform and Media Profiles) and Digital Rights Expression Language. The metadata standard LOM (Learning Objects Metadata) [11] was developed in cooperation with ARIADNE and IMS and is built on metadata work done by Dublin Core. LOM maps the DC elements and adds several other elements. The last version of LOM is based on the former LOM standard (developed in cooperation with IMS and ARIADNE) and extended by LTSC. LOM was developed to allow interoperability and reusability. Its main aim is to have a classification that allows an easy way of searching, retrieving, using and evaluating learning objects. For each learning object a metadata file is added, which classifies the learning objects in LOM. But LOM does not specify a certain data format, protocol or a guideline for implementation. So it can be interpreted and implemented in many different ways, which is counterproductive to the aim of interoperability.

**IMS Global Learning Consortium (IMS):** IMS was founded in 1997 by the members of EDUCOM (now EDUCAUSE National Learning Infrastructure Initiative). Especially in the area of metadata IMS cooperates with ARIADNE. IMS bundles several working groups, which since 1997 have developed standards in the areas of: Metadata, Enterprise, Content Packaging, Questions & Tests, Learner Information. At the beginning IMS, ARIADNE and IEEE worked together in the development of the

metadata standard LOM. In the meantime IMS created a new metadata specification, which takes LOM (Version 6.1) as a basis, but some elements are added, some are redefined, etc. This means that the metadata specifications are departing from each other. Concerning the IMS Learning Design, IMS has approved the Final version (v1.0). This specification is based on the work carried out at the Open University of The Netherlands in the field of Educational Modelling and the specification called Educational Modelling Language (EML, [8]). This seems to be an approach in the right direction. It is the first specification, which tries to put a structure on everything and it focuses the didactical process directly (it concentrates not only on the technical model).

Alliance of Remote Instructional Authoring and Distribution Networks for Europe (ARIADNE): The ARIADNE-Project was established by the European Union and the Swiss Federal Office for Education and Science. The ARIADNE project treated the development of an international system of knowledge pools (KPS). These knowledge pools can be understood as pedagogical elements and training resources. In addition tools for creation, maintenance and reuse of learning resources were created. Within the project two specifications were developed, one for indexing resources and learning objects (including a guideline for metadata) and the other for describing a course structure. The origin ARIADNE metadata specification was harmonised with the IMS metadata specification and submitted jointly to IEEE, where it became the basis for IEEE's LOM standard (Version 6.1). Therefore, there exists a mapping of today's ARIADNE elements and DC or LOM elements, but again the format for coding the metadata is not specified.

Aviation Industry CBT Committee (AICC): AICC founded in 1988 was a pioneer in the area of guidelines for e-learning environments. The main aim was to develop and to publish guidelines for developing, using and describing CBTs (Computer-Based Training). Since 1988 10 AICC Guidelines and Recommendations (AGRs) have been published, including recommendations for courseware interchange, web-based computer managed instructions, digital video, digital audio, courseware delivery stations, etc.

Advanced Distributed Learning Initiative (ADL): Within ADL organisations like IMS, a consortium of several US government organisations, 1600 universities and more than 150 companies (Microsoft, Apple, General Motors, etc.) are working together since 1997. ADL's main aims are to build a network for web-based e-learning and the development of reusable learning objects, to allow a faster development of dynamic and cheap software to establish a broader market for e-learning and to give access to high-quality e-learning contents, which can be personalized. To be able to achieve these goals ADL developed SCORM (Sharable Content Reference Model) that separates learning contents and learning applications and specifies how they should work together. Actually SCORM is a combination of various standards and it is an approach not to create more small standards, but to think and develop globally to establish a common base for the developments in the e-learning market. Within this combination of various standards, the SCORM Content Packaging Information Model 1.2. [9] is based at the IMS CPS, but is augmented with SCORM specific elements (especially in the organizations section). Originally, SCORM 1.1 was derived from the Aviation Industry Computer Based Training Committee (AICC) Computer Managed Instruction. So SCORM 1.1 is a sub-set of the AICC work. The development of SCORM 1.2 and IMS CPS showed that both used the same hierarchical concept for structuring, but different terms. Therefore now SCORM adheres strictly to the IMS CPS, but extends it in order to assure compatibility to SCORM Version 1.1.

## **The consequences of today's specifications and standards**

Above there are only mentioned some major players in the world of specifications and standards. But there exist many many more companies, organizations, etc., which are creating specification in the area of Distance Education, so not only at the first sight today's specifications and standards seem to be inhospitable. Which problems are caused by today's specifications and standards?

One problem is that there nearly exist as many specifications or standards in Distance Education as working groups or organisations exist. Most of the organisations are working in various areas and are providing at least specifications for each area.

Within an organisation most times the different specifications are interrelated. This means that sometimes specifications of one organisation are not compatible to the specifications of another organisation.

So, to get an overview about the different specifications and standards is time-consuming and therefore it is a cost argument in developing software for Distance Education. Furthermore, most of the specifications are too complex for practical use. Content developers focus on developing content, adding metadata and support multiple specifications takes too long and is too complicated at the moment. Moreover appropriate tools and support are missing.

Another problem is that the elements of the specifications can often be interpreted differently. There is no exact documentation what is meant by a certain element. To give an example: LOM defines an element called “structure”, which is described as “the underlying organisational structure of the learning object”. As values “Collection, Mixed, Linear, Hierarchical, Networked, Branched, Parcelled, Atomic, Vocabulary” can be chosen. Fine, but what exactly is meant by “collection” or “parcelled”? And what is the difference between “collection” and “parcelled”? The answer to this question can vary from developer to developer.

But, what is the reason why we have to live with hundreds of specifications in Distance Education? And why are there so many initiatives and organizations?

These questions are not easy to answer. One reason maybe is the difference in the European and American way of standardization. Europeans tend to find solutions on a governmental basis and so several governmental institutions and organizations are founded to work in this area. In opposite to that the Americans often work out of market-driven situations and are pluralistic.

Another reason is that only a few years ago, there was no common language. This has now changed because XML (Extensible Markup Language) [10,19] has become the lingua franca in many areas. Because of the widespread use of XML it is now becoming easier to integrate or adopt different specifications and standards.

A third reason is that Distance Education is very much culture-based. Different societies have contradictory educational systems (different school/university models) and therefore a divergent understanding what specifications should handle, what is essential and what is unimportant. Also within a society or state, there exist multiple specifications. E.g. the Austrian Federal Ministry for Education, Science and Culture initiated the development of a standard for metadata especially suited for school [4]. This specification is partly based on LOM, but adds several other school-specific elements. For that reason it can be foreseen that this specification will not be implemented at universities or in the area of adult continuing education.

Last but not least, it seems that one reason is simply a political and economical one. “In a recent macromedia survey of corporate and government e-learning developers, a convincing 93% said that standards were either “very important” or important. [9]” This shows – apart from the advantages of using standards (which are mentioned above) – that the use of standards is also a marketing argument. Customers will force developers to support and to integrate various standards. So one reason of having so many specifications and standards nowadays is that the organisations and institutions are competing, their race-condition is to develop and disseminate a specification as fast as possible to become the leader. In the sense of “the leader takes it all” – DE has become a battlefield for specifications.

What is the consequence of missing one agreed standard? It means that at the moment it cannot be foreseen, which specification will make it. But as said before, the market already forces Distance Education products to support certain specifications. Therefore developers are forced to implement not only one, but several specifications. This increases the development costs.

Finally, because of just having specifications and not a final standard, there are always various releases. So, when one has decided to support special specifications, the support has to be maintained and extended with every new release. This implies that each tool or product has to cope with that. For instance, WeLearn – Web environment for Learning - Release 2.0 and WeLearn’s Offline-Converter [6, 17], both developed at FIM – is in use at several universities (University of Linz, University of Zurich, etc.) various high schools in Austria and in the area of adult continuing education. Within these tools we support CPS (Content Packaging Specification [12]) of IMS. Since, we have included this specification IMS has published several versions of it. In case of a new release both tools have to be adopted to the new version and in addition it must be ensured that the old version is still supported or that a conversion tool from the

old to the new version is developed, because users may have built CPS packages with the old version and they will refuse to further use the products when they have stranded investments because they can not use their CPS packages anymore. In order to accommodate quickly to changing specifications we implemented a computable model. This is independent from a specific DTD – it is more abstract – and therefore we can react immediately to changes. It also allows implementing changes incrementally and the possibility to cope with exceptions and special cases is given.

## Conclusions

Surely standards are needed in Distance Education. Customers have already started to force developers to support specifications and standards. However, the use of standards bears several advantages, such as a decrease of costs, an increased interoperability, quality, accessibility, etc.

At the moment many organizations and institutions are already developing specifications in various areas of Distance Education, such as content packaging, metadata, user profiles, communication, etc.

But unfortunately there exists no international agreed standard and the various specifications are changing rapidly. In addition to that, some specifications are too complex for practical usage (e.g. metadata specifications for content authors). And last but not least several specifications are not described and specified exactly, so that each developer can interpret them in various ways.

We are both – customers and developers – it is on us to find a solution and conferences like the EDEN Conference can pave the way, to establish one internationally agreed standard.

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# FLEXIBILITY BEYOND TIME AND PLACE: STRETCHING AND OPENING THE COURSE

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## **The changing context in higher education**

The field of education is changing, as the world is changing. Traditional and distance universities are in the process of providing quality education for rapidly diversifying student cohorts (Middlehurst, 2003). This change process is multi-faceted: broader and more diverse students, changing roles of instructors, more-flexible curricula, new delivery methods, new contacts between universities and other partners, and the globalization of higher education (Guri-Rosenblit, 1998). Bates (2001) argues that a mix of on-campus and flexible learning is an ideal mode of delivery for many of the new types of learners. He estimates that the lifelong learning market for formal university and college courses in knowledge-based economies is at least as great as the market for students leaving high school.

Although they are anticipating the new students, institutions in many countries lack a strategic view for responding to these new target groups (Middlehurst, 2003; Bates, 2001; WRR, 2002). In an international survey which was carried out in both developed and developing countries (Observatory of Borderless Education, 2002, Middlehurst, 2003) the conclusion was that institutions are changing slowly and not radically. Middlehurst (2003) found that online learning has had only relative impact on campus and on distance education. Change has been relatively rapid with respect to the uptake of a “modest” amount of online components and institution-wide learning platforms, but a fundamental move away from on-campus provision has not happened. In general institutions are still focused on their traditional target group (high school leavers).

Interestingly, institutions that do have a clearer view of their mission with respect to serving different target groups (e.g., lifelong learners or international students) usually demonstrate higher levels of use of ICT and influence of ICT on general teaching practice than do institutions without such a mission (Collis & Van de Wende, 2002). ICT provides a tool for supporting more flexibility in practice. Within the course, different types of students should have options for different ways of experiencing the learning process. But how can this be operationalised in practice? A first step is a thorough analysis of flexibility in order to guide subsequent choices about options and better assess the progress of an institution in terms of offering flexibility in learning. While institutions can make system-wide decisions about flexibility in admission and programme requirements, the individual instructor is the key player in offering flexibility within the course itself. In order for quality assurance relating to flexibility, there needs to be consensus relating to ways in which options can be offered within courses. With such a consensus, the degree of flexibility within a course, as well as within the institution, can be measured and progress tracked. Identifying such a framework and applying it in practice is the basis of our research (Collis & Van de Wende, 2002; De Boer, 2002a).

Based on results of this research, this paper addresses the questions:

How can flexibility be best expressed in terms of dimensions and options for course design in higher education? What model can guide decisions, particularly by the instructor, in terms of flexibility options for learners? Can the model serve as a framework for assessing progress in flexibility provision at the course level and within the learning experience itself?

## ***Flexibility as a key concept in higher education***

Flexibility in higher education is not a new phenomenon. Learning regularly takes place outside of explicit course settings, as students read their textbooks, interact with classmates outside of class, take part in events such as guest lectures or debates or use computer tutorials. But the term *flexible learning* is the focus of a new wave of interest. "There must be more flexibility to meet the needs of the learner, through

adaptability to different learner needs, learning patterns and settings, and media combinations" (Van den Brande, 1993, p. xxi). Flexible learning is often taken as synonymous with distance education. This is not necessarily so. Flexibility can involve options in course resources, in types of learning activities, in media to support learning, and many other possibilities. The key idea is *learner choice* in different aspects of the learning experience. "Flexible learning is a movement away from a situation in which key decisions about learning dimensions are made in advance by the instructor or institution, toward a situation where the learner has a range of options from which to choose with respect to these key dimensions" (Collis & Moonen, 2001, p. 9). Choices can vary in many ways, such as in the appropriate amount, content and types of learning materials. Depending on where learners are (i.e. in a professional working environment) options with regards to place and time of learning are important but also options should be available in terms of forms of interactions and communications as well as other variables that relate to the learning experience. The instructor is the key decision maker for many of these within-course options.

The instructor-rooted classroom-orientation model (Gustafson & Branch, 1997, p. 30) can be seen as the dominant approach within higher education. The weaknesses of this classroom orientation can also be its strengths: the instructor as content expert fully responsible for the course can mentor, stimulate, scaffold, and personally interact with his or her students so that the course is much more than a systemic way to meet pre-defined objectives but also can be a framework for an apprenticeship-type mentoring relationship between instructor and learner (Collis, & Moonen, 2001; Sfard, 1998). Instructors can also monitor and adapt during the instruction; tasks that are often difficult to accomplish with technology-based instruction. Within this instructor-rooted classroom-orientation model it is also possible to use ICT to make a course more flexible in some aspects, but not to change the basic principles of a course (Mioduser & Nachmias, 2001; Collis & Moonen, 2001). This could be seen as "stretching" the course. The same sorts of lectures, assignments, and study expectations may pertain; what is more flexible is the way in which students can carry out or participate in these. As a starting point for more-systematic provision of options to students related to course participation, the idea of gradually "stretching the mold" of the course without changing its key characteristics can be a change strategy for instructors. And if the stretching occurs often enough, it can lead to "breaking open" the mold and new models for higher education. Thus, starting with the instructor-oriented classroom-rooted model, what are ways to add flexibility so that stretching the mold begins to occur?

### ***From dimensions to a framework***

Collis, Vingerhoets and Moonen (1997) identified 19 dimensions of course flexibility, which they grouped in five sets: Flexibility related to time, to content, to entry requirements, to instructional approach and resources, and to delivery and related logistics. Lewis and McDonald (1988) noticed that flexible learning leads to individualised and student-centred approaches and also often to more active learning. Students will get choices about their own learning, but also a greater responsibility. They will have a greater independence in terms of what, how, where and when they learn, how quickly they learn, who to turn to for help and whether, and when and where their learning is assessed. The student will eventually have more control on the learning process and route. Van den Brande (1993) notes that students within fully flexible learning can learn when they want (frequency, timing, duration); how they want (modes of learning) and what they want (learners can choose). Although this leads to more control by the student, the instructor is still a very important actor. As has been identified, courses will stay an important organisational form. Within this course organisation the instructor has possibilities to make the course more flexible. From the framework of Collis, Vingerhoets and Moonen (1997) 12 of the identified flexibility dimensions are choices that can usually be determined at least to some extent by the instructor. Table 1 shows 12 of the 19 flexibility dimensions identified by Collis, Vingerhoets, and Moonen, organised around the categories related to time, content, instructional approach and resources and logistics. For each of these, the instructor can offer options to the learners.

Table 1. Instructor choices in flexibility, grouped according to main categories

<p><b>Flexibility related to time:</b>          Times for starting and finishing a course          Times for submitting assignments and interacting within the course          Flexibility in pace of learning</p>
<p><b>Flexibility related to content:</b>          Topics of the course          Orientation of the course (theoretical, practical)          Assessment standards and completion requirements</p>
<p><b>Flexibility related to instructional approach and resources:</b>          Ways in which the course is experienced (face-to-face; group, individual, combinations)          Language to be used during the course          Types and sources of learning resources          Assignments required for the course</p>
<p><b>Flexibility related to course logistics:</b>          Flexibility in location of learning          Flexibility in times of learning events</p>

In order for these dimensions to serve as a basis for guiding instructors in decision making and flexibility options and for quality assurance and progress assessment at the course and institutional levels, it is necessary to see if indeed they are recognisable in practice and if they can be simplified so as to provide a supportive framework. This has taken place as part of an international comparative study on changes in higher education.

### Validating the flexibility dimensions

CHEPS (the Centre for Higher Education Policy Studies) and the Faculty of Behavioural Sciences of the University of Twente in The Netherlands have recently completed an international comparative study on models of technology and change in higher education (Collis & Van de Wende, 2002; De Boer; 2002a). In the international study (nine countries, including seven in Europe), over 650 respondents (instructors, decision makers and support professionals) within higher education institutions gave their opinions relating to the variables in a model for predicting change. The purpose of this project was to study factors that influence current models relating to change and technology use in higher education and which predict how institutions are likely to evolve, given their current conditions. Consequently, the research explored the ways in which higher education institutions perceive their changing environments and how they are responding to challenges related to these changes. Furthermore, the study reviewed how strategic responses translate into internal policies and implementation plans and what effect these are perceived to have on teaching and learning practices.

A questionnaire was developed and piloted. A set of items related to the flexibility dimensions in Table 1 were part of the questionnaire. For each of the 12 dimensions, instructors were asked “To what extent do you offer options relating to each of the following to students in your own courses?” (One addition dimension was added, relating to flexibility in terms of language used in at least parts of the course). The response options were: (1) No flexibility, (2) (Unlabelled), (3) Some flexibility, (4) (Unlabelled), (5) Extensive flexibility. (The decision was made for all items in the questionnaire to only label the first, middle, and end points on the five-point scale, and leave respondents to assume that the values of (2) and (4) were mid-way between the flanking values.)

A selected sample of universities in the nine target countries was identified, using information sources in national Ministries of Education. ICT contact persons were contacted at each of the institutions, and asked to approach decision makers, instructors, and support personnel in their institution with the request to respond to the questionnaire. Approximately 30% of the approached institutions responded fully to the survey (for full details, see Collis & Wende, 2002). From these institutions, 347 instructors responded to questions relating to their current teaching practice and their predictions about this practice several years



in the future. Table 2 shows the means and standard deviations of the responses of the instructor sample to the items relating to the flexibility dimensions shown in Table 1.

Table 2. Amount of flexibility within courses currently offered by instructors in higher education (n=347, 1 no flexibility, 5 extensive flexibility).

	Mean	Std. Deviation
<b>Flexibility related to time:</b>		
Times for starting and finishing a course	1.82	1.02
Times for submitting assignments and interacting within the course	2.76	1.21
Flexibility in pace of learning	3.06	1.05
<b>Flexibility related to content:</b>		
Topics of the course	2.76	1.16
Orientation of the course (theoretical, practical)	2.26	1.05
Assessment standards and completion requirements	2.15	.97
<b>Flexibility related to instructional approach and resources:</b>		
Ways in which the course is experienced	2.68	1.23
Language to be used during the course	1.80	1.09
Types and sources of learning resources	3.40	1.07
Assignments required for the course	2.47	1.10
<b>Flexibility related to course logistics:</b>		
Flexibility in location of learning	3.28	1.07
Flexibility in times of learning events	3.18	1.11

It can be seen that most of the responses were within a standard deviation of “Some flexibility”. Thus, there is a start toward stretching the mold that instructors in this sample at least have already made. In this context, the original 12 flexibility dimensions can be said to be recognisable in practice. However, to serve as a tool for decision making and quality/progress assessment, it is desirable to see if the dimensions can be grouped further and reduced to a smaller set of components. To examine this, a principle components analysis was carried out, using Varimax rotation with Kaiser normalisation, converging after nine iterations. Three factors with eigenvalues greater than 1.00 were retained for interpretation. The three factors explain 54% of the variance. Table 3 shows the loadings of the 12 flexibility-dimension variables on the three retained factors. The shaded areas indicate the factor related to each variable for subsequent interpretation. For convenience, loadings less than 0.300 are not shown.

Table 3. Rotated component matrix

Flexibility Dimensions	Factors, eigenvalues, and percentage of variance accounted for		
	1, eigenvalue = 3.260, 27.166%	2, eigenvalue = 2.154, 17.950%	3, eigenvalue = 1.053, 8.778%
Times for starting and finishing a course			
Times for submitting assignments and interacting within the course	.562		
Flexibility in pace of learning		.836	
Topics of the course	.812		
Orientation of the course (theoretical, practical)	.736		
Assessment standards and completion requirements	.668		
Ways in which the course is experienced			.833
Language to be used during the course			
Types and sources of learning resources	.363		.531
Assignments required for the course	.566		.493
Flexibility in location of learning		.853	
Flexibility in times of learning events		.909	

Factor 1 relates strongly to five variables all involved with the decisions the instructor makes in setting up a course. What topics will be chosen? Will the orientation be theoretical or practical? What assignments will be carried out, when must they be completed, and how will they be assessed? What needs to occur in order to complete the course? Together, these relate to the “internal organisation” of the course. For each of these, it is possible to offer some degree of flexibility to the learners.

Factor 2 relates to the “external organisation” of the course, location, times, and pace of learning. Although these may be set at the institutional level, the instructor may have some choice in offering options to the learners.

Factor 3 relates most closely to the learning setting as experienced within the course: What learning resources are used and from where are they obtained? How is the course experienced in terms of group or individual or combinations?

These three factors together form a “flexibility framework” for stretching the mold and eventually opening it.

### **Applications of the flexibility framework**

Thus, based on the principle components analysis of the flexibility dimensions, a three-dimensional framework was identified that is recognizable in practice and can serve as a basis for metrics relating to flexibility. Two of the dimensions relate to course organisation and participation logistics, while the third relates more directly to the nature of the interaction and communication within the course. For each of these, flexibility options can range from none (all students treated the same) to some (ad hoc responses to individual students’ requests) to substantial (all students offered at least two options). Even offering some (ad hoc) options can lead to a “stretching the mold” (Collis & Moonen, 2001; Collis & Van der Wende, 2002) effect. As the systematic provision of options grows, the “stretching” can lead to an eventual “opening up” of the mold of traditional instructional practice. For this reason, the flexibility framework can be called The “S-O” Framework: “From stretching to opening the mold” (De Boer, 2002).

The flexibility framework is being used in practice in several ways. The first is as an analytic tool. For example, factor scores for the three factors retained for the framework were calculated for each of the 347 instructor respondents in the international survey. An analysis of these scores shows that flexibility in relation to the internal and external organisation factors is proceeding faster than flexibility on the pedagogical factor. From this, we have focused our attention on alerting instructors to options for flexibility relating to the learning experience itself, the third factor.

This has led to a second use of the framework. The flexibility dimensions identified in the framework, and particularly the less-well established pedagogy dimension, have served as the basis for the design and development of a decision- and performance-support tool for instructors, to help them identify options for flexibility and incorporate these into their course-design processes (De Boer, 2002). The tool is now being tested by instructors throughout the University of Twente.

The third use of the framework relates to the use of the dimensions as metrics against which an instructor’s current practice can be measured, and compared over time. This can lead to the objective assessment of flexibility and thus to institutional quality assurance.

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# ENHANCING QUALITY THROUGH INTEGRATED EDUCATIONAL DEVELOPMENT: A MODEL

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## Abstract

Quality assurance and enhancement of any educational provision takes many forms and is secured by a variety of means: educational development is one of them. Firstly, this empirical study describes the Roehampton Educational Development Centre, which operates a holistic, developmental, enhancement model in which quality assurance and educational development are integrated (this is unusual in UK Higher Education). Secondly, the study describes a model in which distance and distributed learning training is integrated into more general educational development to make the point that, technical matters notwithstanding, there are many common issues in learning and teaching whatever the medium. This is illustrated through a discussion of a Postgraduate Certificate in Learning and Teaching in Higher Education. As well as describing the programme, extracts from lecturers' computer-mediated conferencing conversations are used to develop the central argument: that it is better to integrate, rather than separate, educational development for distance and distributed learning to emphasise similarity not difference.

In summary the paper suggests that universities should place enhancement ahead of assurance and develop models of distance/distributed learning training emphasising the former not the latter.

## Background

### *The relationship between quality assurance and educational development*

In the UK quality assurance as a formal process tends to be divorced from academic or educational development areas: in older universities it is common for staff managing internal validation events and external inspections (by the national Quality Assurance Agency) to reside in a central administrative unit such as a registry; in newer universities a separate unit for quality assurance is as common as a dedicated section within a central area. It is extremely rare for these units to have a specific educational development brief: quality *assurance* is central to their operation not quality *enhancement*.

Learning and teaching quality *enhancement* is usually the remit of a separate unit for education development (see Gosling 1996 and 2001 for more detail). Gosling points out that there are many models but most include some of the following (Gosling 2001, p 75):

- Improvement of teaching and assessment practices, curriculum design, and learning support – including the place of information technology in learning and teaching;
- Professional development of academic staff, or staff development;
- Organizational and policy development within the context of higher education;
- Learning development of students – supporting and improving effective student learning.

Note that quality assurance is absent from this list. The model described in the following section adds quality assurance in an attempt to integrate enhancement and assurance functions.

### *The National Context: Educational development in relation to distributed learning*

In the UK there are, perhaps, two dominant models of educational development for distributed learning: pedagogic-focused and technology-focused. It is rare for there to be an absolute split between the two but it is common for one approach to predominate over the other. Often this is due to the location of educational development units in relation to larger providers of academic support, usually information

services/library services departments or their equivalents. Where educational development has been subsumed within information services/library services it is likely, although not inevitable, that technology focused development will be provided because staff involved in the development will be from a background other than teaching in higher education. They may be experienced support staff who may well have an extensive remit in staff training (in the use of online databases, information retrieval systems and online catalogues) but they will not have been involved with pedagogic programme design at a higher level. In contrast to this is a model in which distributed learning academic development is provided by pedagogues (usually ex-higher education lecturers) working in an educational development unit. Given their background one would expect programmes to reflect pedagogic concerns as much as technical ones.

There are, of course, many caveats here. For example, irrespective of the basic model adopted one is likely to see similar posts such as instructional designer and multi-media developer. This can mean many things ranging from a highly technical content author with no training in higher education teaching or programme design through to pedagogues with a modest amount of technical skill.

A common feature of much distance/distributed learning academic development is that it is taken forward in isolation from academic development for face-to-face teaching. Generally speaking courses in using particular software products, with or without substantial pedagogic input, are run in isolation from those dealing with more mainstream issues such as reflective practice, teaching large classes and problem-based learning.

The model below integrates distance/distributed staff development with more mainstream work to emphasise similarities across modes of delivery and to stress pedagogic rather than technical issues.

## **A model**

### ***The Roehampton Educational Development Centre***

University of Surry Roehampton is a campus-based institution with a small amount of distance provision (postgraduate programmes delivered entirely at a distance) but far wider blended use of the managed learning environment *WebCT* at both undergraduate and postgraduate levels. It has roughly 7000 students, most of which study on campus but are making increasing use of online resources and off-site working. It is located in south west London (see [www.roehampton.ac.uk](http://www.roehampton.ac.uk)). Its educational development unit is the RED Centre, described below.

The Roehampton Educational Development (RED) Centre models quite a distinctive kind of educational development in that it embraces not only more mainstream educational development enhancement activities for staff but also quality assurance and student learning support:

1. Educational development: includes provision of a Certificate in Learning and Teaching in Higher Education for all staff with less than three years' experience of learning and teaching in higher education, general staff development and staff development in distributed and distance learning;
2. Quality assurance and enhancement: not only is RED responsible for maintaining quality assurance processes but also for developmental work with academic staff, outlining new initiatives and external requirements as they arise;
3. Student learning support: this includes support for students with a learning disability, dyslexia and students needing more general help with their studies. This includes training in the use of specialist disability software and the University's virtual learning environment.

The model is an holistic one in which each area of the Centre's areas feeds into the others. For the purposes of this paper two aspects of the RED Centre are noteworthy:

1. Distance and distributed learning staff development are integrated into the educational development mainstream;

2. Staff development in distance and distributed learning is included in an externally-validated learning and teaching qualification: exposure to these modes of working are not optional extras for new staff but are integrated into the mainstream.

### ***The Postgraduate Certificate in Learning and Teaching in Higher Education***

The Postgraduate Certificate in Learning and Teaching in Higher Education is a one-year, part-time professional development programme for staff with less than three years' experience of working in UK higher education. Attendance is not mandatory but it is strongly encouraged: an incentive to attend is a centrally-funded buy-out of 25% of a lecturer's teaching load for the duration of the programme. The programme comprises two modules:

1. Learning and teaching in higher education: the syllabus includes learning, teaching, assessment, the scholarship of learning and teaching, distributed/distance learning, quality assurance, current issues in higher education, legal/ethical issues in learning and teaching and teaching a diverse student population. The module is delivered through workshops, lectures, simulations, student presentations and collaborative working online in *WebCT*;
2. Researching Learning and Teaching in Higher Education: the module includes research methods training but the focus is a research project focusing on the student's own practice (which could include distance/distributed learning). The outcome of the module, and mode of assessment, is a 5000-word research paper (the model suggested is *Studies in Higher Education*, a leading journal).

An important aspect of the programme is its theoretical basis. Underpinning the programme is evidenced-based reflective practice. In terms of working in the face-to-face classroom students are observed by lecturers and their peers on the programme. Observation logs and reflections by students on other sessions form the basis of a portfolio submitted for assessment. Online working is evidenced with reference to participation in computer-mediated conferencing. The focus of work online is, firstly, evaluating distributed/distance programmes within a theoretical framework and, secondly, considering whether there is a pedagogy of distributed learning.

### ***A pedagogy of distributed learning?***

At the beginning of the programme students are exposed to a considerable amount of theoretical literature on teaching and learning and are asked to consider their own practice in light of it. The basic theoretical model is a reflective one using the phenomenographic work of Prosser and Trigwell (1999) and others to help students position their practice in the pedagogic debate surrounding deep vs surface learning and student-centred vs teacher-centred. One of the aims of the programme is to make their approach explicit in terms of these dualisms so they can then examine and change practice where they are able to do so. The section on distributed learning, described below, attempts to ask similar questions about distributed/distance practice in an attempt to draw parallels with face-to-face practice so as not to place distance/distributed learning in a (pedagogic) ghetto. Having discussed how deep, student-centred learning can be brought about in a face-to-face context, the challenge of the section of the programme discussing distributed/distance learning (taught entirely online) is to do the same. In recognition that most technologies do not allow the range of interactions afforded by face-to-face work, Diana Laurillard's taxonomy of technologies (2002; pp83-4) in which she describes each as being narrative, discursive, adaptive, interactive or reflective (or a combination of these) is used to help students to consider distributed/distance techniques and their potential to aid student learning. The taxonomy is then placed in her 'Framework for Analysis' (2002; pp 81-90).

In *WebCT* they are then asked an initial question to begin the process of contextualising distributed/distance practice in relation to face-to-face practice:

The subtitle of the book is 'a conversational framework for the effective use of learning technologies'. Is the framework just for learning technologies or does it have a wider application in learning and teaching?

They are then directed to a number of distance and distributed resources to be evaluated with the initial question in mind. Prompt questions are provided (below is a selection):

1. A printed text: Read the study booklet given to you from EU208 *Exploring Educational Issues* (a course run by the UK's Open University). Answer the following questions:

- How does it vary from a textbook? What are the additional features and what are they for?
- Is there any sense of dialogue? If so, how is it brought about? Can you have a conversation with a text?
- To what extent is the booklet narrative, discursive, adaptive, interactive and reflective (as defined by Laurillard on pp83-4 of her book)?

2. A web-based course: Go to the website for First Fleet (an open access Web-based course provided by the University of Wollongong, Australia). The site is self explanatory and I will leave you to explore it for yourself. When you have done so answer the following questions:

- What makes the course particularly suited to Web delivery? What is the added value from using this technology?
- To what extent is the course narrative, discursive, adaptive, interactive and reflective (as defined by Laurillard on pp83-4 of her book)?

After a month of exploration and discussion students' experiences are drawn together around three further questions:

You have looked at an instructional text, two Websites, and a print/CD-ROM package. Of course by using WebCT you are experiencing another form of distributed learning: computer-mediated conferencing [CMC]. In light of this experience and in light of the theoretical reading discussion you have done already, discuss the following questions:

- What are these distinctive features of distance/distributed teaching in comparison to face-to-face teaching?
- What can face-to-face learning and teaching learn from distance/distributed techniques?
- Are there fundamental intellectual/theoretical differences between distance/distributed and face-to-face teaching?

I have set up a conferencing thread for each of these topics in a conferencing area *Distributed Learning*.

Finally the discussion turns full, circle and the taxonomy developed for the pedagogic evaluation of technology is used to evaluate face-to-face work:

Let's revisit Laurillard's taxonomy in relation to face-to-face working. You've examined the extent to which particular distributed/distance technologies are narrative, discursive, adaptive, interactive and/or reflective but what about your own practice in the classroom. If best practice is all of these things then to what extent is this true of the way you teach? If you do some things less well than others how could you change to rectify that and could technology play a part in that?

The importance of this final exercise is that it returns students to their deliberations about work in the classroom after having considered the strengths and weaknesses of technology within a coherent analytical framework. Hope fully it has broken down the artificial barrier between face-to-face and distributed/distance practices by illustrating that practices from each tradition are analogous to a certain extent, can be complementary and do not need to be separate.

## Student Discussion

At this point perhaps the students should speak for themselves. Their comments relate to just three of the questions asked: firstly, is there a pedagogy of distance/distributed learning and, secondly, to what extent are your classroom practices narrative, discursive, adaptive, interactive and/or reflective and, thirdly, could technology enhance practice?

### *Is there a pedagogy of distributed/distance learning?*

[Student A] I think that to answer this question we need to ask ourselves whether dist'd learning varies in essence from other types of learning, or whether it is in fact the same/similar, only in the form of other media...Most of the forms we've looked at WHEN USED ALONE (textbook alone, non-interactive website alone, CD ROM alone) are not fully effective means of fulfilling Laurillard's Conversational Framework and have many similarities (as far as I can see) to the textbook used with institution-based courses. However, if they are used IN CONJUNCTION WITH other complementary aspects of dist'd learning (CMC, e-groups, e-mailing, phoning, tutorials) then surely it works in the same way as institution-based learning with lectures, library visits and one-to-one tutorials (what Laurillard calls the "ideal teaching situation"). I feel that a pedagogy of dist'd learning closely mirrors that of institution-based learning, only via different media...

[Student B] I agree with [Student A]. There are many similarities but there are some differences too: I like the way distance books and Web site are structured much better than ordinary textbooks (and some of my lectures!) Ok, we're doing the same thing in the classroom as we are online but you have to structure it differently and much more clearly.

### *To what extent are your classroom practices narrative, discursive, adaptive, interactive and/or reflective?*

[Student C] A difficult question – I hadn't really thought of it in that way before. I suppose I'm often very narrative and discursive but not really the other two...

[Student A] Oh God, narrative I suppose....

[Student B] Well a bit of everything really. It depends on the situation: it's easy to be narrative in a lecture but harder to be the other things. Mind you, when you're running a practical workshop the other things are easier.

### *If you do some things less well than others how could you change to rectify that and could technology play a part in that?*

[Student A] Well I need to do something about being more interactive and reflective: I'm not that keen on CMC (sorry) but I will try to write some reflective materials for after session along the lines of the OU [Open University] materials we've looked at.

[Student B] I like the idea of CMC to extend classroom conversations....

What is interesting in these conversations is that students do not separate distance and distributed learning options from face-to-face classroom ones, either pedagogically or practically. They are as likely to choose a classroom solution as they are a distance/distributed one. In terms of pedagogy, little distinction is made between the two modes of delivery: lecturers understand that there is not a substantial intellectual gulf between face-to-face and distance/distributed delivery, more that it is a matter of presentation.

## Conclusion

Educational development is a powerful tool for quality enhancement (and a preferable approach to quality assurance). As distance and distributed learning become a more usual part of everyday practice for increasing numbers of academics in traditional campus universities the need for academic development programmes is growing correspondingly. In most institutions in the UK, irrespective of whether the focus of training has



been technical or pedagogic, distributed/distance academic development has been separate from more mainstream work dealing with face-to-face practice. It is argued here that a more effective model, and one that academics understand, is an integrated one in which distributed/distance practice is contextualised in a blended approach to teaching and pedagogic practice. The Roehampton model has sought to do that and evaluation by staff has indicated that it is not only effective but, more importantly, authentic. It has enabled them to approach technology not purely as an alternative to face-to-face delivery but as a number of tools among many which can be used in programme design and delivery. By using Laurillard's taxonomy of narrative, discursive, adaptive, interactive and reflective media staff can consider the most effective attributes of each and compare and contrast them with their own face-to-face practice. This unity of approach promotes a holistic and theoretically unified approach to the now wide range of learning and teaching tools (technological or otherwise) available to academics working today. Using a technology authentically and for sound pedagogic reasons is, surely, one of the most potent ways to ensure quality in any distributed/distance programme.

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# IMPROVED QUALITY IN LARGE-SCALE IMPLEMENTATIONS OF E-LEARNING IN THE WORKPLACE – IN SEARCH OF CRITICAL SUCCESS FACTORS

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## **Introduction**

When relocating more than six thousand employees to the new headquarters at Fornebu, Telenor, the biggest telecommunication company in Norway, decided to use e-learning to prepare their employees for a new working environment that included open-office solutions, extensive use of ICT solutions, advanced equipment and expectations to utilize new work forms. The goal was to do “Business as usual” within some few hours after relocation [10].

In the study reported in this paper the implementation of e-learning at Fornebu is viewed from a *critical success factor perspective*. This large-scale implementation of e-learning conforms to the definition of Collis et al. [1]: “[E-learning is] the support of learning using network technologies”. The concept of critical success factors (CSFs) was first introduced by Rockart [8] to describe the key factors absolutely necessary for the management to handle, to achieve the business goals and guarantee the survival and growth of the enterprise. This paper focuses on the ongoing quality improvements of this implementation and the identified critical success factors related to this process. The paper begins by introducing the Telenor case and describing the methodology used. Then the critical success factors, as identified in the case study, are presented and related to literature on CSFs. The findings may contribute to higher quality in the implementation of e-learning in the corporate sector, making it possible to develop frameworks which ensure quality skills and knowledge development, adding value to the e-learning activity itself.

## **The Telenor Case**

### ***Introduction***

At the end of 2001, more than 6000 Telenor employees were going to be relocated to Fornebu. This took place in four waves, from November 2001 until August 2002. The relocation should improve the possibilities for communication and innovation, and contribute to a more rapid sharing of knowledge [10]. During the first implementation wave of e-learning, I made a pilot study [14] together with Telenor and InterMedia. Six dilemmas were identified to make the further implementation of e-learning a success, and from March 2002 a set of changes was implemented.

Throughout the spring of 2001 I carried out telephone interviews with representatives of the implementation staff and these kept me informed about the ongoing changes. In August and September 2002, I had the opportunity to have a workplace at Fornebu, with access not only to the Intranet, the Learning Management System (LMS) SABA and the set of e-learning programmes, but also to key actors in the e-learning project at different levels. I have made interviews with all the members of the project organisation, the project owner and key actors at all levels in the relevant business areas (in total 18). Representatives from top management to end users have been interviewed about various aspects of the e-learning implementation, the e-learning programmes, support, experiences in their new work environment, their work tasks, collaboration partners and not at least, which factors they would evaluate as most critical to make the implementation of e-learning into a success and why. In addition I have attended three internal meetings with participants both from line organisation and project organisation, where user feedback, completion rates and prospective e-learning activities were presented and discussed. Furthermore, I have tried out in practice most of the compulsory e-learning programmes as well as

different types of web-based help functions. I have also focused on the internal marketing of e-learning and new work forms on the Telenor Intranet.

In this paper I first introduce the case study based on data collected during my two stays at Fornebu. Then, with the CSF perspective on the large-scale implementation of e-learning in Telenor, I present a summary of the critical factors of this process. In their research [3] on ICT-mediated learning in work organisations, Fjuk et al. argue for a holistic view of pedagogy, technology and organisation (fig 1), to reflect the individual's competence need, learning profile, work style and relations on the one hand, and the organisational framework and the technological infrastructure of the enterprise on the other. This view is used to organise the presentation of the CSFs at Fornebu.

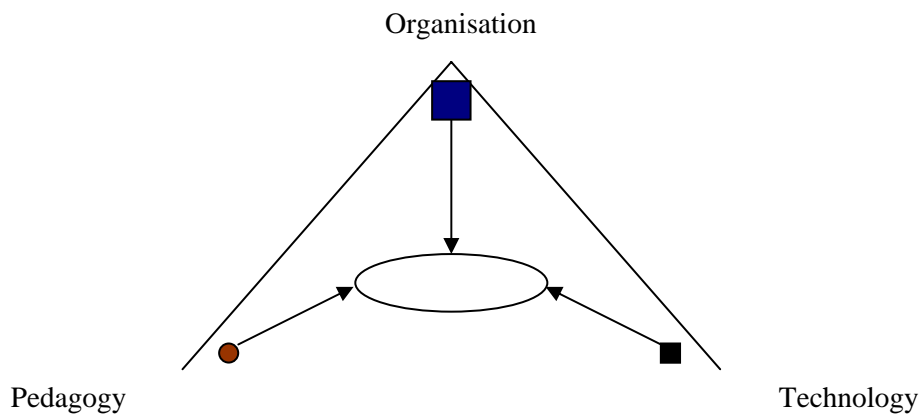


Figure 1: Pedagogical, organisational and technological aspects in a systemic entity [3]

### ***Case Description***

In the beginning of 2001, Telenor made a survey to identify the existing competence within the company. The aim was to determine necessary learning activities before relocating to Fornebu. Since “Business as usual” would be expected some hours after relocation, e-learning was, according to one of my informants regarded as “the only possible strategy to reduce the time to performance when people arrived at this new location [Fornebu]”. Based on a gap analysis between needed and available competence, 17 e-learning programmes were developed. The project is on the Telenor Intranet referred to as the biggest e-learning project in Scandinavia [10]. Although it was admitted that e-learning probably would be cheaper than classroom training, crucial for the decision to choose e-learning was, according to one member of the project staff, “the opportunity for relearning ... to repeat the learning at times as it is needed [and] when it is relevant to the situation”. In addition to a short-term goal focusing on a high completion rate of the programmes, a long-term goal related to corporate competence building was also of vital importance to Telenor. This job has just started. In this paper I will therefore concentrate on CSFs regarding the short-term goal.

### ***Technology***

As part of the e-learning project at Fornebu, both the LMS Saba and the 17 programmes were implemented. Saba was seen as a portal for delivering content as well as an administrative tool for gradually handling more than 6000 users and their need for follow-up and competence development. Employee data migrated from the financial system SAP combined with data about the completion rate, are available through predefined reports, *one* aggregated at unit level, *the others* identifying employees and additional completion rates at unit or manager level. Adjusted reports can be generated on request.

The 17 e-learning programmes were categorized in three groups: ICT solutions, Physical workspace and Work forms. The web-based learning packages are designed as individual tutoring programmes, without any type of collaboration. The use of headphones emphasizes this focus. The programmes are all multimedia based, including audio, video, animation and graphics. Interaction with the user is offered through different built-in tests and work tasks. Expected completion time for each programme is from 20 to 45 minutes. Between 80 and 100% of the programme has to be finished to be regarded as completed.

The users are free to make a break, log off the e-learning programmes and log in later, without losing credits. Some of the programmes were compulsory, others optional, and the different business areas in Telenor, in some cases the underlying units in those business areas, decided whether a package should be seen as compulsory or optional and when the package should be completed.

### *Organisation*

The implementation of e-learning at Fornebu was originally organised as two separate projects, both owned by the top management. One was dealing with the LMS implementation, the other with the implementation of content. The latter project team also included educational personnel. Since the communication between the projects and the various business areas was of great importance, a function as Training Administrator (TA) was established as a connecting link. The TAs, recruited primarily from the Human Resource staff in the particular business area, were given a broad responsibility: the coordination of learning activities and support within their own units, and especially to keep their leaders informed about relevant completion rates. The main responsibility for the e-learning activities, however, was given to the manager of the business areas in combination with the project group. Before moving to Fornebu, these managers were personally invited to a meeting with the corporate top management, encouraged them to stimulate a widespread use of e-learning. Negative sanctions were considered, but never adopted.

Throughout the project the e-learning activity was marketed on the company's website, through teasers, newsletters, stories, business cases and interviews that highlighted aspects of the project. To raise the completion rate of the e-learning activity, some of the business areas and units initiated the use of incentives, to reward employees with a high completion rate. Other units decided not to use incentives at all.

### *Pedagogy*

The e-learning activity was both self-paced and self-directed, based on instructional design. The focus was on flexibility and mobility for the single employee, in time and space. E-mail was the only tool for communication, offered through the intranet. Two of the e-learning programmes were designed especially to support reflection on new cross-organisational work forms, co-operation, individual responsibility, self-leading principles and dilemmas in the workplace.

The e-learning programmes were marketed on the intranet by a funny teaser and a link to the programme. A support team was at the employee's disposal for the first week after relocation. Colleagues holding positions as Floor Managers, were steadily rerouting questions about the new technology back to the e-learning programmes. Furthermore, an attended helpdesk, together with a new help portal embracing web-based mini guides, FAQ-lists, user manuals and system documentation, were available, as well as a built-in index prepared for relearning and paper-based instruction material. This pedagogical approach may be recognized as *blended learning* [11].

### ***Changes from wave 2 to wave 3***

Based on the pilot study [14], the project focus was changed. From being two projects, one more technical, the other more content-oriented, the projects were merged, with a distinct focus on the end user, on pedagogy and organisation. The project was also decentralized: The e-learning activity was anchored to the middle management, local TAs complemented the central TAs in each business area, cooperation between the local TAs and the Floor Managers was established and local solutions based on central goals, plans and strategies were developed. Different types of workshops, including either employees, managers or a combination of both were introduced for training and reflection. The project resources were the same as before, but the organisation of these resources changed.

Although the completion rate neither should be interpreted as a proof of learning nor of success, the following rates might serve as an indicator of a successful shift:

- 86% of the employees in the fourth wave had on average completed five e-learning programmes
- 92% of the employees in one of the units of the third wave had completed nine programmes each
- in one unit more than 90% of the employees had completed all the 17 e-learning programmes
- the last two waves showed an impressive average completion rate – the average number of learning modules 14 days after relocation had increased from 3.6 in the first wave to 5.3 and 5.4 in the last two waves

The completion rates differ because of differences in mandatory and optional e-learning programmes, from unit to unit and from one business area to another. As the statistics illustrates, however, the tendency to an increased completion rate was noticeable from the first two waves to the last two. One member of the project team referred to this shift as “two different worlds”. There may, however, be other reasons for this increased throughput, for example biases like gender, age and culture.

### ***The findings of CSFs at Fornebu***

My interviews with top management to end users, participation at different meetings and my study of internal web sites and statistics from the LMS, have resulted in a list of critical factors in the implementation of e-learning at Fornebu and an additional list of reasons why these factors are regarded as critical. It has to be underlined that my informants constitute the primary source for the table. The critical factors and relevant main purposes are organised with reference to Fjuk et al.’s triangle (table 1). As the table shows, critical success factors exist at different organisational levels and in various areas.

Not surprisingly the informants place emphasis on different factors, dependent on organisational level and their role in the implementation project. The opinions differ, however, there is not a 1:1 ratio between the role and the evaluation of critical factors.

## **Discussion**

The Telenor case shows that anchoring at all organisational levels is necessary, but not sufficient. Collaboration between these levels is of great importance together with focused marketing of the e-learning activity. Critical is also a relevant, flexible and reusable content and available time.

As the goal of the e-learning implementation at Fornebu illustrates, the desired outcome of corporate e-learning is seldom the e-learning activity itself. Whether the e-learning is individual or based on collaboration, in most cases the e-learning activity is rather the input to a learning process, meant to result in transfer to performance and knowledge building. The literature on this field has grown simultaneously with the increased use of e-learning in the workplace. Below I will tie my findings to relevant literature on corporate implementation of e-learning and critical factors inhibiting or supporting this process.

Table 1: Critical success factors of the implementation of e-learning at Fornebu

Type of factors	Critical Success Factors	Main purpose
Organisational factors	Ownership and anchoring of the e-learning implementation in the top management	Financing, involvement, responsibility
	Anchoring in middle management	Time for learning, engagement, involvement, pushing
	Decentralisation of the implementation process	Local learning goals, local supporters/stakeholders, local ownership, structural limits for mobility and flexibility
	Develop a communication and information strategy towards the different organisational levels and different target groups	Sell in the e-learning message
	Coordinated support structures including web-based material and human support	End-user focus, coordinated end-user support
	Interaction, coordination and cooperation between different projects, different organisational levels, between managers, employees and human resource staff and between project organisation, line organisation and technical staff	Competence transfer, synergy effects, better processes
	Relevant and dynamic content	Learning at the right time for the right group, satisfied and motivated users,
	Value adding and goal-oriented content	Utility effect, satisfied management , economic benefits
Technological factors	Pre-tested and a well-functioning technology and technological infrastructure	Avoid trouble
	Adequate technological resources	Support, help
	An LMS including satisfying measurement instruments and available statistics	High-quality reports
	E-learning programmes designed for desired measurements	Evaluation
	In time and correct basis data	High-quality reports
Pedagogical factors	Implementation of new work forms, new ways of working together, including collaboration and social networks	Innovation, collaboration
	Implementation based on local learning goals	Relevance, realistic
	Adjusting means to process	Cost-effective
	Develop good measure instruments	Evaluation, efficiency, effects
	Process and pedagogical competence	Learning
	Design for reuse	Relearning, holistic support

A review of literature on the corporate implementation of e-learning from a CSF perspective, reflects various contexts and a shifting focus. Different terms and concepts are used, together with various levels of categorization [2, 4, 7, 9]. A general approach to the subject is given by Wands et al. [13]. The study introduces three different categories of success factors, *organisational*, *general* and *cognitive factors*. While their organisational and general categories are mostly confirmed of my findings, their category of cognitive factors is fairly absent. The four Cs of success specified by Rosenberg [9], however, Culture, Champions, Communication and Change, seem to be supported, not necessarily in detail, but as indicators of stakeholders and issues to place emphasis on in the implementation process. On the other hand, my study underlines two additional Cs of success – that is Content and Collaboration. Authentic, relevant and dynamic content, adding value to the e-learning process and targeting specific groups of employees, seems to be crucial both for the individual user and the company. Furthermore, collaboration between actors and stakeholders at different organisational levels and between different projects, appear to be of fundamental importance in my study. As one of my interview objects puts it, “it is the collaboration and interaction between people holding different roles in the implementation process that leads to success”. This factor is also emphasised by Kotter [6] in his study of CSFs in his effort to identify manager-related factors inhibiting the transfer of learning to the workplace.

The heavy focus on content and collaboration in my study might be attributed to the *volume* of the Fornebu implementation. Cross-organisational collaboration between different stakeholders, actors, levels and projects might be more important by implementation of e-learning in large organisations than in smaller ones. Correspondingly there might be a need for a more flexible navigation within the e-learning programmes just in those contexts, to make the content relevant for larger user groups. An alternative strategy might be e-learning programmes targeted to smaller user groups, depending on knowledge, tasks, needs and experience. When the e-learning activity is optional, this demand for flexibility might be even more important.

## Further work

In this paper I have proposed a quality framework for large-scale implementation of e-learning in the workplace, by referring to six categories of critical success factors that should be assessed *before* and *during* the implementation process. Further studies should be accomplished to evaluate the proposed framework and try to elaborate the six categories. My follow-up study of the long-term implementation of e-learning at Fornebu should also be of interest. With the huge interest of e-learning in the business sector, large-scale implementations of both individual and more collaboration-oriented e-learning programmes in the workplace should be studied from a critical success factor perspective.

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# IMPROVING INTERACTIVE E-LEARNING FRAMEWORKS BY FOSTERING THE TEACHER'S ROLE

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## Abstract

A three level approach to support teachers in carrying out web-based courses is described. Based on a didactical concept that puts the teacher back in focus an exemplary e-teaching-process is developed. Each phase of this interactive process is supported by specific application systems that help teachers to improve both the quality of course material and the quality of communication in web-based learning environments.

## 1. Introduction

Learning with the aid of computers and the internet has shown its potential to align pedagogical activities with learner's needs for several years now. Multimedia content is used to get facts across. Communication channels with both synchronous and asynchronous mechanisms ease cooperation between students and help tutors coordinate 'virtual' classes on the Web. Learning management systems help organize courses or even whole virtual universities.

But taking a closer look at the actual situation of most educational institutions dealing with e-learning or web-based learning real life is different. Most of these institutions weren't start-ups which began educating the computer-based way from scratch. The better part had accepted e-learning as just one new way of teaching and learning. But as online teaching is remarkably different from teaching in traditional structures most problems occur not on learner's but on teacher's side.

This paper proposes an approach to support these teachers in their endeavors to perform the best possible teaching action. For this purpose we introduce three conceptual levels of the approach as a whole. The first level (didactical concept) constitutes the teacher's position within an overall pedagogical model. The second level (process concept) describes the process view of teaching in e-learning or web-based learning environments. And finally the third level (support level) pinpoints several application systems that are appropriate to support the teacher in each and every step of the e-teaching process.

## 2. Problems

Teacher activities in e-learning scenarios can be broken down into two major tasks: providing the content for the students and supporting communication between students and tutors [Sche02]. Both tasks pose problems to teachers who are used to follow more traditional teaching methods so far.

On the one hand the transformation of paper-based content into multimedia content often fails, because teachers have difficulties in judging the abilities of a certain multimedia format or just don't know which technical representation suits their instruction needs best. As a result a distinctive part of so called e-learning courses on the Web consists of very simple packages, e.g. sets of presentation slides, plain scripts without hypermedia elements or barely commented weblink collections. Often these kinds of content come from the above mentioned institutions, which started to provide e-learning courses just recently.

On the other hand communicational issues of e-learning scenarios are an even more severe problem, not only for the inexperienced teachers but also for apparently skillful e-teachers. Almost every e-learning application offered on the market not only promotes high standard in matters of quality, up-to-dateness

and pertinence. In addition the production and distribution of content is supported by communication tools at a technically high level of sophistication. But in many cases, these tools are not as useful as they ought to be in order to carry out meaningful and precise communication processes.

Furthermore in most cases various communication channels are just provided but not exactly explained or actually taught to inexperienced teachers. As a result, teachers do not know how to use a particular communication tool effectively.

### 3. Didactical Concept: Focus on Teachers

For several decades now the prevailing pedagogical paradigm is to focus on learners instead of dealing with teachers' needs and desires. In traditional educational scenarios this of course leads to better learning experiences, where students are treated individually and the teacher's role changed from a simple knowledge provider to an empathetic adviser and facilitator of a learning group.

E-Learning however has changed the environmental conditions of this paradigm shift. Teachers can no longer rely upon their competencies to guide a class both providing the content to extend students' knowledge and communicating with learning groups.

What teachers need in this situation is to redefine their position within the context of individual learners, learning groups and themselves. This repositioning is shown in figure 1.

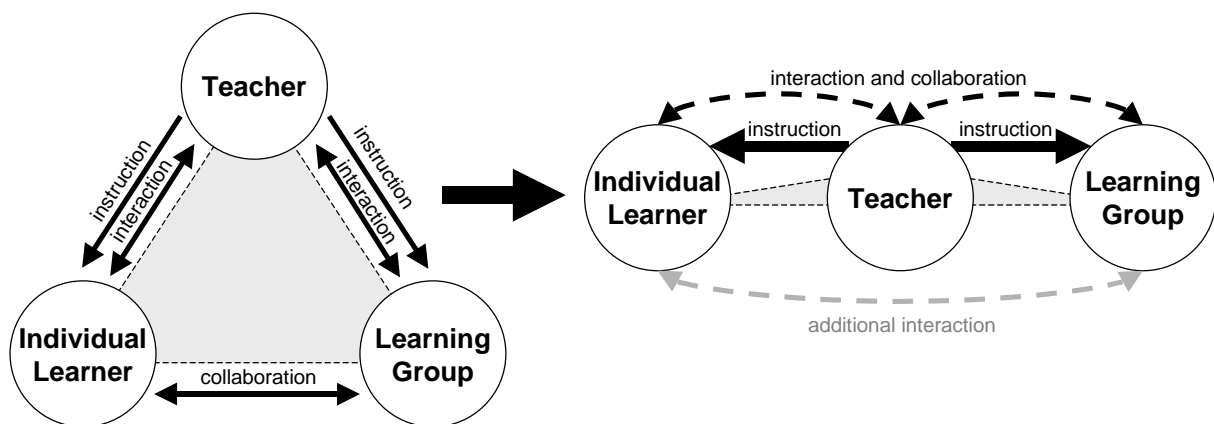


Figure 1: change of the teacher's role

The left triangle shows the widely accepted relationship model of learning as a multidimensional communication process [Hutz02]. Teachers instruct and interact both with individual learners and with whole learning groups. As each individual learner is member of a learning group as well, all members of a learning group collaborate. This model works in traditional education and might work in e-learning situations as well, if teachers are *not* facing the problems mentioned above.

But if they do, the repositioning of the teacher shown on the right side of figure 1 illustrates possible starting points for support measures and systems:

- The teacher is in the center of the educational relationships, as without the teacher almost every educational method will fail.
- The success of an educational arrangement basically depends on the imparted knowledge. Thus, the instructional activities are weighted stronger, as instruction is one major option a teacher has got to reach the students.
- Every interaction and collaboration among students and of course between teacher and students takes place involving the teacher who applies a tight communication support structure using moderation methods.

Unaffected by the teacher only the additional interaction between students remains, which is anyway indented to exchange information that is irrelevant for the course or to post private statements.

#### 4. Process Concept: Teaching in a Web-Based Learning Environment

Every didactical process can be broken down into different phases which are assigned to different teacher tasks. A popular process model for media didactics distinguishes seven phases [Maie98]:

- *Motivation:* In this starting phase the teacher tries to gain attention and to attract interest.
- *Presentation:* The teacher uses different methods and media to present the content of a course during this phase.
- *Demonstration:* This phase is used to intensify the students' perception. The teacher uses media to illustrate hidden processes with the aid of utilities like time lapse, slow motion, enlargement or diminishment. The phases of presentation and demonstration are closely linked.
- *Exercise:* The teacher tries to activate his/her students in this phase. Each student should deal with the course content him- or herself again, the teacher only interferes if a student is on a loss.
- *Repetition:* After a course module or a whole course the students spend this phase memorizing the new knowledge. The teacher can support this process phase offering different perspectives on the facts and abilities the students had just learned.
- *Test:* This phase serves as a feedback loop for both the students (was the learning process successful?) and the teachers (was the teaching process successful?).
- *Enrichment:* This is an optional phase. If required, the course content is enhanced and deepened by the teacher.

This didactical process model can be very useful for teachers who are already comfortable with a modern way of teaching. But as mentioned above a lot of teachers might find it quite hard to adapt to this or another similar model, because they cannot see their particular needs taken into account.

As a result of these considerations the following e-teaching process model is proposed (see figure 2).

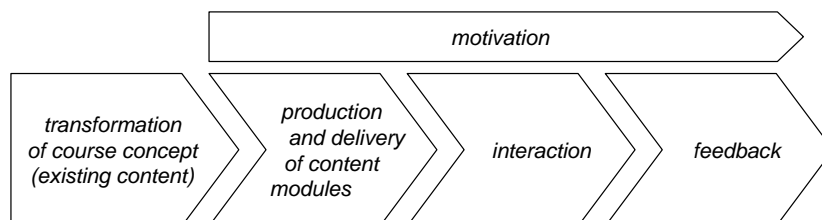


Figure 2: e-teaching process

The e-teaching process consists of four major phases which are adjusted to characteristic tasks teachers have to perform in order to change their teaching into e-teaching. In the following the four phases, the critical activities within each phase and the connections between each phase and the phases of the process model for media didactics are depicted:

- *Transformation of course concept:* In this phase, teachers try to transform the existing content into computer-based, multimedia oriented course material. Depending on how enthusiastic a teacher is, two main cases can be distinguished: Teachers who are eager to bring every possible kind of technical enrichment into their classes anyway won't have much trouble in creating e-learning content or even have accomplished the transformation already. Teachers whose attitude towards media technology is rather reluctant will need more support. A suitable support system for their needs is illustrated in the next section. The tasks of this phase have mostly been ignored or carried along only implicitly in the phases presentation and demonstration of the media didactics process model.

- *Production and delivery of content modules:* An e-learning course is more than just an accumulation of material. There are lots of authoring systems on the educational software market, but most of them require at least a reasonable amount of time to get used to or, in the worst case, force their users to acquire a new kind of programming language. This is of course an excessive demand for almost every teacher who just started e-teaching. Unlike this, we offer an authoring system that tries to meet the teacher's needs as it leaves it to the teacher, how intense he wants to get involved in the authoring process [Sche01]. This phase comprises the media didactics process steps presentation, demonstration and parts of the exercise phase, if the produced course contains interactive elements.
- *Interaction:* Even more important for a successful learning and teaching outcome than only content production, composition and delivery is didactically meaningful communication. As communication suffers more from teaching and learning scenarios being distributed in time and space [Sche02] it is necessary to provide the teachers with appropriate tools to fulfill their role as facilitator. Teachers need extensive moderating abilities to control communication processes, as unguided discussions too often miss the point. In this phase mainly the activities of exercise and repetition of the media didactics process are executed.
- *Feedback:* This phase is more or less a mirror image of the test phase in the media didactics process model. At the end of an e-teaching process the teacher wants to evaluate how much the students' knowledge has increased. In this phase he needs support from an online test system, that helps him to create a question database for his/her course, choose a particular set of questions for each exam and finally mark the answers handed in by the students.
- In contrast to the media didactics process model, where the motivation phase is fixed at the starting point of the whole process, motivation tasks during an e-teaching process take over an overlapping function. As e-learning scenarios are generally harder to stay with over a long period of time a continuous motivation is necessary. During the *production and delivery of content modules* motivating elements are an integrated part of the course modules. The *interaction* phase can be arranged in a motivating ambience deploying the right communication channel at the right time and making use of moderation possibilities as needed.

## 5. Support Concept: Application Systems

In each phase of the e-teaching process teachers are supported by corresponding application systems (see figure 3).

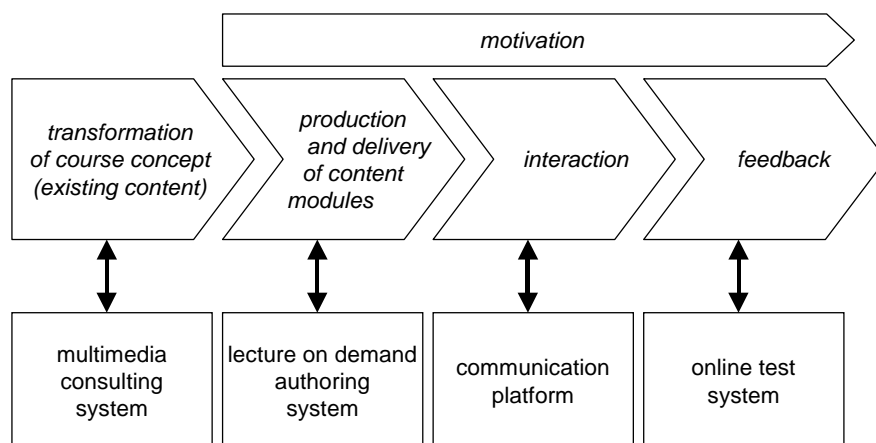


Figure 3: application systems supporting the e-teaching process

### *Multimedia Consulting System:*

The multimedia consulting system is used to advise teachers while transferring existing course content into multimedia content. The emerging material serves as input for the next phase of the e-teaching process. The system suggests an appropriate media type on the basis of certain attributes that are

requested from the teacher. In addition, the system offers design instructions and tips for the chosen media type. One major goal of the system is to advance educational media production that is motivated from a didactical and not only a technical perspective.

Every consulting cycle consists of four steps: in the first two steps the teacher defines the attributes of the target group and the technical equipment. Attributes give information e.g. on whether students of the target group are already familiar with the content or whether their information processing ability is rather high or low. The questions on technical equipment mainly focus on the available network connection. The third step comprises so called diagnostic questions that enable the system to give its suggestions for the appropriate media type for the given content, target group and technical equipment. The last step is the creation of an expertise for the teacher. Each expertise includes a didactical explanation, why the specific media type has been suggested, a technical instruction, which data formats the suggested media type should use considering the given network restrictions, and a best practice example of how to produce content of the suggested media type.

*Lecture on Demand Authoring System:*

The basic idea of lecture on demand (LoD) is to provide students with lecture content at any time and any place [Bode00]. This is done by recording video and audio streams of lectures, editing the recordings, and linking additional teaching resources (e.g. slides, animations, quizzes, exercises, subtitles) to the lecture video. To produce LoDs in an efficient way a simple-to-use authoring system has been developed to encourage teachers to do the editing and production of course modules by themselves.

The following screenshot (see figure 4) shows the main window of the authoring system. Basic features and working areas are labeled.

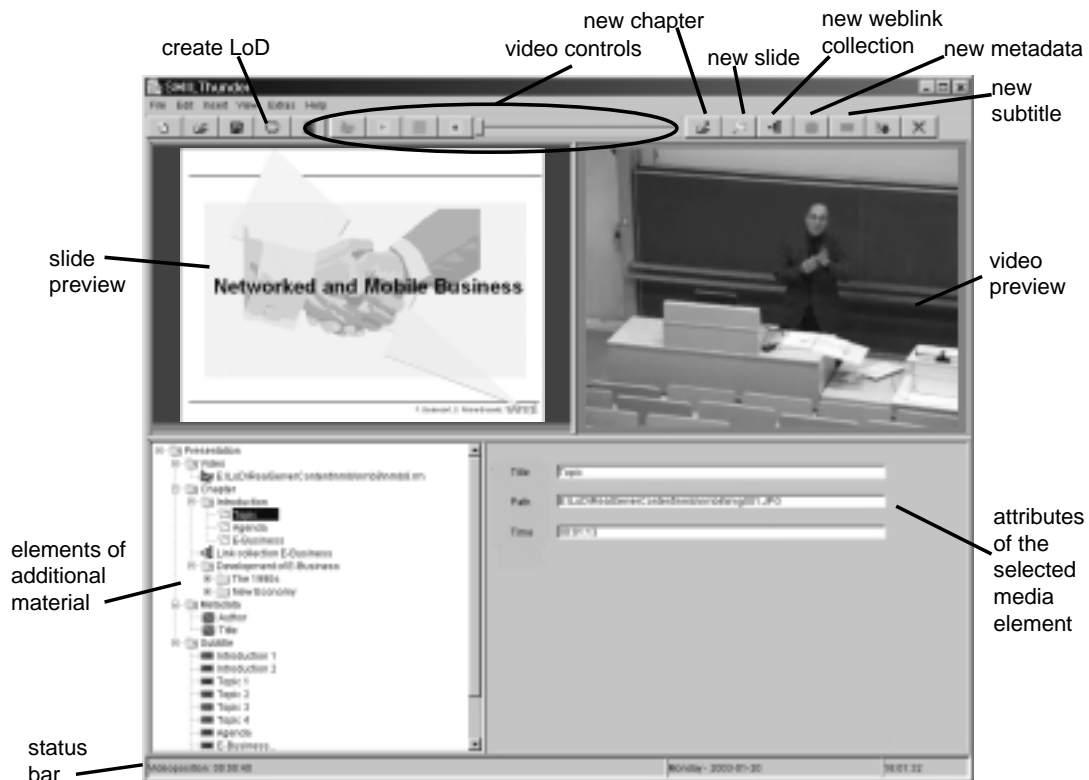


Figure 4: screenshot of lecture on demand authoring system

The authoring system uses the RealPix [Real00a], RealText [Real00b], and SMIL format [W3C98] to display and synchronize the different media elements within one system environment. Students need a standard, free of charge RealPlayer to access the LoD modules.

### *Communication Platform:*

In order to satisfy the students' demands for intellectual exchange, individual advice and personal guidance an effective and efficient technical infrastructure connects teachers and students. At the beginning of an online course the teacher uses the communication platform to configure a communication scenario, that is exactly specific to the unique course he is carrying out at the moment. A communication scenario consists of a combination of communication patterns. Examples for communication patterns are building up a group structure, collecting information, making group decisions and discussing individual or groupwork results. The communication platform suggests an appropriate communication channel and tool for each communication pattern. The teacher can accept these suggestions or define his/her channel or tool for a particular pattern.

After the configuration of the communication scenario the platform also provides the runtime environment for the current communication processes between students and teachers.

### *Online Test System:*

The online test system offers teachers a manageable tool kit to create and carry out exams via the internet. Every online test consists of several closed-ended questions that are characterized by their type (e.g. multiple choice, sequence, classification, yes-or-no-question), the level of the learning target (knowledge, comprehension, application, and problem solving), the process time, and the difficulty of the question (easy, medium or hard).

When a teacher wants to create a whole examination, he just selects the desired percentage of each question type, level of learning target and difficulty of the exam as well as the overall process time and the system composes the online test. After the teacher has made possible adjustments the test is submitted to the students who answer the questions. At the end of the test the systems calculates the number of points reached by each student and marks the exam.

## **6. Conclusion**

Going virtual with web-based courses is not a choice any more for most educational institutions. The challenge of teaching within media rich environments is often reduced to technical problems. Pedagogical and didactical aspects evoke interest only as far as the learners are concerned. As a result many teachers are not prepared for a paradigm shift claimed by theoretical and technical visions of future education. One way to meet these requirements is described in this paper. The presented theoretical aspects as well as the conceptual e-teaching process and the suggested application systems help teachers to improve both the quality of course material and the quality of communication in web-based learning environments.

Currently our project team is enhancing the communication platform already implemented and the online test system. Further research work will focus on the integration of all presented application systems within one seamless support system and on the evaluation of the teachers' responsiveness to the suggested support measures and systems.

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# INTERACTIVITY AS A QUALITY CRITERIUM FOR PEDAGOGICAL DESIGN IN FLEXIBLE, DISTANCE AND ELEARNING

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## Introduction

Distance and eLearning is the fastest growing educational method for adults looking for a convenient and affordable way to enhance their competences and train for new careers. A new prognosis states that Norway will be investing 66 mill Euros in eLearning in the year 2006<sup>1</sup>. But there is no easy and simple way to adopt eLearning. Most educational institutions are creating or adopting quality statements, standards, and criteria relevant to their field and level. When doing so, they have a tendency to reinvent the wheel. A European web-based study on quality and learning, carried out in April 2002 in five European languages<sup>2</sup> reveals that 61% of all respondents rated the overall quality of eLearning negatively - as "fair" or "poor".

The most important criteria used to evaluate quality in eLearning are - according to this study:

- Functions technically without problems across all users
- Has explicit pedagogical design appropriate to learner type, needs and context
- Subject content is state of art and maintained up to date
- Has a high level of interactivity

There has been much debate among education specialists as to whether the use of new technologies such as the Internet implies a radical change to the nature of education systems, or whether these technologies are merely tools that serve to enhance the delivery of education.

According to Elliot Masie of the Masie Institute<sup>3</sup> we have learned how to use the medium and have begun to understand the human response to technology. He recommends that we don't just compare eLearning to the classroom. We should look at what eLearning can do on its own, where it can reach people that will never get to the classroom, and how it can change the process of how we share knowledge. If a telephone call is never as good as seeing and hugging a good friend, yet that does not destroy our perception of its value and quality.

Elliot Masie recommends that we judge quality from a technology perspective as well as from the experience of learning activities perspective. Quality may also be cultural and generational; what one person gets all excited about may be very different from what another person of a specific age, position or culture finds interesting.

Adult learning should take into consideration the background of the individual learner and adapt to individual progress. Flexibility and adaptability makes eLearning and multimedia learning materials new pedagogical tools. Ideally, multimedia learning materials are different media seamlessly integrated into a whole, a pedagogical "engine". Texts cease to exist in a linear way, they become part of an integrated whole where impressions from several media create the context - the whole. Video in multimedia have several functions, such as being descriptive, informative and motivating.

The learning materials take over a large part of the traditional role of the teacher, and make the learner more "in command". eLearning puts more responsibility for the learning on the student and on the interaction/role-play between the student and the ICT-based learning materials. Interactivity can give an active sense of engagement in the learning process. Communication facilities are useful as social channels and to help problem-based collaborative learning.

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<sup>1</sup> According to the Norwegian newspaper *Atenposten* 23.02.03

<sup>2</sup> By Bizmedia at [www.elearningage.co.uk](http://www.elearningage.co.uk)

<sup>3</sup> D E S I E N, Volume 6.5, May 2001 - <http://www.uwex.edu/disted/desien/2001/0105/bized.htm>



## **Interactivity - involving and engagement - as quality boosters**

The digital environment is expanding very rapidly and growing more powerful. Interactive narrativity - enhanced, supported and/or generated by computers - offers an active sense of engagement in the process of dramatic development, and adds quality to the learning environments.

Is it possible to provide a sustained, rich, moving and meaningful learning experience in the context of interactive storytelling and simulated role-plays?

To achieve involvement and engagement and thus enhance the quality in eLearning, Vox (The Norwegian institute for adult education) has developed methodologies within eLearning based on problem solving in the context of role-plays and scenario-learning on the Internet.

In the following, we will present four eLearning models developed by Vox in collaboration with other European partners. These models take especially into account two of the factors identified as the most important ones used to evaluate quality in eLearning (see footnote 2) – a clear, explicit pedagogical design appropriate to learner type, needs and context – and a high level of interactivity.

### ***Explicit pedagogical design appropriate to learner type, needs and context***

STUDIT is an Internet-based distance learning model and the intention behind it is to make use of the principles of collaborative learning in a long term project. This model includes the subjects Norwegian, English, History, Social Science, Natural Science and Mathematics at secondary school level. The model consists of six modules and all the six subjects are included in the modules. An Internet-based platform<sup>4</sup> was used during the first half of the course, but during the last part all communication was based on the use of e-mail.

Some pedagogical principles were chosen. We wanted the model to be close to reality and cross-curricular, based on the principles of collaborative learning and including face to face reunions.

### ***Close to reality***

One of the clearly defined pedagogical ideas behind this model is that the learners should experience the course as close to reality and thus involving and engaging. For this purpose a fictive family was invented. All the exercises are connected to this fictive family and their lives and personalities and to different situations and problems. The story of this family is used to introduce new topics to the learners in a way that makes them recognise similar experiences from their own lives. In this way many topics are being made less abstract and theoretical and thus easier to grasp and understand. This methodology is considered as appropriate dealing with learners with little experience in studying and thus doubting their own ability. The target group is adults and there are reasons to believe that they will be anxious about returning to school because of bad experience from earlier school attendance and low self-confidence.

### ***Cross-curricular***

The other pedagogical idea behind STUDIT was to make it a cross-curricular distance learning model. Linking the course content to the life of a fictive family is meant to make this objective easier to obtain. We tried to integrate several subjects in the exercises and in this way make the learners work with more than one subject at a time. We benefited from the fictive family by creating problems and situations where we could introduce several of the subjects. The quality gain in this approach is that it enables the students to see connections and links between the different subjects which they have not been able to observe earlier instead of seeing the subjects as isolated from each other. This will contribute to improving the quality of the learning process by initiating a development where the students can see that the reality is not as fragmented as the organisation of learning materials may suggest and hence result in a greater understanding.

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<sup>4</sup> LUVIT

### ***Collaborative learning***

Using the methodology of collaborative learning is the third pedagogical idea in STUDIT. We wanted to arrange the exercises in a way that required discussion and collaboration among the learners to find the answers. This idea is also connected to the idea of the model being cross-curricular since cross-curricular exercises normally will be more complicated and demanding. The assumption is that this way of working will improve the learning process compared to working individually.

### ***Face to face reunions***

The choice of a blended solution is the fourth explicit pedagogical approach which was supposed to increase the quality of this distance learning project. This approach was chosen on the background of the learners' needs. Because they were not familiar with studying on their own and could be expected to have problems with their motivation, we included face to face reunions.

### ***Interactivity as a quality assurance procedure***

As stated above, there are clearly explicit pedagogical principles in this distance education model. There was also a high degree of interactivity between the learners and the tutors, and this communication resulted in some modifications and changes in the course like not using the Internet-based platform because it did not suit the learner's needs.

The pedagogical principles turned out not to be as appropriate to the learners attaining the course and their needs as expected. Forcing the students to collaborate made the course less flexible. The learners preferred to work individually, when it suited them, and with only one, maximum two, subjects at a time. They found collaboration and cross-curricular exercises too time consuming and generally demanding. Subsequently, individualism and flexibility was given priority at the expense of collaborative learning and cross-curricular exercises. Even if one can generally claim that a cross-curricular approach together with a high degree of collaboration will improve the quality of the learning process, it also depends on the target group. This means that quality may be something relative, not a clearly defined expression. In this case the learners were adult women with families and jobs and little spare time available and this influenced their way of thinking and organising their studies.

As to the face to face reunions, the students were positive that they had increased the quality of the distance learning course for their part. This enthusiasm remained during the entire course. The reunions provided the learners the professional discussions they did not have time for on-line. There was a social aspect as well that maybe was the most important aspect for the students. Regular reunions with the fellow students and the tutors contributed to keep the spirit and the motivation high, but the reunions also give the students an opportunity to voice their frustrations which was important as well.

An interaction like this, between learners and tutors, where the opinion of the learners is taken into account while the model is developed, may contribute to make the pedagogical profile less clear and explicit and thus reduce the quality of the distance education course. On the other hand, modifying a distance education course by respecting the interests of the learners, can also be looked upon as a quality assurance procedure. As stated above, the pedagogical design must be appropriate to the needs of the learners. At the same time, an interaction as described in this case, contributes to increase the engagement and the involvement of the learners at the same time as the lack of rigidity and high degree of flexibility can be claimed to be a quality criteria in adult learning.

### ***eCOLE - Internet-based Collaborative Learning in Adult Education***

eCole is a Grundtvig 1-project with a clearly defined pedagogical idea - to explore the potential of Internet-based collaborative learning. The aims are to motivate adult for creative writing both in their mother tongue and in other European languages, thus lowering the threshold that provokes fear of performance (the WebSiteStory). We also want to enable a holistic approach to adult education throughout Europe by involving several subjects and disciplines in short duration activities at European level (The ACROSS model) The target group is adult learners at all levels of education.

The methodology in WebSiteStory (WSS) is to motivate adult learners to creative writing and intercultural competence. WSS consists of five scripts and each has a theme like a Love Story, a Detective Story, a Soap Opera, a Travel Book and an Autobiography. Each script was given a starter (as a trigger) like a small text, a photo or a person gallery. There are a group of students in each country and the groups are collaborating to make the scripts. They each write one chapter in each of the stories and then pass the story over to the next group after a certain deadline. Then they are denied access to the story, but they can still follow the development. Each group is writing the first chapter in one of the stories and can then to some degree decide its content.

The other model, ACROSS, is a model for cross-curricula problem solving activities. The first time this model was run, the groups were given different themes in the field of energy. Each group collaborated with the other groups to write a report covering the situation in their particular field. The second time ACROSS was run, the theme was Mobility in Europe. The groups had to find information and facts about certain professions – salaries, holidays, necessary education etc., but also the cost of living and social security and put this information into the appropriate tables. Finally all this information was compared and commented upon.

The pedagogical approach is clearly explicit in both models. WSS is about writing fiction, the content in the scripts is up to the students to decide and they do not have to take any curriculum into consideration while writing and thus there is no such obstacle to the process of writing. It is all fantasy or fiction and it may be asserted that this has an involving and engaging effect on adult learners and their writing process and helps them to overcome their fear of performance.

In ACROSS the collaborative aspect is stronger than in WSS. The students or the groups of students have to collaborate to be able to finish their reports on energy or their tables on income, cost of living and social security. They have to communicate with the groups in the other countries to gather information and to give similar information themselves. Both models put most of the responsibility for the learning on the students which demands a high level of interactivity – with the technology and with fellow students.

There has also been an on-going quality assurance process throughout this project. After each round of WSS and ACROSS the students are filling in a questionnaire and the results are influencing the preparation and elaboration of the next round. Consequently, there is an interaction also between the students and the tutors which contributes to increasing the quality of this eLearning model.

### ***On-line simulations***

The third eLearning model, SIMULAB, is based on simulations; that is problem solving role play situations in which students have to communicate to negotiate an issue on the basis of a fictional but realistic manuscript to develop communicative skills in a foreign language.

Real communication is brought into the classroom by creating a totally fictitious frame through the use of role-play created in a www-based multimedia environment.

The simulations were performed on a TELSI-platform, which is very user-friendly and have been created to meet the needs of teachers, instructors and students who are not acquainted with www-technology. This approach enabled the pedagogical experts to produce good learning packages (simulations and exercises). The phases of the simulation concept are: presentation, description, negotiation and debriefing. An expected benefit for the users of the application was that teachers should easy get access to high quality interactive multimedia pedagogical material for language learning.

Being able to use the interface, however, does not guarantee the quality of the simulations that can be set up.

The concept and the software behind SIMULAB have been developed with support from the European Union and was rewarded the European Label for Innovative Language Learning in the year 1999.

### ***Interactive scenario – learning – a new project***

At the time being Vox is developing a new project named GenEthics. This project will establish a digital arena geared towards raising awareness and enhance adult citizenship related to the social and ethical consequences and usage of modern biotechnology.

By using interactive multimedia-based realistic scenarios on the web the learner is given the possibilities for having a learning environment which is independent of time and/or place, and still maintain some dynamic values of the classroom teaching.

The interactive platform developed within the frames of this project can easily serve as an interactive platform for scenario-learning in other topics by plugging out and plugging in new media content (text, animations and videos). This digital environment will offer a high level of interactivity, and hopefully give an active sense of engagement and thus add quality to the learning experience.

The scenarios will be presented in two steps. After the first part of the story the user is presented with a dilemma and asked to make a decision on where to go further, by clicking Yes or No. Dependent on the choice he/she makes, the next part of the story will develop in two different ways.

The learner has access to glossary and thesaurus from the site, and complicated biotechnical expressions will be explained by hypertext. This scenario-model, based on real-life examples, will improve learning in the way that it brings the learner into a mode of contemplation on which she reflects, reconsiders and negotiates the information presented.

The pedagogical model takes into account these four basic principles: Individualization, activation, concretizing and motivation. With the option of getting in direct contact with a scientist by e-mail, and being able to ask questions, exchanging viewpoints and receiving answers, the users will experience a virtual classroom. With the options: *Discussion forum* and *All given comments to this history* -, the user gets the opportunity to get in contact and share views with other users/students.

### **Conclusions**

According to the European web-based study on quality and learning carried out in April 2002 clear, explicit pedagogical design, appropriate to learner type, needs and context and a high level of interactivity are two of the most important quality criteria in eLearning. There are many pedagogical designs and methodologies which can enhance the engagement and involvement of the student. Motivating and stimulating pedagogical contexts which function technically without problems across all users are crucial for the student experience of quality. It is possible to provide a sustained, rich, moving and meaningful learning experience in the context of interactive storytelling, simulated role-plays and scenario-learning keeping in mind the target group; the learner type, their needs and the actual context. To attract new target groups into eLearning it is necessary to increase awareness concerning quality. The sharing and dissemination of good practices as well as dialogue between actors will give an added European value to the field.

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# THE ASTROLABIO PROJECT ON THE USE OF ICT IN SCHOOL EDUCATION: SOME INPUTS FOR IMPROVING QUALITY

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## 1. Introduction

An appropriate use of ICT in School Education is considered a key factor to improve quality in this educational level. The European Commission is promoting this use in learning processes through its *eLearning Action Plan*, which one of its aims is “to improve the quality of learning by facilitating access to resources and services as well as remote exchange and collaboration.” (p. 2).

The efforts of the different governments and administrations in Europe have been focusing on providing the schools with good equipments. However, there is a certain lack on the analysis of the educational uses of ICT in the classroom. At this stage, some European projects as DELOS<sup>1</sup> are doing an important work in this sense.

In Spain, it is said that “*all Spanish State schools have an Internet account*”<sup>2</sup>. But the point is which use are teachers giving to it. To analyze it, a group of seven Spanish universities, from different Spanish regions, developed the Astrolabio Project, which main aim is to analyze the use and evolution of ICT in school education and to find out good practices in order to take their main components to try to generalize them.

## 2. The Astrolabio Project

This paper focuses on the work developed in 2002, but it started with a pilot experience in Catalonia the years 1999-2001 (Sangrà, Bellot and Hinojosa, 2000).

The final aim of the project is to establish an observatory to analyze the implementation and use of ICT in school education. To do that, a number of surveys, studies and observations are being developed in order to look at the changes that ICT are causing in the schools and how it could help teachers and schools to improve the quality of education.

At this stage, the main aim of the project we are going to present was to establish a procedure to data gathering, to design and validate some tools to collect information and to analyse which is happening in the Spanish primary and secondary schools related to the integration and use of ICT.

Particularly, we are going to use a part of the findings of this research to highlight some aspects concerning the improvement of the quality of education through the use of ICT. To this respect, we do not use all the data we analyzed during the project.

## 3. Research methodology

A multiple case studies research methodology was applied. Each university chose 2 schools of each grade in its region, giving an initial total of 48 centers and the school was chosen as the unit of analysis. Schools are disseminated in the Spanish territory, but focusing on some specific regions: Galicia, the Basque Country, Madrid, Catalonia, the Valencian Community and Andalusia. Data were collected through interviews to

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<sup>1</sup> <http://www.education-observatories.org/delos>

<sup>2</sup> European Commission (2000). *European Report on the Quality of School Education*. Brussels: Directorate-General for Education and Culture (p. 25) Available at: <http://europa.eu.int/comm/education/indic/rapinen.pdf>

the schools Executive Board, questionnaires to the school teachers (1.222) and some teachers were interviewed where good practices were identified. Qualitative content analysis was realized through Hyper Research (Hesse-Biber, 1994) and quantitative data were processed through SPSS statistical software. Apart from this, other information resources from the different schools were used (reports, strategic plans, teaching plans, etc.)

#### 4. Some relevant conclusions

The research did not try to have statistical significance, because its main objective was to identify the major trends in order to develop a new and wider study. Despite of having a number of conclusions from the obtained results, in the framework of this paper, we should highlight some interesting aspects we consider could be related to the appropriate use of ICT in school education to increase educational quality.

In this sense, we are specially concerned about which is the perception of teachers about the real benefits ICT could contribute to their pupils' learning, which are the current uses they are giving to ICT in the classrooms and which are the training needs, if so, in order to make ICT a real shifting tool at schools.

- a) Most of the asked Spanish teachers consider that **the use of ICT in the classrooms benefit some intellectual processes** like attention, perception, response mechanisms, application of learning and understanding. Expression and communication are the less valued items (see Table 1)

Table 1: Influence of ICT in developing intellectual processes

<b>INTELLECTUAL PROCESSES</b>	<b>n</b>	<b>Average</b>	<b>T.D.</b>
<b>Knowledge facilitation</b>	1195	3,89	0,82
<b>Understanding improvement</b>	1196	3,73	0,82
<b>Application of learning</b>	1191	3,91	0,77
<b>Strategies of analysis</b>	1166	3,43	0,85
<b>Synthesis processes</b>	1159	3,48	0,82
<b>Evaluation processes</b>	1180	3,58	0,88
<b>Fixing attention</b>	1191	4,09	0,83
<b>Response mechanisms</b>	1168	3,94	2,70
<b>Strategis for valueing</b>	1168	3,45	0,87
<b>Organisational schemes</b>	1160	3,55	0,91
<b>Perception skills</b>	1178	3,97	0,78
<b>Expression-communication</b>	1154	3,44	1,08
<b>Other</b>	58	2,90	0,73

- b) Another block of analysis was in which teaching tasks they are using ICT. In Table 2 you can observe that **they are mainly used in administrative tasks**. However, an increasing number of uses are taken into account.

Table 2: Use of ICT for teaching tasks

Teaching tasks		n	Average	T.D.
Administrative tasks	Reports, documents ...	1167	4,14	1,14
	Lists ...	1153	3,94	1,21
	Qualifications, bulletins ...	1133	3,53	1,65
Planning tasks	To formulate objectives	1145	3,33	1,33
	To search information	1175	3,76	1,22
	To select contents	1154	3,14	1,23
	To elaborate activities	1165	3,67	1,13
	To prepare methodology	1161	2,93	1,28
	Didactic material	1155	3,50	1,20
	Assessment activities	1164	3,75	1,19
Teaching and learning tasks	To promote motivation	1156	3,54	1,22
	To transmit content	1157	2,71	1,15
	To present examples	1151	3,05	1,26
	Application exercises	1147	3,18	1,29
	Simulation games	1145	2,96	1,41
	Problem solving	1127	2,91	1,27
	To attend special needs	1096	3,09	3,45
	Teamwork	1132	2,49	1,22
Evaluation tasks	To evaluate	1134	2,82	1,25
		1120	3,22	1,20

- c) A third block of analysis was teachers attitudes facing ICT. **Most of them consider the integration of ICT in their teaching as a need.** They use adjectives as practical, effective, efficient or important.

From the qualitative interviews it is perceived that ICT have an important potential which methodological aspects could be benefit, specially pupil's learning and a more efficient use of time to teach and learn. In the same way, it is considered that the use of ICT will contribute to better attend students needs, improving the quality of education by offering a more personalized one.

- d) Finally, for the objectives of this paper, we should point out the fact that **most of the teachers are** available to receive more training, both technical and pedagogical, so they consider this is a key issue to improve the use of ICT in the classrooms.

## 5. Next steps for improving quality

From the conclusions we focused in this paper, there are a number of actions that Spanish schools and administrations should develop and implement.

**School organization** has been highlighted as a crucial issue for an efficient use of ICT in education. From the study, we can see that a good and clear leadership at schools is a major success factor. In this way, the consideration of ICT as a tool that can contribute to a continuous educational innovation in the centers should be introduced in the school strategic plans and, even, in the each year's teaching plan. Further research will focus on the need of a new and different school organization when integrating ICT.

**Indicators should be focused on the use** more than in the equipment. It is used to concentrate quality indicators on the equipment number and capabilities. This is so because a technical engineering view of ICT in education, but a new glance is needed. We should measure which are the reasons for not using ICT in schools and develop the actions to change this attitude. We should develop and measure new methods of teaching by using ICT, not merely using it to repeat what we are doing at the classroom without them.

Finally, we should focus not only on teachers: there is another very important actor in this play, the student. We need to listen to the students more than usual, because the final objective of teaching is to make possible the students learn. **How the students are using ICT to learn better** and how their context is playing, are important questions that should be answered by further research.

## 6. Acknowledgements

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# PROCESS SUPPORT AND QUALITY IN WBT CONTENT DEVELOPMENT

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## Process organisation in Content development

### *Preliminary remark*

Knowledge is subjective. It continually renews itself and that's why it has to be constantly newly generated, evaluated and distributed. Therefore many organizational units begin, additionally to the topic learning organization to develop the area of knowledge management. Continuously the knowledge of the individual has to be developed to the knowledge of the organization. Especially in small and medium-sized enterprises, which have still the largest deficits in knowledge management, numerous experiences and knowledge are lost through personnel fluctuation irreparably.

The improvement of the knowledge transfer is realizable only by the integration of suitable learning contents, highly-qualified teaching staff, flexible learning forms and appropriate methodology and didactics. Web-based Training offers these advantages and therefore there is an increasing demand. Basis of the successful development of e-Learning contents is a pre-determined process cycle. This is generally recognized and practicably proved. Contents and methods of the conversion as well as the results are variable against it depending upon target group and training aim.

### *Process organisation*

The process organization is shaped by an interrelation of non-technical, general tasks and the concrete technical realization. Four steps have to be differentiated (Fig.1):

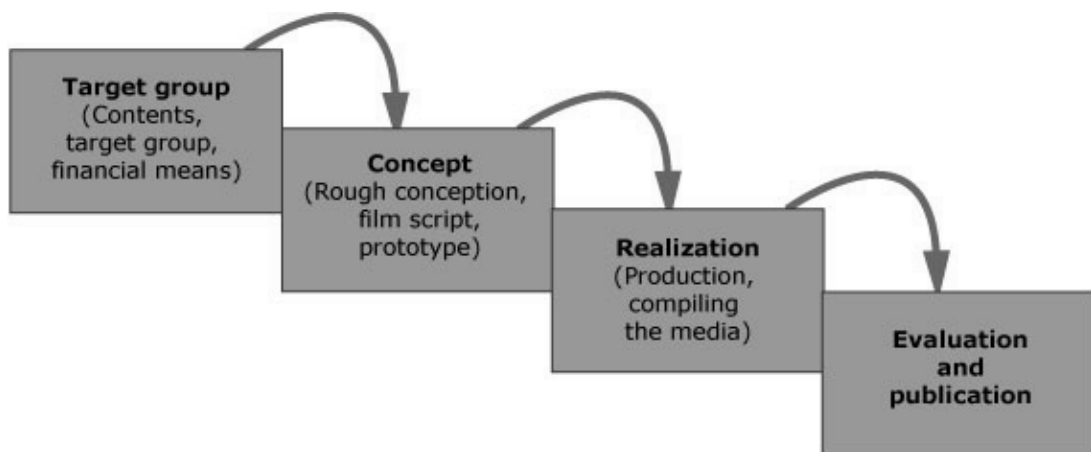


Fig.1

### *Target analysis*

The first step and basic condition for a successful application is the target analysis. In addition, the definition belongs on a target group and clarifying its technical and content-wise knowledge. Training targets must be formulated clear and the time and financial means must be specified as well.

### *Concept*

Only on this basis it is possible to set up a convertible concept in a second step. First, in a rough conception, contents are defined, modularised and co-ordinated. Based on the targets a learning strategy has to be developed according to technical means and specified for conversion. Special attention has to be

put thereby on the system guidance and the organization, since they affect directly the motivation of the student. Already at this time it is indispensable for the further development and adjustment to develop conceptions for learning control and for a feedback received from the students.

The rough conception forms the basis for a film script. That is indispensable as collecting main for the composition of the Contents. All contentwise (texts, hyperlinks, audio- and video files, pictures), formative and technical data (navigation, interactions) result of it. It describes exact details of each screen of the content. A co-ordinated, uniform overall view of the contents must be developed, on whose basis a prototype is produced. With that, download duration, stability of the presentation, navigation and overall view can be optimised.

### ***Realization***

The actual production of the contents takes place at a time, when the state of the contents is stable and contents and representations are fixed. Thus a time-oriented production and a high-quality result become possible.

### ***Evaluation und Publication***

During and after the production of the final product a constant examination of contents and technical functionality is necessary too. That has to take place internally with the producer and externally via the final user. Thus it is ensured that the product always corresponds to the current conditions and remains practicable.

## **Quality assurance during the content development**

### ***Quality aspect***

Each content development has to be led and supervised by a Management. It carries responsibility for the customer contact, the contractual security, the financing, the adherence to the schedule, the distribution of the tasks and finally the production of a high-quality result. Communication with the customer as well as the documentation of the intermediate results and arrangements give security for it. In addition, particularly in co-operation with external experts, quality assurance is only possible, if in each phase of the development control and safety mechanisms are built and are consistently used. On the basis of the objectives the intermediate results must be compared and possibly project-steering measures be introduced, which work result-oriented.

### ***Modular concept and quality***

The management has to proceed systematically and structured to convert these tasks target-orientated. It is an advantage to split the whole process into modules and establish responsibilities. During the conversion of all modules single measures including the exact targets will be defined and the tasks will be distributed (Fig.2). This concept also allows to work together flexible with external contractors.



Fig.2

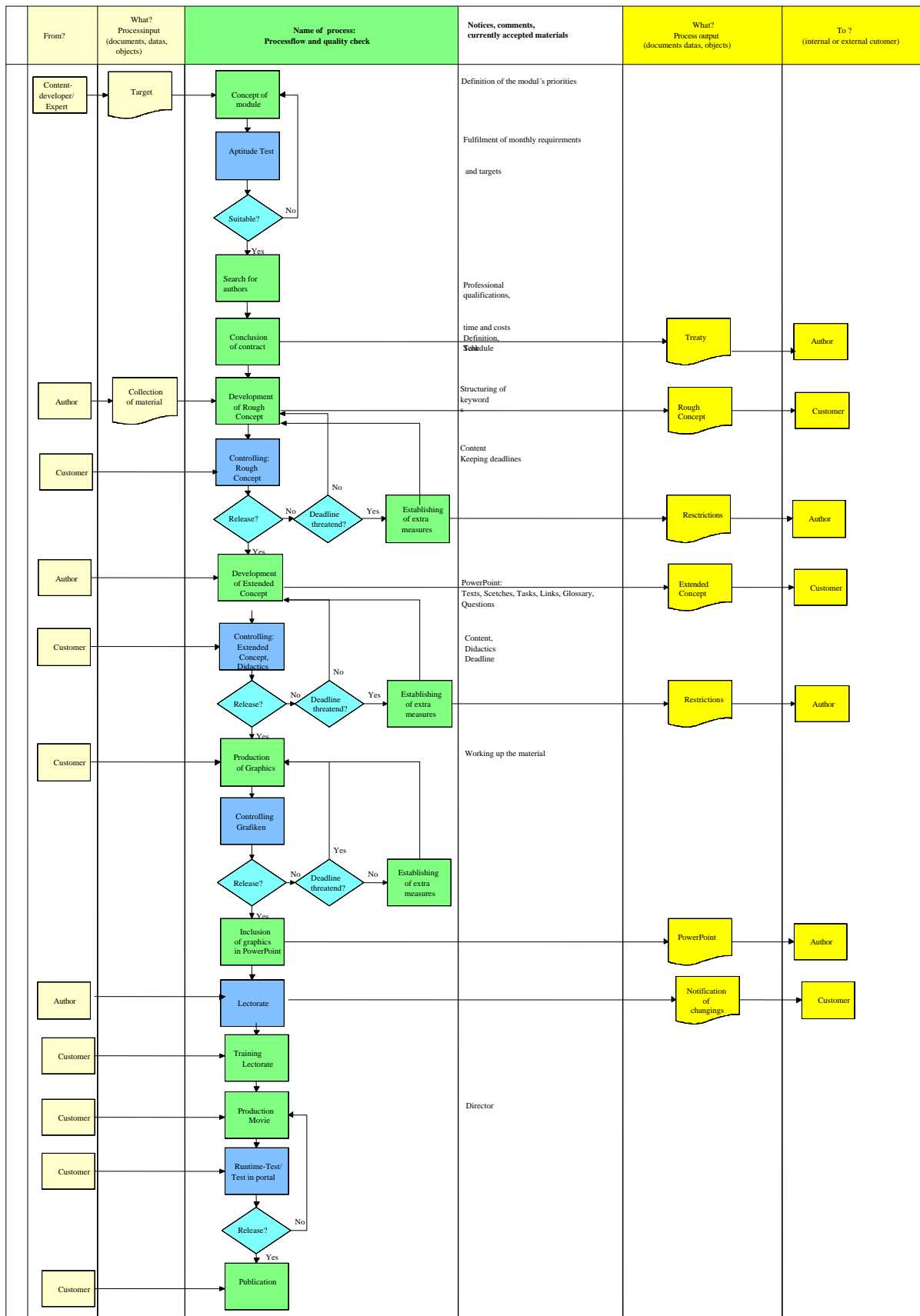


Fig. 3

### Quality concept

Throughout the whole process quality tests have to be set up and measures that are able to work as a project controlling have to be established, no matter if external authors participate in the work or if the whole development as well as the production of the content is done internally (Fig.3).

### Realisation of the content development by the project “Medienkompetenz”

The realisation of the content development in the project “Medienkompetenz” takes place in 4 steps: the basic concept, the extended concept, the graphic construction and the production (Fig.4). The content-frame of the module is defined by its own name. These definitions were created by experts when they applied for the project.

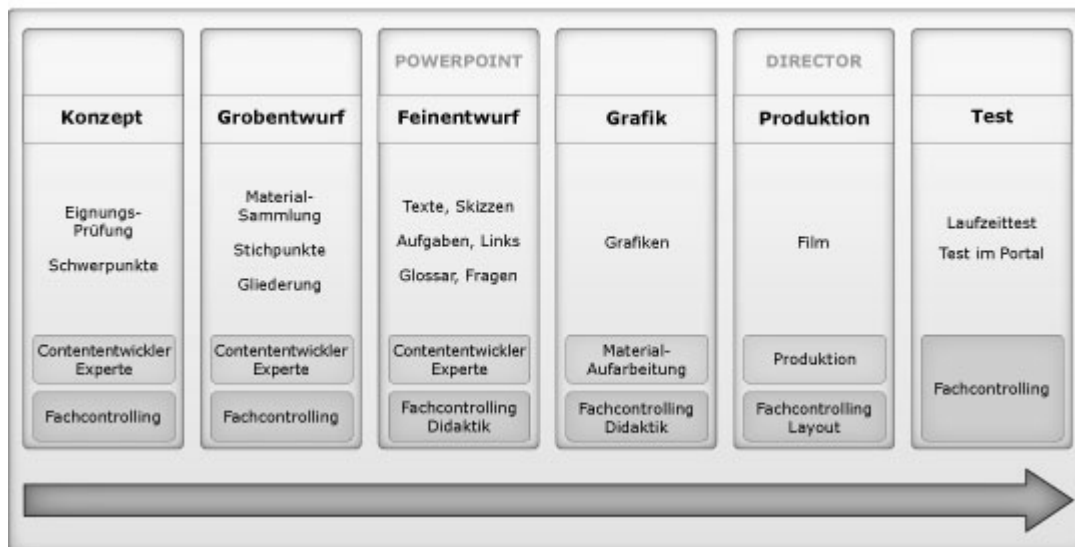


Fig. 4

The structure of the module is fixed in the basic concept. By the collection of material and enquiries of existing publication of this theme, the basic concept gets extended to a storyboard. The storyboard describes the compendium of the module with headwords and graphics for each page. This compendium is audited by the controlling, who looks at the textual cohesion and searches for redundancy to other contents.

After the acceptance of the storyboard extern experts realise the content. The aim is to develop a pendant to the module with the help of PowerPoint, which uses the same Layout as the WBT, including the same texts, graphics, hyperlinks, and glossaries. The controlling evaluates this step for textual discrepancies too.

Before the production the graphical elements of the WBT have to be adapted. The delivered outlines and pictures are realised by skilled graphic artists to a common and didactic design. The graphic elements fit to the size and the layout of the text, and so, extend the didactic way of learning. Some graphic elements are combined with animations. This step is followed by the acceptance of the controlling.

All elements of the WBT are realized with Macromedia Director Shockwave Studio. In the end, a web-based interactive movie is developed. This movie is accompanied by a simple and intuitive navigation. The didactic elements like graphic, text and hyperlink can be extended by animations and videos. A computer-based voice to read the texts is also included. After the lectureship of the expert the module is placed online.

The attendee of the project “Medienkompetenz“ accesses the modules via an internet learning platform. In addition to the contents they are able to use forums, chats and mailing system to communicate with different tutors.

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# GUIDELINES ON THE DESIGN AND CONSTRUCTION OF CBL ENVIRONMENTS

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## Abstract

This paper summarizes our studies and the contemporary literature on the design and construction of effective and efficient Computer Based Learning (CBL) environments. There is adequate evidence on Distance Learning environments, however CBL environments provide some special characteristics that separate them from their distance counterparts, while they have to adhere to educational principles, as they are mainly educational environments. So, we firstly emphasize these similarities and differences under the educational view. Secondly, we provide the contemporary educational research on such environments and we briefly mention the studies we have done in this area. The objective of this paper is to conclude to a set of design and construction guidelines for environments of this kind, as they emerged from our studies and the contemporary trends in the field. We propose these guidelines and discuss some issues of interest for further research on the domain.

## 1. Introduction

Computer Based Learning (CBL) environments have been used since the early days of the utilisation of computer technology in education. A CBL environment is a piece of software that cognitively covers a particular domain and provides the student with all the means of gaining knowledge on the domain. This definition implies two assumptions: The cognitive coverage and the presentation of the domain is sound (theory, exercises, simulations) and the learner can interact with the piece (interactivity with the software, multimedia elements); in other words, there is a communication channel in order for the student to acquire the offered knowledge.

The cognitive transfer, namely the ability of every educational environment to facilitate the acquisition of knowledge, is an issue of paramount importance. In CBL environments the communication and computation technologies play a major role in the storage, process and presentation of educational related information. Moreover, these technologies establish an interaction mechanism in order for the user to communicate with the software. This definition may be adequate to define CBL environments in a technical manner, it does not however answer the question of the cognitive transfer, since the technology itself can not guarantee it.

CBL environments are often confused with multimedia environments, with web-based educational resources, or with distance learning environments. However, there is a great difference that separates these kinds of environments from distance learning ones. In CBL environments there is only limited support for the learner, enough to facilitate the transfer of knowledge, eg. a help function. These environments assume the presence of a teacher and their aim is to support and scaffold him in his work. Alternatively, they can be used on a domain that the user is already familiar with, in order to enhance his/her knowledge of it, eg. a knowledge database for the employees of a firm. The great advantage of such environments is the relative ease and low cost of production, since they only have to provide the student with a basic support structure. CBL environments include de facto the notion of multimedia and they can be web-based or in CD form.

## 2. Background

Many writers have expressed their hope that constructivism will lead to better educational software and better learning (e.g. Jonassen, 1994). They stress the need for open-ended exploratory authentic learning environments in which learners can develop personally meaningful and transferable knowledge and

understanding. The lead provided by these writers has resulted in the proposition of guidelines and criteria for the development of constructivist software and the identification of new pedagogies. A recurrent theme of these guidelines, software developments and suggestions for use is that learning should be authentic, on a cognitive and contextual level. A tenet of constructivism is that learning is a personal, idiosyncratic process, characterised by individuals developing knowledge and understanding by forming and refining concepts (Piaget, 1952), which finally leads to the five main socio-constructive learning criteria (Squires & Preece, 1999) that must be met in order to characterize an educational piece as socio-constructive: credibility, complexity, ownership, collaboration and curriculum. As regards the use of technologies, such as hypermedia and the web in CBL environments, Marchionini (1990) argues that the use of them allows the learners access to vast quantities of information of different types, control over the learning process and interaction with the computer and other learners. A pilot study performed at Cornell University (Fitzelle & Trochim, 1996) had as its primary research question whether the web site enhanced student perceptions of learning. The research findings showed that students thought that the web site significantly enhanced their learning of course content. Student perceptions of performance in the course were also predicted by variables of enjoyment and control of the learning pace.

Ester (1995), in reviewing literature on computer assisted instruction (CAI) and learning style, found that CAI can significantly improve student achievement and attitudes while decreasing necessary instructional times. A meta-analysis of the effects of CAI on student academic achievement and performance by Khalili and Shashaani (1994) found that in 151 published comparative studies, the use of CAI raised student performance on exams by an average of 0.38 standard deviation. Kulik et al. (1986) in examining a large number of studies found that computer based tutorials produce improvements in learning outcomes on an average of 20 percent greater than average. Simulation, interactive video instruction, hypertext programs, bulletin boards and networks have also all been found to be effective in enhancing learning (Khalili and Shashaani (1994); Kulik et al. (1986)). Finally, Bagui (1998) refers to several studies showing that computer-based multimedia can help people learn more information and learn it more quickly compared to the traditional classroom lectures. So to summarize, there is good research for demonstrating that instructional technology often optimizes learning. However, nagging questions remain, such as what features work best, differentiating effects between subgroups of learners, determining how the content of the information makes a difference and specifying how outcomes may be more systematically evaluated, as well as the question of how one should evaluate the learnability of an on-line learning course.

Educational psychology provides many theoretical principles to be applied in the development and evaluation of on-line instructional technology. Milheim and Martin (1991) in studying learner control motivation, attribution and informational processing theory, identify learner control as an important variable in developing the pedagogy of web sites. It is beneficial to generally maximize learner control as it increases the relevance of learning, expectations for success and general satisfaction contributing to heightened motivation (Keller & Knopp, 1987). This research looked specifically at the control of pace by the student as a factor in building on existing theory. A tenet of constructivism is that learners direct their own learning either individually or through collaborative experiences. This implies that learners need to find their own pathways through learning; a philosophy that under-pins hypertext and many web-based instructional systems. E-mail, listservers and web browsers also support this approach by enabling students to search for information and discuss issues with others around the world. So, one can infer that the collaborative and interactive nature of the web supports learning mainly by means of augmented motivation of the student.

Another study, by Sloane (1997), states that the WWW represents a step forward towards the use of resources that are often difficult or impossible to obtain from traditional information sources, and gives seven key areas to consider before using the medium to assist learning, simultaneously or supporting the traditional paradigm:

1. Information availability, that is to ensure that there is an adequate range of material available to provide a varied selection for the intended group of students
2. Ease of access to that information
3. Control of access, which is a problem because the Internet has a lot of inappropriate material which is easily accessible
4. Group dynamics, as web-assisted instruction is in most cases collaborative

5. Specification, to determine the correct information from the great deal of data one can gather from the Internet
6. Appropriateness, the material must be of a type that is useful to both, students and teacher
7. Teacher input, the additional input required to complete the instructional material.

### **3. The research question**

CBL environments may become very complex, in order to completely cover the cognitive domain they deal with. On the other hand, the needs of the potential users must be taken into consideration as well. Some studies, like Rappin et al. (1997) have showed that students needed a system that would encourage them to examine their assumptions as they worked through problems in their domain. Students also need motivation in cases of educational software, such as simulation environments, which provide students with realistic experience, even in domains where realistic activities are too complex to be performed by novices, too expensive or too dangerous to allow students to make mistakes. This makes the presence of a teacher unavoidable. Yet, in order to save resources, we suggest a substitute of the teacher to facilitate the transfer of knowledge, which we call the “tutor”. This could be a human, a help facility or an interface agent. The “communication channel” as described by Karoulis et al. (2003) now seems to play a vital role.

A number of studies regarding distance learning environments, e.g. Garisson (1993), have pointed out that relying solely on packaged materials, like those of the second generation ODL environments, fails to enable students to become critical, independent thinkers. They stress that for these important attributes to develop, dialogue between staff and fellow students in learning communities is essential (Anderson & Garisson, 1995) as in the case of the traditional class. This issue often remains in CBL environments as well, because the learners mainly come into direct contact with the educational material. In this context the role of the “tutor” alters to a manager and facilitator of learning, rather than a director (Squires & McDougall, 1994). However, its presence must be maintained at every cost. An applicable solution seems to be telematics, which is based on the IC technologies. For many providers of distance education and CBL environments, telematics (all forms of electronic communication) has stepped in and is often portrayed as a viable substitute for face-to-face contact, if not indeed a panacea for distance education and CBL in particular and education in general (Mugler & Landbeck, 2000).

It is obvious that the form of this “tutor” is very adaptable. This implies a particular arbitrariness in the design of the environment, which in its turn can lead to a less effective communication channel.

So, our aim in this work is to conclude with a set of guidelines, which would take into consideration more or less all aforementioned issues, utilizing as a starting point the educational principles for environments of this kind and providing designers with a usable set of instructions, adaptable to every individual CBL form.

### **4. The studies**

We performed two studies (Karoulis & Pombortsis 2000, and Karoulis et. al., 2003), where we designed, constructed and evaluated two CBL environments for use in the high-school classes for children aged 13-15 years (the first study) and for 14-20 year old young offenders (the second study). To assist our findings, we made an extensive bibliographic review, which is also reported in the studies. We evaluated the environments utilizing a plethora of evaluation methods, both expert-based and user-based (empirical), mostly combining them to be more effective. For the first environment, we utilized a combinatory evaluation consisting of expert-based and empirical methods. In the second study we used 13 different methods, and since this project was a collaboration of 3 EU countries, we got also evaluation reports from our partners in the other countries. So we had adequate evaluation data to elaborate. As suggestions for the improvement of the environments emerged, we realized that, informally, a set of guidelines on the design and the construction of such environments was emerging as well. So we concentrated our research on this field as well, we elaborated our findings, refined them and concluded in a set of guidelines. Finally, we added some short comments to make their application more lucid.



## 5. The Ten Guidelines

Following the discussion, we are now able to present this set of guidelines on the design and construction of CBL environments.

1. Structure the theory in levels. Follow the “pyramid” structure that journalists adhere to. Most basic and important information must be easily accessible, more detailed information for advanced users must be easily recoverable, yet technical details and in-depth information for experts must be also present and be retrieveable on demand.
2. Support non-linear structure. Avoid the “tunnel syndrome”, however, do not leave the user alone, “lost in hyperspace”. Consider the usability heuristics, according to Nielsen (1993), provide control to the user, however provide guidance, clear navigation structure and provide some navigational aid, either as an interface agent or as a human tutor.
3. Provide adequate multimedia elements. It is widely suggested to provide the information in a variety of means in order to make it more comprehensive for the user. However, it is wise to limit the scope of the involved technologies to those widely accepted and standardized. A good practice is to define them in the specification phase.
4. Provide exercises of augmenting difficulty. Try to utilize the analysis – synthesis – transfer of knowledge model. Provide multiple choices, yes/no, or similar simple questions at the first stage, more constructive ones at the second and simulation environments, if possible, at the final stage of assessment of the students’ progress.
5. Provide self-assessment to the user. Provide self-assessment exercises, some indications of the pace of the advancing of the knowledge (like score bars, or progress charts), and periodic reports on the educational status.
6. Provide guidance on the use of the environment. This could be a “user manual” (the usual, yet unusable approach), a tutor, a help line or another help facility, or an interface agent. According to the usability pillars of “transparency” and “intuition” the interface must quickly disappear, allowing the user to concentrate on his work.
7. Support the personalization of the instructional environment. There are many known techniques to approach this. Refer to knowledgeable people to help you design and construct such an environment. The first approach could be here, for example, to support annotations.
8. Do not ignore the usability heuristics. They have been proved to be of paramount importance in practice, especially for educational interfaces. Refer to Nielsen (1993) for details.
9. Give special importance to the help facilities you provide. It must be in adequate quantity not too extensive, so that no one uses it and not too sparing so nobody finds anything useful. It must be domain sensitive and adaptive as well.
10. Don’t make your work tough. Build the environment in a modular way, so it is easy to update and expand it, and implement agents to catch up users’ reactions, such as statistics or direct feedback, so you can easily evaluate and improve your creation. Consider combining your work with a DBMS for this purpose, however it must be adapted to your particular needs, so you probably need the assistance of a DBMS expert.

## 6. Discussion and Concerns

The first concern on these guidelines is their validation in practice. We need an adequate number of studies to prove their efficiency. This is an issue that remains important, since little evidence is available on CBL environments.

We have to mention at this point the work of Maurer (1997). We believe his guidelines to be well known and to underly every successful CBL environment. However, this work concerns Computer Mediated Educational environments in general and his “theses” are of a higher level than the guidelines proposed here. Our work took these theses/guidelines into consideration, so most of them are covered by our

suggestions, yet in a more concrete and practical level. So we can argue that in this work we partially adapt the Maurer's theses to more concrete guidelines concerning CBL environments.

Another issue is whether the suggested guidelines could expand to cover Distance Learning environments as well as other Computer Mediated Educational environments. We propose the addition of two more guidelines:

11. Provide synchronous and asynchronous communication facilities. Both modes have been proved to be of paramount importance for educational purposes, so do not neglect them. However, adapt them to the individual needs of the particular environment.
12. Carefully consider, design and implement the integration factor. A few (or even many) hyperlinked web pages do not constitute an educational environment, neither does Britannica nor the Library of Congress. You need to discover the appropriate equilibrium for your environment, based on the corresponding pedagogical theories and the underlying technological structures.

## Conclusion

In concluding, we believe the proposed guidelines to be flexible, adaptable and easily applicable to the design and construction of every CBL environment. Furthermore we believe them to be easily adaptable to Distance Learning environments, however this is a tentative claim, since we have not yet performed any studies to investigate it. Our claim is based only on our observations and on the most up to date reports in the relative literature.

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# AN ADVANCED "E-LEARNING COMMUNITY" PROPOSAL USING MS SHAREPOINT™ PORTAL SERVER

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## Abstract

In order to implement e-learning, quite often simple Internet technologies are used, usually without any clear pedagogical approach. Unfortunately this is not quite effective, it restricts learners' exchanges, while influence the quality of resulted knowledge construction. More sophisticated environments are needed when we vision e-learning as taken place in a rich and flexible *Learning Community context*, for young students or even for adults and professionals. Our proposal consists of an *Electronic Learning Community (eLC)* that can be nested in a Web-based system using *MS Sharepoint™* Portal Server advanced features. Such a solution could provide several means in order to overcome problems and difficulties that inevitably occur in a system as complex and sophisticated as that.

## 1. Introduction

*Information and Communication Technologies (ICT)* have become part of our lives. Lately great efforts have been made in order to achieve effective e-learning, mainly by using simple internet technologies such as Web pages, synchronous and asynchronous communication, ftp, etc. These technologies are powerful, flexible and let the user have the control but unfortunately their use has certain drawbacks. Such as time consuming maintenance of Web pages, no knowledge management, no content management, difficulties in supporting higher level or complex services, no clear pedagogic orientation, no security, etc. Sophisticated environments, such as an *Electronic Learning Community*, are required in order to overcome problems that are encountered.

## 2. Electronic Learning Communities

Current e-learning systems rather focus on content delivery and assurance of some traditional educational management functions. Thus, they restrict more complex learning exchanges, and they don't allow flexible and open-ended learning activities. Subsequently, the educational value, the quality of learning and the resulted knowledge construction is reduced. Nowadays, there is an increasing effort to design educational systems over the web based on currently established theory and research in human learning. Recent theories derived from the socio-constructivism paradigm, such as *Distributed Cognition* theory [1], or *Activity theory* [2] have started to influence requirements on such systems. In fact, there is a paradigm shift from teacher directed instruction to learner management learning, from subject-centered design to learning-centered design, from individualistic learning to learning in a social context. Most importantly, there is a shift from a vision of students as more or less passive learners to students as apprentice knowledge workers [3]. There is a tendency for such environments to nest Mason's *Integrated Model* [4], [5]. According to this model, e-learning can be accomplished through numerous online collaboration activities, given the appropriate educational resources and communication services. The content of each lesson can be dynamically and radically changed according to the students' needs and the progress of the activities assigned. During each lesson there is a contribution to the mutual knowledge base from every party (teachers, students, even guests). More over, we have to take into account that while a part of our knowledge comes indeed from formally planned learning scenarios, people learn a lot from informal exchange with fellow learners, professors, or experts. This consideration, concerns exchanges within tightly or loosely defined communities. We can define *communities* as networks, made up of individuals as well as public and private institutions with a social organisation, within which a certain amount of practices, common goals and language are shared. When we vision e-learning as taken

place in a rich and flexible *Learning Community context* [6], for young students or for adults and professionals, the technology must not be just a means to deliver information/knowledge but an aid to the production of knowledge objects, as well as a support of flexible social exchanges.

In order to support this vision, we must focus on the design of *Electronic Learning Communities (eLCs)* that could be embodied in Web systems such as a Portal (enriched with extra services), or community portals such as *C3MS (Community, Content and Collaboration Management Systems* [7]) An *eLC* is a *Virtual Environment* functioning within Web-based systems, with build-in modules and providing services that are organized in a way that none of the previously mentioned drawbacks are noticed. Except for some basic build-in modules and services (basic internet services, basic administration of users and services, search capabilities) that exist in a common educational system over the web, in an *eLC* some more specialized services can also be encountered, in order to implement the above mentioned theories and models. Such services are *Moderation* of communication among users and dissemination of the acquired, within the system, *Knowledge (Knowledge Management)*, *Advanced Administration* of users and resources, *Advanced Security Features*, *System logging and monitoring*, easy to handle *Automated Processes* for every service provided, (for example to be able to automatically link a document to a discussion or to trigger a meeting or a discussion based on a received email), other *Advanced Services* such as the existence of *Collaborative Hypertexts* (also known as *wikis* [7]), *Virtual Space* provided for picture galleries, *Multi-Authoring Mechanisms* or keeping *Versions* of documents.

### **3. Problems usually encountered within Electronic Learning Communities**

*Electronic Learning Communities*, as above described, are expected to overcome the drawbacks that come along by the use of simple Internet technologies. Yet, any environment as complex and sophisticated as that is usually expected to encounter problems (of a higher level of course) during its operation. Such problems, deriving mostly from the technical inefficiency of the systems that the environment is based on, can be categorized according to their relation to several matters as shown below:

#### **3.1 Administration and Manageability**

Administration and management quite often can be complicated and time-consuming because the administrative tasks are *non-transparent* and considerably *complex*. System configuration usually requires technical knowledge or constant cooperation with experts. This can also be caused due to the lack of solid user management policies regarding access rights, user grouping and account managing and inefficient system security policies.

#### **3.2 Knowledge Management & Moderation**

Poor or no knowledge management is often an issue. The generated knowledge, such as the results of the educational activities is not managed well; therefore it can not be easily reused. Communication synchronization problems are also often encountered. These problems can make the sophisticated process of *moderating educational activities* hard to accomplish and problematic.

#### **3.3 Usability**

Often a certain lack of provision for integration between applications exists. Such integration is essential in order to implement more complex learning scenarios. Usually there is no common interface for every service provided, due to the fact that most of the platforms use proprietary technical solutions. Thus the appearance of every module may be different from each other and most importantly their functionality might differ as well. Proprietary solution building leads to inefficient embodiment of any new or innovative Web-oriented facility (an implemented service or technology) in such systems. Even so, embodiment may occur relatively unhurriedly. There are practically no native fully automated procedures or processes within such systems.

### 3.4 Advanced Capabilities (Automated Processes, Multi-authoring, Searching)

As mentioned above most systems lack fully automated processes. This results into complicated and inefficient document exchange mechanisms and document management as well as inadequate communication coordination. It may not be trivial to link a document to a discussion or to trigger a meeting or a discussion based on a received email. *Multi-authoring mechanisms* or keeping versions of documents might not be feasible. Also, most systems have integrated search engines, which crawl within the system's web area, implementing criteria matching search methods. Moreover they have links to broader web search engines or lists of selected web sites for further content browsing. Although such search capabilities are common in eLCs, they are on the whole mostly inefficient, usually leaving it up to the end user to trace the desired information without any automated processes in existence. Finally, implementing *Collaborative Hypertext Services* could be impractical even if available due to complexity and the existence of security holes.

## 4. Our proposal: An eLC based on MS Sharepoint™ Portal Server

### 4.1 System Architecture

We propose the building of an *Electronic Learning Community* based upon a Web-system which is implemented using *MS Sharepoint™ Portal Server* (SPS). Such a solution could provide several means in order to overcome some of the previously mentioned problems and difficulties. These are materialized by linking many different content sources to the user allowing the accomplishment of sophisticated tasks such as *Advanced Administration* of users and resources, effective *Moderation* of educational activities, *Synchronization of user communication*, efficient *Security*, *Knowledge Management*. According to Microsoft [8], *SharePoint™ Portal Server 2001 extends the capabilities of Microsoft Windows and Microsoft Office by offering knowledge workers a powerful new way to organize, find, and share information. For system architects and developers, SharePoint Portal Server is a solution that delivers dramatic new value by combining the ability to easily create corporate Web portals with document management, enterprise content indexing, and team collaboration features.* It consists of three operational modules. *Document Management Services* and *Search Services* modules are used for accessing information drawn from a wide variety of content sources while maintaining the security of the documents. The *Digital Dashboard* and *Web Part Run-time* module is used to present the portal content to a user through a web browser (or other office applications - clients) by using internet communication protocols (TCP/IP). The availability of such functionality, can lead us to the effective implementation of any desired learning model, even Mason's *Integrated Model* [4], and any desired pedagogical approach. Our consideration regards a flexible system which concerns not only secondary or higher education students, but *learners* in general.

### 4.2 Basic Characteristics of MS Sharepoint™ Portal Server

The following features of *SPS* could be used in order to implement several complex services [8]: *Virtual workspace*. This is an organized collection of documents, content sources, management folders, categories, document profiles, subscriptions, and discussions. It provides a central location to organize, manage, and publish content. *Web Storage*. These are built-in services providing a virtual storage area accessed via the Web as if it was a local disk, which is also used for building Web-based collaborative applications. *Dashboard site*. This is a specialized Web site that is created automatically at the same time as the associated workspace. The dashboard site provides a Web view of the workspace and enables users assigned to appropriate roles to search for, view, and manage documents in the workspace and to search for and view content from other sources. The dashboard site contains a number of pages, or *Digital Dashboards*, and includes customisation pages. *Advanced Document Management and Publishing Services Built-in Integration* with common office applications and Web Application Building Protocols (*ASP, CDO, ADO, XML, CSS, WebDAV*). *Advanced Security Options*. These features provide us with the ability to develop distance learning courses which can comply with any pedagogy desired. Moreover they supply us with easily automated procedures, making the system more functional and operable.

### 4.3 Process implementation - Technical Analysis

Except for the basic built-in functionality that all Web-based educational systems provide, some more sophisticated processes can be implemented within a system based on SPS due to its advanced features, as shown below:

- Advanced Security and user administration

In existing Web-based systems security is often implemented on the *IIS level*. Due to the opacity of content placement, file-level permission settings are not easily applicable (if they are at all). *SPS* complies with the *IIS Security* model but also extends permission planning by taking advantage of the *Distributed Security* model supported by Windows 2000 (based on *User, Group* and *Computer Access Control Lists* stored with every file or folder), while simplifying content management, introducing a *Role-based Security* model. According to this model, a fixed set of three roles is used in order to offer a flexible and secure method for controlling user access to content. Permissions associated with a specific role cannot be modified. Roles both at the individual folder level and on the workspace node, which is the top level of the workspace, can be assigned. In addition, access to a specific document can be completely denied to a user (or users). Role-based security is used to control access to content, regardless of whether the user is accessing content using a Web browser, Web folders, or Office. The three discrete roles are: *Reader, Author, and Coordinator*. Their rights vary from read-only access of published documents only, to full management of the workspace layout. *SPS* honours all the various types of authentication by accepting the appropriate access token based on a *SID* (User System Identifier number). It allows coordinators to control the access to a document for both reading and viewing. Someone who does not have access to a document or folder cannot discover its existence by any means (through search or folder browsing).

- Advanced Resource Administration

Speaking of content management, the advanced search capabilities of the proposed system should be mentioned. To begin with, an index of the workspace content is created by *SPS*. In addition, *SPS* can crawl and create indexes for content stored outside the workspace. Access to this content is accomplished by using content sources that the coordinator creates. A content source represents a location, indicated by a URL, where such content is stored. This content is accessed through the content source in order to be included in an index. The important technical aspect is that this content can be located in a different workspace or even in a different computer system anywhere across the Internet. The information (coming from each content source) is included in an index to allow quick searches from the dashboard site. Moreover search efficiency is improved by enabling a user to search across multiple information sources at the same time, regardless of their location. A reader can use the dashboard site in order to: conduct *Search Queries*, access content sources, perform *Full-Text Search Queries*, find information based on *Document Profiles*, browse *Categories*, browse the *Document Library*, create *Subscriptions*. *Document Profile* based queries are applied on basic document properties (keywords, author, etc), web discussions related to a document or even document content itself. These features allow the *SPS* coordinator (*eLC moderator*) to direct users to the most appropriate method for finding information based on their knowledge and skill level. Also *SPS Document Management* features are worth mentioning. Within typical systems, large and complex information sources, such as a collection of file shares, can be difficult to use and navigate in, because there is little or no organizational framework to direct users. File shares, for instance, provide only a hierarchical directory structure as a means of organizing content (due to ftp protocol usage). There is only one navigation path to any given document, and users must know the name of the server that the document is stored on, in addition to the directory structure of folders on the server. It may be difficult to control access to documents, and publish them within the system. Important documents can also be lost, overwritten, or hard to find. A *Electronic Learning Community* based on *SPS* features offers a number of document management options such as **version tracking** to record the history of documents and avoid accidental overwriting by other users. Documents are being *checked out* in order to be processed and *checked in* when finished processing. Application of identifying any document by using descriptive, searchable and customisable information (**metadata**) pertaining to the document. **Document publishing control** is feasible through automated approval routes for documents to be sent to reviewers, thus preventing access to semi-finished assignments by unauthorized users. Likewise a moderator can “force” all involved parties at least to take notice of important documents. **Web discussions** for online commenting by multiple document reviewers are also supported. Control of **document access** based on *Roles* as well as *Access Control Lists*.

- Advanced services

Various modules are implemented within *eLCs* in order to serve comment exchange and logged discussions between users, such as fora, chat, mail. Specifically fora are managed by an *eLC moderator* who usually initiates discussions by topic, for the users to participate. This implementation is inefficient making information illegible, as all discussions are accessed through the same web page, usually apart from the subject (e.g. document) being commented. Modification (if needed) of a discussion content is achieved through html page editing. Within *SPS* a new concept of *Web Discussion* is introduced. These are threaded discussions pertaining to the object they refer to. Thus the comments are visible with the object they relate to with no further searching needed. The moderator can modify discussion content easily (just two mouse clicks are needed), through his web browser. Likewise user activity and participation to discussions and collaborative tasks can be observed in a glance, while there could be ways to log the user's activity while on line through the *Web Discussion* service of *SPS*.

- Process automation

Means are provided in order to fully automate certain processes, deriving from *SPS* technical features. Its integration with applications used every day by common users, such as Office applications and browsers, contributes to usability enhancement by making content accessible through these applications. So that one can use a web browser, as well as Outlook for that matter, gaining access to automated announcements services. A simple *copy-paste* action can be used so as to publish information in the form of an announcement, making it instantly viewable to everybody needed. Also an automated calendar service is applicable, ideal for making arrangements between users during a *Collaboration Task*. Appointments for online collaboration are agreed through simple email messages, with the system providing methods for specifying the best time suitable for all parties involved, even automatically launching the required application (e.g. netmeeting). Simplified procedures for publishing material (like excel tables, word documents, html pages) are substantiated, as easy as saving them to a local disc (using the *save as* or the *copy – paste* function). A discussion can be triggered about any object (file, folder, space) within the system by anyone, assuming the coordinator (*moderator*) has applied proper authorizations.

- Effective Moderation of educational activities

One of the most complicated and sophisticated tasks within an *eLC*, is the *moderation* of communication among users and dissemination of the acquired, within the system knowledge. Usually this is done by a *moderator* or through automated processes. Moderation might include ***Communication Management*** (management of tools such as chat, fora, whiteboards, structuring discussions, deepening the dialogue, visualizing the links between the messages, extracting intelligently the meanings of discussions, writing texts such as summaries and comments), ***Coaching Collaborations*** (following up the tasks and the work progress, helping the decision making process, following up unanswered questions), ***Content Management*** (reporting on the content and the progress of communication and collaboration, summarizing the discussions), ***Knowledge Management*** (fostering the awareness of the progress by modelling the new knowledge, updating the *Knowledge Base*, disseminating the acquired knowledge), the promoting and encouragement of ***Educational Interactions***, even ***Information Maintenance***. The advanced features of the proposed system that were previously described relate to many of the moderator's tasks. As previously mentioned, an *SPS* coordinator can effectively manage many of the above mentioned sophisticated tasks by taking advantage of the advanced features provided.

## 5. Conclusions

Basic build-in modules and services exist in all common web-based educational systems. In an ***Electronic Learning Community*** more specialized services are needed, in order to implement more sophisticated pedagogical theories and models. Unfortunately, certain problems (of a higher level than those of common systems) are often encountered in *eLCs*. Even lately issued, modern platforms appear not to solve several of the above mentioned drawbacks or the solutions implemented are not optimum. We believe that our proposal of an *e-Learning Community* built upon a Web-system that is based on the *SPS* software platform provides us with several means that can help us cope with most of the problems encountered in such cases and effectively implement complex tasks such as the moderation of educational activities within such a learning environment.



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# EDCOMNET: AN ATTEMPT AT BRIDGING THE DIVIDE BETWEEN THE TWO CULTURES

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## 1. The rift between the two cultures: its heavy toll and the ways to overcome it

Information and Communication Technology (ICT) is one of most powerful of shaping forces in today's world. ICT is more than a new category of technologies, meant to facilitate our lives; it is the foundation of a whole new environment that is gradually encompassing each and every aspect of our lives. This new environment is already in existence in the Internet, and is becoming increasingly more dominant with the advance of "ubiquitous computing". As a defining technology (i.e. a technology that defines the nature of its users), ICT is forming our living environment, a fact that already has considerable impact on "human nature" and the nature of social interaction in the years to come.

Such a situation would be perhaps less disconcerting if not for the fact that this defining technology has been developed and formed in a society which suffers acutely from the deep rift between the "two cultures". As claimed by P.C. Snow (who coined the term in 1959), there exist two exclusively distinctive cultures, namely the technological/scientific culture versus the humanistic cultures, which are segregated and run parallel to each other. Neither of these cultures promote any kind of coordination with the other.

The consequence of this rift is that "intercultural" thought remains out of the creative game of machine design, or in other words - humanistic values do not guide this design. Technology is pushed forward exclusively by two basic human needs: innovation and profit. The divide between the two cultures is especially distressing in the face of the growing impact of ICT on our societies, lifestyles and hence, personalities. We will not delve in this paper into the many ways in which ICT may be affecting our lives<sup>1</sup>. What is important to emphasize here is that there are very good reasons to believe that once analyzed in light of Humanistic values, ICT is revealed to be an ethically and socially "double edged". The same technology has the potential to simultaneously lead to hell and to paradise (as defined in humanistic terms), and what is more distressing is that the current default scenario is closer to leading us to hell rather than to heaven. If things continue as they are, with the two cultures carrying on in mutual ignorance of each other, and ICT will continue to be developed, distributed, and used with no regard to guiding humanistic values, then very probably in a generation we will find ourselves in a frightening new world. This new world will be populated by "users" (including what we call today "individuals" and "objects", a distinction that will be undermined in the age of ubiquitous computing and total saturation and disintegration of the individual), having a multitude of instrumental, short and ad hoc interactions among themselves ("relationship" will become an obsolete term, as will "love" "loyalty" ...) easily manipulated by political and economic powers.

In any case this scenario is much more likely as the default dominant scenario than the one usually raised by enthusiasts: a world of empowered individuals flourishing through a network of relationships and realization of mutual interests, having full access to all kinds of information and hence have much higher level of control on various power brokers.

As things stand, those belonging to the technological culture (developers, engineers, corporations and entrepreneurs, most politicians and civil servants) work toward providing "better" (i.e. technologically improved not ethically or humanely preferable), faster, smaller, and more ground-breaking innovations without any thought to the long term effect on human personality. Those belonging to the humanist

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<sup>1</sup> Many books and articles have tackled the subject. It has been suggested that the most basic conceptions, such as "time" and "space" have been changed, and even more profound concepts such as the "individual", of "knowledge" of "social participation" and of "relationships" might be changing due to the impact of the Internet.

culture (scholars and intellectuals of various kinds), are too frightened of the brave new world of technology to try to understand and have a dialogue with it, and do not work to guide innovation with humanist knowledge and values.

This crucial and alarming divide, can be overcome by systematic strategic thinking striving to guide the technological R&D and its distribution and uses in light of humanistic values. Such thinking can be developed on two levels: the macro and the micro levels. The first level refers to large scale policy making (through, for example, the addition of a Humanistic ethical layer to prevailing QA approaches (see the symposium suggested for this conference). The second level refers to specific projects guided by humanistic values serving as feasibility tests for bridging the two cultures. In more concrete terms, the second level, may guide R&D not only by users requirements (i.e. pure market oriented considerations), but also by “ethical requirements”.

## **2. EdComNet: a feasibility test for micro-strategic thinking**

EdComNet is an example of such strategic thinking on the micro level. EdComNet (Humanistic Urban Educational Communal Net) presents an attempt at mobilizing the latest ICT innovations for the service of ideological/theoretical foundations stemming of Humanism. EdComNet is an Internet based platform, now being developed by a consortium made of the Center for Futurism in Education (Ben Gurion University) and ETE Ltd. (a Tel Aviv based company), in partnership with Greece, Italy and France, with projects of the framework of the 5th research program of the European Commission. EdComNet is to be used by an urban community, aimed at the empowerment of its users, through its content, features, functions and design. The project builds on and extend the latest collaborative and experiential learning models and technologies (for example peer-to-peer exchange, as well as advanced simulations and smart agents), while providing a variety of learning experiences addressing the development of users both as individuals and as members of an urban community.

In counterdistinction to many other such platforms that are aimed merely at supplying users with user friendly services that are conceived as desired by them, EdComNet goes much further. It is based on a conception of human development and personality – and derives its characteristics first and foremost from this conception.

Our guiding ideological and theoretical foundations stem from the 200 hundred year old Western Humanistic approach – starting in the early decades of the 19<sup>th</sup> century Europe and represented today by some of the leading psychological and educational theories. According to this view, in order to lead a satisfying life, especially in our chaotic and dynamic knowledge based society, individuals need to develop their autonomy, both individually and in a social context (here we refer to “dialogical belonging”). Thus, the EdComNet team combines both cultures to create a technological tool that leads to increased individual *self-knowledge*, *self-direction* and *self-efficacy* (which are the three components of personal *autonomy*), as well social interactions based on *dialogical belonging*.

If one considers such a field as e-learning, we may see how innovative such an approach as EdComNet really is. Previous and current developers of e-learning platforms may have taken into consideration elements such as content, software, interface and at most, pedagogic results. EdComNet, however, also incorporates the additional aspect of the long term impact of the learning platform on the development of human personality – thus bridging the two cultures.

EdComNet contends that the learning process (or the e-learning process) may either empower learners and their personal development or inhibit learners’ development (even if it is successful in the specific learning tasks). Based on a strong theoretical foundation which incorporates the approaches and methodologies in the fields of philosophy, psychology, education, and group dynamics, EdComNet represents the merging of technology and humanism.

### 3. What is EdComNet

The objective of the EdComNet project is to design, develop and implement a virtual platform for communal learning and communication, which will meaningfully empower its users.

The platform is based on guidelines stemming from the integration of two theories:

- AOE (Autonomy Oriented Education) methodology, that is aimed at the empowering of the development of autonomy and ability for dialogical belonging of the individual
- Self organizing social groups theories, including virtual community dynamics as well as the dynamics of change at the group and community level

The EdComNet platform is an innovative urban communal platform, unique in the active empowerment process it initiates through its architecture, its design of learning and communal spaces and its specific contents.

EdComNet is made up of three distinct and overlapping spaces.

- The Learning Environment
- Collaborative Knowledge Exchange
- 3D Social Stage

These three areas offer the user spaces and features for individual and group learning experiences, meetings and discussions, knowledge exchange and knowledge creation activities, collaborative projects, and social exchanges. The innovation of EdComNet lies in the design of each space, which leads the user through autonomy and dialogical belonging enhancing experiences. Specifically, each area of EdComNet is structured so as to encourage the user to delve into self-exploration and reflection. The interactive platform is designed so as to increase the user's self-knowledge, self-direction and self-efficacy, while creating a space for the user to enhance his/her sense of dialogical belonging. Thus, EdComNet represents the channeling of the latest technology with humanist theory.

We believe that forming this bridge is a crucial contribution toward the positive development of the "digital generation" (to paraphrase Tapscott, 1998). Furthermore, we hope that this leap into interdisciplinary innovation will mark the beginning of a trend, where the development of platforms and programs strive to optimize the ICT environment for the benefit of the individual and society as a whole.

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# QUALITY CULTURE IN TRADITIONAL UNIVERSITIES: A THREATENING CULTURAL CHANGE PROCESS?

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## Introduction

Market forces, competition and new technologies are now having greater impact on higher education than ever before. Since the operating environment is becoming more complex and uncertain, educational institutions have to adapt and change at a greater pace. Competitiveness and the future survival of the traditional universities<sup>1</sup> - trying to integrate Information Communication Technologies (ICTs) to educational processes and adopt Open Distance Learning (ODL) skills - will depend on the ways in which change and improvement are managed. One model for such adaptation is Total Quality Management (TQM) which has been used already in industrial and commercial sectors. Certainly, setting quality culture in universities calls for a change in organizational culture which threatens human resources.

## Total Quality Management in Education

There is a wide variety of approaches to define quality. For example, quality has been defined as being about value (Feigenbaum, 1983); conformance to standards, specifications or requirements (Crosby, 1979); fitness for use (Juran, 1989); quality as excellence (Peters and Waterman, 1982); meeting or exceeding customer expectations (Parasuraman et al., 1985) and quality as 'delighting the customer' (Peters, 1989). In terms of TQM, quality concept is meeting reliable and consistent standards in line with customer requirements. That is to say, quality is judged by the user rather than the producer. Here, it is important to differentiate between customer-perceived quality which is termed as 'true quality' and business process quality which is termed as 'internal quality'. This differentiation points out the internally focused nature of quality management programmes and show the need for paying more attention to 'true quality' and thus more outward looking role. TQM includes the application of quality assurance<sup>2</sup> to every activity and is characterised by the application of good practice quality management principles, practices and techniques (Wilkinson et al, 1998). TQM essentially concerns with customer-focused organizational improvement achieved through the activities of employees at various levels in the organizational structure. Meaningfully, the key principles of TQM is customer<sup>3</sup> focus, continuous improvement and teamwork. Briefly, it is a systems approach to management that aims to continuously increase value to customers by designing and improving organizational processes and systems. In terms of TQM, if quality is taken as the customers' perception of quality, then traditional universities trying to set quality as a culture, first of all, should change their way of perceiving internal and external customer concepts. Secondly, they should have mechanisms in place in order to establish these needs and perceptions regularly. Moreover, they must be able to give timely feedback to this information. It is also necessary to promote the importance of internal employee (managers, academics, administrators, support staff) relations since employee morale, commitment and motivation are determinants of external customer relations (graduate views, employers views, research ratings etc.). The criteria to be used for the evaluation of organizational performance is as follows (Nadler and Tushman, 1980):

- *Goal attainment*, how well the organization achieves its strategic objectives.

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<sup>1</sup> In this paper, we only consider the traditional universities trying to integrate ICTs to educational processes and adopt ODL skills. From now on, traditional universities would be used solely without making any distinction throughout the text.

<sup>2</sup> Quality control is the control of quality both during an operational process and at the post-process stage. Quality assurance involves supplying evidence to external agencies about an organization's potential effectiveness. It is the intention that 'third-party assessment' of a quality assurance system will remove the need for several second-party assessments.

<sup>3</sup> In TQM, customer concept involves internal customer as well as external customer.

- *Resource utilization*, how well the organization makes use of its available resources.
- *Adaptability*, the capacity of organization to review its performance and match the changing requirements of its environment.

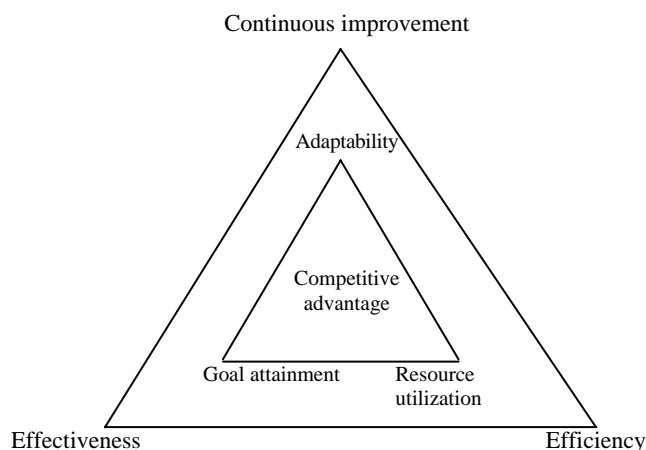


Figure 1. TQM and organizational performance

Here, goal attainment is concerned with effectiveness while resource utilization is concerned with efficiency, and adaptability is concerned with change and improvement (see figure 1). As seen, the main goal of TQM is ‘improvement’ where there is no minimum standard to be attained. Thus the process of TQM is a never-ending journey, and a race with no finish line. The main elements of TQM may be summarized as follows (Harris et al, 1998):

- Quality is conceptualized as customers’ perceptions.
- A customer is defined as anyone who receives a product or service, whether inside or outside the organization.
- The aim is to identify and meet the customer requirement through the design, development and management of processes which are error-free, i.e. by concentrating on prevention to eliminate waste and reduce costs.
- Central to TQM theory is the idea of continuous self-improvement; therefore TQM organizations are essentially learning systems.
- TQM requires the involvement and commitment of all organizational members in quality matters and continuous improvement.
- TQM requires superior quality information systems to provide timely measures of and feedback on performance.

TQM treats quality as a strategic issue and fundamental to organizational effectiveness. Traditional universities are also operating in a highly competitive complex environment. It seems to be appropriate to implement TQM in flexible distance e-learning. Because of the nature and advantages of multimedia and digital technologies in distance education, we are likely to have more scope and chance in terms of continuous improvement and more chance to be closer to customers’ expectations and requirements (more possibility to learn from the customers) and more chance to give timely feedback to their expectations. Nevertheless, there is a need for modification. At the very beginning of TQM movement, there was resistance from service organizations as they thought that TQM was originally for manufacturing organizations. But later on, criticisms have been refuted by evidence as service sector exemplars have emerged. The same may be repeated in distance education sphere. TQM may be necessary for improving open distance e-learning services and customer satisfaction. The potential benefits of TQM in education are cited as follows (Harris et al, 1998):

- Continuous and sustained organizational improvement
- Increased levels of external customer satisfaction
- Tangible and significant cost savings of the order of 5-10 per cent of operating costs
- A focus on the importance of interdisciplinary teams with combinations of academic and administrative staff
- Improvements in employee morale, commitment and motivation
- A new way of managing the organization which promotes company-wide goal congruence, accountability and involvement.

### ***TQM and Organizational Culture: A Threatening Change Process?***

The aim of TQM is to develop a 'quality culture' whereby everyone in the organization shares a commitment to continuous improvement and devotes themselves to customer satisfaction. The philosophy of continuous improvement needs to be part of the new TQ culture, and it is alien to the idea of 'if it's not broke, don't fix it'. Certainly setting a quality culture calls for a cultural change that is for the most time a threatening process. New strategies based on quality may conflict with old strategies and this may be confusing. Actually total quality culture has distinct organizational values and beliefs. Transforming an organizational culture that is not based on customer value, continuous improvement and cross-functional processes into one based on these TQ values is a large-scale, multiyear task.

Organizational culture is defined as the dominant values espoused by an organization (Deal and Kennedy, 1982). Organizational culture consists of the key values and core belief system that are shared by organizational members. Some authors refer to culture as the things are done around here (Martin et al., 1991). Much of the academic literature emphasises the difficulties in changing organizational culture and some discuss whether organizational culture can be managed. For example culture is seen as very deep-seated, consisting of three levels (Schein, 1992): First, 'artifacts and behaviors' are the observable and visible manifestation of an organization's culture. To name a few; symbols, stories, heroes, slogans and ceremonies that signify organizational values. On the second level, there are values and beliefs core to the definition of culture. Values and beliefs are not necessarily observable. However, in some organizations there may be written and widely communicated value statements. At the third level, there are assumptions that are not observable underlying the values and beliefs. Schein underlines the complex nature of organizational culture and is against the view that it is something which can be easily manipulated by management. Some authors point to the existence of subcultures and question the notion of a single, shared culture which is easily manipulable by management. Even to the extent that it is useful to refer to a single 'organizational culture', there may still be problems for the culture management view, in that the existing culture within an organization may be resistant to change and thus act as a barrier to the successful implementation of TQM (Wilkonson et al, 1998).

So for a successful implementation of TQM, it is necessary to adress the issue of resistance to cultural change and avoid too simplistic view of the possibility of managing culture. Resistance is natural even if the adoption of new culture is imperative or inevitable. Because changes can easily spark staff fears about job insecurity, loss of work control, and deskilling. Other reasons of resistance might involve; being stick to customary and day-to-day practices, being afraid of new environments, being afraid of loosing power in organizational chart, not being informed or not having enough information about change process, not being involved and participated in change process, lacking enough training and so forth. It is difficult to overcome resistance to unwanted change simply through training or forced inducements. It is important to create a favorable environment. Once a favorable environment has been created, training can help to facilitate the change process (Byrd & Ikerd, 1992). Top administrators, public relations (PR) and human resources (HR) specialists within traditional universities can help to remove the threatening nature of a proposed change and shape the expectations for the associated change. If they per se are reluctant to embrace the change, it will quickly be recognized by other staff and resistance may then spread and quickly become entrenched. Even when the changes are well managed, the psychological transition to a new environment may be problematic. HR and PR specialists can recommend an appropriate sequence of

change activities based on sound behavioral principals. These activities may include creating awareness (in coordination with PR activities), informing staff about the change and its consequences, having staff participate in the change process, and providing staff training through formal programmes. Measures to reduce insecurity and uncertainty may also be instituted.

Organizations attempting to change culture are most successful if they change it in a sequence of organizational change (Stahl, 1995): The first thing to change is people's behavior. Through direction, reward, training, or other means managers must change the behaviors of the organization's members. Training takes time, and it takes years to change reward systems, because there are too many stories in the organization of the old behaviors that had been rewarded. Then there must be cultural justifications for the behavior. New rituals, new stories, and new heroes are needed to justify the new behaviors. These new cultural artifacts, stories, symbols, and rituals need to be widely consistently communicated. The fourth step that managers must take to impact culture involves the hiring and socialization of members who match the culture. If new human resources are hired who already have the desired values, there are few time lags for training and socialization before the new ones can act on those values. Lastly, a way to reinforce a culture is to remove those organizational members whose behaviors deviates from the cultural values. Their removal reduces the variance in behavior and sends to those in the organization powerful signals relating to appropriate behavior. Today termination is viewed as a last resort, because it is increasingly difficult to terminate employees and because organizations have substantial investments in human resources. Many organizations would prefer to pursue the other four steps first.

A range of social, structural, and physiological issues may need to be addressed through organizational change process. These human factor issues commonly include recruitment and selection, training and development, organizational and job design, performance management and compensation policies. The empirical evidence of Euro literature HR Survey<sup>4</sup> indicates that these issues commonly receive little attention in traditional universities (Akinci 1998). Not surprisingly, organizational culture, performance management system, and change management process have all been cited as common causes of failure. According to some of the findings:

- Most of the teaching staff think that there is no performance management in faculties that aims to establish a culture in which teachers and project groups take responsibility for the continuous improvement of teaching processes and of their own skills and contributions. A remarkable majority think that there is only to some degree a shared understanding about the standards of performance.
- Most of the teaching staff characterize the life cycle of their faculties as growing, and some think that they are in need of regeneration.
- Existing management style is mostly characterized as democratic.
- A significant amount think that bureaucratic, mechanistic, and unadventurous style is more likely to characterize the culture of their faculties.
- In general, the common values and norms within faculties seem to be flexibility, teamwork and quality in education.
- Most of the teaching staff think that the current culture in their faculties is not contributing to organizational performance and is perceived as dysfunctional.
- Most of the staff think that newly appointed ones are informally inducted into the culture by talking to experienced colleagues and picking it up as they go along. It is clear that the socialization of staff is not handled seriously, and most of them try to socialize themselves by informal ways as they are left alone through this process.

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<sup>4</sup> This part of the paper is mainly based on the the research performed in Educational Information Science and Technology Program (EIST) at the University of Bergen under one of EU open and distance learning projects called "Euro literature". For more information about the findings of the research, please look at world-wide web <http://www.eist.uib.no> and <http://www.euroliterature.uib.no>.



- Cultural values are communicated through memos, reports, meetings, faculty newspapers, gossip and rumors. However, stories and myths, ceremonies and rituals, and rewards such as promotion, recognition are not very common forms in cultural communication.
- Most of the teaching staff think that there is a need for cultural change linked with the introduction of ICTs and rapid environmental changes.
- Most of them are seeking participation and involvement through the change process and not in fond of top-down strategies.
- Teaching staff think that their faculties are not that successful in quick responds to changes, new demands and they are to some extent successful at integrating new approaches to teaching. Briefly, they seem to be skeptical about the level of ability and success in adaptation.
- They are encouraged to some degree to react promptly with their own views about management's proposals and actions.
- They are to some degree able to suggest improvements and initiate change.
- Remarkable majority think that there is no quality cycle consisting of volunteers who are engaged in related work, and who meet regularly to discuss and propose ways of improving educational methods.
- There is participation to some degree at job level including the communication information about work, the delegation of authority, and interchange of ideas about how educational taks should be done.
- They are to some degree encouraged to participate in decision making processes that affect the ways in which education is carried out.

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# WOMEN IN DISTANCE LEARNING: 2<sup>ND</sup> CHANCE OR 3<sup>RD</sup> SHIFT?

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## Introduction

Distance learning offers flexible new learning routes and continually renewed opportunities for educational expansion and personal development and contributes to life-long learning. It is estimated that over half the several million world distance-education population are women. (Kramarae 2000, Furst-Bowe 2001). In the postgraduate "Distance Learning" course of the Hellenic Open University (HOU) female attendance is 57.2%, confirming the international data.

Women's testimonies concerning their experiences in distance learning internationally (Faith 1988) along with the reliable findings of much research according to which gender issues influence comparative levels of achievement, drop-out rates and motivation to learn, forced educational circles to become increasingly aware of the diversity offered by gender differences in various components of distance education. (Evans 1995, Burge and Lenskyj 1990). Moreover, it has been argued that recognition of diversity in any conception of the student body is a key area of successful development. So, if the designers of corresponding programs are willing to meet the needs and the expectations of not only women themselves, but also of society, it is important to understand that current and future student body.

This paper will focus on the female way of being a distance learner. At first we will point out the crucial reasons why women attend open, distance, and flexible learning programs, as well as their objectives and their motives. Then, we will report on the factors they consider when they select a distance learning program or course. Finally, we will explore the obstacles hindering women's access to distance education or impeding their successful studies and we will suggest actions that would make their attending easier.

## 1. The factors that motivate adult women to enroll in DE programs, to select specific distance learning programs and courses

Most women in distance learning share goals and ambitions similar to those of students in the conventional education system. This means that they are seeking degrees for a number of reasons including economic (career advancement, higher wages) and individual development. They take up vocations and skills for personal fulfillment from obtaining a degree itself or from gaining useful knowledge to fulfilling personal or social goals. They are searching for knowledge itself as well as the sense of achievement that this offers. (Evans 1995, Furst-Bowe 2001). Educators' research in the Hellenic Open University (HOU) investigating the reasons why women who followed the module "Course and curriculum design for the teaching of French" in the HOU enroll in a distance postgraduate program, confirm that career and personal concerns urged Greek French teachers to do so. More often they report their desire to be informed of the developments in education (specialization, education, theoretical training, and practical improvement of their teaching). The personal reasons - status and career development is one more answer yet remarkable is also their mentioning the chance of attending such a postgraduate/distance post graduate program itself. (Androulakis et al 2001).

Generally, women prefer distance learning because of its nature (May 1994, Kokkos and Lionarakis 1998, Keegan 2000), since studies of this type allow them to fulfill their family and career responsibilities. Furthermore, it enables them to learn at their own pace, while minimizing costs - saving money and time on commuting and child care. Older women students, in particular, comment that the "virtual classroom" minimizes the discomfort and alienation they sometimes experience on conventional college campuses populated by 18 to 22 year-olds. (Kramarae 2000, Furst-Bowe 2001).

When selecting a distance learning program, in addition to considering the nature or the degree and the type of delivery system, female students consider several general factors including the program availability

and quality, the institutional reputation and its location, the service quality and costs (Furst-Bowe 2001, Mowen and Parks 1997). Furthermore, adult women students may be more likely to select a distance learning program because of the way it fits in with the other demands of their lives. (Furst-Bowe 2001).

As far the selected courses are concerned, women choose to enroll in greater proportions in arts, human studies and social sciences. It seems that despite the development of technology over the past decade introducing to the home many more computers and the emphasis on computer skills within the school curriculum, (Lockwood 1995), "the belief continues to persist that females are by nature technologically ignorant and unable to absorb scientific and technological information or to acquire technical skills" (Deligianni-Kouimtzi and Zioogou 1993, Frangkoudaki 1985).

## **2. Barriers to participation**

Any learning at any age requires time, space and support. At a distance, the onus is on the learner to organize the necessary space and structure their available time, often accompanied by external and internal conflicts. These are conflicts related to a series of corresponding barriers whose relative significance varies according to the level of education and training, the age of the women (young/mature) and the cultural context. (Evans 1995)

Further to this point, we will summarize and categorize the barriers to women's participation in distance learning; barriers which are underpinned by contemporary ideological and social structures. Improving the indicators that concern the participation among women in distance learning will only succeed when the educational institutions comprehend these obstacles, given that despite high enrollment rates, a large percentage of female students drop out before program completion, for non-academic reasons. (First-Bowe 2001)

### ***2.1 Conflicting responsibilities (work, family, educational, social-political) – Lack of time***

For all the benefits of distance learning for women, these students still have to make tremendous sacrifices to balance the demands of work, family, and school (study, writing assignments, research etc.) being mothers, female partners, employees and citizens. That is why the majority of women declare anxiety, and many others (especially mothers of young children) often do their coursework while the other family members are sleeping (Morgan 1991, Stalker 1997, May 1994) commented that taking on distance study roles often results in "double duty" and Kramarae (2000) concludes that working mothers interested in furthering their education are adding a difficult "third shift" to their responsibilities. "We need to deal with the time bind that all parents and older students face if we want to make the rhetoric of "lifelong learning" for the "information economy" a reality", she suggests.

Yet, King and Hill (1993) point to the phenomenon of upper class women who bring in low-paid domestic labor of other women in order to pursue their educational/career aspirations. This phenomenon, though, can be found only in developed and developing countries and is an advantage that is limited to the privileged affluent classes.

### ***2.2 Emotional barriers: guilt, fear of success, lack of confidence and self esteem, as far as educational goals are concerned***

Even though they try hard to combine study with their other various responsibilities and roles, and despite the motivation and dedication on-line learners demonstrate, many are still made to feel that they are letting their families down when they try to further their education. (Kramarae 2000) Distance learning demands devotion and time and there are male partners that experience anxiety owing to the extent that they are alienated from this new concern in women's lives. Tolerance is conditional based on length of time spent and potential neglect of relationships and responsibilities, but on the understanding that this is an aberration. Some women felt obliged to "pay back" this tolerance through restricting time spent and normalizing relationships. (Burke 2000).

Dowling (1983) argues that the fear of women achieving success leads them to choices beneath their possibilities and generally hinders their social development. "It seems as if women are consumed by "gendered panic" in the face of success", she points out. One can assume the consequences that this

attitude will have on women's self-esteem and confidence." (Nova 1994) and evidently on their studies, especially in the distance learning mode, where initiative plays a decisive role.

### ***2.3 Lack of partner support, the children and the wider family – gender stereotypes***

As feminists have pointed out for decades, when women pursue an interest or activity which does not relate directly to their domestic role, and effectively expose and challenge unequal power relations within the family, they often meet with strong resistance from male partners because of suspicion/jealousy as well as ridicule. (Evans 1995)

Sometimes wider family (children, parents and parents-in-law) creates and sustains (internal and external) barriers to studying, reinforcing gender stereotypes. Greek grandmothers while baby-sitting during the face-to-face Team Counseling meetings usually state, "She should be at home taking care of her family. What does she want with this course of action?"

Common patterns in lack of family support for women engaged in distance learning are the cultural and cross-cultural social norms and traditions by which the subservient status of women is maintained. (Effeh 1991, Kirkup and Abbot 1997, Athanasiadou 2002). However, the intersection of discourses in the home is located where traditional and postmodern gender expectations collide. Burke (2000) cites vigorous examples of women's experiences: "Sometimes I work from home. On these days I usually put some washing in the machine early on in the day and dry it during coffee breaks or between tasks. Although my husband is supportive if he is working from home then he is WORKING and would not dream of incorporating domestic tasks into his day." "My partner is also in academia. He prioritizes his work over mine every time even when I am working to a deadline. I work at college as much as I can although child care responsibilities mean I cannot often work during the evening or weekends because my partner has the computer."

### ***2.4 Lack of sufficient or appropriate support from the state: cost of studies, child-care availability***

Tuition fees in distance learning are very expensive in some countries. It is obvious that the high cost of the studies inevitably hinders women's participation. This is a crucial factor especially for those who depend on their family for financial support or on sponsorship from their employers. Even women who have their own source of income are on average paid less than their male counterparts, and as a result the economic obligations for study become insurmountable.

In Greece, for example, not only is the issuing of student loans for distance learning not foreseeable (even though the Hellenic Open University provides scholarships for economically disadvantaged students), the lack of low-cost, all-day child care for the children of students is clear. Paying private baby-sitters at home is also economically difficult. The mention by women of childcare as a factor preventing study center use clearly shows that children are the responsibility of women. Good, affordable childcare is difficult to arrange. In this way, women find it difficult to ensure the necessary time for study, the completion of assignments and research as well as the attending of face to face meetings.

### ***2.5 Learning obstacles: undereducation, difficulty in adapting to principles - methods - tools of distance learning, women's ways of learning***

The undereducation of women due to cultural restrictions at their expense, not only in developing countries (Commonwealth Secretariat 1987), and in many developed countries (United Nations 2000, Vergidis 1995) is one more limiting factor since it deprives women of the basic prerequisite necessary for distance learning studies. The principle of the autonomy of the program participants with their interaction with the teaching material, as well as the development of critical thinking abilities, that are applied in distance learning, create additional problems of adaptation in women that follow the general model of passivity of their gender. (Evans 1995, May 1994)

Further difficulties may present themselves in lessons that demand the extended use of computers for example. (Furst-Bowe 2001, May 1994) due to the fact that women may have (whether they believe or not) less ease of use and experience working with technological interfaces. Female students may have less experience with working with technology than do their male counterparts and may become frustrated with

distance learning courses that require extensive use of computers. Despite this, the belief continues to persist that females are by nature technologically ignorant and unable to absorb scientific and technological information or to acquire technical skills.

One more obstacle related to the nature of distance learning programs is that students experience isolation and lack of individual attention. The sense of isolation that women students experience in their studies is due to the lack of natural contact with their peers. (Kirkup and Von Prummer 1990, Furst-Bowe 2001). Gilligan (1982) confirms the difference of women, supporting that the tendency of women to share their studies with their classmates, their friends and their families is not connected to any type of inferiority or to any negative personal experiences, but to a positive stance of participation and "dependent - connection." This stance probably extends from their social role that strengthens a model of behavior which is less independent. (Beauvoir 1989).

### **3. Strategies for reducing the barriers**

In order to eliminate or at least minimize the barriers that women experience in distance learning education, the educational organizations and the professors-counselors of distance learning education should become activated along with the women themselves and wider social groups.

#### ***3.1 Principles - methods - tools - content of distance learning education***

The educational institutions that provide distance learning education must recognize that student learning environments comprise the home and local center from which women study as well as the educational institutions itself. First and foremost, the role that the house and the local setting play in the learning environment of the woman student must be recognized and the fact that this education, like technology must be adapted to local circumstances (May 1994). The next step is to conduct research into the special way in which women engage in distance learning, into the types and levels of interaction between students and tutors that suit a female way of learning, as well as the documentation of the major social aspects that influence women's learning.

As far as the program of study is concerned, more women's studies courses must be made available via distance learning programs and a feminist perspective must be incorporated in the curriculum in other disciplines. More women administrators, teachers and students should be involved in the planning process for on-line courses so that their experience can contribute more directly to the benefit of others. (Kramarae 2000). This means that the possibility of adapting study programs to the needs of women can be utilized in such a way that steadily the educational demands of other categories of learners can also be satisfied.

#### ***3.2 Supporting Services***

The scholarships, the low tuition costs and the widening of economic assistance for distance learning study programs are ways in which the educational institutions and the state can make it easier for women with economic dependence to break free of social and educational isolation. The establishment of more local study centers is one way to counter the isolation that women distance learners experience (thus ensuring a quiet place for study - supportive services and one-on-one lessons). (Effeh 1991)

Educational policy-makers must be sensitized to the needs in particular of working mothers who are engaged in distance learning programs. The services for professional orientation, finally, belong to that category of supportive mechanisms which give meaning to all of the previous effort. Otherwise, there exists the strong possibility that women distance learners will be unable to utilize the knowledge and skills that were gained through the program thus rendering their efforts futile both typically and essentially.

#### ***3.4 Professors - counselors***

Professors and counselors can decisively contribute to the removal of barriers that women in distance learning encounter by treating distance learners as responsible and intelligent human beings, not as passive educational consumers (Kramarae 2000) and by creating a safe and supportive environment in accordance with the principles of adult education (Rogers 1999), with the intent of dispelling women's

fears concerning education. Educators need to be sensitive to women's personal and unique circumstances and to investigate ways to help students develop effective support systems. Supportive conditions which raise the self-confidence and self-awareness of the learner in the context of distance learning education can be ensured by the use of a variety of communication means and pedagogical methods - strategies as well as with the promotion of interaction between students, professors- counselors and technology. (Furst-Bowe 2001, Kirkup and VonPrummer 1990).

### **3.5 Women students and the social-cultural context**

In order to promote distance learning education, the broad dissemination of information to women's populations that can benefit from the advantages of distance learning programs of study but for whom it would be impossible otherwise to access the typical sources of information such as web sites must be ensured. Within this category are unemployed women, older women, women living in rural/agricultural areas, and women in prison. Women themselves can contribute to this effort through the network of the women's movement and of women's professional organizations.

Discrimination against women must be confronted more generally. This means that parental prototypes must be changed that assign to women the bulk of child care (important here is the role of the mass media), and at least the legal provision of dependable - specialized and economic child care during the course of study and of work for parents.

## **Conclusions**

Distance learning offers an essential opportunity for the beginnings or continuation of education for women (especially for women living in rural agricultural regions or mothers of small children), precisely because the program can be adapted to the rhythm and the life style of each woman individually. These same women believe that distance learning education is easier for men and that of course "it does not constitute a panacea" for all the problems of access to the traditional educational system, while at the same time "it is not for all" (May 1994). It demands self-discipline and self-confidence and the dilemmas that are present that have been addressed by the women's movement are those stemming from the male-centered concepts that persist in the area of education.

Nevertheless, the local and global restrictions that operate at the expense of women's educational efforts should not obscure the issue that " women constitute a varied and complex category so that we cannot speak of educational opportunities for women generally, as if they were all the same amongst themselves."(Burke 2000) Distance learning education, as "open", is characterized by a lack of restrictions. This characteristic must not lead to the assessment of learners as a homogenous body. On the contrary, emphasis must be given to the personal dimensions of distance learning, that is based in the self-determination of distance learners, whether they be women or not.

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# INTERCULTURAL COMPETENCIES IN CAREER DEVELOPMENT SERVICES AT DISTANCE – OPEN UNIVERSITIES

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This paper presents a model of intercultural competencies to be developed by services and professionals of career development counselling services in open and distance universities. The document is a result of a qualitative research that the author is currently carrying out within five large open and distance universities in Europe<sup>1</sup> (FernUniversität – Hagen in Germany, Open Universiteit in Holland, Open University in Great Britain, Universidade Aberta in Portugal and UNED in Spain) as part of his doctoral degree undertaken at the Department M.I.D.E I (Research and Assessment Methods in Education). It advances some of the data and knowledge that is being accumulated in such research. From the bibliographical revision carried out it is clear that there is not just one intercultural competencies development model, and therefore not just one theoretical frame. The model presented is a result of the consensus found among different authors from several historical, political, geographical and linguistic contexts. (Aguado et al., 1998; Arredondo, et al., 1996; Auernheimer, 2002, Dekelskamp, 1991, Essinger, 1986; Hammer et al., 1978; Hannigan, 1991; Herbrand, F. 2000; Hoffmann, E., 2002, Palmer, C. & Laungani, P. 1999; Ruben, 1990; Sodowsky, et al., 1994; Sue, et al. 1992, 1998; Sue & Sue 1999; Toussaint, Pierre & Fournier, Gabriel, 2002; entre otros). However, the more elaborate frame of competencies found is summarized in the north American context (Sue & Sue 1999). The next scheme is based on this model with some modifications.

## **1. Intercultural competencies model within career development counselling services at the distance – open universities in Europe**

To talk about intercultural competencies of the professionals who work within open - distance universities institutions requires talking about intercultural competencies of these institutions. The institutional culture is essential for the behaviour and identity of the people who work in it, besides the influence of the socio-political structure in which the institution is set up. Without meaning to be exhaustive, we can list the following characteristics of an inclusive and culturally competent institution:

- The inter/multicultural policies, mission and vision are explicated
- There is an intercultural action plan and to address diversity
- The staff is multicultural
- It requests feedback from the employees
- It constructs a accountability of multiculturalism within the system
- It includes intercultural competencies criteria in the system assessment
- It provides help and mentorship to minority employees networks
- It promotes coalitions and self-help networking between minorities and women
- There is a long-term commitment to continuous training
- The organisation is a reflection of the whole community

Regarding intercultural competencies of the counsellors, these comprise three areas: awareness of our own cultural values, prejudices, and assumptions. Awareness of the others, to understand their worldview

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<sup>1</sup> Career development in a whole sense is the “self-development over the life span through the interaction and integration of the roles, settings and events of a person’s life” (Gysbers, N.G. (1996): Beyond Career Development - Life Career Development Revisited. En: Feller, R.; Walz, G.: Career Development in Turbulent Times. ERIC 11-30)

and the social situation in which they live. Finally, but not less important, a development of culturally appropriate intervention strategies. Every competency involves three domains: attitudes, knowledge and skills. The most important competencies for counsellors and other professionals working in counselling and guidance services to develop are the following:

#### Domain A) Awareness of Own Cultural Values and Biases

- Reflection and awareness of own worldview and cultural setting, as well as own cultural identity (attitude)
- Reflection and awareness of the influence of the previous competency in relation to the users (attitude)
- Knowledge and awareness of value systems inherent to the theories used by the counsellor, as well as of the strategies and techniques used in interactive situations (cognitive)
- Knowledge of the impact of communication styles upon the users (cognitive)
- Involvement in intercultural experiences (skill)

#### Domain B) Understanding of user cultural background and worldview and their social and political situation

- Reflection on the stereotypes, perceptions and beliefs the counsellors have about different cultural groups, which can interfere on their professional relation (attitude)
- Knowledge of users' worldview and the influence of such worldview on the careers of these people (cognitive)
- Knowledge of the socio – political influence on the different groups, specifically on the discriminatory processes and situations that certain groups live (cognitive)
- To be aware of current and relevant intercultural research (skill)

#### Domain C) Accurate intervention strategies development

- Respect for and collaboration with culturally different groups, associations (attitude)
- Knowledge of the discriminatory potential of both clients' assistance practices as well as institutional practices.
- To be able to interact differentially according to client's cultural background and worldview

## **2. Need for intercultural competencies within distance university counselling in Europe**

The European Union is already a reality; a reality full of uncertainties, expectations and doubts. The European Union is established over four pillars with no restrictions: commerce, mobility of all European citizens, free circulation of capital and of services (Omnia, 1996). There are at least three ways of understanding diversity in Europe: on one hand, there diversity within each Nation State: gender, ethnicity, religion, social class, sexual orientation are the main factors to bear in mind. On the other hand, citizens belonging to these countries can move freely from one country to another, always within the European borders, in search of new career or trainings opportunities. Finally those citizens that come from outside these borders. A common characteristic of this new situation is its tendency to a certain homogeneity and cultural convergence, and on the other hand the tendency to a radical diversity. What seems to be appearing are new structures of common difference (Wilk, 1995, en Paul duGay 1997).

Within this multicultural context, distance or open universities have the possibility of flexibility, which, from the economic and political domain is understood as necessity: they can trespass national borders without losing their national character. Counselling in the university structure is meant to assist individuals' career development.

### **3. Intercultural competencies training goal**

Client independence and autonomy (Wedemeyer, Charles A., in Keegan, D., 1983), industrialization of education (Peters, O., 1974 en Keegan, Desmond, 1983) and interaction and communication (Baath, Holmberg, Daniel, Sewert, Smith, en Keegan, Desmond, 1983) are the main theoretical elements around which current services, processes and products in distance education are organized and articulated. In addition, if we understand distance education as a cultural system (Hall, Stuart, 1997) we consider distance – open education as the production, circulation (communication), use and regulation (certification) of meaning through programmes, activities and educational experiences, mainly non-traditional or at a distance, both for graduate educational programmes, as well as undergraduate ones. These programmes use different forms of representation for their dissemination through texts, images and sounds and have a great influence on the identity of the consumers of the programmes.

Despite the great technological progress, university centres still need to be decentralised in study centres that make possible an accurate contextualisation and dissemination of programmes, the organisation and development of workgroups and which can respond efficiently and in a non-standardized way to doubts and questions that would otherwise be difficult to address. Although student counselling services also use communication technologies, and are based at a central level, they are located mainly in these centres (Clennell, S., Peters, J. & Sewart, D., en: Sewart et al.: 1983). This is a common denominator to all university institutions visited and consulted up until now.

Analysing the statistics given by local administrations, we reckon that these contexts involve a great diversity regarding their potential students as well as the actual ones. But even without looking up any statistics at all, nothing is better than to walk around the towns in which the study centres are located to observe people from every origin, from every social class, from any age group. The distance and open Universities consulted are institutions that proclaim to serve a public function without any discrimination whatsoever. Users of these centres have the right to be competently serviced, bearing in mind their peculiar characteristics and necessities.

### **4. Strategies to develop intercultural competencies**

The concept and processes of counselling in each university differ deeply (Watts et al. 1998). Therefore there is not any one model to train in intercultural competencies. In those educational contexts where there are specific curricula in academic, vocational – professional, personal and family counselling, such as the case of Spain, a curricular infusion would be desirable, that is, inclusion of concepts and experiences in subjects to be developed in multicultural contexts. In these systems it is also possible to implement multicultural courses throughout the syllabus. In those educational systems in which there are no counsellor education programmes it is possible to organize masters, postgraduate courses and specialist programmes for future counsellors. An important factor in every case is to develop intercultural competencies linked to the practice within multicultural contexts, bearing in mind the wide concept that is presented here. Training must reflect real world contexts.

### **5. Dialogue as a basis for the establishment of an intercultural competencies training programme**

Dialogue involves interaction and communication as integral parts. Intercultural communication is an essential part of intercultural competence, with special characteristics which allow it to help create an atmosphere that can promote cooperation and understanding between cultures (Asunción-Lande, Nobleza, 1997). We affirm that dialog as a behavioural domain has to be based on equity of opportunities and rights for all people, and therefore on respect, recognition and acceptance of all cultural and worldview models (attitudinal domain), and on a mutual understanding of cultural characteristics (cognitive domain) (Auernheimer, G., 1999). In order to function properly, the intercultural competencies training programmes require the dialogical participation of all stakeholders involved in their planning: politicians, professionals and all the affected society without any discrimination (OCDE, 1995; Callejo et al.: 2001; Documento Proyecto Brial. IUED).

## 6. Conclusions

The intercultural competencies model in counselling services for career development of the citizens, who live together within the mentioned European countries and its institutionalisation and interiorising in the counsellors aims at erradicating prejudices and discrimination with regard to gender, ethnic origin, social situation, religion or any other factor of diversity. Awareness of Own Cultural Values and Biases, Understanding of client's cultural background, worldview and their social and political situation and accurate intervention strategies development attempts to attain that. Distance or open education is able to cross barriers borne for a long time by certain groups of people, thus assuring, on the one hand the equal opportunity to choose life-style and career path, and on the other hand to guarantee the flexibility that the current situation demands from all institutions responsible. We think that this plan is possible only through dialog, implementing and evaluating intercultural training programmes for counsellors or professionals who work in counselling services in such universities. A difficult dialog, but productive for all.

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# PEDAGOGICAL QUALITY IN ONLINE LEARNING: IMPROVING THE QUALITY OF LEARNDIRECT LEARNING

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## Introduction

Ufi Ltd was created in 1998 to bring about the UK government's vision of a 'university for industry'. It is a unique partnership between government and the private and public sectors. Within a year of becoming fully operational in October 2000, it had created with its partners - **learndirect** - the largest publicly-funded online learning service in the UK. Today there are over 800,000 registered learners and 20,000 new course enrolments every week. The vision of Ufi is that, through its **learndirect** network, the organisation will act as a significant catalyst for change in the lifelong learning market. Its remit is to:

- Widen participation in lifelong learning, in particular for those individuals and employers who are impeded by economic, motivational, physical or learning barriers;
- Improve the employability of individuals and the competitiveness of businesses through the provision of high quality online learning opportunities.

Ufi/**learndirect** offers a fully supported online learning experience through a network of partnerships with our education, industry and community partners staffing nearly 2000 learning centres throughout England, Wales and Northern Ireland. These learning centres provide attractive learning environments offering high specification computers, access to the Internet and staff trained to support learners on technical, administration, learning and social matters. In addition there is a network of over 1000 trained online tutors to provide expert course support. A national telephone support line is also available 24 hours a day, seven days a week.

## Quality

Ufi/**learndirect** is committed to an evidence-based approach to refining its learning model and improving the quality of its materials. Quality can be defined as fitness for purpose as expected by the relevant stakeholders. This definition appears too simplistic when one attempts to define the quality of learning software. Alley and Jansak (2000) present an integrated approach to quality in online courses as a pyramid with the "principles of learning science independent of the delivery medium" at the base, "practice (in instructional artistry)" which dictates the nature of delivery on the next level, and the application or system by which the delivery is achieved at the top. Thus the pedagogic principles should underpin both the medium and the message. Freeman (1993:60) regards quality assurance as encompassing more than the product of the learning, stating 'the product of training and education is in two distinct parts: process (the experience of learning); product (what you have achieved at the end)'. For the purposes of this paper, learning materials are accepted as high quality when learners learn what they wanted and expected to learn in a way that enables them to put their learning into practice. In addition, after a quality learning experience learners should be motivated to engage in further similar learning experiences.

This paper gives a summary of the ways in which Ufi/**learndirect** addresses the issue of pedagogic quality, concentrating on one specific learner-centred quality management tool, QUAL-IT, which was developed during 2000-2002. The 'Ufi Improving Learning Project' was carried out by Professor S Geertshuis and her team at the University of Wales Bangor and the University College Northampton. The project assessed the validity of one specific instrument, QUAL-IT, as part of Ufi's learning materials production cycle.



## Existing methods of addressing pedagogical quality used by Ufi

The pedagogy of the online learning materials is currently addressed throughout the production cycle. Before the materials are commissioned, prospective suppliers must demonstrate their ability to develop interactive learning materials that enable learners to test their progress and consolidate their learning. A manual stipulating all the pedagogical requirements, including design and presentation, as well as content, is available online.

Developers are required to test the materials with learners before they submit them to Ufi/**learndirect** for final sign-off. Whilst this may ensure that inaccuracies and inconsistencies in the content are identified and corrected, it represents neither a robust nor reliable system of determining the pedagogic quality of learning materials.

Feedback from learners is captured from learning centre staff and tutors as learners work through the materials. Specific comments are passed onto the commissioning team for consideration and are then prioritised and action where appropriate. This method is clearly reactive, unsystematic and unreliable as a means of ascertaining the pedagogical quality of learning materials.

## QUAL-IT: a potential improvement

Ufi/**learndirect** has been working with the Professor Geertshuis since 2000 to test and further develop a tool to establish the pedagogic quality of its learning materials. (QUAL-IT was designed as part of an earlier local research project supported by ADAPT funding.) It aims to assess the quality of computer-based learning materials to inform and empower commissioners, purchasers and the users of the materials. The explicit focus of the project was the pedagogical perspective, rather than technical or administrative concerns associated with computer-based learning and online delivery.

QUAL-IT is essentially an online questionnaire, comprising eight sections each addressing a different dimension of e-learning. Each section asks learners to respond to between four and seven statements from a database. namely:

- user friendliness (eg, *“it was easy to start up the course”*);
- match to learner (eg, *“the course suited my level of knowledge”*);
- clarity and content quality (eg, *“the course clearly explained what I would learn”*);
- multimedia presentation qualities (eg, *“there was an appropriate balance between graphics and text for me”*);
- opportunities for active learning (eg, *“the course gave me lots of chance to practice what I was learning”*);
- engagement (eg, *“the course material was interesting”*);
- feedback and assessment (eg, *“I had the right amount of assessment to tell me how I was getting on”*); and
- learning outcomes (eg, *“the course increased my knowledge of the subject matter”*).

(Originally there were 11 sections; three were merged with others after the first pilot study with **learndirect** learners.)

Each statement is positively framed and has a seven-scaled response option plus a ‘not applicable option; for example, under user friendliness, *“it was easy to start up the course”* learners could respond by selecting one of the following options: very strongly agree; strongly agree; agree; neither; disagree; strongly disagree; very strongly disagree; not applicable.

Learners are able to make comments regarding technical problems or other generic problems they encountered whilst working through the materials at the beginning of the questionnaire in order to

identify any problems outside the scope of the course materials. Once submitted the learner responses are recorded, and the learner receives feedback on the answers and comments given. An opportunity is then given for them to confirm or deny their choice. Once all responses have been received a copy of their final report is delivered to the learner.

QUAL-IT includes a secure administrator's page enabling staff to add, edit or delete courses for evaluation. All gathered data, such as overall course scores against the eight dimensions expressed as percentages, general comments, specific course comments are accessible through the administrator's page.

## **Evaluation**

### ***Phase 1 (2000-01)***

The original QUAL-IT instrument was tested in two main studies (Geertshuis *et al*, 2000). One used a sample of 22 learners who worked through a pre-selected set of **learndirect** courses. This enabled reliability and validity to be assessed. The results of the reliability and validity testing were positive with pedagogical quality dimensions correlating highly with self-reported learning outcomes. The study was successful in that it confirmed that the instrument was reliable, as assessed by Cronbach alpha scores.

The second was an implementation study using an opportunity sample of 150 **learndirect** learners across a range of learning centres and engaged with a course of their choice. The results of the study indicated that the sample was on average satisfied with the quality of their courses and their learning outcomes. Overall the reliability in study one was maintained despite the diverse sample.

The results of both studies served to confirm the importance of capturing quantitative and qualitative data. The former enables direct comparison to be made between courses. The latter provides an insight into how differences in perception arise.

Phase I concluded that the QUAL-IT instrument could be used in three ways: during the development of courses; after development, but prior to acceptance by Ufi, or as a means of routinely monitoring learner perceptions. Given the process involved in commissioning online learning materials and the complexity of the technical testing processes involved, Ufi indicated that the most appropriate application of QUAL-IT would be when the developers had signed off the content and any technical bugs and interworking issues had been corrected. In this way the learners' experience would not be influenced by issues other than pedagogical ones.

The following recommendations of Phase 1 were implemented: the instrument was shortened by 15% and the layout was adapted to include a rollover help facility with sound to assist learners completing the instrument without support.

## **Evaluation**

### ***Phase 2 (2001-2)***

Initial in-depth testing with a small number of learners (6) investigated the user friendliness of the package from the learners' viewpoint and the ease of administration from the administrator's viewpoint. The results of this phase led to a series of refinements, like the facility to insert a progress indicator showing the individual's advancement through the QUAL-IT questionnaire.

The main study tested the QUAL-IT tool with 200 learners representing a cross-section of Ufi's target audience. Learners worked through one of 23 courses and accessed QUAL-IT either from home, via a **learndirect** learning centre or from a college. On recruitment, learners were emailed a web address where they could register and be entered into a prize draw. Those failing to complete the questionnaire within the designated period were sent a reminder and a fast track form to reduce completion time.

## Results

The main result was the confirmation not only of the validity of QUAL-IT as a tool to assess the pedagogic quality of **learnirect**'s online learning materials, but also of its suitability for implementation into the organisation's course development cycle. QUAL-IT was straightforward to use and was accessed, completed and submitted remotely by all learners. Significantly, the majority of learners required no additional support to complete the questionnaire. By reducing the number of items included in the instrument, the time taken to complete the questionnaire was similarly reduced.

The results also confirmed that the qualitative data received from learners were important in further illuminating the quantitative data and should therefore remain as a vital to underpin the measurement of pedagogic quality. This is true of the comments invited at the beginning of the questionnaire on technical or general concerns as much as those comments relating to specific aspects of the course content. Moreover, the qualitative and quantitative data supported each other with a greater number of comments being attributed to those courses with the lower quantitative ratings.

Further enhancements to the administrator's page to ease the interpretation of data have been recommended, for example the inclusion of additional learner identifiers, and are currently being implemented. This function will be further developed by Ufi once QUAL-IT is integrated into the organisation's piloting process in order to ensure that the data can be interrogated and analysed easily.

## Conclusion

Ufi/**learnirect** is committed to investigate ways in which the pedagogical quality of its online courses can be improved. QUAL-IT provides the organisation with an opportunity to benchmark its learning materials, highlighting particular areas and issues which need further attention from course designers and content specialists.

It is clear from the research carried out during both Phase 1 and Phase 2 of this project that QUAL-IT will make a valuable contribution to Ufi's commitment to "adopt a rigorous approach to the development of quality standards for e-learning resources, materials and technology platforms" (Ufi Ltd 2002). The next stage of the research will concentrate on its day-to-day integration into Ufi's learning materials production cycle. This is currently underway and the outcomes of the process will be available at the end of 2003.

## Acknowledgements

The author would like to acknowledge the research carried out by Professor Geertshuis and her team at the University of Wales Bangor and the University College Northampton in developing and refining QUAL-IT as part of this Ufi-funded project.

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# E-LEARNING AND TRANSFERRING OF BEST PRACTICES: EVALUATION OF EFFECTIVENESS AND METHODS OF BENCHMARKING IN THE INTEGRATED PROCESSES OF TRAINING, EDUCATION AND LABOUR MARKET

*Luciano Galliani, Emiliana Bonanno, Department of Educational Sciences, University of Padua, Italy*

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## 1. Scenario

In Italy the insitution of a post-secondary channel (Higher Integrated Education and Higher Technical Education and Training) prerepresents, in full capacity, new ways for partnerships between University and Secondary Schools and vocational education Companies and business representatives. In addition these kind of partnerships represents the changes ahead of our education system, need new organizational structures and optimization of human, technological and financial resources. The actual challenge lies really to make the network organization not only reaching good training activities, but also integrating the educational processes, the supporting services, the administration and the management effectively and efficiently. In the South of Italy, where there are a great number of graduates, the data related to the unemployment of young people between the age of 15-24 has risen over 60% for Sicily region. The development of post-secondary education, the agreement of curricula offer by schools to the new competencies in relation to the territorial economic system, a general improvement of organization and individual performance are the necessary conditions to substain the change of the labour market and of the local development.

## 2. Aim of a best practice

The best practice that is going to be transferred through the project named “Evaluation of effectiveness and methods of benchmarking in the integrated processes of training, education and labour market” – financed by the Ministry of Labour inside the Action System of F.S.E. – got ready by small and medium concerns in the Veneto region. The best practice consists of a benchmarking model about business processes, allowing development and implementation of a tool for control, able to define the referred indicators (performance indicators), through which analyzing the individual performances and those onces of the organization in its whole.

**Developed best practice - methodology**

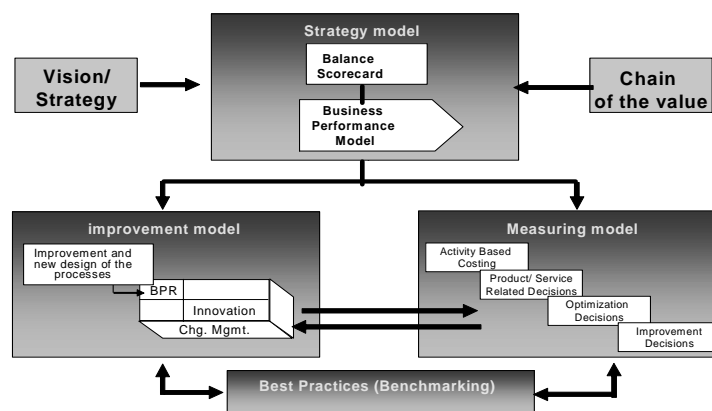


Figure 1

In the analyzed sample (about 40 small and medium concerns of the Veneto region coming from different product sectors) has been reached the following results:

- the mapping of the principal processes and therefore the testing of the organizational model;
- the definition of the activities presenting a value added that are inside the organizational structure, the consequent improvement of the working flow in the management of the resources;
- the definition and implementation of a new measuring system with reference indicators (performance steps) lined up to the strategic targets of the concern.

Through this model it was possible to offer a turn aimed at managerial actions, to monitor the individual and collective performances during times and to start up improvement actions aimed at a potential redesigning of the processes with long lasting effects.

The spreading of best practice through the creation of an on-line site and the use of ITC, proposed the aim to realize an informing network to delivery methods and results. The project of transferring best practice that we have now described is addressed to Higher Schools and training Organizations of the Sicily region and is aimed at spreading the experienced method over the regional territory. The aim is that one to contribute, in a concrete manner, to the improvement of the quality of the offer by schools, through an evaluation system of the administration processes in educational activities by schools. The last aim of transferring best practices is its spreading all over the national context in secondary schools and in Higher Technical Education and Training.

### 3. e-Learning and transferring actions

Technologies and methods of e-Learning in transferring best practices allowed an involvement by managers, teachers and administration staff during the dialogue with the expert-trainers of the three partners (Department of Educational Sciences, University of Padua; CUOA Foundation – University Consortium for Organization Corporate, Vicenza; CERISDI – Research Centre for Management Studies, Palermo) and during the collaborative on-line activities in the net of the schools.

Actually e-Learning develops an “blended model” of research-action with learning activities at a presence, on-line interaction supported by tutoring and the use of questionnaires and database for the tasting and the applicability of the processes in the single schools.

The project is articulated into 9 actions:

1. awakening and promoting to transferring of best practice and identification of the institutional subjects (regional school headship, regional management of vocational education, association of enterprises) and of the stakeholders (managers, teachers and administrative staff of secondary schools) through meetings and questionnaires;
2. bringing the best practice to top through a revision of the definition model of the processes and the related indicators for its measuring, with referring to the context set up by the 20 schools identified as samples;

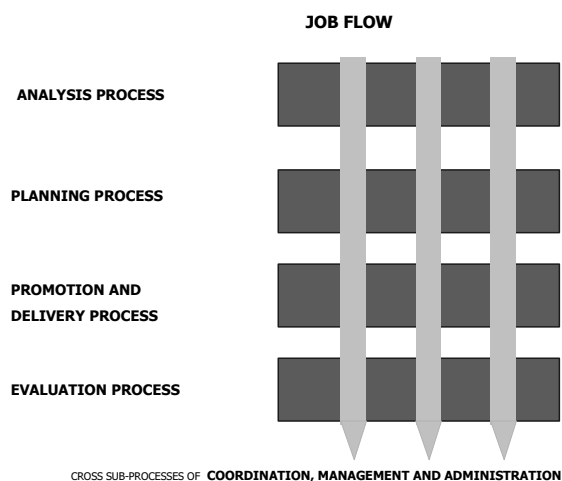


Figure 2

- testing of the processes that control how schools work, planning the tools to distribute and the meetings at every school institute with interviews with managers, also involving teachers critically;

**MANAGEMENT PROCESS OF TRAINING SUPPLY**  
The principal subprocesses and the supporting ones

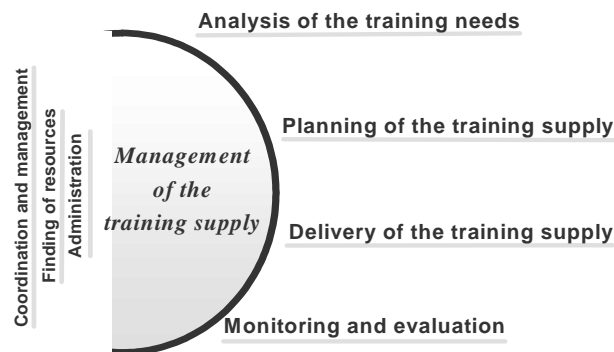


Figure 3

- identification of the referred indicators (performance indicators) through the method of Balanced Scorecard and organization of the Internet site and of the e-Learning platform for the on-line collaborative work with professionals and for e-tutoring;
- to start a benchmarking process to measure products, services and corporate procedures, giving detailed instructions to the work-groups of the schools about the use of the database to impute, examine and to processes information;
- this action, crossing all the other activities by transferring a best practice, consists in following and connecting the activities in the classroom, in the field and on net, in organizing and coordinating the seminars of the work group, in supporting the use of the on-line tools, in managing the database, in prearranging and releasing informative materials;
- this action, crossing all the other activities of the project, consists in monitoring and selfevaluating of the level in transferring best practice;
- procedure to spread methods and results on regional and national scale through a final report and a permanent administration of the Internet site, to supplement with new experiences gained by schools in similar activities;
- spreading of the results on national scale, involving the school headships of the other regions in Italy, and the other schools connected to them, allowing the access to the site and then to the net.

#### 4. Monitoring and evaluation of effectiveness

The project of transferring best practice is characterized by a method of research-intervention and by the strategy of evaluation of the effectiveness of integrated processes in training, education and labour market. The emancipation of private and public actors and their emotional involvement in the change of the school and training system and in the develop of all cognitive, motivational and professional sources is a decisive factor.

As regards to these strategical lines, monitoring and selfevaluation concern:

- for the *Action 1*, communication processes between the group of the researchers “Keepers” of the organizational model and of the benchmarking method and the process of the public and private managers who must be persuaded and rallied in “equal” terms;
- for the *Action 2*, procedures of composition and working methods of the research-action groups and the achievement of the aims through the testing of organization and the characteristics of the

Higher Technical Education and Training offer in accordance with the QFD method (Quality Function Deployment) particularly referred to the necessary training interventions of the involved actors;

- for the *Action 3*, the levels of “supportability” by the institutions of the managerial innovations oriented to customer;
- for the *Action 4*, the “agreed” availability among the actors to apply the methods for monitoring the inside-outside actions of the own organization and the individual performances;



Figure 4

- for the *Action 5*, the level of “repeatableness” in other institutions of the organized solutions to improve that performances connected to the benchmarking process;
- for the *Action 6*, the processes and the multimedial and interacting tools for the spreading of the results on a regional and national scalea;
- for the *Action 7*, the level of satisfaction to actors involved during the different steps of the research-action.

## 5. Perceived results

From the evaluation of the project of transferring best practice, relevant to the processes of integration in training, education and placement, it is possible to come to the following results:

- informations and tools helpful to school institutions to plan/improve services that answer the real needs of their customers (students and families), to renew the managerial system of the organizations and the evaluation system of the individual performances (teachers and managers);
- optimization of kinds of communication and of interaction among the institutional actors of the region Sicily involved in the system of Higher Integrated Education through the Internet and action learning in web-Communities;
- building and reinforcement through e-learning of convergence and integration of Knowledge Management, Competency Management, Performance Management and Improvement;
- sharpening of the methods and technologies used and their potential repeatableness, through the develop exportable to different stakeholders so that the specificity of nobody will be a blocking element;
- increasing in value of the local cultures in different countries through the involving and the dialogue between teachers and schools, with their cultural specificities, curricular typologies and social contexts.



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# QUALITY CRITERIA AS A POWERFUL TOOL FOR TRAINING, AWARENESS RAISING AND EVALUATION ILLUSTRATIONS THROUGH CONTRASTED USES

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## 1. Introduction

In Europe, one of the current challenges is to reach a critical mass of quality Open and Distance Learning (ODL) courses, in order to allow for dissemination of best practices in local languages. After having proposed a definition of what we mean by quality in ODL, this paper presents three projects making use of a set of 100 quality criteria developed by LabSET. It then advocates for a wider use of such quality sets at a European level, allowing for contrasted uses and leading to a quality enhancement of the existing offer, but also to a better dialogue and understanding amongst the educational community.

## 2. A quality grid

In 2000, LabSET-ULg (Belgium) has developed a quality grid comprising about 100 criteria addressing the five phases of development of a distance course. The grid, continuously used and improved by the team across all the LabSET projects, allows for transparency in what we call “quality”. As it appears by browsing through the criteria, our definition of “quality courses” is the following:

“Quality Courses ground their objectives on learners’ well analysed needs; they include motivational (affective) components as well as cognitive ones, they use methods chosen on the basis of sound and explicit theories, they assess learning achievements and processes by relevant and ecologically valid processes and tools giving rise to meaningful and diagnostic indices ...and they enable a large majority of the learners to fulfil the learning goals at a high level of mastery.” (Poumay, 2003)

Corresponding to this definition, the quality criteria are split into three categories, themselves divided into sub-categories. We give hereafter a flavour of the instrument by just mentioning some titles, stressing the importance of the activity (in a constructivist sense) of the course user:

- Pedagogical evaluation: objectives (clearly stated, in coherence with activities and evaluation, of specified taxonomy levels, diversified in those levels, ...), pre-requisites (announced, tested), credibility, validity and maintenance of the site (identified responsible persons), target public (specified, analysed in terms of needs), contents (valid, consistent, exact, comprehensible, well organised), pedagogical activities (described, instrumented, of different taxonomical levels, functional, allowing for tracking, in accordance with the evaluation, corresponding to varied learning paradigms, allowing for interactions, ...), evaluation (with customisable feed-backs, formative, repeated, in coherence with objectives and activities, allowing for different paths, ...), interactivity (varied levels, with possible individualisation and personalisation, ...);
- Technical evaluation: evaluation of the site (error robustness, ...), of the navigation, of graphical design and of the use of multimedia;
- Evaluation of the use of the product: conditions of use, existence of a user guide or manual, of an on-line help menu, specification of roles and functions, views on the results per student, per activity, per group, per question, etc.

The 100 criteria, although used by partners and professionals, are complemented by a user guide and illustrated, for each of them, by best practice examples to make sure there is a common understanding of the concepts. The following screens, from the EMDEL project, detail some of the criteria.

Activities
1. Are activities clearly defined (Do they have an objective, purpose, instructions, assessment criteria, desired length, and examples)?
2. Do activities prepare for the final evaluation?
3. Are activities adaptable to the needs of the students of various academic levels?
4. Is the learning method based on students learning by imitating a given model?
5. Is the learning method based on transferring of knowledge between the professor and students?
6. Is the learning method based on completing activities by students?
7. Is the learning method based on the use of course resources and reference material?
8. Is the learning method based on carrying out experiments?
9. Is the learning method based on enhancing creative thinking?
10. Do students learn by discussing topics among each other?
11. Is the learning method adapted to the subject being taught?
12. Does the course promote the independence of the students?
13. Do the activities encourage communication, co-operation, and collaboration?
14. Is the student-tutor interaction encouraged?

Evaluation
1. Is evaluation relevant to the objectives?
2. Is evaluation relevant to the content?
3. Is evaluation relevant to the activities?
4. Is there an uniform system for grading and evaluation of acquired knowledge?
5. Is the self-assessment possible?
6. Is the self-assessment valid?
7. Is self-assessment instruction unambiguous?
8. Can the assessment be repeated?
9. Does the assessment give appropriate feedback to the students?
10. Does feedback provide explanation of errors?
11. Is the assessment useful for students?
Comments

We illustrate hereafter three contrasted uses of the grid by explaining precisely the activities, driven by the grid, that we conduct in three of our running projects.

### 3. Contrasted uses of the quality grid in three running projects

#### 3.1 In an annual competitive call: the FORMADIS initiative (Supported by the European Social Fund and the Belgian Ministries of Education and Professional Training)



In 1998, the Walloon Region of Belgium asked LabSET to conduct a study advising the stakeholders on the choices and steps to be made towards a Walloon Virtual Campus. Following this study, a competitive call was launched in 2001 to select 13 projects to be closely coached and to be turned into on-line active courses. Training is provided half at a distance, both in technology and in pedagogy (minimum of 160 course hours). Building on the success of this first call, a second one was launched in March 2002. It selected 10 new projects that are currently closely coached on the same model, and consequently produce a second set of quality courses. A third call will be launched in April 2003.

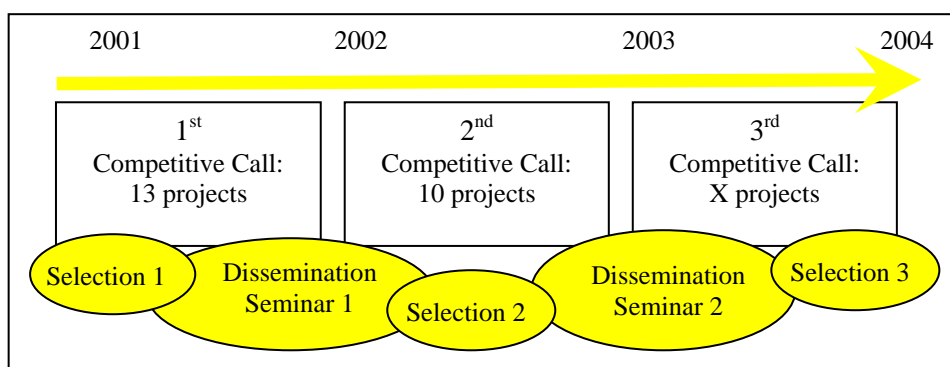


Figure 1: FORMADIS annual competitive calls, for a massive production of quality ODL

After each session, open seminars contribute to the dissemination of “best practices” in ODL through demonstrations of the achieved products, through discussions on their uses and on the added value perceived by their actors (trainers as well as users) and through critical thinking in order to continuously improve the process.

In FORMADIS, the quality criteria are used at different stages:

- For the selection of the candidate organisations, on the basis of the project they submit to the evaluators: five evaluators select in the grid a set of about 15 criteria, used as minimal indicators of the success of the process of ODL design and implementation.
- With the selected candidates, during the pedagogical courses: the LabSET team works with the participants on the quality of their own distance course, criteria per criteria.
- On a regular but optional basis: the grid is used as a self-questioning tool, allowing for continuing improvement of the developed courses.
- Just before the experimentation phase: each participant (professor) has the possibility to compare his/her self-evaluation with an external advice from two LabSET members before testing the course on real students.
- During experimentation: the grid is customised according to the activities of each tested course. It is then used as a dynamic evaluation tool, questioning the users on their perceptions.

### ***3.2 In a degree in ODL design and development: the FORM@SUP initiative***



In parallel to that FORMADIS initiative, the University of Liège launched in September 2002 a postgraduate degree (called FORM@SUP) in Higher Education Staff Development. This degree is coordinated by the LabSET. One of its three orientations is dedicated to ODL design, production and delivery. It aims at the same objectives as the above-mentioned annual competitive call and processes in largely common ways: the production of quality courses in local languages over the Internet. The main difference between the two initiatives is that the postgraduate degree provides less individual support and more on-line courses to the participants than the FORMADIS initiative. The degree is therefore better suited to those professionals who are already familiar with self-learning and more autonomous in project management. This degree also acts as an incentive (due to formal accreditation) as well as recognition for the involvement of the faculty members and external trainers in the continuing improvement of their courses.

As in FORMADIS, the FORMASUP selected projects cover a wide content diversity, the courses concerning different domains.

The quality grid is used the same way than in FORMADIS but in addition, we organised regular sessions in which colleagues as well as some external experts use the grid to react to the projects presentations. That way, the participants can benefit from regular external advice on selected criteria of the grid, depending from the competences of the invited experts. This use has been tested this year. It will be extended in 2004 as it has been considered by the participants as very formative. We noticed it was sometimes easier to automatically take into account advice from external experts or from colleagues not directly concerned by the running project than to accept advice from direct colleagues or from tutor in charge. Having a shared grid allows for continuity, independently from the evaluator.

### ***3.3 In the EMDEL project: European Model for Distance Education and Learning***

This European project (LEONARDO program) joins the efforts of 10 countries in the development of an on-line catalogue of distance courses. LabSET is responsible for developing an evaluation “Model”: a tool allowing to inform the database user on the quality of the available courses and a methodology of international evaluation of the courses. A quality questionnaire is filled in by a national expert, a “customer satisfaction” questionnaire is filled in by every user of the course. In EMDEL, the whole products of the ‘On line Catalogue’ will be submitted to a quality certification according to the ‘Model’ adopted.

We notice here a very professional use of the quality grid, where the criteria are transparent and visible by every user but where the grid is only filled in by international accredited experts. This kind of use is likely to be more and more common at a European scale, as an answer to the extending but sometimes very poor ODL offer. Having to choose between several courses aiming at the same objectives, the European citizen will find in quality evaluations a way to maximize his/her efforts and going for the best offer, best

meaning here the most effective in pedagogical terms. The EMDEL partners hope that this decision of providing citizens with an evaluation of the pedagogical quality of the offer will increase the global quality of that offer. The service providers will be pushed towards quality and the public awareness will raise, the criteria being well known and announced. Note that a course does not receive a final “quality note” as a result for its evaluation, but a series of written comments for each section of the grid, qualitatively underlining the strengths and weaknesses of the course. For each comment and to better understand them, the user can access the filled in grid.

Contrarily to the ones described upper, this last use of quality criteria is still under fine-tuning. The web site exists, together with the evaluation grid, it has been tested but it is now in the phase of extension of the use to a wider set of evaluators, from the 10 partners countries. The opening of the site to public access is planned for mid-2003.

#### **4. Conclusion – towards the improvement of quality grids and practices**

In these three projects, although the quality grid is used very differently, it has the same consequence of raising awareness on the meaning of quality for a distance course, therefore improving the quality of the developed courses. It allows for a better understanding between professionals, sharing ideas on pedagogical values. The concept of quality itself has evolved, following those reflections amongst professionals. FORMADIS, FORMASUP and EMDEL help the grid improve, by reacting to its use, adding criteria or refining others. Partners from different countries also have cultural differences affecting the adaptation of the grid. They underline their preferences and foresee slightly different uses in the different countries.

As FORMADIS does it in Wallonia (Belgium) and FORMASUP in the academic sector, the EMDEL project will allow for a wider dissemination of the grid, collecting additional feed-backs from professionals, towards an improvement of European ODL practices.

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# **LOCUS OF CONTROL, SELF-ESTEEM, MOTIVATION AND SATISFACTION, TEACHING AND LEARNING THROUGH AN INTERNET-BASED AND TRADITIONAL „INTRODUCTION TO STATISTICS” COURSE**

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## **Distance Education**

In the wake of the development of sophisticated third generation Distance Learning systems which include interactive video, email, internet, and intranet, technologies, learning activity through the medium of these Distance Learning systems has been redefined to include and focus on teacher-student interaction (1). Interactive videoconferencing, and interaction through the medium of internet or intranet offer one-to-many or one-to-one tuition in which teachers and students are able to communicate on-line thereby solving key instructional and learning problems in real time (2). Third generation Distance Learning systems are flexible and present teachers with the opportunity of continuously monitor overall progress of their students. These systems also allow tutors to modify, reinforce and even model educational processes, thereby fulfilling the cognitive as well as affective needs and requirements of students. Interactivity, which characterizes third generation Distance Learning, has also been shown to meet student needs more fittingly and comprehensively than the older Distance Learning modes. Interaction provides the student with a new cognitive environment that both activates and motivates learning and contributes to student satisfaction as well as to a feeling of control of the learning process (3). Trentin (1) confirmed that interactivity available in third generation Distance Learning approaches promotes active engagement of students in the learning process and leads to improved academic achievement.

Research studies have indicated that third generation Distance Learning is especially suited to higher education and to adult learning mainly as a result of the interactivity embedded in the system (2). Some studies have indicated that the various modes of interactive Distance Learning technologies give rise to positive change in the instructional and learning processes when compared with earlier Distance Learning systems (4). Other studies have emphasized the importance of student activity provided for by interactive Distance Learning systems and have indicated that the student activity variable contributes significantly to improved student achievement (1). In addition, interactive systems, in which teachers or tutors present formal lectures or study material from a studio geographically far removed from the classroom where the receiving students are located, promote a high degree of cost-effectiveness and efficiency (5). For example, the CALVIN interactive and collaborative system demonstrates how student interaction with tutors as well as with fellow students through an interactive Distance Learning system facilitates more efficient group learning and problem solving, thereby providing an improved learning environment (6).

## **Psycho-pedagogical Variables Affecting Teaching and Learning**

One of the issues apparently related to positive computer attitudes as well as efficient computer use in the classroom, is that pertaining to pupils' personality profiles (7) An examination of studies conducted to ascertain personality and attitudinal traits of pupils engaged in CAL indicates that certain personality and attitudinal variables are significantly correlated with pupils' computer related attitudes. Empirical evidence intimates that certain personality and attitudinal traits are related to more positive computer related attitudes than others.

Griswold (8) found that positive attitudes toward CAL are related to higher levels of self-esteem of elementary school pupils. Woodrow (9) alluded to the fact that there seems to be a significant relationship between locus of control and pupils' computer related attitudes. Katz and Offir (10) found that positive computer oriented attitudes are related to self-esteem and school motivation and satisfaction. Pupils with

positive self-esteem prefer study through the medium of Computer Assisted Learning (CAL) as do pupils who express dissatisfaction with teachers who use traditional and older established teaching methods. Passig and Levin (11) indicated that in schools where sophisticated multimedia learning and instructional packages were introduced into the school curriculum, student and teacher interest in the educational process was increased, and student achievement was enhanced. Katz (2; 12) confirmed that psycho-pedagogical attitudes such as satisfaction of students, control of the learning process, and self-confidence in learning are significantly enhanced when distance learning methodologies are used in the educational process at the college level. In addition Katz (13) indicated that student attitudes such as self-image, social-image, self-confidence, internal locus of control, satisfaction, and motivation are those, which lay the foundation and contribute towards the willingness of students to use ICT methodologies in learning and instruction.

## **Internet and Traditional Introduction to Statistics University Course**

Increasingly more university courses are being delivered to students through the medium of internet (14). Both university professors and students increasingly utilize the new medium to increase meaningful learning based on the use of online audio-visual material, databases, simulations and tutored exercises (15, 16). Hellebrandt (17) indicated that the internet provides students with authentic learning materials - difficult to obtain in the traditional learning situation - that increase the effectiveness of learning and instruction.

Idrus and Lateh (18) confronted the implications of university learning and instruction using internet-based courses. They contended that the internet has moved formal instruction in these courses from the formal setting of the university campus to the home of the student. Learning has become significantly more flexible and content sources much more accessible. Creating, sharing and knowledge capitalization are all facilitated by internet. Wider sources of learning are provided in internet-based courses and worldwide expertise can systematically be brought to the student's desktop. In addition, a decade ago, Szuprowicz (19) foresaw internet-based university courses as contributing not only added learning and instructional efficiency to the educational process, but also improved cost-effectiveness in university tuition in that internet-based courses can be made available to an almost infinite number of students.

## **Aim of the Present Study**

The main aim of the present study was to examine the achievement, locus of control, self-esteem of students who participated in internet-based and lecture-based mandatory first-year „Introduction to Statistics” course at the Bar-Ilan University. In addition the comparative motivation and satisfaction as well as comparative attitudes toward teaching and learning of students enrolled in the internet-based compared to those of students attending the lecture-based mandatory first-year „Introduction to Statistics” course were also examined.

## **Method**

### *Sample*

The experimental group consisted of 62 (60 females and 2 males) first-year students enrolled in the School of Education at the Bar-Ilan University who were registered in a mandatory Internet-based „Introduction to Statistics” course. The internet-based course was the first course of its kind that these students attended. The comparison group was made up of 38 (36 females and 2 males) first-year students enrolled in the School of Education at the Bar-Ilan University Ashkelon Regional College Extension who participated in a mandatory traditional lecture-based „Introduction to Statistics” course. Students in the experimental and comparison groups were accepted to their respective courses of study on the basis of grades attained in a psychometric entrance examination and in their school-leaving matriculation examinations. Mention should be made of the fact that the criteria for acceptance at the two Schools of Education were based on similar psychometric and matriculation examination results. In addition to

cognitive similarities, students enrolled in both School of Education students are almost all female, this being the complexion of the Israeli teaching profession.

### ***Instruments***

Students in the experimental and comparison groups were administered three research questionnaires as follows:

1. Rosenberg (20) 10-item Self-Esteem Scale. This questionnaire taps the factor labelled „self-esteem” and is structured according to a Likert Scale paradigm with a high score indicating high self-esteem and a low score indicating low self-esteem. The reliability of this scale, computed by the alpha Cronbach method, reached the .84 level.
2. Katz (21) Locus of Control Scale. This 24-item questionnaire is based on the Likert Scale structure, with a high score indicating internal locus of control and a low score intimating external locus of control. The reliability of this scale, computed by the alpha Cronbach method, was set at the .68 level.
3. Yablon and Katz (22) 15-item Learning Evaluation Scale. The questionnaire was designed to tap students’ motivation and satisfaction as well as attitudes towards teaching and learning from the internet-based and lecture-based „Introduction to Statistics” courses. The items were compiled in conformity with a Likert Scale structure in which responses were provided on a five-point scale ranging from a low level of motivation and satisfaction to a high level of motivation or satisfaction on 7 items and ranging from low attitudinal level towards teaching and learning to a high level of teaching and learning on 8 items. The Cronbach alpha coefficient of reliability for the motivation and satisfaction factor reached the .86 level and was set at the .89 level for teaching and learning.

The questionnaires were administered in a post-test only quasi-experimental design after the students in both experimental and comparison groups participated in the internet-based and lecture based year-long „Introduction to Statistics” course. In addition to the questionnaires the grades achieved by experimental and comparison group students in the final examinations were registered.

### **Results**

In order to establish possible inter-group differences between the students who participated in the internet-based „Introduction to Statistics” course and those who studied in the traditional lecture-based course for the research variables, namely self-esteem, locus of control, motivation and satisfaction, teaching and learning, and achievement, as well as to evaluate the contribution of each of these variables to the differences between the two groups at the end of the course, a Discriminant Function Analysis was computed on the data obtained. Results of the statistical procedure, indicate statistically significance differences between the two groups and correct placing of 72.7% of the respective students to their particular groups. Experimental group students were correctly assigned to their group in 78.3% of the cases and comparison group students were correctly assigned in 70.4% of the cases. The analysis of the data also indicated that locus of control, motivation and satisfaction, and achievement significantly characterized students in the experimental group who participated in the internet-based course. On the other hand the self-esteem and teaching and learning variables significantly typified the comparison group students who participated in the lecture-based course (Table 1.).



Table 1. Standardized Discriminant Function Coefficients for Experimental and Comparison Groups

Variable	Experimental Group	Comparison Group	Function 1
Self-Esteem	M = 4.13, S.D. = 0.57	M = 4.26, S.D. = 0.47	.45
Locus of Control	M = 3.74, S.D. = 0.29	M = 3.61, S.D. = 0.26	-.07
Motivation and Satisfaction	M = 3.15, S.D. = 0.89	M = 3.06, S.D. = 0.93	-.35
Teaching and Learning	M = 2.69, S.D. = 0.76	M = 3.11, S.D. = 0.88	.99
Achievement	M = 85%, S.D.= 12.48	M = 76%, S.D.= 18.66	-.78
Wilks Lambda			.73*
Canonical Correlation			.51

\* P<0.001

## Discussion

The findings of this research study indicate that students who participated in the internet-based "Introduction to Statistics" course achieved higher grades in the final examination than the students who participated in the lecture-based course. In addition these students were also characterized by a higher level of locus of control as well as a higher level of motivation and satisfaction than their counterparts who participated in the lecture-based course. On the other hand, students who participated in the lecture-based course were higher on the self-esteem variable as well as on the teaching and learning factor. It appears that the internet-based course, which provided participants with audio lectures, full text as well as revision exercises and online assistance, provided a superior opportunity to achieve higher grades than their comparison group counterparts. Furthermore, they exhibited a higher level of locus of control over the learning situation as they were obliged to expend more time, thought, effort and engagement into the internet-based learning process. This was also accompanied by a feeling of motivation and satisfaction because of their newfound ability to successfully come to terms with a novel learning approach.

The students in the lecture-based course had a higher level of self-esteem as the traditional learning approach that they experienced held little threat for them and they were familiar with the traditional learning style that complemented the feeling of self-esteem. It appears that the traditional learning approach with which they were familiar contributed to their higher appreciation of teaching and learning as presented to them in the lecture-based course because of their habituation towards this learning approach.

In conclusion it appears that the research variables accurately differentiate between the students who experienced the two teaching approaches and emphasize the psycho-pedagogical factors that underlie these two approaches. It appears that both approaches emphasize different psycho-pedagogical aspects of the learning process and both contribute to learning in different ways. Further research is necessary in order to examine what contribution each of the research variables makes to achievement and the psycho-pedagogical aspects of learning as well to investigate how the advantages of both approaches can be utilized at one and the same time.

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# **THE PYRAMID OF USABILITY: A FRAMEWORK FOR QUALITY COURSE WEBSITES**

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## **Abstract**

This paper describes a potential quality framework for course websites, based on a framework in use at the UK Open University called the Pyramid of Usability. Its background, methodology of development, structure, current and potential future uses and users are described.

## **Introduction: Usability as Quality for course websites**

Although the Web is becoming an increasingly popular medium for the provision of course-related materials and tutorial support for distance, flexible and self-access education, issues of quality in the context of educational websites are not, as yet, well understood. One aspect of quality control that has received attention in the commercial sector is **website usability**. Although there is a plethora of usability guidelines available for those interested in the provision of websites conforming to technical usability standards (e.g. Nielsen 2003, Norman 2001), educational usability requires that course-related websites be not only technically but also pedagogically usable. Pedagogical usability may be seen as the educational effectiveness, practical efficiency and general ‘enjoyability’ of a course-related website. It is a fundamental consideration in the provision of high quality educational websites, yet it is much less well defined than technical usability. There are many “checklists” for usability guidance and evaluation in academic literature (French, 1999, Raigner 2002), but there is little which provides an integrative framework for developing pedagogically usable websites.

A focus on usability can reveal more than just the strengths and weaknesses of websites. It can be equally useful in shedding light on conceptions of users held by the makers of websites, or those who are such experienced users or so expert in their domain that they make too many assumptions. Cockrell and Jayne (2002) have written about the “transforming experience” of administering a usability test which provided objective information, improving communication among team members and helping to establish shared goals and priorities.

By considering a website in terms of a pyramid whose levels correspond to the increasingly specialist needs of an educational website, the Pyramid of Usability endeavours to integrate both pedagogical and technical aspects, and to provide a means of organising the discussion of key issues. Its use over the course of two years for practical usability work with educational websites so far indicates that it is an effective and simple framework. In this paper, we describe research into pedagogical usability at the UK Open University (OU) and the ‘Pyramid of Usability’ that is one of the resources that can be used by OU academics to ensure that their course-related websites are designed on the basis of pedagogically usability.

## **Usability and course-related website development: the UK Open University Context**

For paper-based course materials, it is, to a large extent, possible to ‘take for granted’ established practice in developing layout, visual appearance and relationships between different elements on the page. This practice also integrates what is known about how students read and study. In contrast, no such practice has yet been established in the case of web-based materials. “Pockets” of expertise undoubtedly exist across different professions involved in website development, including education experts. However, it can be difficult for academics and academic-related staff who are involved in the process of producing and approving learning and teaching materials for the Web to obtain appropriate guidance as to how to ensure that the pedagogical design of the materials is not overshadowed by the technology.

At a time when we are moving towards a learning environment which incorporates an increasing proportion of e-learning materials, it is important that the non-technical members of teams developing course-related websites be conversant with the pedagogical issues surrounding electronic course material production and presentation. They should, moreover, be well-informed about usability issues connected to the development of such learning materials and able to make informed judgements about these when creating their own e-learning materials or evaluating materials produced elsewhere. This includes having quality frameworks that are simple and widely applicable, so enabling discussion and quality design amongst different team members.

The Pyramid of Usability has been used at the OU as a flexible-yet-ordered framework which helps considerations of website usability and quality.

## **The background of the Pyramid of Usability**

The origins of the Pyramid of Usability (the Pyramid) lie in an investigation of usability in online music education (Muir 2001). The research question, “What makes effective, efficient and enjoyable online music education software?” resulted in Muir encountering a flood of often conflicting guidance from the different fields of music, education and web technology. This guidance included theory, tips, data, opinions and methods for determining the quality of music education software. In order to answer the research question, it was necessary to order this “guideline overload”; the Pyramid was developed to capture the context-sensitive way that various types of guidance come together in a website.

In the field of online education as a whole there is a similar case of “guideline overload”: a wealth of guidelines, methods, theories, opinions and some empirical data. A series of interviews with informants from across the OU suggested that it can be difficult for staff without specific usability and user-centred design training to order and prioritise the large number of usability guidelines available and that this can adversely impinge upon both time management and the morale of those involved.

Since 2001 the Pyramid has been used in the following ways at the OU:

1. In a research and development project identifying and drawing together diverse expertise in the design of web-based course materials in order to provide guidance to enable academics and academic-related staff to participate on an equal footing with other specialists (eg graphic designers, web developers, broadcast media professionals) engaged in the development of web-based course materials. The Pyramid is used to organise guidance relevant to course website development, for presentation to non-technical teaching staff.
2. By usability specialists for planning and carrying out usability inspections and user tests of course related websites. When conducting an expert walkthrough of a site, the levels of the Pyramid provide a useful mnemonic for the range of issues that need to be considered.
3. By teaching staff as a simple framework for thinking about their own site. This has happened in staff development workshops as part of (1) above, and in meetings between academics and usability specialists in (2) above. Although the Pyramid is not an established part of course website development, it is being officially promoted by the University’s Institute of Educational Technology (Institute of Educational Technology 2003).

## **Structure: the Pyramid and its Ground**

The Pyramid comprises two parts: the Pyramid itself with four levels, which correspond to the four levels of a website’s functioning (explained below); and the Ground which represents the human teams which create and maintain the website, and upon which the pyramid rests.

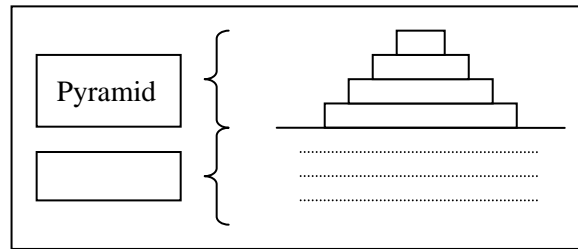


Figure 0 The shape of the Pyramid and its Ground

## The Four Levels of the Pyramid

A simple way of conceptualising a course website is to see it as functioning on four levels. These are pictured as four layers of a pyramid, each layer resting on the previous one.

1. **Technical usability:** This level addresses issues such as server reliability, download times, appropriateness of plug-ins, accurate HTML.
2. **General web usability:** common to most websites this includes issues such as clear navigation. It also includes accessibility for learners with special needs, and ergonomics.
3. **Academic usability:** this level deals with educational issues, such as the pedagogy behind a site, its place within a course and the other media it links to. Learning theories such as constructivism influence the pyramid from this level. Expected study behaviour also comes into play.
4. **Context specific usability:** each course has its own particular needs and intended outcomes which make it different from other courses. For example, one OU course focuses on web technology, and therefore departs from the norm by asking the students to undertake complicated technical operations.

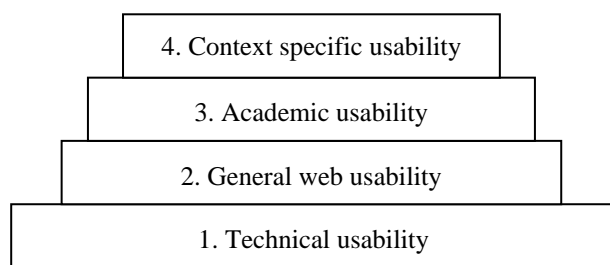


Figure 1 The four levels of the Pyramid of

The levels rest on each other in the following ways, from the top down:

- a) If the learning and teaching resources supplied by an educational website are not presented and sequenced in a pedagogically-focused manner, the learner is less likely to succeed in achieving the specified learning outcomes of the course. Thus, context specific usability (Level 4) rests on academic usability (Level 3).
- b) No matter how pedagogically-effective content may be, it is of little use if the learner is unable to locate it in a poorly organised website. Academic usability (Level 3), then, is based upon principles of general usability (Level 2).
- c) A well-designed website with pedagogically-effective content has no purpose if it cannot be reliably accessed. Technical usability (Level 1) is the basis for the rest of the Pyramid.

## Using the Pyramid

Before it was possible to use the Pyramid to represent usability issues in a large educational institution, it was necessary to identify what those issues were. To obtain this information, a series of semi-structured formal and informal interviews was carried out with web-development specialists (technical experts) and content-development specialists (academic experts). Staff development workshops were also offered to all categories of website developers. Interviewees and workshop participants were encouraged to share typical difficulties they had encountered when developing educational websites. The issues that emerged were then mapped onto the appropriate level of the Pyramid (Table 1).

Table 1 Usability issues ordered on the Pyramid

Pyramid level	Sample Issues
4. Context specific	<ul style="list-style-type: none"> <li>• Learning outcomes: each course has its own learning outcomes, and the website will have specific ways to facilitate these</li> <li>• International students may need extra information or support from a website</li> </ul>
3. Academic	<ul style="list-style-type: none"> <li>• Students print out pages from the website regardless of whether this is appropriate</li> <li>• Security: e.g. limiting access to some materials, risk of plagiarism</li> <li>• Integration of materials across media (e.g. relating paper-based materials to web-based materials and vice versa)</li> <li>• Educational/pedagogic “Help” for students, e.g. so they know “what to do next” - and when to do it - on the website</li> <li>• Online study skills, e.g. note taking, assessing external web pages for validity</li> <li>• Adding educational value with a site, rather than just providing an “optional extra” or “bolted on” component</li> <li>• Integration of website materials with course assessment</li> </ul>
2. General web	<ul style="list-style-type: none"> <li>• Security: user implications of password-protected access</li> <li>• Display: e.g. Screen resolution, colour schemes, fonts (Mac and PC)</li> <li>• Plug-ins: e.g. the user’s experience of downloading and using Flash and Shockwave applets</li> <li>• HTML: Non-standard HTML, style-sheets, frames</li> <li>• Navigation: e.g. new windows opening, disabled back buttons</li> <li>• Accessibility for the differently-abled</li> </ul>
1. Technical	<ul style="list-style-type: none"> <li>• Security: technical implementation</li> <li>• Cookies: aware of differing user preferences as to their use</li> <li>• Platform &amp; Browser: variations in the technical set-up of these can lead to web pages appearing very differently than intended</li> <li>• Plug-ins: e.g. technical requirements</li> <li>• Download times</li> <li>• The shift from development site to live site</li> </ul>

Although the interviews and workshops did not give rise to an exhaustive list of usability/quality considerations, they did support the hypothesis that a four level model of this type can be used effectively to order and prioritise a series of issues that, hitherto, may have been overwhelming. Organisation and prioritisation of concerns allows them to be more effectively engaged with, and it becomes clear that certain ones naturally fall within the province of technical or academic experts respectively. This is important because continued investigations have revealed that when such clarity of order and priority has not been identified, it is not uncommon for academic experts to spend time attempting to solve minor general web usability issues (Level 2) while technical experts make design choices that effect the instructional design of a website (Levels 3 and 4). Mapping specific issues onto the correct level of the Pyramid at the outset of a web development project should, therefore, lead to more effective use of resources and a better product. This has been substantiated by teaching staff who have seen the improved efficiency, enjoyability and potential effectiveness of their course website as a result of usability work using the Pyramid.

## ***Discussion of the 4 levels***

### ***Blurred boundaries***

The Pyramid illustrated in Figure 1 is presented in neat blocks with no overlap between Levels. In practice, usability issues are often complex and multi-layered, spanning more than a single Level of the Pyramid. For example, in Table 1 (above), the first of the issues listed at Level 1 (Technical usability) is “security”. On this Level, “security” refers to the functional implementation of passwords, firewalls, etc. However, “security” is also an issue at Level 2 (General web usability). On Level 2, “security” refers to the practicalities of the user being required to enter a password – dialogue boxes, error messages, the cognitive load placed on the user, and so on. “Security” can also be an academic issue (Level 3); for instance, password protection may be used to limit access to course materials or to learners’ outputs. Plagiarism may also be an aspect of security (Level 3 Academic Usability). Usability issues, then, may be multi-faceted and the boundaries between the Levels of the Pyramid may, in some cases, be blurred. However, careful definition of the issues allows them to be mapped onto the appropriate Level of the Pyramid. The issue is then highlighted and can be addressed by the appropriate expert(s) either individually or in dialogue with each other.

### ***When guidance is contradictory: using the Pyramid to define priorities***

Usability guidance may often seem to be contradictory. Substantial amounts of time and energy can be wasted in debating such conflicts (Krug 2001). An alternative to this illustration which the Pyramid affords is to assign issues to Levels of the Pyramid so they can be prioritised. For example, while it may be useful for the course to supply a number of multimedia items such as audio and video clips, these cannot be downloaded easily over a standard 56k modem. In this case, there appears to be a contradiction between guidance that encourages the use of new media to deliver rich media learning resources, and the need to minimise online time and expense for the learner accessing from home. The first principle is related to Pyramid Level 3 (academic usability) and the second to Levels 1 (Technical usability) and 2 (General Web usability). As levels 1 and 2 underpin Level 3, this gives an indication that they should take precedence and that download times should not be excessive.

### ***Where is the learner in this?***

The presence of the learner can be found in all four levels of the Pyramid. The model is defined by the learner’s requirements, i.e. their technical setup, their general web ability, and their general and specific study requirements. Thus, although the Pyramid approach does not overtly refer to the learner per se, it is in fact a model that addresses the different levels of functioning that a site must fulfil to facilitate effective, efficient and enjoyable learning.

### ***The Ground of the Pyramid***

In order to capture the range of perspectives that staff bring to the usability/quality issue, another aspect of the framework was developed: the “Ground” upon which the website rests. These are the human teams needed to develop and maintain the site.

Figure 2 illustrates the Pyramid resting on a Ground, which is presented in layers to emphasise in graphic form the human teams which support each other and the website.

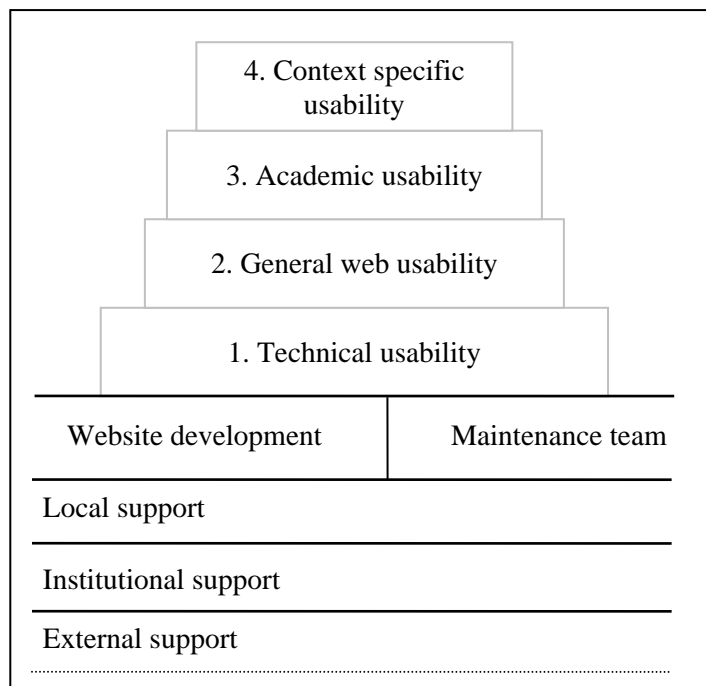


Figure 2 The Ground of the

- **The website development team.** The group that plans, designs, implements and maintains the site, probably including academics, programmers, editors, educational technologists, instructional designers, and graphic designers. They are in contact with the pyramid most directly.
- **The maintenance team.** The individual or group who maintains the site, e.g. uploading new content, or correcting bugs.
- **Local support.** Individuals and teams that the production team can call upon for support either in official capacity or unofficially. Official support may take the form of certain specialists, in areas such as educational technology or accessibility. Unofficial support may be guidance and encouragement from other members of staff who have greater experience but no official role in website development.
- **Institutional support.** Individuals and groups that support the creating of quality course websites at institutional level. There may be specific departments that can evaluate educational software or give strategic advice on use of media.
- **External support.** Bodies outside the institution, such as the Resource Discovery Network (RDN): “the RDN gathers resources which are carefully selected, indexed and described by specialists in our partner institutions.” (Resource Discovery Network 2003).

This part of the framework can capture the range of views as to what usability/quality actually is. This highlights the pluralistic view of usability, i.e. different perspectives dependent on peoples’ professional backgrounds, goals and constraints. It avoids the temptation to attempt to find a definition which suits all.

*Plurality of perspectives: examples of the different perspectives on quality from the different levels*

The sample perspectives in Table 2 are taken from the formal and informal interviews referred to above and illustrate the range of views as to what constitutes a successful educational website.



Table 2 Sample perspectives

Ground Layer	Sample perspective
Website development team	Lead academic: "For us it's important that the student actually attains the learning goals." Programmer: "Well clearly we want to make a website that works smoothly and well."
Maintenance team	"I don't have much time in my work plan for this job, and also the actual uploading can be quite technically challenging. So anything to make the process smoother and easier, the better."
Local (faculty)	"In our faculty, all of our courses now have websites. However, there isn't much uptake by students, and we are curious as to why."
Institutional support	"We have a goal that all courses will have online components by 2005. Course teams need support to help them employ these effectively."
External	"Higher education has very limited, often public resources, so we've got to be absolutely sure that we're getting the best value out of those resources." (Laurillard 2002)

## Conclusion

Although its use has not as yet been formally assessed, the Pyramid model continues to be employed by usability researchers and practitioners, as well as by non-technical staff, at the OU. Its uses are diverse and include functions ranging from the ordering of usability guidelines for presentation to academic and academic-related staff to serving as an *aide-memoire* for usability practitioners when carrying out usability inspection of course-related websites. Such uses indicate that the Pyramid model is flexible enough to serve the purposes of both expert and novice users, while continued informal reports indicate its multiple benefits.

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# STUDENT SATISFACTION IN THE ONLINE MASTER OF DISTANCE EDUCATION (MDE) – PRELIMINARY RESULTS

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## 1. Introduction

The Master of Distance Education program (MDE) was launched in January 2000 by the degree granting University of Maryland University College (UMUC) in partnership with the Center for Distance Education at Carl von Ossietzky University of Oldenburg, which contributes two of the six integrated certificate programs. The Master's and certificate degree programs are completely accessible online.

The mission of the MDE is "...to qualify present and future managers of distance education. Given that distance education - and e-learning - have expanded so rapidly in the past few years in both public and private education, as well as in the training sectors, the program educates the multitude of new managers and future leaders necessary in this field. These managers need to be qualified as leaders, since they will be required to be active advocates for distance education and training in their organizations and need to manage significant change processes that affect the entire organization" (Bernath & Rubin 2003, p. 20).

The online MDE has proven its competitiveness in the international educational market. The co-operation of the partnering institutions is managed efficiently: the program is self-supporting and fully established in an online teaching and learning environment. It attracts distinguished experts from four continents as adjunct faculty and visiting experts. Standardized course evaluations and additional surveys are administered to analyze the MDE students' learning experiences. Preliminary results from surveys on MDE students' satisfaction with the program, its courses and the faculty can be presented.

## 2. The MDE Students

More than 500 students from 12 different countries joined the MDE community within its first three years. A total of approximately 1,500 course enrollments in 18 courses occurred between Spring 2000 and Summer 2002. The first certificates were awarded in April 2001 and the first Master graduates completed the program in December 2001. As of Spring 2003 there are 20 Master graduates and 117 Certificate recipients.

The students come from a very diverse set of backgrounds and almost all of them are presently working (usually full-time). Their present employment includes higher education, corporations (often in a training capacity), government and non-profit organizations (again, often in a training capacity), and military, with a small minority from the K-12 education sector. This range corresponds very closely with the proposed target populations at which the program was originally aimed.

Data gathered from a questionnaire indicate that students learn about the program from a number of sources. However two appear to be the most common: by searching the internet and from a present student.

## 3. Student Intentions

Immediately after the start of the entry *Foundations of Distance Education* course (OMDE 601) students are asked in a questionnaire: "Do you plan to participate in the MDE program towards graduation with a Masters degree?" in order to express their initial intentions. The results of all questionnaires show that 73 % of the beginners in the MDE program aim at a Master's degree, 16 % at a certificate, and 11 % are undecided.

The same questionnaire is presented again at the end of the *Foundations* course in order to see if the experiences in their first course cause a change in the students' plans. The comparison of results from each semester shows that there is little change with respect to the overall goals towards formal qualification. There is a significant change however in the time frame in which to reach the goals. Fewer students plan to finish their program within only two years. There is a shift from a two and three years plan to one of four years. This longer term planning may also have some impact on the mild shift from pursuing a MDE degree to aiming for a certificate.

#### 4. Student Satisfaction

MDE students' satisfaction is seriously taken into regard. Students are regularly asked to evaluate the courses, the faculty, the appropriateness of technologies, and the support services provided by the institution (Bernath and Rubin 2003, p. 32ff.). Results in terms of student satisfaction help to analyze the achievement of course objectives, skills, knowledge or competencies. Such results can also be seen as an expression of a general sense of customer satisfaction, which is key in continuing learning (cf. Sloan-C 2002). The MDE program directors make also use of the measures as an instrument for continuous program improvement.

##### 4.1 The Course Evaluation of the entry OMDE 601 course

Since the MDE program's initial implementation in Spring 2000 formal student feedback has been received for every course offered – a total of 50 course sections (as of Summer 2002). UMUC's formal evaluation process is used in all of its courses. Students rate their experiences on a five-point Lickert scale from 1=strongly disagree to 5=strongly agree. The evaluation takes place before the end of the courses. The data are based on:

- 7 items on "Quality of Instruction" (the instructor was well prepared; the instructor stimulated my interest; the instructor was accessible to me...);
- 13 items on "Quality of Course Design and Content" (the course was intellectually challenging; course objectives were clearly stated in the syllabus; the course encouraged me to develop a more global or intercultural perspective; the course enabled me to improve my critical thinking skills; the course encouraged student-to-student interaction...);
- 7 items on "Overall Satisfaction" (I would recommend this course to other students; I would recommend this faculty member to other students; my personal goals were met by the course; my professional goals were met by the course...); and
- 3 items on "Impact of Technology for Online and Web-enhanced Courses".

The weighted average mean of all 50 MDE course sections taught from Spring 2000 through Summer 2002 with a total of 1,123 participating students in the evaluation is 3.92. *The Foundations of Distance Education* course received a weighted average mean of 4.17 for the overall rating from 353 participating students in 16 sections.

Worth mentioning is the fact that the *Foundations* course sections are taught by different faculty teams composed by a lead faculty (Beaudoin, Bernath, Hülsmann) and visiting experts (Holmberg, Moore, Peters). The maximum number of students enrolled in one section was 36 and the minimum was 16. Most sections reached their capacity limit of 28.

The strength of UMUC's standardized online course evaluation is the large number of participating students and thus a kind of benchmarking for all courses and programs. The shortcomings of this evaluation tool are however, that they do not relate to course particularities, such as:

- a) OMDE 601 is the course of the MDE program that is strongly recommended to be taken first and lays the foundations for the program by emphasizing history, principles, theory, and institutions of distance education. This course sets the tone and standard for the program. Some students expect applicable content for their current needs, skills, and/or professional goals. It is difficult to lay foundations for a longer lasting degree program and at the same time fulfill students' short term skill or explicit professional expectations.

- b) The Foundations course, like others in the MDE program, integrates visiting experts, who are usually the authors of the required readings. In addition some sections integrate senior students while others were taught by a team of faculty. These different situations and contexts cannot be evaluated appropriately. The standardized evaluation only reflects a standard situation: one faculty and her or his students.
- c) OMDE 601 is a paced course, which allows group discussions, group work, and social learning processes. Some students who register for this course are not fully aware of the course structure and the time commitment. They may expect an independent study format and encounter conflicts with the course, the instructor and themselves.
- d) OMDE 601 is a course that emphasizes the asynchronous seminar discussions in the virtual classroom, which is an unusual setting and approach to learning for some program beginners.

Despite such a range of possibilities that could have negative influences on the rating the *Foundations* course reaches a high range of ratings between 4.02 and 4.55 and a weighted average mean of 4.17 on the five-point Lickert scale.

These results can be related to a comprehensive study by Carswell & Fleming (2003) of all of UMUC's course evaluation data with over 19,000 individual data records and of which the MDE students' data are only a small part gathered from Spring 2000 through Spring 2001. According to this study the students' level of satisfaction with the course and the instructor seems to be predictable by the following "dependent variables":

- The faculty member appeared well organized
- The faculty member stimulated my interest in the subject
- The faculty member provided support and guidance to students
- The workload was reasonable for the type of course and the number of credits
- The syllabus provided a useful framework for planning my study
- The information I received from this course was relevant to my career or personal goals

The study resulted in a remarkable general observation: "...faculty members have to work especially hard in online courses to enhance their presence in the eyes of their students".

#### ***4.2 The 100-Points Questionnaire***

In order to get more course specific feedback from the students a second questionnaire in addition to the standardized course evaluation was administered. The questionnaire's intention was to identify those course elements that contributed most to the students' learning experience. A total of 100 points were allotted to be distributed among the following elements:

- The required reading
- Additional recommend reading
- Recommended URL's
- The course management of the seminar leader(s)
- Communication with the seminar leader(s)
- Communication with the visiting expert(s)
- Communication with fellow students
- Witnessing the written interactions. (Reading, but not responding)
- Participating in study group work
- The Foundations Café
- The assignments
- The learning environment WebTycho
- Other
- An open question with unlimited space "Which are the main critical aspects of the course you would like to comment on" was added.

In the case of team-teaching communication with each of the two teachers became a distinct element of the respective questionnaire. Visiting experts were also named individually. Consequently, the numbers of items in each questionnaire ranged between 12 and 15 for which the total of 100 points was to be distributed. Students were asked to complete the questionnaire during the last week of each course.

As previously mentioned, UMUC's official course evaluation of the *Foundations of Distance Education* course resulted in overall positive ratings. The vast majority of the participating students encountered a successful learning experience in this MDE beginner's course. In the so-called 100-points questionnaire the same students were asked to weigh the course elements that most contributed to their success.

Table 1: Mean results of each item in the 100-points questionnaire in the Foundations of Distance Education courses from selected courses Spring 2000 through Summer 2002.

*("To which extent did the following elements contribute to your personal success in the Foundations course? You have 100 points to be distributed among the various elements. Please give each element the amount of points (a portion of the total of 100) you regard as appropriate. Please don't exceed a total of 100 points.")*

	Sp 00 N=28	Su 00 N=27	Fa 00 N=18	Su 01 N=23	Su02 N=16	Overall range min-max	Standard deviation min-max
The required reading	15.43	17.04	19.11	22.57	22.56	0 - 75	7.2 - 17.6
Additional recommended reading	5.11	4.48	3.44	3.70	4.44	0 - 20	3.4 - 5.1
Recommended URL's	3.93	1.96	2.78	1.39	4.00	0 - 20	2.1 - 4.8
The management of the course process by the seminar leader(s)	8.54	10.84	8.11	12.22	8.94	0 - 50	4.5 - 10.1
Communicating with the seminar leader (s)	14.32	11.68	8.61	8.74	13.56	0 - 30	3.2 - 7.1
Communicating with visiting expert(s)	11.47	13.76	13.78	18.92	15.44	0 - 30	3.2 - 7.5
Communicating with fellow students	6.54	4.80	7.56	7.30	5.06	0 - 65	3.9 - 13.0
Witnessing the written interactions (Reading but not responding)	7.57	9.12	7.06	5.30	6.00	0 - 35	3.6 - 7.0
Participating in study group work	5.43	4.64	7.28	2.52	2.13	0 - 20	2.3 - 5.5
The Foundations Café	2.57	1.64	3.00	1.00	1.44	0 - 15	1.9 - 3.3
The assignments	14.32	12.52	13.61	13.35	11.56	0 - 40	8.5 - 10.4
The learning environment WebTycho	3.89	7.32	5.39	2.87	4.75	0 - 35	3.7 - 9.1
Other	0.89	0.20	0.28	0.13	0.13	0 - 7	0.5 - 2.2
Total	100.0	100.0	100.0	100.0	100.0		
<b>Comparison with rating "overall course"</b>	<b>4.34</b>	<b>4.34</b>	<b>4.05</b>	<b>4.29</b>	<b>4.03</b>		

We can now see in Table 1 that the required readings received the highest weight with an average of 15 to 23 points out of 100, followed by communication with the visiting experts (11 – 19 points), the assignment tasks (12 – 14 points), and communication with the seminar leader(s) (9 – 14 points). Elements, which can be considered to be the main pedagogical resources for classroom-based graduate courses appear to be similarly important constituents in the online learning environment.

The students of all above mentioned *Foundations* courses stated that the online course-specific element "management of the course process by the seminar leader(s)" (with an average of 8 – 12 points out of 100) was another important resource that contributed to their successful learning experience. One must recognize that students may not differentiate between the seminar leaders' instruction as part of the course management item and the communication item, which is a spontaneous element closely related to the interaction process taking place in each individual section and course. It therefore makes sense to compile both items. Then, the seminar leaders' contributions would receive an average of 17 – 23 points out of a total of 100 points.

An online course that makes every effort to intensify interaction between teacher and students and is particularly supported by the integration of visiting experts creates a situation in which "witnessing the written interaction" (Fritsch 1997) becomes another important element of the online learning experience (5 – 9 points in average).

The findings show similarities over a series of courses. They allow for some generalizations regarding the importance with which students weigh the contributing elements to their successful learning experiences. As already mentioned, these courses were taught by different faculty teams but based on common syllabus and with similar content and approaches. Despite changing teams the mean results for each evaluated element were similar. Differences could be related to changing teams or be a result of course dynamics caused by spontaneous communication processes between the students and their teachers and the students with each other. That is a general impression.

Table 2: Raw data of 28 students who rated 15 elements (E1 – E15) in the 100-Points Questionnaire

E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12	E13	E14	E15
20	10	10	10	5	5	5	5	0	0	10	0	20	0	0
20	5	3	10	5	5	5	5	5	5	10	5	15	2	0
25	5	1	5	5	5	5	5	0	25	4	0	15	0	0
20	2	2	10	5	5	15	15	5	5	4	2	5	5	0
20	2	2	20	5	5	10	10	5	5	2	2	6	6	0
18	1	5	1	1	1	1	1	13	10	13	1	18	16	0
10	6	7	12	7	6	8	8	6	7	2	4	10	7	0
6	6	6	3	4	4	4	4	6	4	20	1	30	1	1
10	5	5	20	5	5	10	10	5	5	0	0	15	5	0
10	5	0	10	10	10	10	10	5	5	10	5	5	5	0
25	7	0	5	2	2	5	5	1	6	0	15	10	10	7
15	5	5	5	15	5	5	5	10	10	10	0	10	0	0
10	10	10	10	5	5	5	5	10	10	5	0	10	5	0
10	0	0	0	5	5	10	10	5	5	5	0	40	5	0
40	10	5	5	0	0	5	5	5	10	0	0	15	0	0
20	5	5	5	5	5	5	5	15	10	0	0	15	5	0
13	3	3	7	5	5	7	7	7	7	10	2	14	10	0
15	0	0	20	0	0	3	3	3	6	3	3	35	3	6
20	5	5	10	8	12	2	2	4	4	3	5	20	0	0
10	6	3	10	10	10	10	10	6	7	2	3	10	3	0
10	0	5	15	5	5	10	10	15	5	5	5	10	0	0
10	4	6	6	6	7	6	6	5	6	10	7	10	5	6
10	2	5	15	8	8	8	8	8	10	4	2	8	4	0
10	10	2	3	10	10	10	10	10	10	10	3	2	0	0
20	0	0	0	10	10	10	10	10	5	3	0	20	2	0
15	15	1	4	10	10	10	10	2	15	0	2	3	3	0
10	7	6	8	10	5	7	8	9	10	0	5	10	5	0
10	7	8	10	0	0	9	9	8	5	7	0	20	2	5

If we now look into each individual's preferences and ratings not many students are similar in their judgements. The range of ratings, as already shown in the Table 1, is extreme. These results are underpinned by the extremely high standard deviations. Table 2 shows the raw data of 28 students in one course who rated 15 elements (E1 – E15) and illustrates the differences between the students and their ratings of the various elements. The heterogeneity of the micro data can be found in all courses and in all cases where the 100-points questionnaire was administered.

Obviously each individual student constructs his or her own learning process and despite the extreme differences most students achieve a successful learning experience in this course. The heterogeneous structure of these results may reflect the different personalities of our students as well as their different learning styles. However, it clearly demonstrates the different preferences for learning resources, which support their seemingly different learning processes.

The findings suggest that highly individualized learning processes result in overall student satisfaction in the *Foundations of Distance Education* course. Similar results were found in other courses, in which the 100-points questionnaires were also administered.

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# E-LEARNING TOOLS IN HIGHER EDUCATION: USERS' OPINIONS

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## **Introduction**

The introduction of e-learning techniques in traditional courses dates back, at Bologna University, to the Academic Year 1995/96. The goals of these experiments concerned the preservation of high qualitative levels introducing also quality indices, the increase of the effectiveness of single teaching activities, the increase of the productivity of the whole teaching staff and the promotion of transparency. The attributes requested to the environments introduced as support for traditional courses were: bidirectionality, easy and intuitive use, diffusion, low cost, possibility of use in the whole access basin of courses and multimediality.

Some of the functionalities that have been implemented concern the distribution of general and specific information on courses like contents, purpose, educational goals, structure and suggested books, information on the teacher, on its educational and research experiences, current research areas, reception schedules, the distribution of specific educational materials like notes, software, problems, questions and the information on exam sessions (planned dates, sites, texts, evaluations given in previous sessions etc.). Other more relevant functionalities concern the submission to the teacher of questions on specific arguments that will receive public replies, the access to self-evaluation tests based on artificial intelligence tools, the insertion/deletion in exam lists and the booking of colloquia with the teacher.

## **1. Architecture of the sites**

The functionalities implemented in the sites introduced as support tools to the target courses are contained in the following five logical areas.

### ***Information on the course***

This area has been used to provide complete and updated information on the contents of the course, its structure, goals, available tools and evaluation criteria. The relevant links of this area concern: program, educational goals, tools, structure and exams. Inside this area it is possible to download many materials previously distributed by means of traditional media; among them *errata* of textbooks, notes on some topics, software, manuals and copies of recent exam exercises. The exams link allows also to check the results of the last exam session; this includes the replies given to multiple-response questions by single students.

### ***Information on the teacher***

The information contained in this area is not strictly necessary in the context of the course and could have been limited to the reception time schedule. It has been preferred, however, to test a wider picture including a complete curriculum, a description of research activities and a list of publications.

### ***Interaction between teacher and students***

This area is the pivot of the whole experiment since it introduces some peculiar potentialities. The links contained here concern: questions to the teacher, exam booking, self-evaluation and questions and replies. The first link activates a direct channel to reach the teacher also when he is not physically inside the campus area. This channel allows collecting all questions arising during the interaction of the students with the material described in the lectures. The purpose of self-evaluation tests is to allow a pre-exam assessment of the level of proficiency acquired by the students and to point out the integrations required, if any. Selected questions of general interest have finally been used to set up a FAQ section that takes advantage also of some links to Internet resources.



### Information on master theses

This area gives information on the criteria followed in assigning graduation theses, on the themes of current theses and on those still available. The links concern general criteria, the theses in progress and those to be assigned.

### Information of more general interest

The last area (goodies) is a container for information whose interest goes beyond the course horizon and that spaces from maps of the city to links, images, videoclips etc. It is worth noting the presence of a very complete set of links concerning the specific area of the course.

The site contains also other services that fall outside previous areas, like a *Forum* opened to all or a working area dedicated to Cooperative Learning.

The impact of this experiment, the first at the University of Bologna and, as it turned out at the Meeting of European Professors of Automatic Control (EPAC'96) (Guidorzi, 1996a), probably the first of this kind in Europe, at least in the area of System and Control Theory, has been evaluated by means of anonymous questionnaires. The first results obtained in 1966, reported in Guidorzi (1996b, 1996c) and directly accessible at the address <http://sting.deis.unibo.it/tds/>, evidenced an high appreciation for the initiative. This paper describes some results of the more extensive investigation performed in the subsequent years. Only some basic results are reported here because of space limitations; a more complete set can be found at the address <http://www.elearning.unibo.it/>; a more detailed description of the design philosophy of the sites can be found in Guidorzi (1997).

## 2. Users' evaluation

The first evaluation, reported in Figure 1, concerns the completeness of the contents of the course area. The large majority of students consider a positive or very positive evaluation while 18% would appreciate more extended contents; of course one of the limits to the insertion of more materials is the existence of printed textbooks subject to copyright. A similar and even more positive picture can be observed in Figure 2 that shows an high appreciation (80,5%) for the usefulness of the course site.

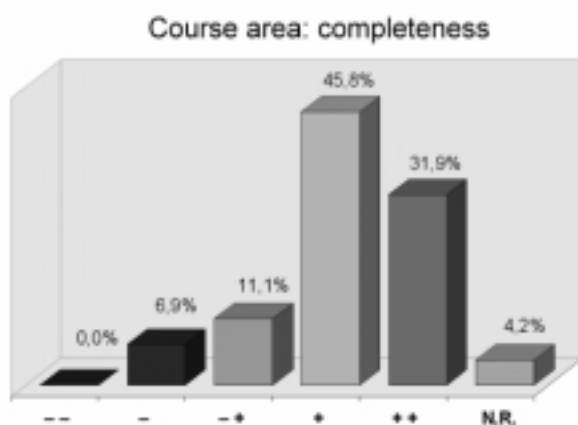


Figure 1

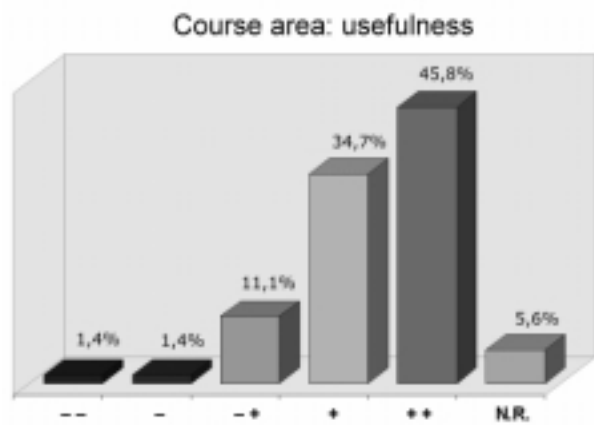


Figure 2

Figure 3 shows that the information on the teacher is considered as very complete (nobody suggests extensions). It is surprising to observe, in Figure 4, that only 18,1% of the students consider this information as useless since the information on the teacher has, in fact, a very marginal impact on the learning path defined by the course.

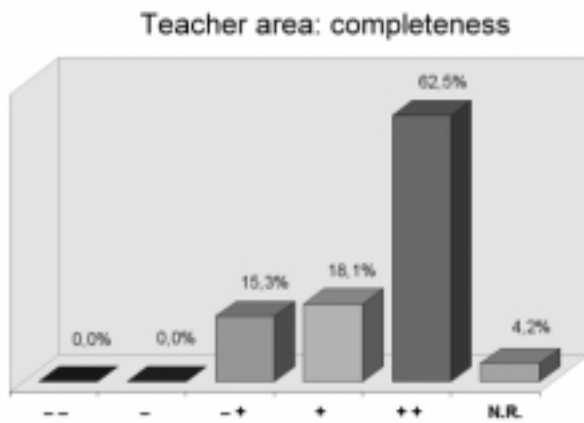


Figure 3

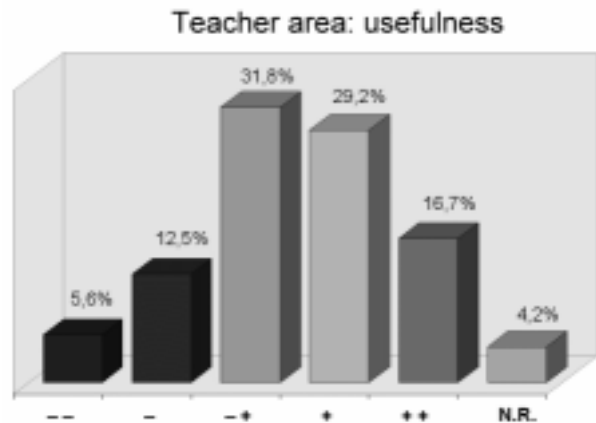


Figure 4

The information concerning textbooks has various characteristics and extensions in different courses since it must take into account the existence of printed texts and copyright issues. The evaluation reported here makes reference to a course (System Theory) already endowed with officially adopted textbooks so that the additional information available on the server was more limited than in other cases. It reported all *Errata Corrige* of the books, a list of their contents and some additional free texts on topics not covered by the official textbooks. Despite these limits a large majority of users appreciates the completeness and usefulness of this area (Figures 5 and 6).

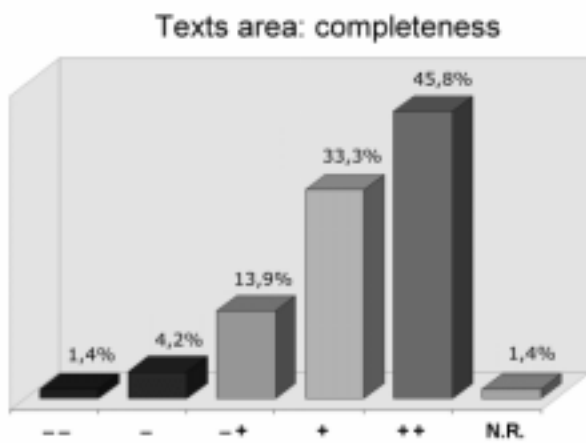


Figure 5

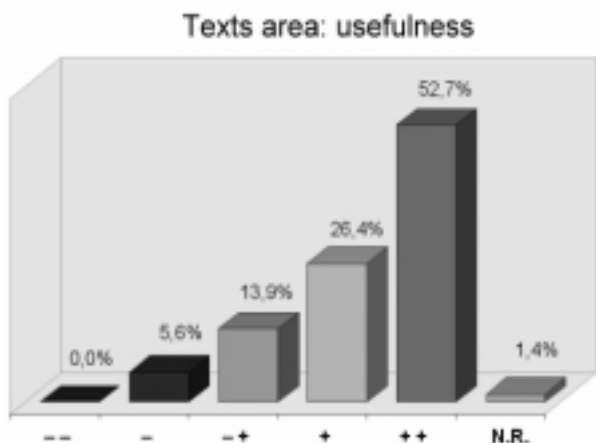


Figure 6

It is not surprising to find that the information on the exams as well as the associated services obtain the highest score (Figures 7 and 8). Part of this appreciation is due, as obvious, to the practical usefulness

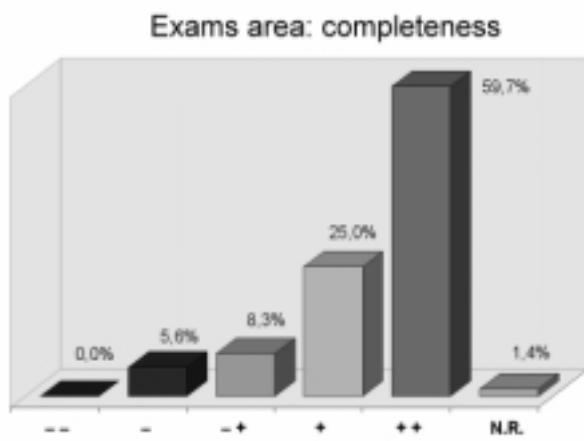


Figure 7

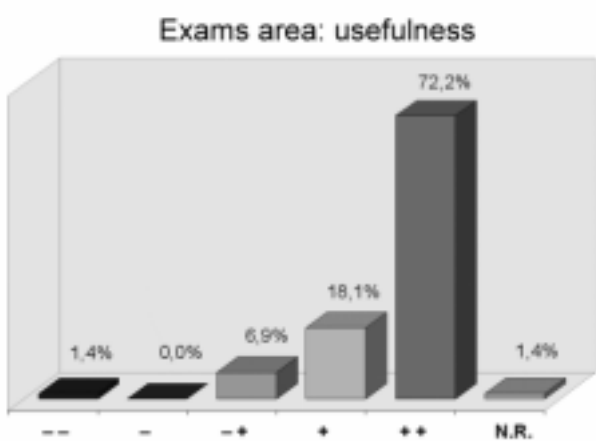


Figure 8

of some information like, for instance, that concerning the availability of the texts of problems assigned in previous sessions. A more detailed analysis shows, however, an equal degree of appreciation for auxiliary services like the availability of corrections and results on the server a few hours after the end of written tests.

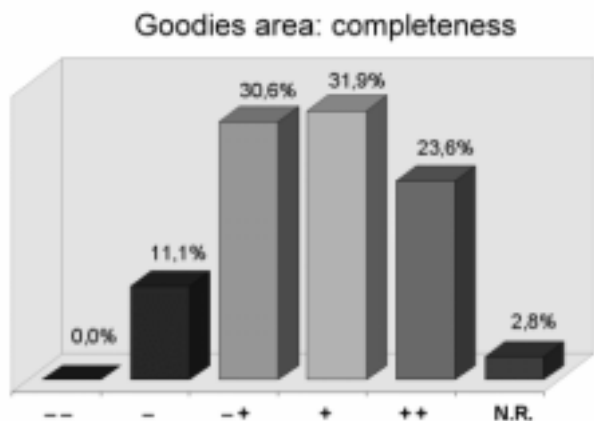


Figure 9

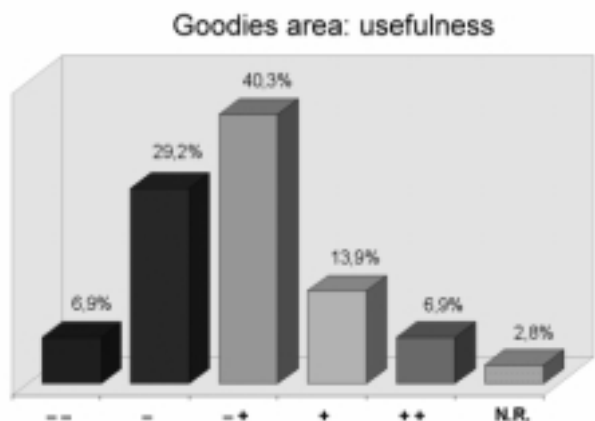


Figure 10

The area concerning the goodies is considered by most students as very complete but only 20,8% evaluate it as particularly useful in the overall course economy. This evaluation is certainly correct (or even optimistic) if referred to the direct impact of complementary contents (pictures and other documents concerning important events at Bologna University, maps of the city etc.) but underestimates the importance of the large collection of links to sites containing information on researches in the area of the course or on courses in the same or related areas.

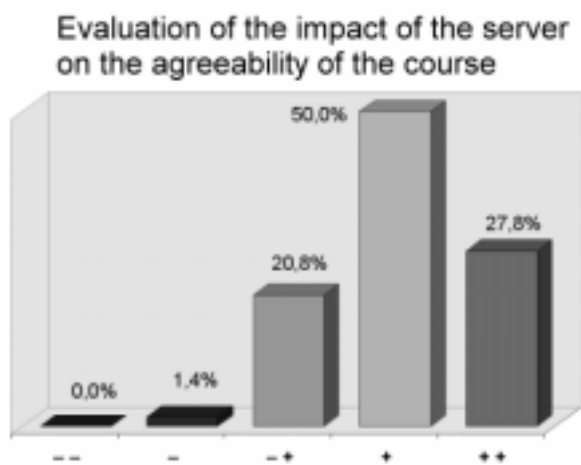


Figure 11

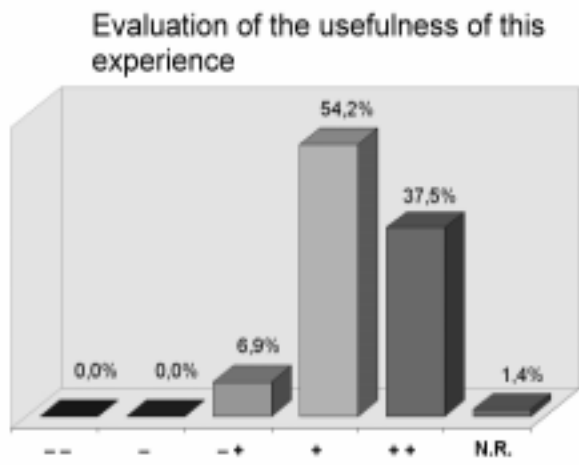


Figure 12

Figure 11 reports the opinions of the students on the impact of the course site on the agreeability of the course; 77,8% of all students evaluates as high (50%) or very high (27,8%) the increase in the course agreeability due to the use of the site. An even more positive picture emerges from Figure 12 that shows that 54,2% of the students evaluate as useful the experience associated with the use of the server and 37,5% as very useful.

These results are confirmed by the opinions on the global impact of the server on the effectiveness of the course are reported in Figure 13. It is very interesting to observe that nobody considers the services offered by the course site as useless or less preferable to traditional ones; on the contrary, 48,6% of the students evaluate the effectiveness of the course as improved by the site and 38,9% express a very high appreciation for the improvement in the course effectiveness due to the introduction of the site.

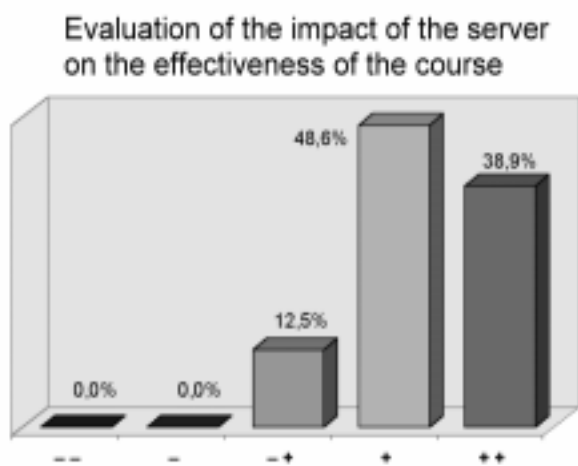


Figure 13

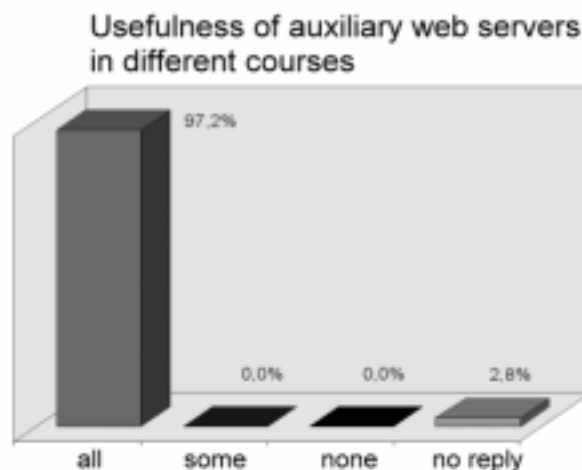


Figure 14

This very positive evaluation is confirmed by the replies reported in Figure 14 where 100% of the students that have replied (2,8% have not inserted this reply) see with favor the use of web sites as auxiliary tools in all courses.

The evaluations reported in Figures 11-14 are finally confirmed by Figure 15 that shows the high or very high interest in this experience expressed by 90,3% of the users; the number of connections to the site is finally reported in Figure 16.

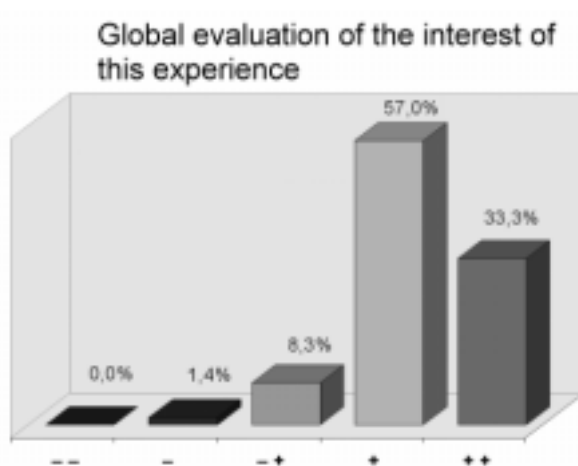


Figure 15

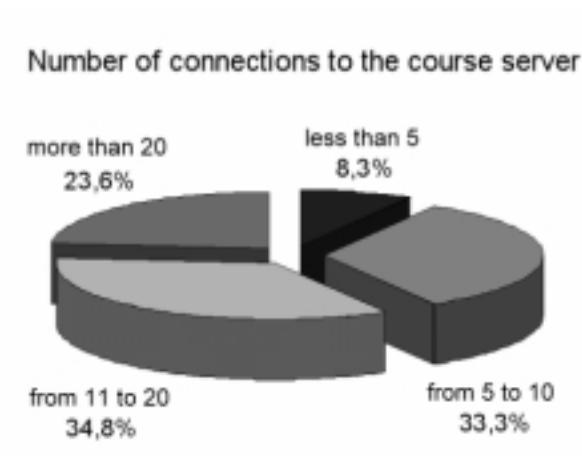


Figure 16

### 3. Concluding remarks

The route towards a new higher education system taking advantage of the possibilities offered by the use of digital technologies will be long and, at present, only the first steps in that direction have found a practical implementation. A limit often present concerns the tendency to mime existing environments by means of new tools instead of exploiting their intrinsic possibilities. This tendency leads, now like now, to consider as substantially different areas distance learning, ex-cathedra teaching and post-graduate courses; their distance, in a digital word, will be probably less relevant than in the existing one.

It is, of course, almost impossible to devise, today, a picture of the future system; it is only possible to establish that it will require a deep restructuring of many environments. Two aspects that, probably, will play important roles concern, however, confluence and asynchronous interactions. Confluence phenomena, intrinsic to the very nature of digital encoding of information, have already been observed in areas previously based on different technologies like audio recording, video recording and photography; future educational environments will almost certainly integrate distance learning and on-campus learning and be based on a selectable mix of synchronous and asynchronous interactions.

Important design parameters can be derived from the evaluations expressed by the users of the new services inserted into existing environments; the results reported in this paper, constitute, from this point of view, an encouraging and positive indication.

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# REPLACING HUMAN FEEDBACK WITH AN INTERNET-BASED METHODOLOGY FOR THE TRAINING OF SELF-ASSESSMENT SKILLS A RANDOMISED TRIAL

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## **Introduction**

One of the most important skills for independent and lifelong learning is the ability to self-assess one's competence and consequently define individual learning needs [1] [2] [3]. Self-assessment is therefore a crucial part of every distance education process. Rather than a natural gift the ability to assess one's competence and achievements is a skill that can be learned, improved and excelled [4]. However it is evident that not all students have developed this ability to a satisfactory degree [5-7]. Continuous and constructive feedback from supervisors [8,9] is critical for the development of self-assessment ability, however the need of such feedback can tremendously increase the tutors workload in distance learning settings. A remedial support methodology, which could help students improve their self-assessment skills within the respective subject area, without requiring a constant and costly feedback from supervisors would be without doubt a very valuable tool in distance education.

The recent developments in Information Technology and in particular database driven Internet applications appear to be a promising tool the training of certain skills [10]. Under the scope of these findings, a stand-alone computer application designed to encourage students' in depth reflection upon their own competence might be proven a convenient way to support the development of self-assessment skills.

The aim of this study was to investigate the potential of a database driven Internet application (Learning On-Line, "LEO") as a means of remedial support for the development of self-assessment skills among dental students. This randomised control trial took place during the autumn semester 2002 in the department of Periodontology, Centre for Oral Health Sciences, University of Malmo.

## **Materials and method**

### *Sample*

Fifty-two students in their third semester of studies (cohort 2002) were randomised in two groups: LEO group (experimental, n=26) and Non- LEO group (control, n=26). Students were informed about the nature of the study during a two-hour introductory session, where the software used by the two groups was also demonstrated. Participation was not obligatory, but it was stated that the content of the Internet cases would be highly relevant to their final examination. Students went through 4 learning cases in clinical Periodontology during a period of 1 month. A new case was available every Monday. A password-protected portal was designed for all students with general information and links. The case material (text, clinical images, x-rays, reference and hyperlinks) was identical for all students, but the experimental group received the cases through the LEO methodology, while the control group through a static web page.

### *LEO methodology*

LEO (A. Nattestad, R. Attström, <http://tmk.odont.ku.dk/leo>) is a database-driven, Internet-based application, aiming to promote students' self-assessment skills and reflection upon own competence. The programme is developed in Php script (<http://www.php.net/>) and mySQL (<http://www.mysql.com/>) database and it runs on an Apache (<http://www.apache.org/>) server. All software and scripts used for the development and function of Leo are freeware and available without any cost on the Internet.

A typical LEO session starts with a case, a question or a clinical problem, usually accompanied by images or relevant data. The student is requested to respond to the question in essay format. Upon submitting his/her response, a database provides instantly an “expert’s” response, which represents the way an expert would respond to the same question. The level and language of the expert’s response is adjusted to the student’s or user’s level of competence and knowledge. The “expert’s” answer constitutes a “primary”, automated feedback.

After receiving the expert’s response, the student has to write a comparison between his/her own answer and this of the expert. This comparison should identify all possible differences in content, structure, form, prioritising etc and attempt to explain the rationale behind these differences. Finally the student must define possible individual learning needs deriving from the observed differences.

Upon completion of this stage, the teacher in charge receives through e-mail student’s initial response and comparison with the expert. Within a week’s time the teacher replies to the student with a detailed commentary on the quality of the essay and the comparison. The commentary is especially emphasising teacher’s view on the existing learning needs and the ability of the student to identify them. This commentary constitutes a “secondary”, human feedback and is the most demanding part of the methodology in terms of human resources. For the purpose of this study however, the experimental group did not receive any secondary feedback, as one of the aims was to test the effectiveness of LEO methodology as a stand-alone supplementary application, suitable for Distance Learning environments. In addition, it was considered that secondary feedback would seriously favour the experimental group in comparison to the control. Students of the LEO group were aware that their contributions would be checked, but this stage would have no effect on their final assessment, neither will they receive any feedback.

### ***Non-LEO Methodology***

Identical cases and reference material were available through a static web-page, Non-LEO students were not requested to type in any response or comparison and students were free to use the material in any way they wished. The expert’s answer was available through a hyperlink.

### ***Baseline measurements***

Before the beginning of the study, students’ competence with the use of computers was measured on a scale 1-50, through a specially designed, task-oriented questionnaire. Students’ attitude towards computers in learning was also measured through VAS 1-14. Demographical data and data relevant to the availability and use of computer and Internet were also collected from each student.

### ***Measurements during the study***

Every week students of both groups were administered a questionnaire investigating the way they used the week’s case. Students’ use of the material was recorded through a set of pre-determined options. Students’ attitude towards the software, the learning content and their confidence on how this experience will help them in the final exams was measured through a VAS 1-16 and free text fields. Attitudes after completion of the first case and again after completion of the whole study were statistically compared by means of unpaired t-test.

Students were asked to personally log the amount of time they spent working on each case through a special function in the web portal. The time logged automatically by the server was not taken in consideration, as many students spent most time working off-line preparing their answers, or studying reference material.

### ***Interactive Examination***

One week after the completion of the fourth case, all students were assessed through the Interactive Examination [11]. The Interactive examination is an assessment methodology which combines self-assessment, a written essay question and a group discussion. In the end of the examination students received an expert’s response to the essay question. As a final task students had to prepare a written comparison between their answer and the expert’s one within a week

Two independent assessors (Senior, Junior) blindly evaluated all students' examination documents. Students essay answers were graded in a scale 1-6 (1 poor – 6 excellent) based on criteria related to the clarity of the content and the degree of covering the learning objectives. Students' comparison documents were graded on a scale 1-9 based on the criteria described on table 1. The degree of agreement between the two assessors was statistically tested with weighted Cohen's Kappa, while the symmetry of grades distribution with a generalised McNemar test.

The Senior assessor also evaluated students performance in the oral discussion on a scale 1-6 (1 poor – 6 excellent). One month after the examination students received individual feedback on their performance and their learning needs, but the grades were not disclosed and were only available for research purposes. The grades for the whole cohort 2002 were compared with those of the cohort 2001 with a Mann-Whitney U test, as the methodology and the assessors were the same.

Evaluation of final attitudes towards the software and the whole experience was done through a questionnaire which combined ordinal scales, VAS and free text fields.

### ***Experimental hypothesis***

It was hypothesised that the LEO group will demonstrate higher level of self-assessment skills than the non-LEO group, as these skills are measured through the Interactive Examination Methodology.

## **Results**

During the course of the semester two students dropped out. In addition, two students from the experimental group did not use the software and were excluded from the study. All students in the control group used the cases. The presented results originate from 48 students (LEO n=24, Non-LEO n=24).

### ***Baseline***

In a scale 1-50, the average computer competence of the students was 18,1 (SD 8,6). No significant difference was found between experimental and control group, however male students (score 22,3-SD 10,2) were significantly ( $p=0,006$ ) more competent than their female colleagues (score 14,1-SD 4,7). There was no significant gender difference in the attitude towards computers.

### ***During the study***

Four sets of questionnaires (one after each case) were collected, amounting in total to 82 questionnaires for LEO group (85,4% response rate) and 84 for the non-LEO group (87,5% response rate). The use of the software as described by students is presented in table 2. Significant shifts were observed in some of the attitudes towards the software during the 4 weeks period, as measured by the VAS (table 3). Each student of the LEO group spent an average of 215 min (SD 131) for all four cases, while the same average for non-LEO group was 122 min (SD 66).

### ***Interactive Examination***

Grades for the written essays and the comparison documents from both the Junior and the Senior assessor revealed no significant difference between LEO and non-LEO group. The same was true for students' performance in the oral part of the examination. There was a moderate [12] agreement between two assessors' grades on the written essays (weighted  $K=0,5$  –  $p<0,001$ ) and the comparison documents (weighted  $K=0,5$  –  $p<0,001$ ). McNemar test revealed significant deviation in distribution symmetry ( $p=0,001$ ) of grades between the two assessors in the written essay, but not in the students' comparison document. It was observed that the average written essay grades for the current cohort of students were significantly higher than these of the previous year, although the assessor, the content and the methodology of examination were identical.



On the contrary, the total time spent on the cases was strongly correlated with many performance parameters of the Interactive Examination for both LEO and non-LEO groups. In particular, total time was correlated with both written essay ( $p=0,01$ ) and comparison document ( $p=0,01$ ) grades of the Junior assessor, as well as with the written essay grades of the Senior assessor ( $p=0,04$ ).

In addition a strong correlation was found between baseline score in computer competence and written essay ( $p=0,02$ ) and comparison document ( $p=0,02$ ) grades of the Junior assessor, as well as with the written essay scores of the Senior assessor ( $p=0,04$ ).

Judging from their free text comments, students received the Internet support very favourably, however especially during the last two weeks there was an increasing number of comments within the LEO group complaining about increased workload and lack of time. Students judged the first two cases as “relatively easy” and “good repetition of already known facts”. The last two cases were repeatedly characterised as “challenging”.

## **Discussion**

There was only a moderate agreement between the two assessors' grades, despite the calibration efforts and the explicit criteria. It is doubtful whether a higher degree of agreement can be achieved, given the nature of the judgement that is expected. The element of subjectivity appears inevitable, when it comes to assessing complicated cognitive skills such as problem solving or self-assessment ability and therefore the use of multiple assessors is recommended [13]. It is worth noticing however, that assessors judgement presented higher symmetry in the comparison document than in the written essay, which indicates that assessment of such comparison documents can be at least as reliable as traditional written essay exams.

Despite the moderate agreement, both assessors found no significant difference between the two groups regarding their self-assessment skills. Stand-alone computer applications have been reported successful in improving student competence in areas such as knowledge comprehension, clinical skills [14], communication skills [15] etc. In such applications, the software was able to provide constructive feedback pointing out the actual mistakes made. However, when it comes to complicated cognitive procedures (critical thinking, problem solving, self assessment) computer generated feedback does not point out actual weaknesses, but rather provides a flexible example or standard, in expectation that the subsequent student's reflection will result in improvement of the skill in question. Such an assumption is encouraged by recent theories in cognitive science [16,17], but research in this area is still at a very early stage. It could be reasonable to assume that improvement is possible without supervisor/peer's feedback through simply reflection, once a satisfactory level of self-assessment skill is possessed. However if this is not the case, the danger exists that wrong perceptions will be carried out until they are corrected by human constructive feedback. If this assumption is valid, then stand alone applications could be effective for those who already possess sufficient self-assessment skills, but would not help those weaker, who are actually in real need of remedial support.

It is not surprising to see that time spent on task was correlated to the exam performance, as research has pointed out time as a significant factor towards development of expertise [18]. However, it is interesting that time on task appeared connected also with the self-assessment skills, at least for one of the two assessors. The variation between individuals regarding time was extreme, not only between the groups but also within each group. Interpretation of such results is not easy and it's very unclear whether such findings indicate cause-effect relations, or appear due to confounding factors. For example, more motivated and knowledgeable students who would have a better performance in the exams, are also likely to devote more time on the Internet than the ones less interested in the subject. The correlation between computer competence and performance might be well attributed to similar dependence on confounding factors.

Students' attitude towards the Internet cases was in general positive, as well as their perceived benefits from its use. It was evident that the expected benefits especially in relation to their examinations kept their motivation high throughout the study. Weekly measurements reflected much of their perception of

the whole experience. Probably due to their awareness of the study design, the LEO group appeared initially more positive (table 5, nr.1) and more confident about the effectiveness (table 5, nr.2) of the software they used. Confidence remained higher among the LEO group till the end of the study. However, the attitude towards the software didn't change within LEO group, while there was a progressive, significant improvement within the non-LEO group. This could be attributed partly to an expiring "novelty effect" within the LEO group and partly to the increasing feeling of "too much workload", as it emerged through their free text comments. Complains about increased workload coming at a later stage of the study from the side of LEO students, might have pushed non-LEO students to feel more convenient with their less demanding application. However, as distance learning students appear to have different level of motivation than in-classroom ones, attitudes observed during this study might differ in original distance Learning settings. The use of the references was lower than expected. Most common students' arguments for not checking the references were that they knew sufficiently enough to answer the respective questions or that they were already aware of the reference provided. Also, as some of the references remained the same for more than one case, their use is somehow underrepresented by provided figures. It was observed that the non-LEO group made more use of the references, but this could be attributed to more time available for them, as they didn't have to formulate and type any answer.

The current attitude observations indicate that for such applications to be successfully accepted by the students, two factors are critical: First students must have a clear perception of the benefits deriving from the use of the software and second the applications should be integrated in the course replacing some of the existing workload and not on top of students sometimes already overloaded programme.

Promising developments within the fields of cognitive science, artificial intelligence, neuronal and semantic networks might soon provide us with "intelligent" computer-based tools, which will eventually manage to simulate supervisor's feedback in cognitive fields such as self-assessment skills, problem solving ability and critical thinking. However, at the basis of the present findings it can be argued that stand-alone applications are not currently able to replace constructive human feedback and constitute an effective, short term, remedial support for the improvement of self-assessment skills of students.

## Acknowledgements

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Table 1. Criteria for grading students' comparison documents on a scale from 3 to 9 points.

<b>Evaluation</b>	<b>Excellent (3 pts)</b>	<b>Acceptable (2 pts)</b>	<b>Not acceptable (1 pt)</b>
<b>Comparison of content</b>	the student has identified most/all the important differences	The student has identified half of the major differences	The student has only identified very few or irrelevant differences
<b>analysis explanation of the differences</b>	The student is able to analyze/attribute differences	The student can only partly analyze/attribute differences	The student does not attempt to analyze the differences.
<b>defining learning objectives</b>	The student reaches the learning objectives deriving from the analysis of differences	The student provides learning objectives only partly relevant to his analysis of differences	The student does not reach learning objectives, or they are irrelevant to his analysis of differences

Table 2. Use of the respective software (LEO – non-LEO) as described by students after each case. Total of 166 questionnaires after 4 cases.

<b>LEO Group</b>		
	<b>n</b>	<b>%</b>
I did not check the case	5	6
I read through the case	11	13
I checked some of the references	8	10
I checked all the references	16	19
I tried to answer simply to get the expert's response	12	15
I tried to answer as I could best	<b>51</b>	<b>62</b>
I printed out everything and saved it for the exams.	<b>44</b>	<b>54</b>
<b>non LEO group</b>		
I did not check the case	5	6
I read through the case and the answer	<b>79</b>	<b>94</b>
I checked all the references	15	18
I checked some of the references	20	22
I tried to answer in writing before I checked the expert's answer	6	7
I tried to answer without writing before I checked the expert's answer	8	10
I compared my answer with the expert's in writing	1	1
I just compared my answer with the expert's without writing	9	10
I printed out everything and saved it for the exams.	<b>70</b>	<b>83</b>

Table 3. Comparison of student attitudes towards the software used after the first case and again after completion of the study as measured on a VAS 1-16.

<b>1. What do you think of the Internet application you used?</b>			
	<b>LEO group</b>	<b>Non-LEO group</b>	<b>difference</b>
Mean after case 1	10,15	8,3	p>0,05
Mean after case 4	10,5	10,8	p>0,05
difference	p>0,05	<b>p = 0,0148</b>	
<b>2. How much do you think that the software you used will help you at the exams?</b>			
	<b>LEO group</b>	<b>Non-LEO group</b>	<b>difference</b>
Mean after case 1	11,2	8,8	<b>p = 0,0091</b>
Mean after case 4	10,9	9,9	p>0,05
difference	p>0,05	p>0,05	
<b>3. How much have you learned through the Internet cases?</b>			
	<b>LEO group</b>	<b>Non-LEO group</b>	<b>difference</b>
Mean after case 1	6,7	5,43	p>0,05
Mean after case 4	10	9,434783	p>0,05
difference	<b>p = 0,0032</b>	<b>p = 0,0004</b>	

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# ASSESSMENT OF WRITING COMPETENCE IN DISTANCE EDUCATION

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## Introduction

Distance education in most of Europe was until recently strongly focused on a knowledge-centered approach even when printed books became e-books (De Volder, 1996). Nowadays we see a growing emphasis on a competence-based approach to distance education. Competence in general refers to the ability to deal with non-routine and abstract work processes, operate in ill-defined and ever-changing environments, understand dynamic systems and work in groups. In competence-based distance education students are expected to solve so-called authentic problems which closely resemble the problems waiting to be solved in the real world. This implies that students must have the ability to coordinate skills, knowledge and attitude in such a way that new problems can be solved or tasks can be handled (Van Merriënboer, 1999). In view of the role writing plays in people's academic, vocational, social, and personal lives, the development of students' ability to write is a main priority of schooling at all levels (Chapman, 1990). In higher education, a core competence for most if not all students is the skill to formulate ideas in written format. Writing is a cognitive higher order skill which consists of various heuristically-based sub-processes such as generating, selecting and organising ideas, translating these ideas into text, and polishing them to produce a clear and attractive text that is appropriate to the purpose and the audience. Successful composing is contingent upon the writer's ability to monitor and manage this complex process in interwoven recursive stages. Writing makes a strong appeal to self-regulation, because writing activities are usually self-scheduled, performed alone, require efforts with a high cognitive load sustained over long periods, and what is composed must be repeatedly revised to fulfil personal or external standards of quality (Zimmerman & Bandura, 1994).

Although writing skill is an undisputed core competence of professionals to be acquired during higher education, the assessment of writing competence has not received as much attention as other forms of assessment such as the multiple-choice test of knowledge or the performance-based test of practical skills. In our view assessment methods for writing competence deserve more attention than presently given, especially in an academic environment where more and more importance is attached to teaching core competences and less to teaching facts to be memorized and recalled. For reasons of readability, the concept of assessment is sometimes referred to as grading, marking, judgment, rating or evaluation. And written products are sometimes referred to as reports, papers, (manu)scripts or writing. Competence is sometimes called a (higher order) skill or ability.

## Reliability and validity of writing competence assessment

The higher-order cognitive skills which are employed during the writing process are reflected in the complexity of the product. Writing products are multidimensional and therefore not easily characterised as correct or incorrect. Instead, judgments on numerous quality criteria are necessary to assess the great diversity within and between writing products. Reports written by students may provide evidence of indistinct and ambiguous problem definitions, deficient corroborations of statements, shortcomings in global coherence, imperfect references, all sorts of formal flaws, and so on. A rater of such a multifaceted product keeps somewhere in mind a set of criteria that are used idiosyncratically to arrive at a judgment of the quality of the written report. There are no universally accepted and used uniform criteria for grading papers, so there is a large latitude for judges' subjectivity. It is therefore not surprising that reliability of report ratings is rather low. Reliability refers to the question how error free (accurate, reproducible, consistent) the assessment is. When in a wine tasting session a wine taster is given the same wine sample again the rating of the taste should be the same or almost the same as his or her previous rating of the same wine. This provides a measure of the intra-rater reliability. With scripts it is unusual to

have the same paper rated twice because a rater would normally recognize the paper and remember his or her previous assessment. However, academics at Lincoln university in New Zealand have accidentally marked the same script twice during a marking 'run' and found a wide discrepancy in the two marks given when the double marks were later discovered (Fleming, 1999).

The inter-rater reliability refers to the agreement between two or more raters of the same manuscript. This inter-rater reliability is typically quite low. Gabb (1980) quoted inter-rater correlations as low as 0.28 and 0.40 and differences as high as 20 percent between two scores of the same academic paper by different raters. There are several systematic 'rater errors' that directly affect the precision (reliability) of the assessment: interpretation effects, halo effects, rater tendencies, contamination effects, sequence effects, and specificity effects. For a discussion of these rater biases, see Murphy and Balzer (1989).

A measurement may be very reliable but at the same time not very valid. The validity question is: Are you measuring what you think you are measuring? The situation where a test is intended to measure higher-order thinking skills but where most items require only recall of facts is a well-known validity concern. A distinction is made between concept, content, concurrent and predictive validity. Concept validity means that the variation in test scores is consistent with the scientific theory about the concept that is measured by the test. For instance expert writers should achieve higher scores on a test for writing competence than novice writers. Content validity refers to the factors or variables that are measured by a test and is sometimes called face validity. For example performance on a writing assignment can be not very good because the writing assignment is not clear and complete. In this case a low grade on the paper is linked more with low assignment quality than with writing competence: thus the writing assessment is not valid. Concurrent validity refers to the correlation between the scores on a particular test and scores on other tests of the same concept administered at about the same time. If one wants to measure general writing competence the scores received on different writing assignments should show high correlations. Predictive validity refers to the correlation with assessments of competency later in life. For example writing grades in undergraduate education can be compared to writing grades in graduate education but also with overall professional functioning in a later career.

Validity and reliability are interdependent. An unreliable assessment cannot be valid. Reliability is a necessary but not sufficient condition for validity, because assessments may be reliable in the sense of being consistent over time, over judges or over cases, but still be off-target, i.e. invalid. If competence tests are found to have low reliability this automatically means they have low reliability leading to great uncertainty about the fairness of grading and the great importance of finding ways to improve reliability and validity.

## **Improving reliability and validity of writing competence assessment**

Reliability and validity can be improved by having multiple raters, multiple assignments, successive partial judgments, specification of formal requirements, anonymity, and analytical scoring (Ebel & Frisbee, 1991; Huot, 1990).

### ***Multiple raters***

One way of improving reliability and validity is having more than one rater for grading papers. The most direct way to increase the ratio of true score variance to error variance is to obtain ratings from multiple raters. By combining ratings of the same record by different raters, idiosyncratic rater-errors are roughly averaged out. A prerequisite for this is that the raters carry out their work independently, without consulting each other and without knowing what score the other has assigned. Otherwise the notes of the first rater will function as a 'pilot' for the other. Sometimes proposals are made to determine the results by mutual deliberation of the judges. However, when the views about the product diverge, it is not unlikely that the final rating is determined more by a possibly dominant or obstinate rater at the expense of the viewpoint of a possibly accommodating, more docile rater.

### ***Multiple assignments***

Reliability and validity can also be increased by increasing the number of assessments. When students have to produce more short reports instead of a single long one, the error caused by the variability of student performance across content and topics of the reports, will be more or less 'averaged out'. The practice of using multiple reports to improve reliability is analogous to constructing tests that consist of multiple questions. When different reports of the same individual or group are assessed by different raters, not only does the content specificity problem diminish, but furthermore the subjectivity which is connected with the judgment of one rater fades.

### ***Successive partial judgments***

Rating accuracy improves when the judge concentrates continually on one criterion/category and scores all papers partially on this criterion only. To be able to rate more accurately based on current exposure to the text, it will be necessary to read the report more than once. When judges have to examine a number of reports at the same time, ratings may be less haloed if the judges evaluate all reports on one category, before rating on the next category.

### ***Specification of formal requirements***

The more specific the formal requirements are formulated (and the better the students meet these requirements), the more uniform the raters will assess these aspects. The minimal and maximal number of pages should not be forgotten. Some students are inclined to produce endless reports, without distinguishing main issues from side issues. Most students like to know the absolute minimum requirements. It is advisable to record the formal requirements in a practical brochure.

### ***Anonymity***

To reduce the possibility that halo effects or other biases, associated with the student's name and reputation, will influence the assessment, it seems advisable during the rating process to conceal the identity of the student who composed the report. However, in cases where the rater is at the same time supervisor of the activities in the community, this will be virtually impossible.

### ***Analytical scoring***

Still another way to improve reliability and validity is to use an analytical method for grading papers instead of a holistic method. Whereas analytic scoring focuses on specific criteria for various aspects of a writing product, holistic scoring focuses on global evaluation of the entire piece of writing. When a judge does not make use of an explicit assessment schema, the assessment will be based on the general impression the report evokes and this impression is converted into a rating. Therefore this method is called holistic. The plus point of this method is the relatively limited investment in time. A minus point is that there is a wide margin for tacit subjective notions and rating errors. In addition it is obscure for the students which of the elusive, tacit criteria will be used, providing them with less information to guide the writing process.

With analytic scoring, the rater evaluates the report on a specified set of criteria, assigning a separate score for each feature or category of features. Each category in the rating list is separately rated; subsequently the partial ratings are converted (possibly weighted) into the final rating. Analytic assessment methods differ with respect to their structure, extensiveness and ambiguity. The more extensive the list of criteria, the more stringently the rater acts, and the lower the average score will be. If the rater sticks to the list, the validity of the rating is improved. Unfortunately most fixed criteria lists lead to frustrations because of their inflexibility. The analytic method is usually time-consuming and independent ratings of the various aspects seems almost impossible: partial evaluations may affect each other and each partial appraisal is affected by the general impression the report evokes. An obvious advantage of this method is that the student knows beforehand which criteria are considered as important.

In most cases judges who rate holistically will have some points of special interest in mind. Analytical judges cannot free themselves from the general impression. Consequently, the distinction between both methods is less clear in practice than in theory. In other words, most ratings will be semi-holistic or semi-analytic. And each judge will interpret and combine criteria idiosyncratically. It is therefore not so surprising that the reliability of the analytic method is found to be not a lot higher than that of the holistic method (White, 1985).

### **Usability of writing competence assessment**

The usability of an assessment method is to a large degree related to its acceptability by its users: not only the primary users, i.e. students and teachers, but also so-called third parties such as parents and employers. Usability is strongly influenced by the perceived reliability and validity of the assessment method. But also time and cost factors are important. Unfortunately improving reliability and validity often requires spending more time and more money (Speck, 2000).

### ***Establishing standards of reliability for writing grades***

Establishing norms for the desired standard of reliability is in fact an arbitrary act. In the literature on educational measurement a reliability of around .80 is considered to be desirable (Ebel & Frisbie, 1991). The logical application of this standard would result in a real 'deforestation' of the 'evaluation landscape', for in most cases essay questions fall short of this standard, let alone papers. Even if all above-mentioned measures to improve the reliability were realised, only in a few cases of grading reports they would come up to the indicated norm. However, the psychometric quality of an instrument is not the only criterion for using it in education. Also the relevance and educational value of an assessment instrument should play a part in this. It would be a bad thing if an unreliable instrument with an irreplaceable educational value were removed from the arsenal of assessment tools. The relevance of students' written reports is unquestioned. Obviously one should always try to pursue the highest possible reliability.

### ***Formative versus summative use***

Not only does the nature of the assessment method tend to guide what and how students learn, but also the way the results are used: formatively or summatively. Formative evaluation is conducted to determine whether the reporting has taken place as planned or desired; the student gets informed about the strengths and weaknesses of the writing product or presentation, without a final pass-fail decision. The key element in formative appraisal is feedback about how successfully something has been or is being done, so that satisfactory aspects can be recognized as such, and unsatisfactory aspects can be improved. Such assessments should be free of threat. Typical of summative evaluation is to determine whether the product is above or below the standard (the cut-off score). Usually information gathered for summative purposes (to check the final status) will be useful too in a formative sense (to monitor progress). This poses a potential conflict of roles for the teacher: between helper and informer. Students who most need help may be reluctant to reveal their difficulties, or to choose learning options that are more challenging, for fear of being adversely reported on (Rowntree, 1999).

It is sometimes questioned whether papers are appropriate tools for summative assessment. However, the higher the summative weight of the pass-fail decision, the more seriously the students will take up their writing tasks. Obviously, the summative use of a measurement instrument requires sufficient reliability. Subjective assessments (measurement errors) can be acceptable in a formative context (to improve learning) but not with respect to summative use (to make final judgments about the extent of learning). We have seen that the reliability of the assessment of reports is generally low. This means that the summative implications of the assessment results must be carefully considered without stripping papers of their summative power to motivate students. Because a possible or real disadvantage of purely formative evaluation is that the students do not make every effort to produce a good performance. The motivation of students to make a good report can also be improved by other means, such as giving them a wide degree of freedom in the choice and elaboration of the subject, by stimulating cooperation and by deciding that the product has also to be presented to others (fellow students, staff members, community members) in oral or poster presentations.



### ***Rater training***

Not all raters are aware of or sufficiently sensitive to the fact that human judgments are highly subjective. To learn to be alert for major errors, research results on the validity and reliability of grading papers should be compulsory training for every rater. Convergence between raters will grow when at set times they discuss their scoring methods in a group (Linn, 1994).

### ***Fraud***

With the advent of digital media and the internet, it has become a lot easier to commit fraud by plagiarism. Entire papers or big chunks of text are sometimes copied to produce a 'new' paper. While this can be detected sometimes by certain software programs, other forms of cheating are almost impossible to detect. Students can translate freely an existing paper written originally in a different language. Or they can hire a 'ghost-writer' to produce the paper for them. When the writing process is closely supervised, plagiarism is harder to hide from the supervisor who sees the paper grow from its small beginning and regularly discusses the next steps to be taken by the student.

### **Conclusion**

It seems advisable in view of the above-mentioned research results, to use a holistic-analytic grading method combining the advantages of both the analytic and holistic methods. At the University of Maastricht a holistic-analytic assessment method for grading papers in a problem-based curriculum has been developed (Geerligs, 1990). The evaluation of the reports is done from two points of view: paper form and paper content. Form refers to format aspects and communicative aspects. Content is subdivided into four subcategories: correspondence between form and content, problem definition and research design, argumentation, and (fourthly) discipline-specific content.

These five main criteria (or 'big five') are scored by a rater who is also given a long list of more detailed criteria for each category. The detailed criteria are not scored separately but provide anchor points for scoring the broad criteria. This way, a rater takes into account specific criteria which are uniform for all papers (analytic scoring) but also takes into account how specific criteria are related to the total context of the paper (holistic scoring). For example the paper may do a poor job on the criterion of providing evidence of cause and effect, but that may be because a very original correlational study is described. In a purely analytic method, this criterion would be scored low, or not applicable or whatever interpretation the rater gives to it. In holistic-analytic scoring the rater can make a professional judgment based on weighing the several criteria in the context of the total paper. Besides grading the five mentioned categories separately, the rater also provides some written feedback in order to highlight and illustrate certain points.

In conclusion, the advantages of holistic-analytic scoring are: (i) evaluation criteria are specified, (ii) scoring is faster than with purely analytic methods, and (iii) grading is context-sensitive. The holistic-analytic method in our opinion is very promising not only for problem-based campus education but also for competence-based distance education and deserves to be viewed as a good-practice example to be implemented more widely.

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# ON THE UTILIZATION OF «LESSON SHEETS» DURING THE INSTRUCTIONAL PROCEDURE

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## **Abstract**

This study concerns the application of tools and methods of Open and Distance Learning in the traditional class. More concretely, we study the design of «lesson sheets», according to specific guidelines, which evolve from the corresponding educational theories, their application in traditional classes and their transformation for ODL environments. We applied our study in four classes of adult students and we present the results. Our study shows a good integration of the proposed tool, however its construction must be applied according to the provided guidelines. We propose these guidelines and we pinpoint some further research, which is necessary in order to investigate the correct application of this tool in ODL environments.

## **Introduction**

Many instructional aids have been proposed to activate the participation of the learners in the instructional procedure and to solve some of the problems of face to face instruction and of traditional printed material delivered to the learners. Race (1993), for example, suggests a “handout” for use during the instructional procedure and pinpoints some advantages and disadvantages of this tool as well. He argues that the delivery of the same «package» to all the participants, their active participation, the time profit, the acceleration of noting down information are some strong points of the tool, while the weaknesses include the possibility of the ill structure of the educational material, the diminishment of interest or total loss of interest due to the presence of this tool. So, the motivation of our study was the need to invent a tool that could scaffold the student during the lesson, providing him with the ability to personalize the offered knowledge, as well as after the lesson, namely during his study at home. So, we propose a «lesson sheet» for use during the lessons, to aid the student to capture the offered knowledge, as well as for use after the lesson to assist him in understanding and learning the acquired knowledge.

## **Background**

Nowadays the main means for the delivery of new educational approaches is the World Wide Web, and there are some good reasons for it: It is easily accessible by many groups of learners. It supports multiple representations of the educational material and various ways of storing and structuring this information. It is powerful and easy to use as a publishing medium. However a hyper-medial space, like the web, cannot be considered, only by these features, as an effective tutoring environment. It is rather more appropriate to think of the web as a powerful tool that can support learning, if used in an appropriate way (Eklund, 1995; Alexander, 1995). This is because learning is a process (Duchastel, 2001) that depends on other features, such as learner’s motivation, previous experience and learning strategies that the individual has been supported to develop, etc. Effectiveness of any educational environment cannot be considered independently of these aspects. It is widely accepted that effective learning is also related to educational environments and tools that provide the students with an incentive for active participation in the learning process. So, the approach of delivering the instruction over distance unveils the issue of the students’ support and scaffold, an issue that always was important in all ODL schemes. Therefore, a set of new educational approaches and methodologies evolved, in order for this material to be smoothly integrated into the instructional procedure, as well as a set of «learning aids», such as «study frameworks», time scheduling, or summaries. These tools aim to scaffold the student in his work and to confront eventual learning difficulties. Anderson (1995) gives an analytical description of the procedure of the development

of the novice to knowledgeable expert for different cognitive domains. But it is Vygotsky (1930/1978) who defined the “zone of proximal development”, thus providing a complete explanation of how, according to him, the augmentation of the knowledge happens. Basic role in the augmentation of a person’s knowledge and expertise plays the factor of “meaning” as well. According to de Gelder (1981) the understanding of an action implies granting it a «status». Also, Demetriadis (2000) argues that the student may have less interest, or none at all in learning things that have no meaning to him. To continue, Anderson (1995) claims that for every message, people remember the «meaning» and not the words or pictures it consists of. To summarise, there is broad consensus that a situation with clear meaning easily becomes «property» of the person.

The next issue to be considered is the factor of motivation, which is another important factor concerning the transition of the novice to expert. The term motivation refers to the choices people make as to what experiences or goals they will approach or avoid, and the degree of effort they will exert in that respect. (Keller, 1983). Aubé (1997) also studies the role of emotions, needs and available resources. He claims that motivation has as its ultimate aim the ideal resource manipulation for benefit of the person. A «resource» is considered to be everything that could contribute to the achievement of a level of completion, be it by natural means (temperature, food, power, etc) or immaterial (time, knowledge, relation etc).

## **The Study**

We wanted to investigate the applicability of the «lesson sheets», according to the theoretical issues already stated. With respect to the advantages and disadvantages of the qualitative evaluation methodologies, we used a triple approach. We utilized questionnaires with open-ended questions, however assessable as in a likert-scale, in order to be of use for statistical elaboration. Open interviews with the participating subjects during the whole application period, and our observations and notifications about the on-field use of the tool, contributed to a more valid outcome of this study.

### ***The «lesson sheet»***

According to the theories already presented, we elaborated a set of lesson sheets, one sheet for every lesson of the course. The design of the sheet had to take the following principles into consideration.

1. To facilitate the transition from «understanding» to «learning», by accelerating the procedure with the removal of routine tasks (eg. copying from the blackboard).
2. To provide in its full form (after its completion), the “aiding and scaffolding factor”, eg. during the homework.
3. To provide the student with a more comprehensive environment with visual representations of the knowledge on offer, by making its structure visible.
4. To enclose all the necessary assessment features (exercises, activities etc.), so that the student is aware of his/her own progress.
5. To assign “meaning” to the offered knowledge, namely to be “personalizable” for every participant.
6. To provide a high grade of motivation, as to be interesting in its use.

It is obvious that these principles stand, with minor adaptations, in the traditional approach, as well as in its distance counterpart, at least in the «open learning» part of both. So, we designed and elaborated our lesson sheets according to following guidelines:

- It utilizes the shape of a table, as to frame and structure the offered knowledge.
- It contains, in terms of «titles» and «paragraphs», on the left hand side the offered knowledge. In fact, this left hand side provides the outline of every lesson.
- On the right hand part of the sheet the student can note whatever he/she wants, corresponding to the pending paragraph, personalizing thus the lesson by the use of one own’s comments.
- It includes images, figures, charts, and whatever else is appropriate to visualize the information.

- Notifications that are not personalizable, eg. Internet links, tables, additional or external information and resources, even if they belong to the sphere of the students' notifications, must be provided on the sheet, to accelerate the procedure and diminish the distraction that occurs during the students' noting time.
- The left hand side includes the necessary self-assessment exercises and the activities the student has to perform during the lesson, while the corresponding space on the right is usually reserved for the answer.
- It must be usable: no more than 4 pages (sufficient for a 3-hours lesson), with adequate space for noting, good image quality, high quality printing etc.

The full set of the lesson sheets used during the instruction in one of our courses, can be found at <http://aiges.csd.auth.gr/karoulis>, in the «Lessons/ODL» sector. The sheets are in the Greek language, however there is a sample sheet, translated into English, which is also available.

### ***The Application***

We applied the tool in four different classes. One postgraduate class of students at the Pedagogic Department of the Aristotle University of Thessaloniki, and three classes of secondary education teachers; two of them were taught the application of ICT in the classroom and one basic skills in computers. In our study we consider our sample as homogen, because it provides some common characteristics. All classes consisted of adult participants, studying some form of additional knowledge at postgraduate level. All classes consisted of about the same number of participants (approximately 12) and had about the same duration (40 hours), and they were ignorant of the taught domain prior to the course.

### ***The questionnaire***

The questionnaire consisted of three parts. The first part consisted of general questions, concerning the application of the questionnaire and the cognitive transfer due to its application, as perceived by the participants. The pending questions were:

1. *Did it (the «lesson sheet») make the structure of every lesson clear?*
2. *Did it help you to keep track by using notes during the lesson?*
3. *Did it help you during the revision at home?*
4. *Do you consider this tool as an «archiving tool», namely, if you browse through these sheets at a later time, do you think they can remind you of the lesson material?*
5. *To what grade does it recall the lesson to you?*

The last question was an overall assessment of the tool:

6. *To what level do you consider the whole application of the «lesson sheet» as successful?*

In the second part of the questionnaire, the participants were asked about the advantages and disadvantages of such a tool, according to Race (1993). We wanted to investigate if Race's claims are still present in the tool we propose. Race considers as advantages (and the participants have been asked about their opinion):

1. *The fact that every student gets the same educational «package»*
2. *The students do not need to note passively or copy from the board.*
3. *The students have more time for the content of the lesson, instead of dealing with noting*
4. *Whoever writes slowly is not so disadvantaged as he profits from the tool*
5. *Whoever has language or comprehension problems, or assimilates slowly, has now more time to think about the taught material.*

The participants were also questioned about their opinion of the disadvantages, according to Race:

1. *The students may lose interest, because the sheet contains everything they need to know.*
2. *They may not come at all, as they know they can have copies of the material.*
3. *There can be too much material or not enough.*
4. *Sometimes such aiding tools can not substitute the personal involvement of the students.*
5. *One does not feel «in possession» of material that is delivered to everybody (and was not produced by oneself by keeping one's own notes)*

To record the participants' opinions we used «bipolar semantic differentiated» expressions (Shneiderman, 1998), assessable on a five gradation likert scale. Example:

*Did the sheet help you to repeat the taught material?*

①	②	③	④	⑤
<i>No, not at all</i>				<i>Yes, it was the main means</i>

### Results

During the application we observed similar behaviour by all classes, so our claim for a homogenous sample was strengthened. This observation is of course only an empirical one, as the instructors perceived it. At the beginning of the courses, all students needed some assistance to use the tool, as expected, however soon it became transparent in its use and the participants did not have any further problems. However, during the first lessons the instructors had to repeatedly remind the students of the presence of the tool and urge them to keep their notifications on it. We observed that after the second lesson the students got used to the tool and no more prompting was necessary.

We provide descriptive statistical results. In this phase, the locus of our study was in the qualitative assessment of the tool as perceived by the users; the augmentation of the cognitive transfer, due to the use of the tool, has not been investigated. The mean values (M.V.) and the standard deviation (S.D.) have been considered. The mean is recorded in a 1 to 5 scale, corresponding to the likert scale. As for the standard deviation, a great deviation from value 1 means disagreement, while concentration around value 1 means coincidence. The tables below summarize the findings of the studies.

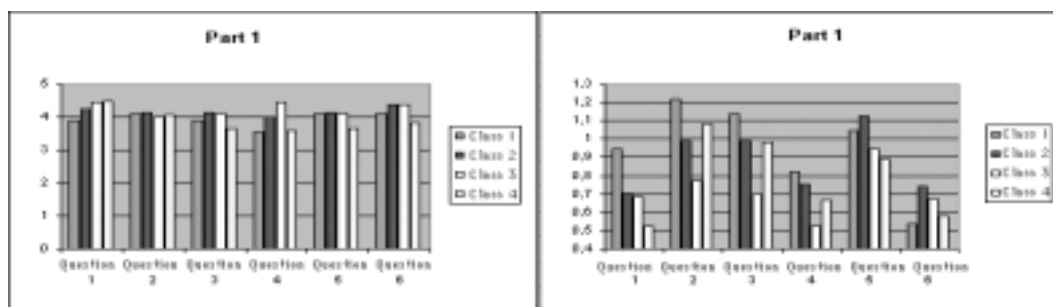
Table 1. M.V. and S.D. of the general assessment, advantages and disadvantages

		Course 1	Course 2	Course 3	Course 4	Course 1	Course 2	Course 3	Course 4	Course 1	Course 2	Course 3	Course 4
quest 1	M.V.	3,90	4,25	4,45	4,50	4,36	3,38	2,90	3,50	4,55	4,25	3,72	3,58
	St.Dev.	0,94	0,71	0,69	0,52	0,69	1,39	1,27	1,16	1,03	0,92	1,38	1,09
quest 2	M.V.	4,09	4,13	4,00	4,08	4,72	3,50	3,63	4,08	3,45	3,25	3,09	3,33
	St.Dev.	1,22	0,99	0,77	1,08	1,50	1,28	1,04	0,89	0,65	1,07	1,36	1,64
quest 3	M.V.	3,90	4,13	4,09	3,67	3,27	3,00	2,36	2,83	4,55	4,25	4,18	3,66
	St.Dev.	1,14	0,99	0,70	0,98	0,68	1,39	1,08	0,78	1,27	0,76	0,81	1,40
quest 4	M.V.	3,55	4,00	4,45	3,58	3,00	3,37	2,45	3,08	3,63	4,25	4,00	3,91
	St.Dev.	0,82	0,76	0,52	0,69	1,21	1,04	1,10	1,00	1,48	1,19	0,93	1,16
quest 5	M.V.	4,09	4,13	4,09	3,67	1,72	2,00	2,00	2,08	4,00	4,25	3,82	3,42
	St.Dev.	1,04	1,13	0,94	0,89	1,26	0,89	1,17	1,31	1,27	0,93	1,00	1,08
quest 6	M.V.	4,09	4,38	4,36	3,83								
	St.Dev.	0,54	0,74	0,67	0,58								

## Discussion

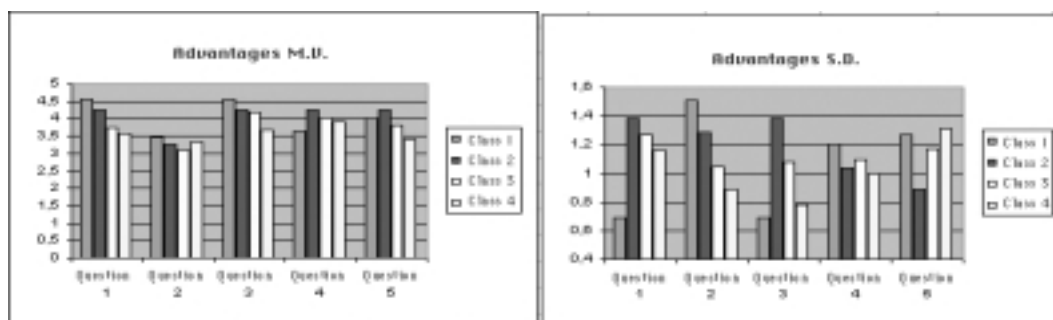
For the discussion we use the corresponding diagrams, who present the results in a more visual form.

### Part one (General assessment of the «lesson sheets»)



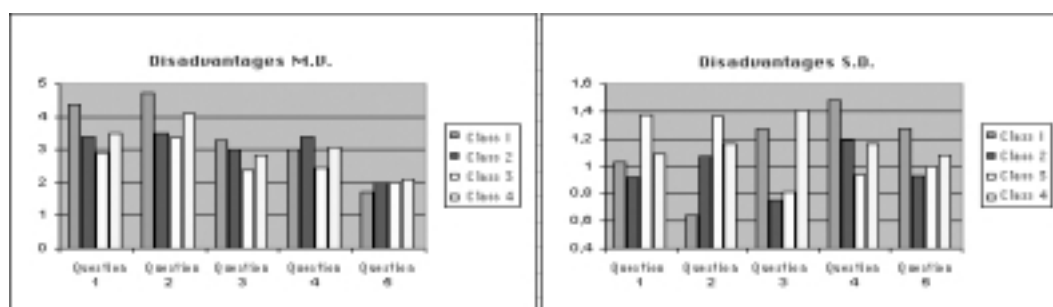
The diagrams provide the mean and the standard deviation for every class and for every question. We can elicit that the students perceived the sheet as a fair tool, with mean values greater than 3,5. Their opinion was especially positive in that it can assist them to keep notes and to remind them of the lesson (questions 2 and 5 respectively), while in question 5 we observed an almost coincidence, as we can see on the diagram of the standard deviation. We also had a high mean value (almost 4) in the question for the overall assessment of the tool, yet here there were some objections that placed the standard deviation in the interval 0,50 – 0,75.

### Second Part (Advantages)



The participants consider as not so important the «no need to copy from the board» (M.V. almost 3), yet they agree in general with the rest of the advantages Race reports. Moreover, we observe a respective coincidence at question 4 (regarding slow-writing people) with a S.D. of about 1.

### Third part (Disadvantages)



We observe a respective coincidence at questions 1 and 5, while for the rest the opinions were divided. We can elicit from the M.V. diagrams that there is not a unanimous agreement with Race's claims. Especially for question 5 (possession of material that is delivered to everybody), we observe a M.V. below 2, with respective coincidence as well. We also have a low M.V. at question 3 (less than 3), however with some objections.

According to the qualitative part of our observations, we can argue that all of the participants agreed that the lesson sheets aided them during the lessons, as well as during their home study. Most of them noted that they helped them to «keep good track» and not delay them during the lesson, because of the fact that the most

important points of the lesson were recorded on the sheet. They also encouraged the students to organize their home study, as the lesson plan was clearly marked on the sheet. They also believed the sheets to be helpful in cases where they needed further study on a topic. Some also disagreed during the interviews with disadvantage 5, arguing that finally everybody constructs his/her own knowledge, enhancing the «main corpus» that is provided in the lesson sheets with individual notifications, thus personalizing the offered knowledge.

## Conclusions

We can argue that this modified «lesson sheet», as described and proposed in this work, has been positively accepted by the students. In particular, the qualitative comments from the unstructured interviews gave us a strong support to continue with the study of the tool. A second conclusion is that the participants agree in general with the claims of Race about the advantages of such a tool, while they only partially agree with the stated disadvantages, which they don't seem to take very seriously. As the only coincidence with Race's claims, we note questions 1 and 2 of the third part, which lead to some suspects, that the students may perhaps perceive the sheets as a «complete instructional aid». This is obviously not true, since our aim was to provide them with a tool to personalize the lesson.

In summarising, we want to emphasize the adherence to the presented guidelines, in order for the tool to be effective, at least until some of them are abandoned or modified, as results by future relevant studies. Our aim is to provide a tool derived from the domain of Open Learning to be applicable in the traditional class and finally to import it in ODL environments as well. We believe that these first results are encouraging in this direction.

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# SEARCHING FOR EVALUATION PROCEDURES FOR WEB BASED COURSES – CASES FROM EU PROJECTS

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## Introduction

Since 1997 Distance Education Centre at Gdansk University of Technology (DECTUG) has been involved in different EU projects. The most of them are concentrated at the developing Web based courses. Not all of them as final results are able to produce self-sustained and a good quality product. In the article quality and customer satisfaction approach based on experiences gathered in Leonardo da Vinci Programmes (1998-2004) will be presented. The proposed solutions will be implemented in the Framework Programme 5 - CURE (Centre for Urban Construction and Rehabilitation: Technology Transfer, Research and Education, 2002-2005).

## Evaluation strategy - why, for whom, what and how?

For evaluating Web Based courses the strategy proposed by Derek Rowntree [1] for evaluating open learning can be implemented. First of all the following questions should have been elaborated and answered:

- Why bother with evaluation?
- For whom are we evaluating?
- What shall we evaluate?
- How to evaluate?

Question “**Why**” can be answered in one sentence: Evaluation is the key to improving the quality of our learners learning. Example reasons for evaluating are as follows:

- To justify expenditure and to obtain extra resources.
- To help in the course marketing.
- To demonstrate acceptable outcomes.
- To detect any problems that arise.
- To monitor staff performance.
- To help team building.
- To improve teaching and learning.

“**For whom**” can be answered from the position of people influenced by the evaluation. Among others the most important bodies are as follows:

- subject experts
- course developers
- course manager
- tutors, trainers, instructors
- exiting and potential learners
- funding bodies
- accrediting bodies

Answering “**What**” needs collecting data about process, products, outcomes.

The last question “**How**” can be answered on a basis of the proposed approach – quantitative or qualitative. The first strategy is based on formal assessment of learners and the statistical analysis of questionnaires. The second one uses observations, discussions and interviews.

In 2 cases described in the article the proposed evaluation procedure is based on the quantitative approach.

### **Case 1 - Leonardo da Vinci programme TeleCAD (Teleworkers Training for CAD Systems Users (Leonardo da Vinci programme, 1998-2001))**

TeleCAD - Teleworkers Training for CAD Systems Users project consisted of:

- developing dedicated platform in the Internet for project developers (for management purpose, exchanging ideas, developing the project contents, monitoring the results),
- developing training methodology for teleworkers working with CAD systems on a basis of experiences of partners involved in the project and results of research in this field,
- developing dedicated platform in the Internet for teleworkers,
- developing electronic-based teaching materials (CD-ROM),
- developing the special guides for tutors and learners in English and in national languages,
- delivery of example courses for teleworkers working with CAD systems for different target groups (university students in Poland, post secondary students in Italy, young workers in Finland and Greece).

There were the following organisations involved in the project:

- Gdansk University of Technology, Poland
- ARGO s.r.l. Formare l'Europa, Italy
- IDEC, Greece
- ZEUS, Greece
- Pekkala Software Oy, Finland
- Young Digital Poland, Poland

The quality assessment procedure was discussed among partners and finally it was decided to apply a quantitative strategy and in order to achieve a good quality product the set of three types of questionnaires were proposed:

- questionnaire for students preferences (preferable type of educational materials e.g. printed, CD ROM, online, communication tools, ICT skills),
- questionnaire for educational resources (quality of contents, usability of supporting materials e.g. links),
- questionnaire for training quality assessment (students and tutors evaluation).

The questionnaires generator program was developed in Linux, PHP and MySQL technology. It consists of four interrelated parts:

- Questionnaire preparation
- Questionnaire filling in
- Questionnaire analysis
- Questionnaire modification

In order to work with the questionnaires generator a personal login and password is required. After preparation the questionnaire is generated automatically. 3 types of questionnaires were developed: the questionnaire for students preferences, the questionnaire for training quality assessment, the questionnaire

for TeleCAD system usability assessment The example screens of the online questionnaire system are shown in Fig.1. and Fig.2.

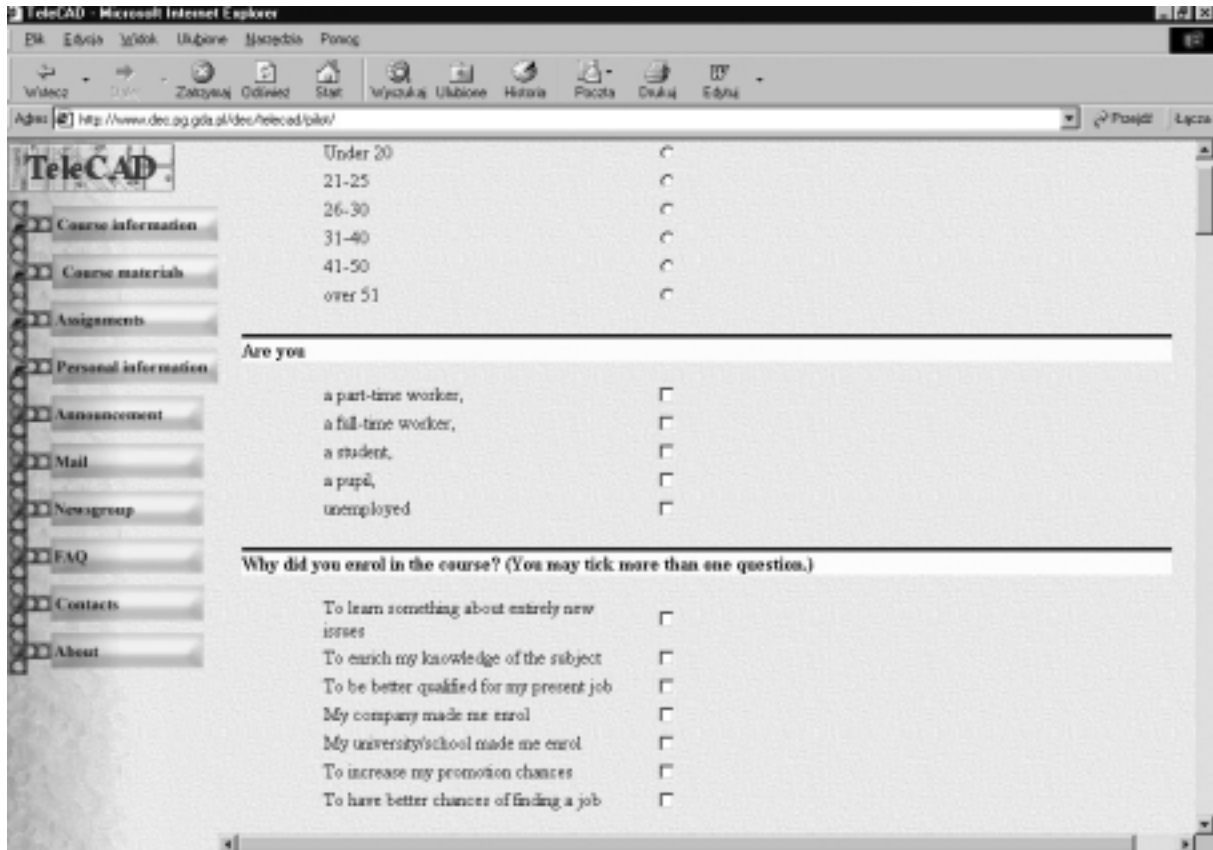


Fig.1. Questionnaire online - students preferences

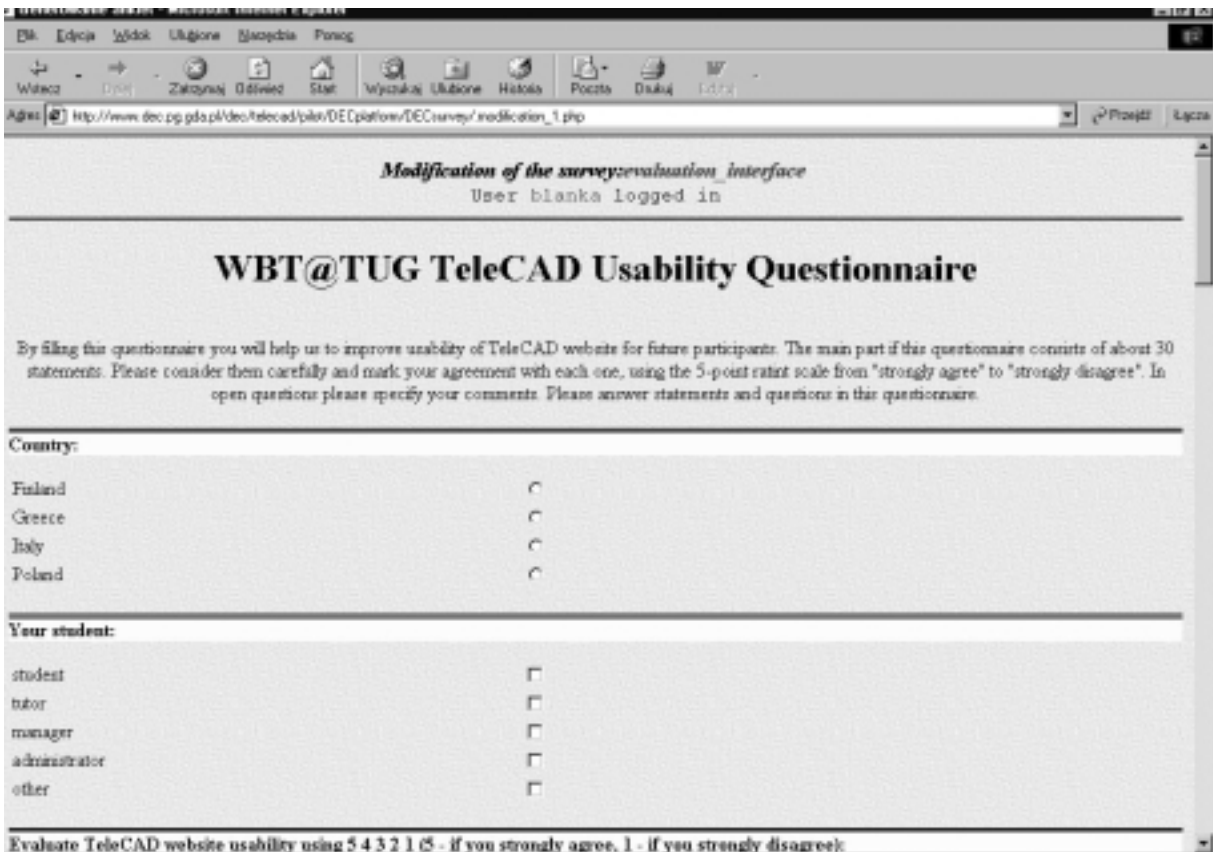


Fig.2. Questionnaire online generator - modification mode

## **Case 2 - Leonardo da Vinci programme EMDEL (European Model for Distance Education and Learning, 2001-2004)**

The main goal of the project EMDEL is the realisation of an European Teletraining System which, from what already has been produced, could immediately start a process of co-operation at the level of production and organisation of distance training services. Besides it should bring to the reduction of costs, the harmonisation of local systems and the rapid increase of the offer of formative courses.

The main objectives of the project are following:

- Production of an on-line Catalogue "Showcase of Distance Learning Modules" which will contain a list and a description of the products partners' interesting at transnational level, collected in their "Diathèque" by the partners. The creation of the Catalogue will give both the trainers and the managers of Distance learning systems, the possibility to know what is the offer on the market regarding distance learning modules and their ways of utilisation.
- Production and share of a basic software programme for the assessment of customer satisfaction and quality of the products.
- Exchange of the best products realised by the partners. The first selection of at least 10 Distance Learning Modules will be done and then the post production (translation, adaptation and diffusion) will be performed.
- Virtual mobility through on-line utilisation of Distance Learning Modules installed on the servers of the partners' net mainly by allowing the utilisation of distance training products in original language to a person living in a partner country without an action of post production and by having at one's disposal services of support and accompanying both locally and on line (in the original language) thanks to the presence of tutors operating in local systems.
- Dissemination, through the presentation of a model of realisation, of an European Teletraining Network to demonstrate the concrete possibilities of construction, starting from an existent distance training system based locally but with transnational connections. The dissemination also aims at extending the number of agencies of distance training which want to co-operate for the maintenance of the catalogue and for the increase of the exchange of products.

The project moves from the results realised with precedent projects by partner countries in the field of the European financing. The Regione Toscana, within the frame of activities provided by the Fondo Sociale Europeo, has given birth to a Regional System of Teletraining (Trio Project - [www.progettotrio.it](http://www.progettotrio.it)) and to the production of didactic contents for Distance Learning chiefly addressed to apprentices, drop out young people, workers, managers of small enterprises, besides old people. Also the partners' experience has lead to the creation of distance learning models and, particularly, to the production and evaluation of materials which can be used in High Training as well as in the trainers' training.

The project has started from collecting information about partners' institutions and their offer in the subject of Distance Learning Modules. Now the database is opened for public and private mode at the URL: [http://www.progettotrio.it/emdel/public\\_homepage.html](http://www.progettotrio.it/emdel/public_homepage.html)

The evaluation procedure and the questionnaires were prepared by University of Liege from Belgium. The quality and customer satisfaction proposed in EMDEL project is specified in the Table 1. The online software will be developed by Trio and example screen of the system is shown in Fig.3.

Table 1 - Quality and Customer Satisfaction Table

<p><b>1. Expert's assessment</b></p> <ul style="list-style-type: none"> <li>I. Content</li> <li>II. Activities</li> <li>III. Evaluation</li> <li>IV. Technical aspects</li> <li>V. Aesthetics and multimedia</li> <li>VI. Mode of using</li> </ul>
<p><b>2. Tutor's assesement</b></p> <ul style="list-style-type: none"> <li>I. Content</li> <li>II. Activities</li> <li>III. Evaluation</li> <li>IV. Technical aspects</li> <li>V. Aesthetics</li> <li>VI. Mode of using</li> </ul>
<p><b>3. Customers' Satisfaction</b></p> <p>Number of responses: ...</p> <ul style="list-style-type: none"> <li>I. Overall impression</li> <li>II. Contents</li> <li>III. Activities</li> <li>IV. Evaluation</li> <li>V. Navigation, technical design and ergonomics</li> <li>VI. Tutoring</li> </ul> <p><i>Customers' satisfaction rating is quantitative. For each of the six items a graph in the form of a line is drawn. One end of this line is labelled "Poor", the other – "Excellent". The rank is based on the average rating of each item.</i></p>
<p><b>4. Impact on customers</b></p> <p>Percentage of students who dropped the course (if any)</p> <p>Rate of successful outcome (if any)</p>

**Quality and Customer Satisfaction table  
for "Teleworkers training for CAD systems users"**

Number of responses: 0	Poor <span style="float: right;">Excellent</span>
Overall impression	
Contents	
Activities	
Evaluation	
Navigation, technical design and ergonomics	
Tutoring	

Fig.3. EMDEL questionnaire online - example screen

## **Framework Programme 5 CURE (2002-2005) - evaluation strategy**

The acronym CURE means - the Centre for Urban Construction and Rehabilitation: Technology Transfer, Research and Education. It is the only centre, in northern Poland, multidisciplinary organisation concentrating activity on finding solutions to strategic urban problems and working for its sustainable development by conducting research and education activities.

Among several innovative features which it is planned to introduce in the work of the Centre the most challenging one is the extensive use of distance education based on modern information and communication technologies (ICT). Distance education has the following advantages:

- Convenience, affordability, accessibility, control over course
- Lower cost of training (additional students with no great capital investments)
- Decreased learning time and faster completion of training
- Higher retention factor
- Easy and quick up-to-date course contents
- Globalization of Learning

Having long term professional experiences in the area of training based on Internet and multimedia it is planned to develop and deliver the distance education courses in the field of urban engineering within the following work packages simultaneously:

- WP1: International PhD studies
- WP2: Postgraduate studies

In order to achieve high quality courses and the students satisfaction the evaluation of proposed studies will be done online on a basis of the former experiences. First of all the quality of the learning materials will be evaluated and secondly the special questionnaire for students satisfaction will be opened online.

It is planned to use for the courses delivery Oracle i-Learning Learning Management System. The Sharable Content Object Reference Model (SCORM) will be used for learning materials development.

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# LEARNING THROUGH ICT – STUDENTS’ EXPERIENCES

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## **Introduction**

In this contribution I invite the reader to take part in some school settings where the students work with the computer. The work of the students is often done in small groups. The students’ own experiencing of what they actually do and their reflections about what they think will be presented in this text. The examples below are not exceptional in any way, they represent ordinary work in the classes I have been investigating.

My study is done among schools participating to the national programme for ICT in Schools in Sweden, called ITiS. The University of Jönköping is responsible, on a national level, for an in-depth evaluation of the experiences of ITiS. The main focus of the evaluation is the teachers, but also the headmasters and the students are parts in the programme (Chaib et al., 2001). ITiS is a national programme for enhancing the use of ICT in Swedish Schools. It is an ICT project as well as a school development project. The programme started in 1999 for a period of four years. It covers all schools i.e. pre-school classes, compulsory schools and upper secondary schools. ITiS is the Swedish name for the programme as it deals with ICT in School (Delegation for ICT in Schools, 1999).

ITiS comprises a number of different components. One of them is dealing with the special ITiS work the teachers were supposed to do with the students. Each teacher team completed an interdisciplinary, problem-based and student-oriented development project together with their students (ibid). In almost every school and class, who run the ITiS programme, the students worked in small groups, sometimes within the same grade but also from other grades.

Research on a micro level about students’ using computers in Swedish schools often shows how the computer is used in an inefficient way. The findings often deal with difficulties to find information on the Internet, how students plagiarize texts from the Internet, students chatting or playing games instead of using pedagogical programmes (cf. Nissen, et al, 2002; ICT in School, 2003). An undertone in many studies is that the students can not use the computer in an adequate way, and that they do not work seriously. There are plenty of these types of findings but also a lot of good examples of young people using the computer, for schoolwork or in leisure time.

## ***The study***

The students’ experiences during ITiS are focused in this study. About one hundred students from 17 different schools and classes are involved in the study. The main question under investigation is: What experiences do the students gather from their participation in ITiS?

Through a qualitative study of a number of schools, we attempted to clarify what experience the students concerned had of their participation within ITiS. The study aimed at gathering unique elements of the students’ opinions according to the content and working methods in the classroom. In order to understand how ITiS was carried out at different schools, as experienced by the students, more and supplementary data collection methods are required. In this study different perspectives and methods inspired by ethnographic approach are used to highlight the phenomenon under investigation (Hammersley & Atkinson, 1983). To gather data surrounding the phenomenon researched I used interviews, and participant observation (cf. Kvale, 1997).

The student interviews were conducted as group interviews. Boys and girls were often separated during the interviews. We chose to interview students representing different levels of study motivation and computer skills to get opinions from different points of view. Besides the interviews we observed the students working in the classroom. The questions to the students were above all about how they used the

computer at school, that means which programmes they used and which tasks were to be solved. Other questions were about the students computer habits in general and how they use it during their leisure time.

### ***Theoretical perspective***

As a theoretical approach for the study, a social-constructionist view of learning is adopted. Social-constructionism, which deals with how people form their reality socially, is not one specific theory but rather it is represented by several competing theories (cf. Berger & Luckman, 1966; Burr, 1995; Searle, 1997; Wennerberg, 2001). Social-constructionist theories about learning are based on the conditions for learning among children and young students (Säljö, 2000).

Learning can be seen as an activity related process. From this perspective, learning takes place through interaction with other people and the surrounding environment (cf. Vygotsky, 1966; Lindqvist, 1999). In the classes where ITiS took place the students worked with their task in small groups. These groups took a lot of the responsibility of both the planning process and how to run the work.

The social constructivist school emphasises the interaction between individuals, rather than individual activities as the most important learning tool “...it is above all through interacting with others, coordinating his/her approaches to reality with those of others, that the individual masters new approaches” (Doise in Dillenbourg et al, 1990, p. 191). Thus, it can be understood that the development of the individual is coordinated with the interaction with other individuals, in turn leading to further development on an individual level. The process of development can be seen as a perpetual spiral movement.

Work is carried out on a collaborative level, where the joint efforts will result in a product in common. The knowledge emerging from this work stems from social interactions and is often a collaborative nature. With this in mind, the question arises about the nature of the knowledge edified by a collective generative process, which obviously also influences the knowledge acquired by each individual. Through collective efforts a representation of reality is built. The individuals construct their knowledge of their own accord (Björkqvist, 1993).

There are a number of similarities between the approach maintained by Björkqvist and that of Vygotsky in his well-known “*genetic law of cultural development*”, meaning that development occurs on two levels: on the interpersonal level followed by the intra-personal level (Dillenbourg et al, 1990, p. 192). The sociocultural perspective, which has been greatly inspired by Vygotsky, as mentioned above, focuses on the conditioning situation between social interaction and individual change. Individual mental capacities are developed through social activities. Sometimes one member in a group possesses a deeper knowledge which is then passed on to the other members, whilst someone else in the group can be instrumental in developing the collective learning process by asking critical, and analytical questions.

## **Using ICT in School**

The results in this study are presented in two different parts. The first one describes the characteristics of the work the students have done within ITiS. The second part focus on the students work with ICT in school and also on how the students experience that the learning setting has changed due to enhance of the computer use.

### ***Characteristics of the ITiS Work***

Planning and realisation of ITiS assumes active student participation. Students were expected to participate in a learning process by taking an active role in it. That means that the process ought to be student oriented, as stipulated in the guidelines from the government (Delegation for ICT in Schools, 1999).

The students in the study did generally not participate in the initial planning of ITiS. Even if the students expressed a certain amount of disappointment about not being able to help plan ITiS from the start, they actively participated in the completion process. They felt responsible for their work and discussed together in small groups the content, how to divide and share the time, how to use ICT and how to



perform the task. They did not succeed in their time planning. Some spent less time in the beginning of the work and had to hurry at the end, while others finished their work quickly and were inactive at the end. Many students felt that the time allotted to complete ITiS was not enough.

The most outstanding characteristic feature of the students' works was that most of them, in one way or another, were "open" towards the world outside the school. Several of them saw it as a chance to "get out" into the outside world. The students looked for pen pals in different countries, constructed home pages and web pages, searched for information on the Internet and published school news on the net. They also worked outside the classroom. In most of the ITiS work it was obvious that students could choose among different media, not just the computer or ordinary schoolbooks. Another distinctive feature was that they combined different media, such as music, film, theatre, and CD-Roms. They gathered information from different working places in the municipality. Sometimes they went to a tourist office, to a hospital, to parents or grandparents job and also to cultural institutions. They also gathered information during their leisure time. The different work within it is engaged many people outside school. This circumstance extended the students' motivation to work better and harder. The work in school became an affair for more than the teachers, the classmates, and the parents. A respect, the students had in common, was that they apprehended that they did "real work" within ITiS.

Another difference between the ITiS work and ordinary schoolwork was that the students' ways of presenting their work varied a lot. Besides PowerPoint presentations and digital magazines students also used other multimedia productions. In one class the student did a film, in another class, grade 5, the young students could choose between to design a picture or to "load down" one from the Internet. In another class in the upper secondary level the student in a media programme constructed a folder about their town. Each group in the class worked with a theme of their own, under supervision by the teacher team. The tourist chief in the town was involved in the students work and was thankful for the folder produced by the students.

### ***New Learning Settings***

Students used the computer extensively during ITiS, and almost all of them appreciated that. It was not just the use of computers which motivated them, but also to work in a project and to have the autonomy of the group work. They used many types of artefacts in fulfilling their tasks. The students' abilities to deal with ICT were different in the groups. Some of them were very used to computers, others were very school motivated and there were also those who did not work at all. Most of them had a computer at home and sometimes several ones.

Apart from the support given by teachers, students helped each other a lot during ITiS. In every class or working group there was a student with a great deal of knowledge about how to handle the computer and different computer programmes. Since many young people are familiar with the computers and spend a lot of time experimenting with both the technology and programs, they could help each other in substantial good ways. Working in groups the student developed enhanced social relations and took responsibility for the work and divided the tasks within the group in a efficient way. The students' individual talents completed each other.

The boys seemed to use computers more often and for longer periods than the girls, although there were some exceptions. The boys often play games during leisure time, sometimes alone and sometimes together with friends. In general, girls and boys used IT in slightly different ways. Some of the young girls admitted that they mostly sat at home with their computer and played "nice" games like Solitaire and Backpacker. The girls in the secondary and upper secondary level used the computers in many ways. Many girls like the boys played games. They also used different chat programs and e-mail.

At school many boys showed an advantage over girls and often monitored the work. The boys were more dissatisfied than the girls with the lack of good soft wares to do "fun things" at school. Some girls also raised additional criticism. For example, they felt that the computer is overestimated as pedagogical tool. At the same time as they expressed negatively attitudes towards the use of computers and other technical tools used in school they complained that they did not get as much access to the computers as they would have liked. The girls saw however many advantages in using computers and like many other students they

began to combine various sources and techniques in their schoolwork. For example, it was common for them to combine text material from books and pictures from the Internet. In their schoolwork, the girls wanted to present tidy and well-designed documents.

Although the students were enthusiastic in using computers they reported difficulties in finding relevant information on the Internet and in evaluating it. The tasks in school also demanded other types of computer know-how than they were used to, and required working methods they had not hitherto experienced. Through ITiS the students developed new ideas about how computers could be used. They also learned new things such as how to evaluate different sources of information, and also a lot of advanced soft ware, both for creating the products and for presenting them.

As ITiS often required the use of computers, the technical equipment for ICT however was not sufficient, according to the students' opinions. The students wasted time waiting for their turn and were forced to have unnecessary breaks. For the young students, especially, and for those who were impatient, it meant that they ran around and were noisy.

Students needed a great deal of help from their teachers to organise their work. However, as some of the students uttered, they could have used some more help and someone to "*light a fire*" under them. The students confirmed that they could have used more supervision and guidance than they normally had during other teaching conditions. According to the students the teacher often was assigned the role as a mentor, not a teacher.

It is easy to point out what the students missed during the learning process, e.g. concerning the contents of the subjects taught – it is, however harder to assess what they really have learned. I mean that the aim of the schooling is of course that the students ought to learn lots of skills but schooling also require a harder task like to become a respectable citizen, to be willing to help each other, and taking responsibility for the school work.

## Reflections

One conclusion from the findings concerning the use of the computer as a pedagogical tool is that the learning setting is different from a more traditional one. There are differences in several respects such as:

- Physical environment - which is reshaped not only in the school, but other rooms and places are also reshaped.
- Time flexibility - the students do their work in the day time at school as well as at home in the evenings.
- Media - students combine many different media and sources of information.
- Social settings - the classroom is extended, and different settings are used in the learning process.
- Group constellations - the groups are often formed from different grades and subjects; they work in themes with other classes.
- Aims - the students have different talents and therefore the student are not doing exactly the same task, individualized learning is promoted.

This contribution is not to be seen as a glorification of the use of computers in school. The different activities with the computer differ in many respects. Many teachers say about the use of computers in learning setting: "We have just started, this is the beginning". The development potential is quite wide. Both teachers and students need to have real chances to find their own ways of using and experimenting modern technology. It will take some time for the staff and students at school to develop new learning methods where the computer can be seen as an effective pedagogical tool.

The learning situation as reported in this study is at once more flexible. The students moved more between activities and rooms, depending on what task was to be solved. Although many students had good computer skills, these were sometimes limited to application areas such as games and chatting. ITiS

encouraged a feeling amongst the students of wanting to learn more, particularly about the use of computers. Teachers managed to stimulate students' learning, and channel their energy towards a form in which generating knowledge and solving problems were in focus.

Many traditional conceptions of learning, knowledge and schooling, have been questioned by new theories and empirical findings. Learning does not occur exclusively in institutionalized forms. Learning and knowledge formation do not necessarily have to be restricted to schools and traditional forms of education, but may very well occur within other activities. Furthermore, the learning process is not always perceived consciously as a learning experience, neither by the learner, nor by the instructor. Säljö maintains that “*on the contrary, there is every reason to believe that almost any trivial, everyday activity and every form of interaction between individuals comprise elements of what we may call knowledge reproduction and constitute a potential learning opportunity for those involved*” (Säljö, 1996, p. 125). By teaching themselves or by learning from their peers, young people make great efforts to learn things which are not taught in school or at home. They can be said to be “teaching each other” and that the teaching focuses on any number or types of subjects. Consequently, knowledge formation can be found within a number of different contexts: within the family, among school peers or friends outside regular school activities.

The computer, like all technical newfangled things, is often associated with conflicting attitudes and feelings. The computer is the most perfect, modern artefact of technology in our everyday lives. One can either be for or against technology as such, but one cannot be neutral. This is the way it has been with all technical advances; new ideas often encounter resistance. It takes a long time for people to get used to using new technology and discovering any possible advantages. Naturally, information technology with its hyperquick development is one of the most intrusive of all technical inventions in history (Castells, 1998).

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# OPEN TRAINER: BLENDED METHODOLOGIES IN ON-LINE EDUCATION

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The Department of Educational Sciences of the Padova University<sup>1</sup>, together with CUOA foundation and ELEA s.p.a. (both involved in vocational training), participates as steering partner in the project about transfer of Best Practices: "**Open Trainer: blended methodologies in on-line education**" which started in September 2002 and will last until October 2003.

The best practice which is to be transferred intended to disseminate innovative didactical methodologies, that may make further education not only affordable to small firms as well but also acceptable for the inner organisation by integrating training in the working time.

## Main aims of the project

- to draw attention of firms and other organisations to the benefits of further learning
- to transfer the best practice of e learning models and to spread it over the Domain
- to create and educate a community of experts in e-learning methods who can utilise the strategy they learned, taking into account all potentials of collaborative learning.
- to give the participants of the learning process not only a structured organisation of knowledge in the e-learning matters but also some operative tools useful to act in the field.
- to produce proper tools for the observation of competencies and for monitoring on-line activities.
- to create criteria and standards for the evaluation of the education system.

The "open trainer", we intend to teach, should have some specific, well defined competencies, often completely different from those requested from a traditional trainer.

Compared to a traditional trainer our "open trainer" lacks all those tools which characterise the classroom but can take advantage from all those tools offered by the usage of multimedia and the net, and is able to adapt to the new educational situation.

Basically the cross-sectional competencies of the open trainer can be characterised as follows:

- integration with all the other actors involved in the learning process
- contextualisation of specific educational contents
- willingness to renounce the centrality of his/her role in the educational process
- readiness to update continuously his/her own competencies continuously

The training will not focus on content issues. The main focus of the programme will be e-learning methodologies. The basic criteria to select such methodologies is that they should be useful to extrapolate concrete tools. Such tools should prove to be applicable and useful within the working context in the short term.

Every proposed subject is intended to develop a specific competence:

DIAGNOSIS (what is e-learning, target analysis);

PLANNING (how the project aims the learning process; how to design learning; learning methodologies and tools);

REALIZATION AND DEVELOPMENT (actors of the learning process; learning environment; how to make materials for e-learning);

PROMOTION (promotion of ICT culture; techniques for using the net);

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<sup>1</sup> The research group involves prof. L. Galliani, prof. R. Costa, prof. R. Di Nubila and C. Dal Bon

DISSEMINATION (suggestions for students, teachers and firms; how to learn in a virtual community; motivation to learn; co-operative learning);

EVALUATION (monitoring in a learning process; on-line evaluation; definition of indicators and criteria; tools for monitoring and evaluating);

QUALITY APPROACHES AND RESEARCH OF EXPERIENCES (quality in e-learning; main Italian experiences in e-learning).

## Monitoring and evaluation

In order to reach the prefixed aims properly, it is necessary to operate a continuous monitoring of the course by appropriately selected tools.

The transfer of the best practices through the on-line activities is based on communicative processes distinct from those which characterise the traditional, face-to-face activity.

For these reasons, the monitoring methodologies traditionally used could not be assimilated to the on-line methods but it is necessary to build some new ones, based on the specific dynamics of the on-line education. In this specific case the monitoring activities have the aim to evaluate the learning process and the collaboration among the participants in terms of time spent on-line and the activities done.

There are five variables we need to observe for monitoring:

- level of construction of the virtual community
- level and modalities of knowledge attainment
- effectiveness of the adopted methodologies
- level of costumers' satisfaction
- level of platform usability

Tutors especially will be involved with monitoring the *level of construction of the community* during the whole learning period, while the planners of the course will be concerned with the *learning process* (methodologies adopted, level of satisfaction of costumers and the level of platform usability).

## Description of the tools

The tools to find out the variables of monitoring could be distinguished in two main sets:

1. qualitative tools: aimed to reach generic and comprehensive aspects (reports, comments on the quality box)
2. quantitative tools: collected to elaborate analysis (tests) and statistics

In our project we utilise:

- Questionnaires: could be either multiple choice tests or open-ended questions and could be utilised to monitor the different modalities of knowledge attainment (collaborative strategies), effectiveness of the methodologies, level of costumers' satisfaction and platform usability).
- Achievement test: useful to monitor the level of knowledge achieved in the different states of the learning process: initial, intermediate and final. These tests may accommodate several types of questions (true/false, multiple choices, multiple answers etc.).
- Observation schedules: could be a fast tool to collect certain elements. They may be used, for example, by the tutors to monitor the construction of the virtual community. Such schedules are filled in monthly.
- Reports: these are tools suitable to collect generic and qualitative information. For example after the first meeting in the presence of future open trainers the tutor could write a report about the cultural level of the community and the friendliness within it.
- Quality box: this is a tool built inside the platform where all kind of comments and suggestions – about any topic – can be collected. This allows to operate a qualitative and generic analysis regarding several aspects of the on-line process.

Follows the table with the description of the monitoring process which involve Tutors and Planners in three different stages, where the intended outputs can be observed.

	<b>TUTOR</b>	<b>PLANNERS</b>
<b>AT THE BEGINNING</b>	Informal <b>report</b> with indications of the following parameters: <ul style="list-style-type: none"> <li>• participants' familiarity with the net</li> <li>• sets of participants</li> <li>• cultural level of participants</li> </ul>	<b>Questionnaire</b> will be open – ended questions to measure the variable “methodological process” (realisation of a <b>report</b> ) Test to obtain an initial assessment (realisation of a <b>report</b> )
<b>EVERY MONTH</b>	<b>Schedule</b> filled with monitored aspects	Collection and analysis of the comments in the <b>quality box</b>
<b>HALFWAY</b>		<b>Achievement tests</b> to evaluate the knowledge achieved during the learning process (realisation of a <b>report</b> ) <b>Questionnaire</b> with closed questions to evaluate the variables “methodological approach” “effectiveness of the tutors' support” and “usability/satisfaction”. (realisation of a <b>report</b> )
<b>AT THE END</b>		<b>Achievement tests</b> to evaluate knowledge achieved at the end of the learning process (realisation of a <b>report</b> ) <b>Questionnaire</b> with closed questions to evaluate the variables “effectiveness of the tutors' support” and “usability/satisfaction”. (realisation of a <b>report</b> )
<b>AT THE CLOSING</b>	<b>Report</b> that could reassume all the aspects observed with the schedule	<b>Report</b> on comments collected with the “quality box”. Final <b>Report</b> on the results of the questionnaires about the variables “methodological approach” “effectiveness of the tutors' support” and „usability/satisfaction”.

As we obtain the outputs of the monitoring process it will be possible to disseminate a newsletter that informs all the actors of the learning process about the transfer of the best practice.

### **Proposal for a single model of Quality standards**

Finally, one of the aims of the project was to arrange several quality standards to evaluate the e-learning courses. The analysis and the synthesis of the best practices, either in national or international level, allowed us to develop an evaluation model. This model is constituted by ten domains and fifty quality standards.

### ***Domain 1: Accessibility***

- time needed by the users to access and read the web pages of the course (do we consider the way our users are connected? by modem, adsl ...are the web pages downloading fast?)
- usability of the e-learning platform (are there any maps to navigate on the web site? are the links and indications easy to understand? are the softwares used for the course known by the users?)
- availability of unusual softwares used within the course (is it easy to find and buy them? are there helpful guides to use them?)
- are there links or services that could inform users about connection costs? (how much does a medium user spend for the internet connection?)
- complexity of registration, access, payment procedures (is it easy and fast to register to the course? is it possible to register on-line and to have an immediate feedback? is the user given a secure password?)

### ***Domain 2: Technology***

- clarity on the roles of the course-staff (is there a person in charge of quality and technical matters?)
- availability of services that can quickly interfere in case of technical problems?
- reliability of the technological infrastructure
- continuous updating of the technological infrastructure and of the staff in charge of it
- does the institution that runs the course use an independent platform for e-learning courses? (are they allowed to use and update the software independently?)

### ***Domain 3: Instructional Design and Course Development***

- development or possibility of substantial changes in the course by the institution that runs them
- possibility of obtaining information on the educational needs of the prospective users
- adoption of proceedings for a periodic revision of courses which are periodically repeated
- courses can be tailor-made according to participants' needs
- implementation of initial, intermediate and final testing
- adaptation of the e-learning environment design to the course aims and contents

### ***Domain 4: Contents***

- consistency in terms of course contents, media and on-line editing
- regular content updating
- are there clear and verifiable information available about the content-source and authorship (copyright)?
- contents can be analysed from different points of view
- the whole set of contents was designed and structured specifically for the course
- contents that are acquired from external sources have been produced by specialised and certified producers

### ***Domain 5: Instruction and Instructors***

- are the teachers/tutors knowledgeable and competent concerning educational technologies before being appointed?
- design of programme aimed at teacher/tutor training
- continuous monitoring activities concerning the meaning referred to the teaching/tutoring activities by the participants
- teachers/tutors will be provided with a time-schedule and ad-hoc tools in order to perform self-evaluation activities including feed-back from participants
- personnel available according to users/participants' needs



### ***Domain 6: Student Services***

- counselling and advising should be available to distance learning students at the same level as for students in more traditional environments
- are there any diagnostic tests to assess if students have the knowledge required to attend the on-line course?
- distance students should be given advance information about course requirements, equipment, and techniques needed in a distance learning environment, as well as technical training and support throughout the course in order to allow success
- is there a learning contract with each user?
- adoption of an efficient communication and feedback system, (user-institution, user-teacher/tutor, user-user)
- arrangement of tools that the students can use to evaluate the offered services
- it is expected to do a follow-up after the end of the course to check if the course affected the students' professional positions

### ***Domain 7: Security***

- adoption of security software (antivirus, firewall...)
- adoption of an effective password system to access the database and the e-learning platform
- adoption of clear system to protect privacy
- continuous monitoring of the web sites linked from the platform

### ***Domain 8: Evaluation/Certification***

- does the institution have the certification needed for the services offered?
- are the proposed contents accredited?
- is the security system evaluated?
- adoption of a self evaluation system

### ***Domain 9: Institutional Commitment***

- has the institution already experienced provision on-line courses
- advertising on the proposed courses
- making the previous experiences and the results visible to the prospective users
- partnership or co-operation with research institutions on the pilot projects
- links to various useful on-line services

### ***Domain 10: Research Net***

- sharing of the achieved results and the utilised methodologies
- does the institution participate pilot projects?
- sharing of reports, results, data about each course to be utilised for any comparison

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# THE SWEDISH NET UNIVERSITY, QUALITY ISSUES

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## **Widening the distance education market**

In 2002, the Swedish Net University was established as a separate agency for higher education through a decision by the Swedish Government. The primary task for the agency is to co-ordinate the different distance courses and study programmes offered by Swedish universities and to support the development of ICT-supported distance education. The Swedish Net University mainly aims at widening the distance education market in Sweden.

Participation within the Net University is voluntary for Swedish universities and university colleges. However, most universities participate. The Net University is planned to be a strong brand name for Swedish distance education provided by Swedish universities.

The agency has an annual budget of about 35 million SEK (c. 3.5 million Euro). Most of this funding will be spent on improving skills and competence among distance education teachers and other personnel. Resources will also be devoted to identifying topics and areas that benefit from distance education in general. Furthermore, the agency runs and develops the web-based platform where the Swedish Net University and its courses are presented.

## **Working with quality issues**

In the autumn of 2002, a committee consisting of university faculty and administrators was set up by the Net University Agency in order to work out proposals for quality criteria within the Net University. The proposals are to be presented to the Board of the Net University during the spring of 2003. If approved, the proposal will be remitted to participating universities and university colleges for further discussion.

The faculty boards at participating Swedish universities are responsible for the quality of the education offered within the Net University system. This implies that participating institutions will assess the quality of the courses delivered on the net according to the same standards used for campus courses. Furthermore, the Swedish National Agency for Higher Education has to examine and support the quality of all higher education, including web-based teaching. In other words, the same demands on quality will be placed on the courses given within the Net University system as on higher education in general.

The work of the quality committee has focused on four goals formulated in the 2002 government bill for the Net University. These are: 1) accessibility, 2) recruitment, 3) combining courses from different universities and 4) pedagogic development. The political aim of the bill specifies that students should be able to take part in higher education regardless of time and geographical location. Students' needs should govern the organization of the courses. It is important that the institution of higher education is there to guide, support and give an administrative structure to the studies. It is also a political ambition to make it possible for students with no experience of higher education to take part of courses, as well as making further education and training possible for students without geographical relocation.

Another aspect of the possibilities of attending courses at different universities within the Net University is that it must be possible to combine courses for a final degree and to combine campus courses with net courses. The last point further stresses the importance of developing the pedagogy for ICT-supported education.

The aim of the committee has been to formulate recommendations for boards at different levels within the participating universities. These recommendations focus on the processes and systems that are important for high quality ICT-supported distance education. The committee has thus adopted the method and terminology of the so-called Quality Audit system.

## The structure of quality recommendations

The structure of our recommendations is threefold. The first part is concerned with conditions at the department or university. The second part concentrates on e-learning services and material. The third part deals with monitoring and outcome. This is a common structure for quality studies.

### *Part 1. Organizational prerequisites*

**Accessibility** has to do both with flexibility and the use of ICT. Courses within the Net University should be arranged in such a way that students can participate, with regards to flexibility in time and geography. The ICT-support should be chosen with regard to target groups and the students should receive instruction and support concerning the kind of technology that is used within the frame of the course.

**Recruitment** should be widened, which means that support and guidance should be offered to groups without a background in higher education and to groups outside of traditional fields of social recruitment. This could be achieved in cooperation with the study centres that are established in nearly all Swedish municipalities. Furthermore, using the possibilities that ICT offers, support should be given to the recruitment of disabled students.

When it comes to **combining courses** from different universities it is important that participating universities set up good systems and it is equally important that courses and study programmes within the Net University can offer both specialization and general courses. University participation in offering courses furthermore ensures diversity in the range of courses given.

Another aspect has to do with the **qualifications** needed for the Net University courses. At the managerial levels, there has to be both development plans and a good understanding of the possibilities of ICT-based distance education as well as teacher training combining pedagogics and ICT and teacher training teams with knowledge from different fields, such as academic specialists and educational technologists. Librarians, study counsellors, IT specialists and all those involved in ICT-supported distance teaching should be offered some kind of in-house training. Finally, **student participation** must remain an important aspect of the teaching process.

The **technical support** offered to both students and teachers must be easily accessible. **Library services** and study **counselling** must be provided for participating distance students.

### *Part 2. E-learning services and materials*

The Net University should disseminate a pedagogy that supports flexible learning. It should also support training and development for the systematic evaluation of the teaching and learning process and evaluation of environments that work and are useful in ICT-supported education.

ICT-supported education does not only mean new possibilities for students to take part in higher education, but will also require new student competencies. Students must be able to use the technology and have sufficient previous knowledge of the field. They must further have enough time for their studies and previous training and experience should be taken into account when setting up courses.

Courses and programmes offered by the Net University should be part of the educational mission to contribute to a higher level of knowledge in society. This will require coordination of the courses and programmes offered.

How should classes be taught? Every educational reform has brought about a more heterogeneous student group and the pedagogic answer has been more individualised teaching. Nowadays teaching and learning must be understood as a social practice. We talk about socio-cognition, a socio-cultural perspective on teaching and learning, situated learning and learning as participation in a social practice. The individual is regarded as an active learning person who is interacting with others. This means that the teacher no longer should transmit knowledge, but instead should organize "learning environment" and guide or supervise the students. Thus, there is no specific pedagogic method that will work in all educational situations.

Teachers, however, are responsible for what and how students learn. The difference between campus courses and web-based courses is that the interaction between teachers and students and among students is mainly carried out on the net and mainly in written form.

Distance education hence requires other skills than campus studies. Students must be able to use the computer and must know how to use written communication in order to interact with the teacher and other students.

Furthermore, it is important to underline the fact that the exam must be part of the learning process and should be adapted to different courses. Finally, the same quality demands must apply to all kinds of higher education.

### ***Part 3. Monitoring and outcomes***

There has to be statistics relating the number of courses given, the number of students and their results, to relevant educational fields in the same way as for campus courses. Preferably, these accounts should be published in annual reports.

Combined with external evaluations, there has to be continuous students' assessments and self evaluations by the teachers responsible for the courses.

The most important part of the self-evaluation process is nevertheless the one continuously carried out by those responsible for the ICT-supported courses and programmes related to the criteria that have been formulated. The important question will be "How?" How do we know if our aims have been fulfilled? How do we go about it? This process of self-reflection could be part of the evaluations made by the Swedish National Agency for Higher Education.

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# KEEPING IT UP TO SCRATCH MAINTAINING THE QUALITY OF A LARGE SCALE CPD PROJECT IN THE UK

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## Section I - Context

In 1998 a project was conceived with the aim of developing the skills of teachers, librarians, and head teachers in the use of Information and Communication Technology (ICT) in the teaching of either their subject (secondary, ages 11-16) or English, Mathematics and Science (primary, ages 4-11). This project was to be funded by the UK national lottery and administered by the New Opportunities Fund (NOF) and the Teacher Training Agency (TTA). The programme focussed on bringing practising teachers to the level of ICT knowledge, skills and understanding expected of newly qualified teachers (NQTs) as outlined in DfEE circular 4/98b. Its aim was to:

*“to bring together the very best practice from industry and education to secure the highest quality training and development”<sup>1</sup>*

This would involve mobilising the majority of teacher educators and professional development organisations with experience of ICT, in itself a changing and developing area. This professional development programme is on a par with the introduction of the new National Curriculum (NC) in 1988 in terms of size but even greater in expectations and the NC was an introduction of new content mostly developing assessment and content within the methodology and pedagogy that would be for many existing professional practice. The NOF ICT programme would expect teachers to explore new methods and pedagogies of teaching that would challenge, extent and possibly transform their existing practice.

This was to be a huge undertaking, about 400,000 teachers would have to undertake a professional development programme between September 1999 and March 2003 (although this was later extended until December 2003).

*“The NoF (ICT) training programme has been the most complex initiative for CPD of teachers and librarians ever undertaken in the UK”<sup>2</sup>*

To facilitate this the Department for Education and Employment (DfEE) later the Department for Education and Skills (DfES) put the project in the hands of the TTA who asked for PD organisations to tender for the contracts on either a local or a regional basis. A handbook of these proposals was developed and sent to schools in the spring of 1999, this book, which became known as the red book, was to be used by schools and Local Education Authorities (LEAs) to aid them in choosing a trainer that was suitable for their needs. A school did not have to opt for just one trainer, though many did especially in the primary sector and the choice was the schools not their LEA – though many were guided by the LEA. Funding was allocated to schools based on the number of full time equivalent teachers (FTEs) and on schools size. This averaged at about £450 (€700) per teacher or librarian. 47 organisations were accepted as approved training providers (APTs) and any school would have had a choice of at least 6. The Learning Schools Programme (LSP) opted to offer PD for primary, all secondary subjects and librarians but not for schools for Moderate or Severe learning difficulties (SLD/ELD) and to offer training in all 4 of the constituent

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<sup>1</sup> New Opportunities Fund Lottery-Funded ICT Training Programme for Serving Teachers: Specification for the Approval of Training Providers TTA (DEE) p.3

<sup>2</sup> From The NOF progress report – September 2002

parts of the UK (England, Wales, Scotland and Northern Ireland), this would mean ‘versioning’ of the materials as the educational curricula differ in each of these areas.

Participation in the CPD was voluntary; those taking part were expected to do so because they had identified a need for the PD, or to confirm that they already had the requisite skills, understanding and knowledge. Each teacher or librarian would be expected to reach a number of Expected Outcomes (the same as those expected of teacher trainees) which were subdivided into 4 areas of practice: planning, teaching, assessing and professional practice.

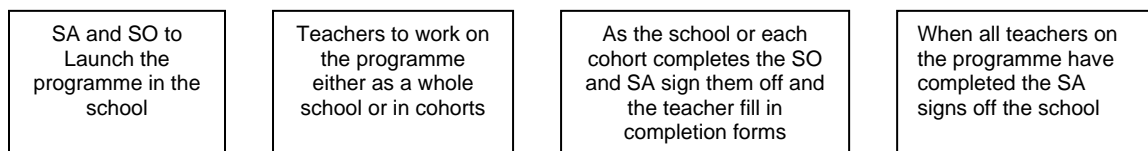
### **The Learning Schools Programme (LSP) Model**

A partnership was formed between the Open University (OU) (a public education body) and Research Machines (RM) (a private company and supplier of educational hardware and software) to form the **Learning Schools Programme™**. The OU would be responsible for the production of the pedagogic strategies, the learning model and the electronic support of the teachers as well as the Quality Assurance of the programme. RM was to be responsible for the re-production and distribution of materials and managing the network of partners who would themselves manage the training in schools. These training partners were mostly formed with the established education authorities<sup>3</sup> (EAs) and 120 of the 150 LEAs in the UK formed partnerships with LSP. In areas where the EA was unwilling to form a partnership LSPANs (LSP Area Networks) were developed with private consortia.

The pedagogic model developed was one of ‘supported self-study’ a model of learning that the OU had operated highly successfully in the delivery of their courses for over 20 years. Each teacher would be given a set of subject (or phase) based print and electronic materials, have access to an electronic conference for peer and tutor support and have, at least, two face to face meetings with a tutor experience in the use of ICT to develop subject (or phase) teaching. Also in each school a teacher would be appointed as the ‘School Organizer’ (SO) this person would be the first point of support for teachers in that institution and would liaise with the School Adviser and Teacher Advisers from the Local Authority.

The approved support partners were to manage the face-to-face aspect of the training by providing the ‘Teacher Advisors’ (TAs). These would be teachers or advisors with expertise in the use of ICT as a teaching methodology and would deliver subject (or phase focused) CPD sessions to teachers within the approved partner’s territory, ‘School Advisors’ (SAs) would handle the administration and management of both these TAs and also be the first point of support for the SOs in the individual schools. In overall charge of the programme within the support partner would be the Key Contact (KC) (often in EAs the officer responsible for ICT).

There was little direction in the original model on **how** the teacher was to progress through the programme, this being left to the discretion of the teacher (or department or school). However each school was expected to follow a model (shown below). It was the responsibility of the SO, supported by the SA, to ensure that this happened.



When all schools in the support have finished the KC would then be responsible for completing the documentation to ‘sign off’ the support partner (this was not expected before 2003).

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<sup>3</sup> These differ in both name and function across the United Kingdom. In England and Wales they are known as Local Education Authorities (LEA), in Scotland Education Authorities (EA) and in Northern Ireland Education and Library Boards (ELB)

## Section II - The Quality Assurance model

The OU was responsible to an external agency for the Quality Assurance (QA) of the programme<sup>4</sup>. A framework for the QA of NOF was developed by the TTA (Appendix 1) and this formed the basis of the OU's QA framework. Those undertaking the QA were required to show:

*“rigorous internal quality assurance mechanisms to ensure that their training is of a high standard, meets the needs of schools and their teachers and consistently meets the criteria set out”<sup>5</sup>*

The OU was to be responsible for the QA of: the print and electronic materials, the delivery of face-to-face training, the administration of the programme and the electronic conferencing environment – all of which would inform the key question of the quality of the programme in enabling teachers to reach the expected outcomes of the programme and to ‘complete’. This was set out in the following aims:

The QA process will, in particular, monitor and review:

- A. The appropriateness and effectiveness of the training materials (c.f. 4.2 National Framework)
- B. The structure and effective implementation of all forms of local and national support structures (including face-to-face and on-line) that assist teachers and school librarians to effectively use the training materials to achieve the expected outcomes (c.f. 5.7 & 5.8 National Framework)
- C. The progress made by teachers and school librarians to achieve the knowledge, understanding and skills set set out in the Expected Outcomes of Training (c.f. 5.5 National Framework)
- D. The effectiveness of the management and administration arrangements put in place by the LSP (c.f. 5.9 National Framework)
- E. The QA systems set in place for A-D above (self QA) (c.f. 5.10 National Framework)

This was to be achieved by:

1. A system of reporting by the LEA and LSPAN partners on the programme on a bi-annual basis. These reports to be devised by LSP to monitor A-D (above) (see also the QA cycle later)
2. Analysis of evaluation data from completion / evaluation forms from teachers and School Organizers and data from the First Class (CMC) conferences.
3. Visits to schools and the Key Contacts (KCs) in each partner on an annual basis and the setting, and evaluation of targets, based on the school visits and the data from completed teachers.<sup>6</sup>

### The QA process

A broad range of approaches was employed to effect this commitment. Some, such as the quality assurance visits to schools and to support partners were entirely specific to the Programme, requiring fresh administrative structures and supporting documentation. Other approaches capitalised upon the very clear quality assurance mechanisms that underpinned the work of each central partner. The Open University, for example, had extremely rigorous guidelines to underpin the production of its learning materials and a long established expertise in pedagogy.

In devising its Quality Assurance Framework, the Learning Schools recognised the importance of clearly defined statements of individual responsibility. Built around the concept of networks of local Advisers

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<sup>4</sup> This again was country dependant in England the Teacher Training Agency (TTA), in Wales the Standards Division of the Welsh Assembly, in Scotland Her Majesty's Inspector for Education (HMIE) and in Northern Ireland the Education Technology Strategy Management Group NI

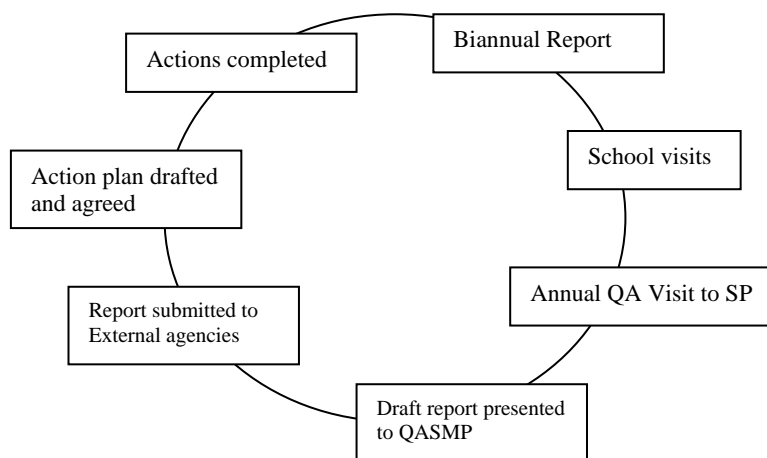
<sup>5</sup> New Opportunities Fund Lottery-Funded ICT Training Programme for Serving Teachers Specification for the Approval of Training Providers TTA (DEE) p.6

<sup>6</sup> The QA visitors were to be recruited from both staff within the Open University and outside and were all experienced in either the programme or in Quality Assurance processes

consulting and negotiating a CPD package tailored to the needs of all or part of a school staff there were many stakeholders in the QA process. This made it important for explicit statements of responsibility to be set out at central Programme team level, at local adviser network level and at schools level. In terms of the latter these were further defined in terms relating to the whole school and then more specifically, the School Organizer and Senior Management Team.

Monitoring and evaluating key elements in the design and implementation of the Programme generated large amounts of raw data. It was vitally important to analyse, disseminate and use this data to effect continual improvement. Through a series of networks, groups and panels involving trainers and teachers, the Programme sought to create a Quality Assurance Cycle. Such a cycle had to work in such a way that it met commonly identified needs and interests, as well as those specific to individual countries. It would also have to be sufficiently flexible to respond to the rigours of the central quality assurance carried out by the separate bodies of specialist assessors operating in England, Northern Ireland, Scotland and Wales on behalf of NOF.

### LSP REPORTING CYCLE



The QA cycle is best understood within a chronological framework. Each QA cycle took place within the academic year, with issues raised by both internal and external QA feeding into changes within the programmes, and into the next cycle of QA.

The information gathered from these activities was further supplemented by data collected from FirstClass conference usage; completion data from schools and reports from the OPM schools database<sup>7</sup>. Issues raised from all these activities formed part of the discussion with each Support Partner.

Year	Dates of visits	Expectations	Visits to SPs	Visits to Schools
1999-2000	May - June 2000	1 bi-annual report	27	39
	Oct - Dec 2000		69	150
2000-2001	Jan – May 2001 plus visits to subject departments in schools	2 bi-annual reports	115	227 (+50 subject visits)
2001-2002	May – July 2002	2 bi-annual reports	120	233
2002-2003	plus additional visits to schools Nov 02 – Feb 03	1 bi-annual + final programme report <sup>8</sup>	? <sup>9</sup>	66
			<b>331</b>	<b>765</b>

<sup>7</sup> This database was developed by RM to track the status of schools on the programme as part of the QA process

<sup>8</sup> It was felt that the bi-annual did not 'tie up' the programme sufficiently – this report may be supplemented by a telephone interview

<sup>9</sup> This will be determined by the issues raised in the final round of bi-annual reports



In conjunction with the internal QA procedures was an external process, undertaken by QA bodies in each of the four countries (England, Scotland, Northern Ireland and Wales) in which LSP operated. The findings of this external QA process, and its effect on LSP QA procedures, particularly in the second and third years of the Programme, is detailed in the analysis below.

Writing in a period of profound change in the welfare services, Pfeffer and Coote observed that whilst everyone *seems to be talking about* quality, the concept itself is *slippery and the meaning elusive*. They suggested three reasons for this: firstly that it was put to different uses to serve different purposes; secondly that it could be highly subjective; and thirdly that whilst often applied to a process what matters ultimately is the outcome. For some, Pfeffer and Coote argued, the chief concern would be value for money<sup>10</sup>. It was for the quality assurance team to get to grips with this *slippery* concept.

### **Section III - Changes in the programme as a result of the QA process**

#### ***1999 – 2000***

Whilst some teachers did begin the programme in September 1999 most of those in the initial phase began in January 2000. The first visits to schools took place in May of 2000. Evidence was gathered from these school visits and in the feedback from Teacher and School Advisors and the main critique of the programme reported by these mechanisms, and in feedback from teachers on the conferences, was that they found the print materials overwhelming in volume and difficult to navigate. Teachers reported that they were unsure what they ‘had to do’ in order to complete the programme.

As a response to this major problem a decision was made to re-package rather than re-write the materials as it was felt that the criticism was in the presentation not the quality of the materials. This re-packaging would create routes through the multimedia resources and highlight links between the Professional Development Record (PDR), professional tasks and subject resources.

This meant two fundamental changes to the materials, which were introduced in the second year of the Programme:

1. Repackaging the print materials from a single large folder with sub-sections into 5 individual booklets (one subject / phase support booklet and 4 generic support booklets)
2. Introduction of Routeway cards, subject programme guide and professional subject tasks linking through from subject materials to Professional Development Record.

#### ***2000 – 2001***

A significant element in the creation of the programme was the use of Computer Mediated Conferencing (CMC) and the course web-site. Feedback from teacher completion forms, school and SP visits showed that use of these parts of the programme were lower than both hoped and expected. External QA bodies found that additional materials were required to support different subject areas, and that materials should reflect curriculum differences between the four countries. They also reported that there needed to be better monitoring methods for schools on LSP.

As a response to this it was decided to re-design the support website to both better reflect current web-site design and also to provide a simpler vehicle for additional, country versioned, curriculum materials. It was also decided to design and implement a more sophisticated database to track the progress of all the schools through the programme.

This meant a number of changes to the structure and management of the programme; these were introduced over the next 6 months:

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<sup>10</sup> N. Pfeffer and A. Coote, *Is quality good for you?: a critical review of quality assurance in welfare services* (London; Institute for Public Policy Research, 1991, Social Policy Paper No. 5), p.1

1. RM designed and implemented the OPM (On Programme Management) database which tracked the status and support provided to all schools on the programme
2. The OU re-designed the website which as well as a simpler link to the CMC provision also offered country specific guidance to the programme, a range of additional and more recent curriculum exemplars, newsletters to keep teachers informed of new developments and a teachers' cupboard of curriculum support materials (Scotland only).

### **2001 – 2002**

As the number of schools in the programme increased well above the initial planning projections the provision of Teacher Advisor (TA) support, especially in the secondary sector where support was provided on a subject specific basis, was identified as a major issue, by the internal QA processes, in a number of support partners, especially the LSPANs. This finding was strengthened by similar findings from the external QA bodies.

This was a serious concern as the partnership between the 'central team' of RM and LSP and the support partners was vital to providing successful professional development. RM and OU could not provide the face-to-face support and day-to-day management of over 140,000 teachers in 7,000 schools over 100 support partners. This had always been the contractual responsibility of the EAs.

Three processes were introduced as a result of this feedback:

1. A tighter contractual structure was imposed on the SP as they booked schools onto the programme as each school, or cohort, had to sign up to a structured 20 week programme with dates of face-to-face support agreed in advance. This was managed as part of the OPM database system.
2. A number of 'School Consultants' were employed to work with 'struggling' schools in a cluster of SPs. These would support the SO in the first instance though they would also some deliver face-to-face support.
3. The SP was required to identify in their bi-annual reporting the status of all schools in their authority (this was previously only an internal SP requirement) and to identify in the case of 'slipping' schools the remedial strategies being used.

## **Section IV – Reflections on the process**

The QA process created by the Learning Schools Programme sought to reflect both internal and external QA structures and systems (c.f. QA cycle above). In responding to issues as they have arisen, the cycle of QA envisaged in the original framework has therefore had to show itself to be flexible and evolutionary in its implementation. The issues that have arisen in relation to the QA process can be summarised in three ways: the flexibility and responsiveness of the QA process, liaising with stakeholders, and 'making things happen'.

### ***Flexibility and responsiveness***

The focus of the QA process was not fixed during the course of the programme. As each round took place, so the focus and activity shifted as issues were identified. In the earlier rounds face-to-face meetings were conducted as the programme increased in size, and the number of visits multiplied, the sheer size and scope of the QA process became an issue<sup>11</sup> and so the procedures needed to be revised. The use of telephone interviewing allowed a more efficient use of time and the results suggested that there was little difference in the quality or amount of data collected; similarly questionnaires were used in the second round of QA. While a degree of consistency was important in the documentation this was also altered to reflect the changing needs and concerns of all stakeholders in the QA process. While the emphasis within the process was still on personal visits to schools, reflecting the requirements of the original framework, it does suggest that there scope for other methods to be used for QA.

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<sup>11</sup> Initial projections were for 30,000 teachers in 1,500 schools by 2002 this had increased to almost 150,000 teachers in 7,000 schools.

### ***Liaising with stakeholders***

The relationship that developed between LSP and the various stakeholders in the programme, including teachers, School Organizers, support partners, and external QA agencies, presented particular challenges to the QA process, but ultimately was an important factor in the flexibility and success of this process.

As the Programme progressed, the QA process had to be adapted in the light of findings from previous QA rounds, and, in particular requirements from national QA bodies. Concern about the level of support offered to teachers on the Programme, primarily raised at secondary level, led to an adaptation of the second round of QA to include Heads of Departments as well as School Organizers. Requirements from external QA bodies have also, more recently, placed the focus of QA on the number of teachers completing the programme, and the quality of outcome of the training. This has resulted in a shift in focus of the current QA towards measuring and assessing progress made by teachers on the Programme. The consequence of these measures has meant that the scope of QA has to be much broader than was originally conceptualized.

The role of the School Organizer within the Learning Schools Programme placed him/her in a 'go between' situation between the teachers in the schools and the support infrastructure offered by the programme. It became apparent that this role made it difficult for some School Organizers to express concerns felt by teachers at the level of support. The inclusion of teachers and Heads of Department in the QA process meant that concerns expressed at teacher level could be reflected in the QA reporting process.

### ***Making things happen***

An important test of the QA process was its capacity to make things happen. In some areas of activity this has been straightforward. The decision after the first round of QA to alter the materials, and to introduce the Routeway cards, came as a direct result of the feedback from teachers. The speed at which this occurred, and resultant change in feedback from teachers, was an indication of the success of QA procedures within LSP and the OU, and their capacity to implement change.

In later rounds of QA the capacity of LSP to implement change was in part restricted by the QA procedure itself. The confidentiality of QA respondents was a fundamental factor within the QA process. However, where QA procedures revealed grave problems at school level, the confidentiality of respondents made it particularly difficult to share these issues with support partners. In the light of this concern, the QA form used in schools was changed to incorporate a separate, optional section whereby comments made by the school could be forwarded to the relevant support partner. This provided the means for the QA process to be effective at micro as well macro level. The confidentiality of the remainder of the form, and therefore the anonymity of the schools, continued to be assured.

## **Conclusions**

The development of a QA procedure to ensure the quality of a programme of this size has been a complex and organic development. The additional complexity of the number of interested parties and the difficulties in intermeshing the internal and external requirements – neither of which have been static across the life of the programme, has meant the development of a flexible, adaptive and responsive QA process. This was especially needed as the programme was so much more successful that the original projections (over 4 times as many teachers received CPD as originally planned) and in an area (Information and Communication Technology) that itself has developed and changed significantly in the 5 years since the programme was conceptualized.

Almost 1100 **internal** visits have been undertaken to schools and to Support Partners since the beginning of the programme along with the analysis of over 70,000 completion forms. Feedback on the process has been collected from all the stakeholders in the programme from the classroom teacher to the country representatives. The duty of any QA process must be to maintain the quality of the programme it is assuring and we can be confident that the Learning Schools Programme has been informative, substantive and relevant to the teachers it has served.

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# CHANGE MODELS FOR E-LEARNING SCHOOLS: A QUALITY INITIATIVE FOR THE BEST

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## Introduction

The transformation to a knowledge based society implicates a clear framework for teaching and learning issues to promote individualisation of learning processes, self organisation of learners or new methods of e-learning or blended learning. In this field of didactic innovation the role of the European level (decisions of the European Council in Feira, spring 2000; five benchmarks for education and training systems in Europe to 2010, EU-Commission, COM (2002) 629 in November 2002) is just as important as then “old” national conditions of the Austrian school system (thematic programmes, vocational drift of schools, different school forms from grade 9). Collaboration ideas of “school clusters” in coincidence with co-operation models with the middle and eastern European countries will be an important figure for the future.

## The Austrian E-Fit initiative

A government initiative in Austria from 2001 to 2003 meets this challenge and has created and initiated a number of projects and perspectives for schools, colleges and universities. Branding “eFit-Austria” ([www.efit.at](http://www.efit.at)), a support programme with about 30 Million Euro was established, where pupils, students, teachers and educational institutions as a whole can participate. Typical topics of this initiative are:

- The campaign “New media in teaching at schools and universities” with platforms and courses for e-learning and internet skills for teachers and a project application procedure for university teachers and institutes;
- A support structure (funding, organisation, evaluation) for e-learning projects of educational institutions (also adult education) and student groups;
- An electronic learning portal [www.bildung.at](http://www.bildung.at), where community building and content providing is managed;
- An approach to reshape the informatics studies at Austrian universities has been established (informatics bachelor, master and teacher-training studies at five universities form a computer-science-cluster; about fifteen new Fachhochschul-study courses were founded; two electronic new media centres in Graz und Innsbruck were developed);
- With regard to private-public-partnerships there is an intensive co-operation to provide internationally acknowledged IT-industry certificates like Network Academies, Networking operation systems, ERP-Software and Internet-script languages (JAVA, PHP, ASP, ...) for students (even young students from the age of 16 on);
- Specific actions in the sector of informatics: thus an Open source software initiative was launched in December 2002 to promote working with software like LINUX, Staroffice or shareware learning platforms. A certificate for students and teachers will rise the acceptance of “free software” and support training structures.

The recent development in learning was focused on the transformation from instruction to problem solving. The higher independence of the learner from teacher instruction or fixed learning programmes due to behaviouristic ideas changed to elements of cognitivistic or constructivistic learning. Not only teacher-pupil interaction but also learning in learning environments or professional support structures (simulation of real working places) determines the learning culture more and more. Concepts from the beginning of the last century like Daltonplan or “Arbeitschul”-concepts (in new forms) are recovered. The model of “training firms” at school (grade 10 to 13) is one of the success stories of the Austrian vocational school system.

In terms of quality thinking a change process of an old top-down education administration (rigid laws, strict workflow between ministry, local boards and schools, single interpretation of decisions) must be changed to quality circles with a “reflecting” learning culture. Schools are regarded to be pedagogical service companies in non profit markets, which should reflect the possibilities of globalisation (global information transfer, global information software, ...), of knowledge based production and rising significance of acting in regional areas. An offensive transformation culture must help to start and support this changing process to foster regional development in a national framework with the result that educational institutions can develop to e-learning schools based on regional decision processes within this framework defined on a national level.

Therefore a model was initiated in Austria, called e-Learning Cluster, where model schools in each of the Austrian provinces collaborate in clusters to implement practical models of e-Learning. These clusters are based on a national framework which is defined, supervised and financed by the Austrian Ministry for Education, Science and Culture.

### **Eight targets for e-learning schools**

In an e-learning school eight targets must be reached and should be tied to leading principles of the school-programme. The participation in the e-learning-Cluster project is connected with these eight critical success factors:

- **Every pupil/student can test “e-learning sequences” in the next two years;**

Successful transformation of schooling processes must be reflected in the learning process. The first parameter of change must have to do with teaching students in lessons. Every learner has to find his position in reflecting e-learning processes. Therefore lessons of about 4 weeks with e-content must be offered to every student at the age 15 to 19.

- **All teachers should get experience with e-learning sequences in their subjects;**

The most challenging aim is to convince a qualified majority of teachers in a school to implement practical models in e-learning. The next aim is that all stakeholders of the school must deal with this new demand.

- **Teams of teachers work on a programme to find possibilities and limits of e-learning methods and materials in their subjects;**

This parameter is a measure for the team performance. e-Learning calls for teamwork among teachers in classrooms and in their subjects. A professional organisation with community platforms (e.g. Quickplace) or learning management systems (Blackboard, WeLearn, Sitos, ...) makes it easier to communicate without restriction of time and place. The production of “e-learning-sequences” requires a high level of co-operation among teachers.

- **Good school experience is developed together in regional networks: Some pioneer-schools test e-learning environments (e.g. learning platforms, content creation tools) and share the experiences with others;**

New ways of co-operation must also be found on the level of school management. The education cluster forms the organisational frame of this interdisciplinary collaboration.

- **School programmes are made with an integration of e-learning in their lectures and exams;**

The e-learning organisation must be integrated in the school programme (middle- and short-term targets and change parameters). The school programme is the basis for annual operative targets and controlling. Innovation in learning processes has to be integrated in an annual programme. e-learning must become an element of all days routine!

- **The principals and headteachers find it quite important to support this e-learning integration process in all subjects; the cluster project has a high priority in the “daily school reality”;**

On the whole, professional leadership is the critical success factor. Evaluation processes of e-learning notebook classes demonstrated that only schools with a positive and clear leadership and a support structure have the chance to adopt a stable innovative structure.

- **A steering group of the school partners (teachers, students, sometimes parents) is established to support content and didactic development, to co-ordinate initiatives in disciplines and subjects and to control the progress of the work;**

Principals are very often occupied with administrative tasks and can therefore hardly be made responsible for every innovation at school. Therefore a steering group must undertake the organisation of projects, in particular the introduction and implementation of e-Learning requires a group of motivated and initiative teachers.

- **Cluster schools are working in networks (technically and as organisation principle) and offer their students (and teachers) additional certified qualifications IT- and e-learning skills and knowledge (basic IT-Skills like the ECDL; alternative operating systems like LINUX; technical networking like CISCO-certificates; JAVA-programmer; network operating systems like MCSE; specific ERP-Software like SAP/R3; operating and co-ordinating e-learning content with learning platforms).**

The school must offer non-mandatory promotion of advanced information technology skills of students and didactic approaches for the teachers. It could be a programme for talents and can integrate professional reality in schools. Typical IT-certificates like ECDL-advanced, network academy, ERP-systems, Open source knowledge (LINUX, learning platforms), networking operation systems or script languages should be offered.

## House of learning

Dreaming of the best of all schools has to do with specific idealistic concepts. One of the most impressive symbols of this new learning culture is the house of learning: In this house with multimedia devices, e-learning environments and bilingual workplaces not only the student-teacher interaction in lessons is important, but also self-organised project work of the students, discussion sessions, culture, theatre, workshops or excursions to sights and companies.

A framework of provisions has to be defined to realise this educational concept:

- The learning process with personal impact is a quite serious target for every student;
- Not only single lessons, but blocking instruction and project work with their specific dynamics;
- Clear targets and issues of the learning organisation, written down in a school programme;
- National syllabus with “European inspiration”, half of the subjects defined by national law, half of them worked out at the school level (school profile);
- Project management and organisation like an SME; definition of success factors for lessons and school management;
- Exchange of good practice between schools in an area (databased, action research) and mutual visits of lessons;
- Principles and head teachers duration is restricted (6 years); a further period depends on the approval of the school partnership. Flexible hiring and flexible personal management at school;
- Evaluation of an annual school programme;
- Global budget of the school; investments can be made flexible, but must be discussed with all school partners; swing between personal costs and device- and material costs;

- School should be a regional centre of education (organising events, courses to learn languages or specific skills for everybody, adult education in the evenings).

Some recent methods of self organised learning and action learning should help to apply these principles to the organisation of the learning processes at school (see H. Klippert, *Eigenverantwortliches Arbeiten und Lernen*, Weinheim 2001 or F. Gramlinger, *die Übungsfirma auf dem Weg zur Lernfirma*, Bergisch Gladbach 2000 or H. Eichelberger, *Einführung in die Daltonplan-Pädagogik*, Innsbruck, 2002).

An important trace of this development in structuring educational institutions is the initiative “Quality in schools”, where methods of quality assurance and management development from enterprises have been applied to schools and adult education ([www.qis.at](http://www.qis.at)). The target of this initiative is establishing a school development plan or programme for every place. Up to now evaluation principles and evaluation tools for different situations in course-management, personal management, good practice of teaching or partnerships between schools and companies were published (QIS see above) and schools joined to quality networks, using different methods for communicating and founding new processes. Soon it has come apparent that some main types of innovation form new targets in the upper secondary field: e-Learning Courses, bilingual courses and emphasis on some specific professional education (e.g. media, tourism, business, electronics, informatics, architecture).

The main track of the next two years of development is just clear: There will be a decision “e-learning classes as an offer for all parents and students from grade 10 +, but not as a compulsory programme” and “e-learning-schools with specific profiles and specific content for some”. A hot discussion of all partners at schools (teachers, parents, students) will begin now and the result of this discussion will have an impact on the legal frames of learning culture until the end of 2003. More motivation concepts for the teaching staffs are needed and a broad e-learning-content development has to begin. The regional clusters will transform to regional education centres (RECs) with e-learning offers for all citizens, not only for “their” students.

## **Transformation processes of enterprises and schools**

In real economy the word “cluster” means a geographical concentration of connected companies or institutions. They compete with each other, but they can profit from limited know-how acquisition, from regional strategies and a common infrastructure. An e-learning cluster of schools can also rely on a regional infrastructure; the different locations of schools have their own learning profiles, but they also collaborate in getting a common know-how in e-learning didactics and in common product development (providing e-content lectures).

In terms of business consultation these schools would be knowledge based companies in change: The individual knowledge of every teacher must be composed to a collaborative know-how (in e-learning processes) of the whole college. In former times we had IT-subjects, then notebook classes, currently we have come to e-learning schools and are developing e-Learning clusters on a regional level.

A very important feature in this process is to accompany the administration process of change and quality management by a clear and concrete pedagogical vision. Major ideas could be

- “E-Education” or “blended learning” with fundamental transformations of learning and organising learning processes, where every school should participate.
- Bilingual models in education, where all professional subjects can be performed in two different languages. Two languages are used in **all** situations of school life.
- Deep insights into work processes of professional fields with intensive contact to companies and simulation of the complex business or trade reality (training firms concepts, business process chains and others).
- International contacts and studies are main interests of a school with many contacts to other educational institutions and offers of mobility and exchange programmes for students with international partners.

Only with this “big pedagogical” ideas a rather dry school management transformation can be made. Change processes have to with quality management on all levels of the school (Classrooms laboratories, IT-environments, training firms, whole school management) and the realisation of the “big ideas”. A very important feature is to find strategic targets and priorities for the everyday change process.

One suggestion to give a perspective to the change process is a “soft definition” of an intermediate networking concept at school. One of the eight targets in the second chapter mentioned a steering group at school to organise change and learning processes. In a sustainable process this steering group shall transform to the role of coordinators of different learning fields in this school (from mother tongue to laboratory and workshops). This professional co-ordinations, selected for a period of 3 years, could be quite important to accompany the transfer to the already mentioned everyday work.

Only recently the e-learning clusters in the Austrian provinces have grown to remarkable large projects. Nine clusters, one in each of the Austrian provinces, were founded and 35 schools participate, trying to realise the eight goals, defined above. The transformation process is not easy and a lot of teacher training and support for the school management is needed.

If the “master plan” of the transformation can be developed in a self-organized way with high commitment of principals, staff and school partners, we expect the change in the public education system to meet the challenge of the next years. Otherwise, private e-learning services will dominate a new and exclusive market.

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# THE AUSTRALIAN UNIVERSITY QUALITY AGENCY (AUQA): ITS APPROACH TO THE QUALITY AUDIT OF INTERNATIONAL OFFSHORE EDUCATION

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## Background and Focus of the Paper

The Australian University Quality Agency (AUQA) was established in 2001 by the Australian Federal Government to review, on a cyclical basis, the quality processes employed by Australian Universities and Institutions. Part of its focus is to establish practices for delivery of programs in international offshore locations. Using the initial five university reports completed in 2002; Curtin, Ballarat, Southern Queensland, Newcastle and the Catholic University, this paper looks at the areas defined by AUQA as essential for international distance delivery of programs. From a 'no holds barred' approach AUQA has set out to establish a series of quality guidelines that preserve the integrity of programs and graduate outcomes. The paper goes on to examine the practicality of such a system for quality assurance and respondent feedback from universities who have been involved in the audit process.

## 1. The Context for AUQA

The Australian Universities Quality Agency (AUQA) is a core part of a total national quality assurance (QA) framework for Australia. In 1999 when The Hon Dr D. A. Kemp, then Commonwealth Minister for Education Training and Youth Affairs set the context for the Government's desire for renewed focus on QA, he noted:

- the massive growth in higher education (HE) both in Australia and internationally,
- the influence of information technology on the delivery of education,
- the internationalisation of education, including the emergence of new providers, and
- a greater focus on good management (Kemp, 1999).

The system proposed was to:

- reflect very clearly the responsibility of governments to provide a robust QA and accreditation framework,
- build on and strengthen the existing accreditation process of the ... governments,
- recognise the autonomy of HE institutions,
- place the responsibility for the quality of provision on individual universities, and
- signal to the community and the rest of the world that the quality of the HE system is assured through a rigorous external audit of university QA processes (ibid).

## 2. AUQA Objectives

The Australian Universities Quality Agency (AUQA) has four primary Objects.

- arrange and manage a system of periodic audits of QA arrangements relating to the activities of Australian universities, other self-accrediting institutions (SAIs) and state and territory HE accreditation bodies;
- monitor, review, analyse and provide public reports on QA arrangements in SAIs, and on processes and procedures of state and territory accreditation authorities, and on the impact of those processes on the quality of programs;

- report on the criteria for the accreditation of new universities and non-university HE courses as a result of information obtained during the audit of institutions and state and territory accreditation processes; and
- report on the relative standards of the Australian HE system and its QA processes, including their international standing, as a result of information obtained during the audit process.

### **3. Initial AUQA Audit Reports**

The initial audits completed took place during 2002. There were a total of 8 universities audited and of these 8 reports have been completed for 5 of the universities

- University of Newcastle (UN)
- Australian Catholic University (ACU)
- Curtin University of Technology (Curtin)
- University of Ballarat (UB)
- University of Southern Queensland (USQ)

It is these five initial reports that form the basis of AUQA' approach to quality assurance of international distance/offshore education.

### **4. AUQA Approach to Assessing International Offshore Programs Operated by Australian Universities**

1. Site visits by members of the audit panel to a selected representative sample of offshore program locations.
2. Review of approval systems, planning documents, existing quality assurance system developed and implemented by the university.
3. Discussion and interview of academic and administrative staff from home campus.
4. Interview of offshore students and staff.

### **5. Core Concerns**

The core concerns that have arisen in the 5 extant reports are:

- Lack of a comprehensive system for deciding which offshore activities to engage in, for planning, implementing and controlling them, and for incorporating an effective quality assurance system (ACU)
- Appropriate academic standard of programs delivered offshore (ACU)
- Lack of effective contract management and review (UB)
- Lack of control of entry requirements of students to offshore programs (UB)
- Suitable level of qualifications of locally employed academics (UB)
- Suitable method for systematically assessing the teaching carried out by local staff (UB)
- Level of resources available at offshore locations including library resources (UB)
- Suitable moderation protocols for assessment items (UB, USQ)
- Comparative monitoring of student cohorts, onshore and offshore, to ensure equivalence of teaching and learning outcomes (UB, UN)
- Annual review of contracts (UB)
- Promotional materials to specifically reflect the structure of the offshore program (UB)
- Orientation for staff teaching offshore (UB, Curtin)
- Communication between onshore and offshore teaching staff prior to and throughout delivery (USQ)

- Risk identification and management process for programs delivered in languages other than English (USQ)
- Ensuring that students receive accurate, consistent and sufficient information concerning the accreditation process of the program (USQ)
- Robust process for due diligence of partners (UN)
- Quality controls for translation services (UN)

## 6. Comment

In general the core concerns above can be categorised as

- Adequate processes for reviewing and implementing and on going maintenance of offshore partnerships
- Adequate processes to ensure quality of teaching
- Adequate processes to ensure standard of learning outcomes
- Adequate processes to ensure students are fully informed of the status of the program and university

Central to the AUQA ‘audit model’ and ways of seeing ‘quality systems’, ‘quality assurance’ and ‘managing quality’ is the notion of ‘processes’; that is, evidence based quality improvement processes.

However, ‘processes’ as the best approach needs to be questioned. Taking into account the complexity of higher education institutions, the diverse nature of delivery modes, the local Ministry of Education requirements and culture specific learning idiosyncrasies perhaps the current emphasis on replicating on campus teaching and learning systems is too ethnocentric.

The need to exactly replicate programs from overseas universities currently defines the approval of programs in Hong Kong through the Education and Manpower Bureau and Malaysia through LAN. Singapore is also starting to move in this direction. If processes required by the home campus cannot match quality processes expected by the local institution and government bodies then a compromise has to be made.

This is not to say that the matters that have risen to the surface following the AUQA reports are not important; they cannot be trivialised. The issue is, specifically in the international sphere, can a series a quality processes based on assumptions from the AUQA auditors be demanded without being placed in context.

The cyclical nature of the audit reporting, every five years for each institution, means that previous reviews will need to be matched with revitalised quality processes to dispel AUQA concerns. That the audits take place at the discrete institutional level rather than on the broader higher education basis may skew the development of truly applicable quality options for management of offshore distance delivery of programs.

There is currently no alternative model being considered. Strategically a broader institutional input could be of benefit in developing a truly applicable quality management approach.

## 7. AUQA Questions

Following is a sample of questions asked in a trial audit at the University of New South Wales.

- What processes are in place to train/induct staff?
- What processes are in place to review courses and programs?
- How do you maintain standards of your courses and assessments?
- What measures are in place to ensure culturally sensitive curriculum?
- How do you know you comply with the university’s policy on outcomes for students?
- How does the university maintain standards in student assessment?

- Describe quality measures in Singapore
- How do you know that these measures are appropriate?
- How do you monitor academic performance of offshore students?
- Is there a standard procedure in the university for approving offshore programs?
- Who is responsible for the monitoring of their performance?
- How are fees set?

## 8. Participants' Impressions of the AUQA panel interviews

Following is a sample of impressions from staff on the trial audit.

### Positives

- Certainly makes one think about the need to track processes and be able to identify those tracking processes and be able to respond convincingly to questions about them.
- I think the far more valuable exercise is our own information gathering and self-inspection as we develop clear quality management systems over the next few years. The real value is that the audit prompts us to do that.
- Overall it has been useful in that it has stimulated me into thinking more about our quality monitoring and accountability processes. It also offers for the first time a message that the organisation is, or should be, interested in and supportive of the development of such processes and such a culture.
- It would be wonderful to build collectively on what "is" already and to have those kinds of discussions as a part of the university planning cycle. That would leave us delivering up to the minute services and be well placed for the Quality think tank next time we get audited.
- I hope and look forward to building on these initiatives and making change happen. It could be great if clear strong messages came from the Executive that this is a valued ongoing exercise and that action is being taken to build an internal culture that supports critical, constructive self evaluation and some support for trying to honestly appraise and improve our services on a university wide basis.

### Negatives

- It is just another bureaucracy asking for similar stuff. On the other hand, I guess we got some idea of what they considered important.
- I thought the questions were predictable. I expected more probing questions. I feel that I didn't get the real feedback on the adequacy of our quality measures.
- Not particularly helpful. It was useful, insofar as I am learning how higher education policy seems to now prioritize the university as a "managed" unit rather than the university as a community of scholars/learners. I might need to discard my lofty ideals about my role in teaching/learning/research in light of this new vision.
- Questions on the actual outcomes of processes – they did seem to just want to know what was in place, but did not seem to question the effectiveness of such processes in terms of desired outcomes, or even whether the desired outcomes themselves were sufficiently subject to scrutiny and revision.
- AUQA really have to decide if they are an examining body (testing knowledge by not informing panel of key information required to answer questions) or if they are interested in how processes work. We could have sat around a table and been asked more specifically and graphically how links are made between expectations and outcomes.
- I think that the meeting, which I attended, was fine as a first step. However, that was all it was. As a way of identifying the issues it was appropriate. As a way of understanding the depth of issues it has no validity whatsoever. There is obviously a need to follow it up with a much more scientific, quantitative and methodical piece of work. If the university uses the same procedures to measure quality that the AUQA used they would get very poor marks indeed.

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# THE RELEVANCE OF SELECTING SUITABLE PARAMETERS FOR QUALITY EVALUATION OF THE TEACHING PROCESS

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## Introduction

The goal of this paper is to present the experience obtained by the Spanish distance university *Universidad Nacional de Educación a Distancia* (henceforth, UNED) in the program launched in 1995 by the Council of Universities of the Ministry of Education to evaluate the quality of universities. The National Plan for the Evaluation of the Quality of Universities (henceforth, the National Evaluation Plan) had its origin in the work previously undertaken in the context of the Experimental Program for the Evaluation of the Quality of the University System (1993-94) and the European Pilot Project for the Evaluation of Quality in High Education (1995). The National Evaluation Plan was established to have a duration of five years, which was to be undertaken in the form of annual calls for institutional evaluations in which both public and private universities could take part, and it was to be revised annually<sup>1</sup>.

The National Evaluation Plan had two major objectives. Firstly, to allow each university to identify its own strengths and weaknesses in order to improve the quality of the services that it offers to the community. Secondly, to provide the users of such services with reliable information regarding the quality level of each institution. In order to undertake this project, in 1996 the Council of Universities published an *Evaluation Guide* whose principles and methodology had to be followed by each university. The process was organised in three phases:

- Autoevaluation: to be undertaken by an Internal Committee within each Department and Faculty. All the information gathered would be published in a document known as the *Degree Autoevaluation Report*.
- External evaluation: to be undertaken by an External Expert Committee, whose work would include the analysis of the above-mentioned document. After having gathered all the relevant information from different sources, a new document known as the *External Evaluation Report* would be produced.
- Generation of three public reports: the first one, called the *Degree Evaluation Report*, would be produced by the Faculty and consist of a synthesis of the documents produced in the two previous phases. The second one, called *University Quality Report*, would incorporate all the reports of the degree evaluation for each faculty. The third one, would be produced by the Council of Universities, and called the *Results of the First Round of the National Evaluation Plan of the Quality of Universities Report*.

The criteria contained in the *Evaluation Guide* were considered by the Internal Committee of the UNED to be unsuitable for this institution, due to the fact that they had been created considering only conventional universities<sup>2</sup>, ignoring the peculiarities of distance institutions.

The UNED is the only national university in Spain. It consists of the Central Headquarters in Madrid, where all the teaching teams are based, those responsible for the different subjects and courses used in more than fifty undergraduate and postgraduate courses. Distributed throughout Spain and several other

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<sup>1</sup> The first round started in October 1996 and the report was finished in December 1997. Subsequently, the second round, which incorporated the experience gained in the first call, started in April 1998. The third round started in 1999.

<sup>2</sup> In this paper the term 'conventional university' is used to refer to the majority of high education institutions, whose teaching system is based around face-to-face taught classes.

points worldwide<sup>3</sup>, there are approximately one hundred Associated Centres, where students do all their administrative work, attend tutorials and practical classes, use the libraries and laboratories, and take exams<sup>4</sup>. The status of the Associated Centres is partly dependent on the Central Headquarters, but they also have their own academic and administrative structure according to their own social context.

The general theoretical framework at the core of the *Evaluation Guide*, which had been elaborated for the conventional university model, clearly showed the unsuitability of the application of the document for distance institutions like the UNED. Specifically it did not take into account its functions, namely the following:

- The UNED has a much broader coverage than conventional universities in many senses: academic, geographical and political.
- Unlike conventional universities, the UNED is a second-opportunity institution<sup>5</sup>.
- The UNED is an open university in the strict sense, i.e. it does not apply *numerus clausus*.
- Apart from official qualifications, the UNED offers professional recycling at different levels, such as Professional Training Courses, Specialized Courses, etc.
- Being the only national distance university, the UNED acts as an instrument for the Spanish educational politics, including teachers' recycling and any other requirement deemed important by the Ministry of Education.

It was therefore necessary to introduce a series of modifications to this initial document in order to permit an accurate quality evaluation of the UNED.

This paper presents the adjustment process undertaken to the initial *Evaluation Guide* which took place in two phases: firstly, by means of a series of amendments proposed by the UNED in 1998; secondly, in view of this work and the realization of the need to consider separately the issue of teaching quality for distance universities, a second document was created by the Council of Universities in 2002.

## 1. The teaching *Evaluation Guide*

The *Evaluation Guide*, which establishes the bases that underlie quality evaluation of different university degrees, consists of four sections:

- teaching evaluation guide
- research evaluation guide
- management evaluation guide
- quality management guide

This paper concentrates on the first section because it is the area in which the evaluation process showed the most evident differences between conventional universities and the UNED. As for the other sections, the research evaluation guide was considered valid by distance university experts and it is understandable that, being teachers, there is little we can contribute with to the management sections.

Once the *Evaluation Guide* was made public, the different departments and faculties of the UNED were consulted on the issue of the relevance (or otherwise) of a document which had been created for an educational model whose principles and structure, as mentioned above, differ considerably from those of the UNED. For example, being a national university, the UNED does not have a single socioeconomic context, so degrees have to be useful to a broad, heterogeneous community<sup>6</sup>.

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<sup>3</sup> Some of these centres are placed in prisons to offer academic formation to prisoners.

<sup>4</sup> Exams are supervised by the teachers from the Central Headquarters and it is them who correct them.

<sup>5</sup> In the sense that the students do not typically go straight to university from secondary level studies.

<sup>6</sup> Highly specific degrees such as Enology (very suitable for certain counties like La Mancha and La Rioja) would not be cost-effective to be established at national level.

This fact was clearly identified by the teachers of the UNED. Once the compendium of observations and suggestions elaborated by all the departments and faculties of the UNED were analysed by its Governing Council, the Council produced a new document on quality evaluation<sup>7</sup> incorporating proposals that were specifically pertinent for the quality evaluation of distance universities.

## **2. The amendments to the *Evaluation Guide***

The starting document of the evaluation process was the *Evaluation Guide* (Council of Universities, 1998)<sup>8</sup>. On the basis of this document, the UNED made a series of amendments contained in the *Teaching Evaluation Protocol* (UNED, 1998) (henceforth, *Protocol'98*). Subsequently, the Council of Universities published a new *Evaluation Guide* (2002) with modifications for the UNED (*Guide'02*).

What follows is a presentation of the key amendments proposed by the UNED and accepted (and in some cases, also extended) by the Council of Universities.

### **2.1 The general context of the University**

The UNED considered that a university quality protocol, when dealing with the global data of the whole context of the university, had to include the specific characteristics of the modality of distance education and their relevance to the degree under evaluation. Other features to be included had to be: access conditions and student profile (namely, age and family and working context).

These considerations are necessary because the student at a distance university is typically mature. S/he is considerably older than that of a conventional university. This has numerous cognitive implications which have been the subject of a lot of research. It should not be interpreted that adults are better or worse learners than youngsters who do their degrees straight after leaving secondary education, but a series of cognitive advantages and disadvantages have been identified. For example, adult students are generally less imaginative and more self-conscious, which could be seen as a hindrance to learning. However, in most cases they also have living and working experience upon which to build the new knowledge. Furthermore, due to their maturity, the students of the UNED have clear expectations and objectives for studying (their studies are generally paid for by themselves) and this leads to a high level of motivation which is a key factor for successfully accomplishing their studies. *Guide'02* (page 6) therefore incorporated *Protocol'98's* suggestion, and made explicit reference to the characteristics of the students of the UNED and the two issues mentioned above: student expectations and motivations. In order to evaluate the quality it was necessary to introduce parameters that would allow the identification of the particular profile of the distance student, whose circumstances are rather different from those of the rest of students.

### **2.2 The syllabi of the degree subjects**

*Protocol'98* included the need to analyse the extent to which the teaching team of each subject dealt with the initial adequacy of programs to the specificity of their students, keeping the same rigour regarding university objectives and syllabi (i.e. issues such as requirements, recommendations, orientations to approach the study of the subject, etc.). This is due to the fact that there is a need to compensate for the physical distance between the student and the teacher. Hence, all the initial information typically given to students in conventional universities at the beginning of the academic year must be supplied in greater detail to a distance student, not only because s/he is going to study in isolation but due to his/her heterogeneous background. It is recommendable that the student has as complete information as possible about his/her studies.

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<sup>7</sup> VICERRECTORADO DE ORDENACIÓN ACADÉMICA Y PROFESORADO - *Protocolo de evaluación de la enseñanza* (Incluye las modificaciones aprobadas por Junta de Gobierno 13 marzo 1998), Madrid, October 1998.

<sup>8</sup> Although the first *Evaluation Guide* dates 1996, this paper deals with the 1998 version on which the report of the Faculty of Philology was written, called *Report of the Degree Autoevaluation for Philology*.



*Guide'02* therefore incorporated *Protocol'98*'s proposals. However, the UNED's reflection caused the Committee to expand this section. The importance of the network of Associated Centres and their Lecturers in the educational structure of the UNED was identified together with the role they play in contributing to the quality of the degrees. Furthermore, the Council stated that the quality of a distance university depends on the existence and adequacy of mechanisms that facilitate not only the relation between the Teaching Teams at the Central Headquarters and the Lecturers at the Associated Centres, but also the planning and coordination of the subject programs that make up the degree. It is of particular relevance that the Council has included this new element about the need to have a coordinated activity between Teachers and Lecturers because, as the UNED's *Degree Autoevaluation for Philology Report* states, this enables the syllabi and programs to be weighted up. This collaboration is basic for our students with busy professional and family lives.

### **2.3 Teaching organisation**

As for the Associated Centres, where teaching is typically organised on a weekly basis, *Protocol'98* stated the need to examine the number of tutorial sessions a week per subject, the length of such sessions and their distribution<sup>9</sup>. *Guide'02* takes this idea and develops it, noting not only the dedication of each centre to each subject in quantitative terms, but also questions related to planning ahead: namely the distribution between theoretical and practical sessions and their overlap.

Furthermore, in *Protocol'98* a reflection is made about the question of the exams, which can produce several difficulties<sup>10</sup>, and the ratio between teachers and students<sup>11</sup>. Both points are considered in *Protocol'02* (page 15), where the need to make a plan of the exams, considering time and space restrictions, plus the fact that students are likely to do the exam of each given subject without the teacher being present.

### **2.4 Teaching methodology**

Given the decentralization of the UNED into numerous Associated Centres, *Protocol'98* considered the need to evaluate the existence of extra-curricular activities of both an academic and/or cultural nature. Examples of the former would include training on study strategies<sup>12</sup>, orientation for first year students, training on the use of distance-specific didactic written materials and electronic resources (audio cassettes, videos, radio, TV, e-mail, etc.). Examples of the latter would be conference series, research groups and publications.

*Guide'02* accepted such considerations and included virtualization as a new teaching element<sup>13</sup>. Furthermore, on the basis of the first hand expert knowledge of the External Committee, it was stated that there were a series of aspects related to the teaching methodology for the degree subjects that had to be evaluated in terms of didactic materials and supporting resources. Finally, it was stated that it was necessary to consider the existence, adequacy, and aptitude of the infrastructure and technological resources necessary for distance teaching.

## **3. Conclusions**

This paper has presented work undertaken by both the UNED and the Spanish Council of Universities in the Ministry of Education to establish a set of quality criteria valid for the evaluation of distance university degrees. Furthermore, it has illustrated the differences between the educational system in conventional universities and the UNED on the basis of four categories: the general context of the

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<sup>9</sup> A key factor for the importance given by each centre to a subject, in terms of the number of lecturers and sessions dedicated to it, is its obligatory vs. optional nature, and the number of students.

<sup>10</sup> In the UNED the dates of bank holidays in different counties have implications for the celebration of the exams, since they do not always coincide.

<sup>11</sup> In 2003 the UNED has approximately one thousand teachers, four thousand lecturers and two hundred thousand students.

<sup>12</sup> This is of particular importance given the lack of learning strategies of our students.

<sup>13</sup> Following the recommendations of *Guide'02*, from October 2002 the subjects of all the new degrees (e.g., Bachelor of Arts in Spanish and English Philology in the Faculty of Philology) of the UNED are to be virtualised.

university, the syllabi of degree subjects, the training program and the teaching methodology, and the working documents of the National Evaluation Plan. However, there are other categories in which the differences between both university modalities become apparent, namely the following: tutorial assistance, the learners' role, learning evaluation, global performance of the degree, teaching staff, the training of teaching staff, and facilities, resources and external relations.

The value of the described adjustment process is evident since the parameters in the initial standard document were applicable to all 'standard' universities in the country, and as such were alien to the UNED. Hence, the Internal Committee of the UNED identified certain criteria that were not suitable to its nature. Working in a bottom-up manner, from the departamental committees, Faculty committees, and finally the Governing Council, a new protocol was produced incorporating all the detailed evidence that had been gathered from all levels of the institution. Following the normal process, it was the External Committee who recommended the insertion of the new parameters contained in the protocol. The Council of Universities supported the identification of the institutional peculiarities highlighted, and even extended some of them, such as the continuous reference to the Associated Centres. In the authors' opinion (teachers of the UNED for many years) the Council has demonstrated a good understanding of the key issues underlying the notion of quality as applied to the UNED<sup>14</sup>. This experience demonstrates that the selection of suitable parameters is a *sine qua non* condition to undertake quality evaluation of teaching processes.

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<sup>14</sup> For instance, the *Guide'02* insisted in several sections on the need to have mechanisms that enable not only the relation between the Teaching Teams at the Central Headquarters and the Lecturers at the Associate Centres.

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# ELEARNING CLUSTERS IN AUSTRIA – A NEW INITIATIVE TO ENHANCE QUALITY IN SCHOOLS

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## Introduction and Background

"European Youth into the Digital Age" is the striking headline on the eEurope website introducing the eLearning Action Plan which claims to design tomorrow's education. The aim that every European citizen should be equipped with the skills needed to live and work in the information society requires structured initiatives in the education systems of the EU member countries and well-trained teachers who meet the challenge that information technologies are a focus of interest for their pupils and students but occasionally still a deterrent for their colleagues.

Austria is meeting the goals of the eEurope action plan with the government initiative called "eFit-Austria", which is designed to foster the implementation of modern communication and information technologies in education, science and culture.

"eFit Austria" (<http://www.eFit.at>) was established as a platform for IT initiatives and projects which deal with new and innovative methods in teaching, learning and research in education, science and culture. The conception of "eLearning Cluster Schools" in Austria is part of this programme and tries to push and promote the development towards innovation in the school system by a special programme for model schools that are implementing eLearning sequences in their notebook computer and distance learning classes. This paper aims at a presentation of the practical work in the eLearning clusters and focuses on the contribution of these schools to the enhancement of quality in education and training.

## eLearning Clusters in Austria

The Austrian model, called "e-Learning Cluster", comprises 43 upper secondary schools and colleges in the 9 Austrian federal provinces. They are organised and managed on the provincial level and they collaborate in clusters to implement practical models of e-Learning. Cluster board managers in the provinces organise meetings to facilitate co-operation and to assure the added value of shared experience and knowledge, but also organise teacher training and know-how input, take over administrative work, internal quality assurance and reporting. Moreover, they are responsible for establishing contacts to all important players in the field of eLearning in their region and co-operate with the clusters in the other federal provinces and the Ministry of Education. These clusters are based on a national framework which is defined, supervised and financed by the Austrian Ministry for Education, Science and Culture. Financial means are not to be used for hardware equipment but for investment in human resources, mainly in in-service teacher training.

**Cluster schools** have to meet **eight goals** in order to participate in the project. These principles form an integral part of the school's profile and school programme:

- Every pupil or student of the school/college gets the opportunity to work with e-Learning sequences, which are best described as lesson plans for blended learning over a period of about 4 weeks – this is the minimum of eLearning programmes to be tested with students
- The teaching staff of the school/college should get acquainted with eLearning models and should apply them in their subjects

- Teachers of the school/college collaborate in teams to work on eLearning sequences for their subjects as the production of “e-learning–sequences” requires a high level of co-operation among teachers. Cooperation of teachers of schools in the cluster is important for motivation and exchange of experience.
- The cluster schools are pioneer schools in their regions and disseminate their experience and findings to other schools with the aim of interdisciplinary collaboration.
- The innovative eLearning methods must be integrated in the annual school programmes.
- Principals have to support the initiative as only a positive and clear leadership and support structure have the chance to adopt stable innovative structures.
- Establishment of a steering group consisting of the school partners (teachers, students, sometimes parents) is established to support content and didactic development, to co-ordinate initiatives in disciplines and subjects and to monitor the progress of the work.
- Cluster schools/colleges operate in networks and offer additional advanced certified qualifications (e.g. ECDL, LINUX, CISCO certificates, JAVA programming, network operating systems like MSCE, SAP, learning management systems and platforms, etc.)

### **Co-operation, Communication and Networking**

As it has already been indicated above, cluster schools operate in networks and co-operation and communication is not only regarded to be a basic principle but a pre-condition for the participation in the project. The schools collaborate in an Internet community via the education server <http://www.schule.at> where they find an easy to use community tool (more advanced than yahoo-groups) for their up- and downloads of materials and links as well as a communication platform and a message board which is the main communication tool for the provincial cluster board managers and the steering group in the Ministry for Education.

The main aim of this collaborative work is the sharing of knowledge and experience and the opening of the systems: participating schools agree to give access to materials and their school servers and thus accelerate the innovation process as the wheel doesn't have to be invented all over again.

The decision for or against a specific learning platform is of minor importance. It is even more essential to process learning material following the IMS standard which allows tailor-made teaching and learning packages to be integrated in any platform. The design and packaging of material with e.g. the LRN-editor (<http://www.microsoft.com/elearn/support.asp>) puts teachers in a very independent position as they can develop their own structure and link any file, link or application to this structure, independent of the learning platform where they want to implement their content package. This open access also favours the co-operation among teachers and relieves the tension of a “very” professional demand to materials which occasionally frightens off teachers.

### **Methodological and Didactic Principles**

Undoubtedly, methodological and didactic issues are of higher importance compared to technological questions - technology has finally turned out to be the tool which can alter the learning process. Therefore didactic questions have to be considered very carefully and the practical implementation of eLearning models required structured planning and thorough preparations. The strict planning and structuring of distance learning courses and eLearning sequences turned out to improve lecturing and tuition at the colleges in general as a higher level and effort of reflection of methodology was required.

What are the characteristic features of an eLearning sequence of high quality? What does such a standardised eLearning package consist of?

*Structure of an eLearning package* (result of the discussion process of the clusters Upper Austria and Salzburg) should comprise:

- Standardised Metadata

- Information for the teacher: Methodological and didactic clues and advice, experience from practice and variations on the topic/theme, teachers' activities, keys
- Organisation of learning
  - teaching targets
  - prerequisites - previous knowledge
  - lesson plan - timeline
- Materials
  - starting off
  - example material and worksheets
  - interactive exercises
- Assessment

The choice of an appropriate methodology depends on the personal beliefs of the teacher, the type of material used for that topic, the level and experience of the students and their needs and the resources and technology available. Therefore educators will combine approaches like constructivist learning, resource based learning, collaborative learning, problem based learning, narrative based learning and situated learning and apply them in the same course.

Thus the teachers have to select an appropriate pedagogy, combine methodological approaches, be prepared to shift roles from teachers to facilitators and make use of the strengths of the technology available. (e.g.: the Internet making resources available in the classroom you couldn't even dream of, or learning platforms for new forms of collaboration).

Detecting the strengths of the new technologies requires intensive use by the teachers themselves and the sharing of experiences and new findings to foster new approaches in the everyday work with our students. This process should spread from the schools in the clusters to wider areas of the educational landscape.

### **The Project's Contribution to Enhance Quality in Schools**

Quality assurance has been regarded an important topic in the Austrian school system for years and evaluation principles and tools have been taken over from enterprises and applied to the school system. Detailed information can be obtained from the website <http://www.qis.at>.

This initiative has led to the development of school plans, the integration of innovation in the schools' activities and their profiles and the necessity of the personnel's continuous training has become apparent. Undoubtedly, it is the teachers who have to accept the challenge of their further development. eLearning can be a key issue as it comprises the idea of innovation to a large extent and has a very high reputation. Thus eLearning activities will not only provide the school or college with a good image but also enhance the readiness for change and continuous development which is necessary to adapt to the accelerating speed of change in a knowledge based and driven society.

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# QUALITY OF EDUCATION IN GREECE MULTI-GRADE SCHOOLS: THE ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGIES

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## Abstract

Multi-grade schools are a reality in Greece, with many problems and particularities. Information and Communication Technologies can provide solutions in many of these problems. The quality of ICT based education in multi-grade schools depends on the tools, content, and mainly by the time management that is required in every action in a multi-grade school. Time management reflects upon the preparation for teaching, during the lessons and in the administrative duties of the teachers. We propose a series of steps and solutions adapted to the needs of multi-grade schools, derived from the experience acquired during a two-year project named SXEDIA. Based on the deductions of that project, we are about to carry into effect the project MUSE and very soon, the project SXEDIA II, projects that are holistic solutions towards the problematic nature of the of Multi-grade schools in Greece.

## 1. Introduction

Multi-grade schools<sup>1</sup> in Greece are a necessity mainly due to the country's specific geographic configuration. There are a lot of mountainous regions and large number small islands in the country. In the past, historical reasons, had forced the population to live in areas of difficult access, scattered in a great number of small and isolated villages that were located either deeply in the mainland, or in small islands. Even though nowadays, there is a change in the demographic dispersion, there is still a significant percentage of the population that still lives in the above described regions. This creates the need of having schools operating in small villages, even with a very small number of students and even when the conditions do not provide the ideal educational environment.

Nowadays, there is a tendency to reduce the number of multi-grade schools. The most common practice is to merge neighbouring schools, providing transportation to pupils on a daily basis to a main village in a "hub" or "centre" school. But mergence (a) is not a choice of the inhabitants of the small villages and (b) does not exist as an option in the case of small islands where there is only one school. Moreover, mergence is strongly opposed by the residents, who consider the school, together with the local church, to be the traditional cornerstones of the village's cultural and social life. They believe that if the school stops operating then the status of the village will be reduced and this will negatively affect its future. Their point is that a school is always a vivid cell and a vehicle of civilization that helps keeping the local population in place, preventing depopulation.

Sustaining a large number of multi-grade schools is a difficult task. The problems that arise can be epitomized in two categories, the financial and the educational [1]. On the one hand, the state has to provide the necessary economic means in order to keep schools fully equipped and in an acceptable operational condition. On the other hand, there must be adaptations in the curriculum; in order to fit in the way teaching is conducted in multi-grade schools. These adaptations often lead to the belief that the quality of the provided education is inferior, compared to the quality of education in the rest of the schools [2]. We believe there are a number of interventions that can be made to raise the quality, involving the extensive use of information technology.

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<sup>1</sup> In a multi-grade school the teacher has to teach in more than one grade simultaneously in the same classroom.

## 2. Addressing the problem

Out of 5800 elementary schools in Greece, 2558 have five or less teachers, at least one less than the number of grades. Around 1800 schools have one or two teachers. More than 1300 schools operate with less than 20 students (table 1). This means that more than 40% of the elementary schools in Greece are multi-grade and with a small number of students. According to the relative legislation a class can be split in two if it has more than 25 students. The same applies for a school as a whole: if a school has less than 25 students in total, it operates with only one teacher, regardless of the number of grades that he/she has to teach. If the school has up to 50 students, a second teacher can be appointed and so on. Statistically the situation is not as bad since these limits are rarely met and the numbers of pupils per teacher are less than the above.

Table 1. General statistical data for multi-grade schools in Greece<sup>2</sup>

Total Number of schools in Greece						5.881
Total Number of multi-grade Schools						2.558
Percentage of Multi-grade schools in Greece						43,5%
Grade of schools	1	2	3	4	5	
Schools per grade	935	871	534	138	80	
Percentage of each grade	15,9%	14,8%	9,1%	2,3%	1,4%	
Number of teachers	935	1742	1602	562	400	
Number of students	8187	22247	19534	7602	4127	

Not all multi-grade schools are similar. There is a possibility that in a small school, a grade is missing, simply because there are no pupils to attend. It is also likely that a multi-grade school has one teacher teaching up to six grades, two teachers each one having to teach in up to three grades, three teachers each one having to teach in up to two grades, four teachers with some of them teaching two grades and, finally, five teachers with one of them teaching two grades.

There is also a certain way that grades are allocated to each teacher. In the case of two teachers, one teaches grades 1, 3 and 4 and the other grades 2, 5 and 6. In the case of three teachers, one teaches grades 1 and 2, the other grades 3 and 4 and the third grades 5 and 6. In case of four and five teachers, care is taken so that the first and second grades are taught separately. It is not an unusual situation for a pupil to attend a next grades' curriculum first and in the subsequent year to be taught the lessons of the previous grade.

The most demanding type of multi-grade school is a single teacher school. Teaching in that kind of school is a difficult job. The approach adopted in general is that when the teacher teaches one grade, the rest of the pupils work by themselves or in groups. Due to the small number of pupils, the most common instructional method is cooperative learning, mixed with elements of self-learning. Working hours are extended and some of the breaks are skipped so that more teaching time is gained, though the truth is that in these cases, no matter the effort, the teacher spends less teaching time per grade, than in an ordinary school. Another method is to use peer teaching, with one or two of the best students acting as teaching assistants.

In order to meet the increased demands of his instructional duties, teachers have to be well prepared. They have to plan ahead and be exact on how and when to administer specific parts of the syllabus. Since the schoolbooks are the same as in any other school, there is a considerable work for the teacher who has to deal with different grades. It is easy to understand that the teacher acts under great pressure.

Another problem of multi-grade schools is the fact that some subjects are not taught at all. For example, there are multi-grade schools in which foreign language is not taught, though this is part of the primary schools' curriculum. In most of them, a specialized teacher does not teach art and music as in the rest of schools. The same applies for physical education and many of the school activities that are skipped and everything is left to the initiative of the teacher. These differentiations exist at the expense of quality.

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<sup>2</sup> Data 2001 – 2002 Ministry of Education

In an ordinary school, the headmaster has very few, if any, teaching duties, and is concentrated in purely administrative work and liaising between the school and local authorities. This kind of job is time-consuming but also very important, particularly since local authorities are responsible for schools' maintenance. In multi-grade schools, usually there is no headmaster but a teacher "acting as headmaster", having the double role of manager and teacher. This means that besides their teaching duties, multi-grade schoolteachers have a great deal of administrative work.

Given these difficulties, one would expect that the state would employ skilful and experienced teachers for multi-grade schools. This is not the case: The vast majority of them are newly appointed or on contract (not permanent job). They have very little experience, if any, and they are not trained for multi-grade teaching. Studies for multi-grade schools are not included in the academic courses of nearly all Greek Universities and no specific in-service training is provided for multi-grade schoolteachers. In multi-grade schools with one teacher, since there is no help from any colleague, the teacher has to face any arising problem alone.

Finally, apart from the teaching experience that the teacher gets, there are very limited incentives for a teacher to stay in a multi-grade school. The most important of them is the fact that they get more points within the context of a point system that forms the basis for teachers' evaluation. These points help the teachers to have a choice later in their career mainly when transferred from one school to another.

### **3. Applying ICT in multi-grade schools**

The role of ICT in education is significant in general but can be decisive in the case of multi-grade schools. There are three areas where this role is distinguished, namely (a) teaching (b) training and supporting teachers and (c) administration [3].

To use ICT in teaching includes various tools and methodologies as:

- Commercial software readily available, tailor made software for specific subject teaching, televised lectures to be presented off line or video on demand, videoconferences, on line connections with others schools, on line and off line exercises and didactical material.
- For teacher training: On line lecturing and consultation, on line and off line material and references specially selected for the instructional needs of a multi-grade school can be used.
- For the treatment of administrative problems: templates of all the documents a school uses with instructions when each one is used, on/off line communication with the educational and local authorities, are among the solutions that can be considered [4].

Of paramount importance is the support that is needed to all of these activities – educational, technical, administrative – by any supervising authority.

The introduction of ICT in multi-grade schools is related to some difficulties, which are presented below.

Since ICT applications are based on an extensive use of the Internet and other means of on-line communication, school units should have computers and Internet connections as minimum prerequisites before the ICT introduction. Though this appears essential, in practice, computers are not always available, or are available but inadequate even though every school has at least one simple (PSTN) telephone line. ISDN is the only broadly applied choice for on line communication and especially for videoconferencing. All the restrictions that the limited bandwidth imposes, apply in this case. Few schools are connected with ISDN lines, even though a lot of them are in the process to be connected in this way.

The standards of the E.U. specify that the ratio of computers per students must be 1 to 25 (1 to 20 in the year 2006). Following this ratio, every Greek school with 25 pupils in one class should have at least one computer lab. In case of multi-grade schools, where the class may be small, the above-mentioned ratio has no meaning. In such schools usually there are no extra rooms available to be used as computer labs, yet the machines are needed in the class where teaching is conducted. The standards for the number of computers for a multi-grade school have to be established according to the number of teachers, grades and



working groups and not according to the total number of students. The smaller the school, the smaller the ratio pupils/computers should be.

The policy concerning computers in elementary schools is recent in Greece. “Society of Information”, is an extensive strategic scheme concerning the introduction of ICT in many fields of life. Within this framework it is proposed that elementary schools should apply to establish computer lab with Internet connection. The number of computers in such a lab depends on availability of extra rooms and the number of students, criteria that are not met in most multi-grade schools and certainly not in single teacher schools. The way of financing ICT is bureaucratic and leads to delays.

It is clear that bureaucratic and centralized policies are major barriers for applying ICT in multi-grade schools. It depends mainly on the teacher who acts as a schoolmaster as well as to the other teachers to take initiatives, at the school’s benefit. Good public relations with local authorities and the local community help a great deal. Interestingly enough, it seems that these practices are effective and, despite the difficulties, many schools are nowadays equipped with computers, which were acquired using funds that (a) were directed for this purpose from the central educational authorities to local authorities, (b) were available for this purpose in the budget of European or national pilot projects in which a school participated and (c) were offered through donations [5].

Providing schools with computers is one issue, ensuring their usage is another. Teachers use a computer if (a) they know how to use it (b) they are persuaded that it is a tool in support of their teaching duties and (c) they realise that ICT’s may potentially support other duties that they have in their multiple role at school. These dimensions are analysed below:

- So far as (a) is concerned, the most decisive factor for multi-grade schoolteachers to learn how to use ICT effectively is schoolteachers’ training, and, in this context, on-site teacher training, though a costly practice, seems to be the best solution. With training *in situ*, there is no need for teachers to travel, their teaching duties are exercised during the training period and training is offered on an individual basis which in many times proves to be efficient. Moreover, *in situ*, the trainer ensures that computers are properly installed, solves any technical problems and gives instructions on how to cope with everyday problems. At this point it is worth mentioning that in multi-grade schools the “plug and play” concept is priceless. Hardware and software must come pre-installed and ready to use. Taking for granted that schoolteachers have no previous experience with computers, the whole interface must be as friendly as possible. Helpdesk and technical support by telephone must be constantly available and the schoolteacher should be confident that there is always someone to help if something goes wrong.
- So far as (b) is concerned, proving the importance of computers as educational tools is a difficult task. Given the extreme time pressure within which schoolteachers in a multi-grade schools work, ICT can provide quick and practical solutions in actual problems. An example of such an application is the development of a database with exercises and activities for all the grades. The teacher can plan the day’s work selecting from the database the appropriate material for the appropriate grade. Thus, the pupils of one grade can work on their own on paper or with the computer the selected exercises, while the teacher teaches another grade. Such databases, which can be online freely accessible, so as to be enriched with new exercises and activities, are useful particularly in cases of inexperienced and newly appointed teachers (who are profiled frequently in multi-grade schools).

In multi-grade schools, a common practice within the teaching context is that, when the schoolteacher is engaged lecturing one grade’s pupils, the rest of them divided in groups, are engaged in preparing exercises or studying previous or next hour’s lesson. Educational software is useful in this case, particularly if specifically prepared for the purpose of this time-sharing type of studying. Commercial educational software is also a good and practical solution, but has the disadvantage of not being directly referred to the contents of the school’s curriculum; hence it can be used as a supplement to ordinary teaching approaches as well as a basic instrument in student-centred activities, such as the preparation and presentation of a project in the classroom. Moreover if pupils deal with educational material not

necessarily referred to the curriculum, it is difficult for the teacher to check whether they are studying or not. For providing educational material directly adjusted to the school's curriculum, there are several solutions:

- A simple way is to convert text books into e-books; this is not a desired solution, since it does not give ICT instruments the chance to offer to pupils something different and more attractive compared with conventional educational material.
- Another way is to form a comprehensive library of commercial educational software, with detailed information about the parts that correspond to specific sections of the school's curriculum. This partially solves the problem.
- Another approach is to rely on synchronous teaching (videoconference) by a distant teacher, who covers all parts of teaching process.
- Finally, asynchronous teaching (web pages) can be implemented, a technique that gives similar results as in videoconferencing from teaching point of view [6].

These practices in their combination provide tools that guarantee quality of teaching and facilitate multi-grade schoolteachers in doing their job.

In parallel, schoolteachers should be convinced that horizontal communication with schools, organizations and other institutions in a number of ways (e-mail, web pages, and videoconference) helps them, supports pupils, provides access to information and reduces isolation. Cross-school activities, lecturing and direct communication with experts can help teachers to promote quality of teaching and to face a number of problems.

With respect to (c), it is important to bring evidence that ICT helps teachers to implement various administrative duties like students records, calendar of events, certificates etc. All these can be produced in a very efficient manner after templates for all the necessary documents have been developed. As far as communication is concerned, given the adverse geographic conditions, multi-grade schools' post is usually delayed so that teachers and pupils are not informed on time about activities and projects in which they would probably want to participate. It is clear that on line communication is expected to improve the situation.

Finally, it is worth noticing that there is a need for a platform for delivering the content addressed to teachers and pupils. An effective platform comes in the form of a simple portal-like web site. A portal is a web site that is intended to be an all-in-one entrance to the Internet, which also provides Internet services: email, chat rooms, free personal web pages, guides, scheduling, etc. Portals provide a single point of access to aggregated information. The main reasons for using such a site are:

- **Presentation.** It provides a single consistent interface across diverse content and function. Provides common user interaction model and API, which new applications can build on. Delivers a common user experience across different device form factors.
- **Access.** Provides common access mechanism for users to a range of applications (single sign-on). Allows different classes of users to have different levels of privileges, mutable and manageable. Provides access in a continuously available, responsive environment.
- **Personalization.** Permits customisations in the interface, to fit each user's specified preferences. Allows portal management to tailor the user experience for different classes of users, based on both implicit and explicit preferences.
- **Administration.** Allow multiple organizational units to create and contribute content and to administer sections of the portal. Allows a central management entity to manage multiple portals across the entire organization.

#### **4. Projects related to ICTs and their role in multi-grade schools**

It is believed that there are strong social and educational reasons why the field of ICT in multi-grade schools should be investigated, and for this reason a number of projects have been designed, developed and are executed (at various phases in their timetables). Some of them are worth presenting here.

##### ***The SXEDIA project***

The usefulness of ICT in multi-grade schools may be examined through the experience gained from the implementation of SXEDIA project. This project, funded by the Ministry of the Aegean, has been developed in 2000, as a pilot program with the task to introduce ICT applications to schools of the Aegean (which in their majority are multi-grade). This program involved the installation of computers in 46 schools in 32 small islands of the Aegean Sea. It also involved the connection of the schools to the Internet, teacher training, work with educational software, development of web pages to represent the schools and help them to communicate and finally, distance learning from the University of the Aegean in Rhodes, using synchronous and asynchronous teaching methods.

Part of SXEDIA's success may be attributed to the fact that (a) specific care was taken for every school separately and the activities were individualized according to the specific characteristics and needs of every school. (b) close links of communication have been developed between the support team and the teachers. The training approach and continuous contacts, either face-to-face, or through videoconferencing, e-mail and telephone contributed highly in the project's efficiency. All those that participated in the project felt as members of a team that worked for their own benefit and not because they were obliged to do so.

During implementation, one of the problems faced was the fact that a large number of teachers serving in multi-grade schools were not staying in their posts for more than a year. This had a negative impact on the schools' network operation, since it was necessary to provide training to the new teachers so as to become quickly familiar with the way in which the network operates and to start using them with no delay.

##### ***The MUSE project***

The MUSE project (Multi-grade School Education), funded by the E.U., aims to develop an in service training program especially designed to meet the needs of multi-grade schoolteachers and to improve educational performance in multi-grade school environments. Training is based on an innovative methodological approach for multi-grade school teaching and on an extensive use of ICT applications so as to provide:

- A flexible, interactive in-service training programme for teachers of multi-grade schools.
- The development of a platform for training, collaboration, networking and exchanging of ideas between teachers, students and trainers.

The MUSE project will provide continuous training and support to multi-grade schoolteachers, enhancing communication among remote multi-grade school teaching environments. The development of the proposed training program will be based on the adoption of a teacher centred approach. Implementation of the training program will include extended cycles of school centred work. Teachers will continuously give feedback to the academic team about their experiences gained in the classroom. This will not only will motivate teachers, but also provide the necessary cross-links between theory and practice. Upon suggestions of the teachers, the academic team will perform the necessary adjustments to the proposed approach. The duration of the project is two years.

##### ***The SXEDIA II project***

SXEDIA II, which is currently at the planning stage, will integrate the experience gained by SXEDIA and MUSE, in a wider target group. This means that:

- A large number of schools will be involved from all part of Greece.
- Apart from teachers and pupils, the project will be addressed to the entire local society of the area where the school belongs. It is one of the project's aims to make the multi-grade school a centre of the society's activities.

Specific aims of the project are:

- Production of exercises, practical educational activities and working plans adjusted to the needs of multi-grade schools. These will cover the modules taught in these schools.
- Extensive support of self- education and of education of pupils that face learning difficulties.
- Development of a system of multi-grade schools' management.
- Development of links with public services.
- Development of plans of activities at the community's service.

## 5. Conclusions

Drastic constraints concerning teaching time per student, intense fragmentation of the teaching procedure, lack of coherence, the need for time-sharing so as to meet the needs of a non-homogeneous class, make the multi-grade school a very demanding professional area. The teacher of such a learning environment is called to unify diversified groups, set objectives for more than one grade, transform heterogeneous groups into collaborative teams and integrate pupils into a functional entity.

In teaching multi-grade schools ICT is an indispensable tool that can provides solutions that improve the educational services offered by these schools. In many instances ICT is used less by the people that need it most. The main purpose of the above projects is to indicate in practice that ICT is needed in multi-grade schools and should become a basic ingredient that has to be included in the design of a new curriculum for these schools. Multi-grade schools, irrespectively of their reducing numbers, will be present in the educational scene for a long time yet, either as a necessary handicap for some or as an interesting pedagogical experiment for others.

However, multi-grade schools have little chance to be the priority in educational planning within this institutional framework. To change the situation a change in attitude could be involved. Changing the attitude with respect to multi-grade schools is a big challenge and ICT could work positively in this context.

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# A DANISH MODEL FOR HIGH QUALITY E-LEARNING FOR INCLUSION IN THE INFORMATION SOCIETY SOCIAL WORKERS AND OTHER LOW-EDUCATED GROUPS

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## Getting started

In this short paper we would like to talk about the ideas and concepts behind one of the most remarkable e-learning initiatives in Denmark.

The Social- and Health Care School in Aarhus, Denmark, has decided to use considerable resources for developing a model for our training courses, that features what we call High Quality e-learning. It is a revolutionary step to develop this kind of learning environment for groups of people with no or very poor educational background.

In the paper we explain what we mean by the *High Quality* e-learning. It is from the very beginning important for us to point out, that our engagement in e-learning environments is not motivated by the wish to get *more* education for the same amount of money spent.

We are motivated by the wish to create *better* and *different* learning possibilities for the poorly educated population – thereby fighting the major threat of exclusion of these rather large groups from the information society and the new learning techniques. We are prepared to pay the costs of this *High Quality*, because we believe in the long term effects it may produce.

## The general idea

What we want to do, is to break down the “Berlin wall” between poorly educated groups and the new media-based learning technologies. So we confront groups of social workers with the best e-learning environments, we are able to create. Knowing that these groups of social workers *will not be able to use this wide range of learning technologies*, we offer them – in the beginning of the courses.

The goal is to change the traditional courses to e-learning courses that allow them to *get access to and learn to use these technologies*. This means that we transform the traditional one-dimensional and very short school-like courses, that deal with specific topics, to a three-dimensional learning environment, that also deals with personal learning competencies and IT- and media training.

A lot of resources during the courses will be used at workshops, for support and mentoring. We know, that participants will not be able to use the offered technologies, when they enter the courses. But we believe that during the courses they will build up a lot of self-confidence, so that they are able to use the new learning technologies in their future working life.

The fundamental learning concept (*constructivism* and *technology fluency*) is very much inspired by the *Computer Clubhouse Network*, that was developed by the MIT in Boston, US. So, instead of giving the social workers isolated IT-courses on one hand and offering them traditional one week school training courses on the other, we try to integrate the work with personal competencies and media competencies in the course, and instead of doing this in a week, we do it over a period of two or three months.

## The goals

Before we *define* what we mean by High Quality e-learning for the poorly educated, let us briefly point out the major goals of the e-learning pilot projects:

- **the integration of working and learning:** the social workers are dealing with very complex problems every day and they do not benefit from the traditional abstract classroom courses, that always is about *what has happened*; the e-learning courses will be about *what is happening now*; the participants will be able to work with their *now*-experiences and they will be able to work by problem-solving, that can be transformed to reality *right here, right now*
- **building up the self-confidence of the social workers in relation to the vision of *technology fluency*:** the ability to use modern media in the learning processes is integrated in the courses, so that the participants can *experience the value of using the technologies*; this integration will also support their motivation to learn to use the technologies, because they will feel that the different tools in fact *support their communication and collaboration*
- **building up the social workers' desire to go on using the new technologies after the courses** and desire to explore the media to find new and interesting ways of learning outside the formal courses: we are not focused on the actual result of integrating the two new dimensions within the course itself, but in the effect the e-learning courses will have on the social workers' relation to the media *after* the course; have we supported their ability to *include themselves* in the information society after building up self-confidence, self-esteem and media skills during the courses?

### What do we understand by High Quality e-learning for the poorly educated?

It is very easy indeed to use the rhetoric of e-learning. But when we talk about HQ e-learning for the poorly educated, we must be able to explain and define, what we mean, and we must be able to do so in relation to the different dimensions or aspects of the e-learning processes. Therefore we will define the HQ in relation to the following aspects of our e-learning courses:

- HQ target group focus
- HQ learning
- HQ communication
- HQ training
- HQ content
- HQ effects on the participants lives.

### High Quality target group focus

The most important HQ for these groups of learners is, that they feel that the e-learning environment is designed for them and for their problems. If we confront them with some kind of abstract mainstream e-learning environment, they will not be able to use it.

It is a question of psychological resistance. Most of these learners have very unfortunate experiences from the classrooms in public schools, and they have bad experiences about the *abstractions* of these schools. They have never been able to benefit from the vast amounts of textbooks and they have never built up self-confidence in the classrooms.

Therefore they do not want to learn. At least not the way, they imagine *learning*. So when we create our new e-learning environment, we must not offer them mainstream e-learning. For these people that would be a new classroom, an e-classroom. We try to create an e-learning environment that reflects the different profiles and needs of these learners:

- the e-learning environment must be a mixture of being together socially and working in groups online between the on campus workshops
- the e-learning environment must build up the motivation of the participants during several precourses: they do not have this motivation from the start; they have resistance

- the e-learning courses must support the learning styles of the participants: they prefer to learn by practical examples and not by theory; they do not want to use too much text, but prefer to act and work with various kinds of expressions: physical, movies, narratives and visual media
- the tools, content and interfaces must be created to support these learning styles and they must be able to motivate the participants to overcome the resistance towards working with computers and technology.

So the key to motivate this group of participants is to create an online environment, that is designed for them and that can reduce the resistance and raise their curiosity. A mainstream e-learning environment will only support their resistance.

Therefore we use quite a lot of resources for creating original elements precisely to this group of e-learners.

## High Quality learning

On one hand these social workers do not want to learn. That is: they do not believe, they are able to learn. On the other hand they want to be *taught*: a special effect of the resistance is to sit down the first day in the classroom and present a very traditional attitude: *the teacher is now going to teach me what I have to know*.

These learners do not want to take responsibility and will not be able to work in an e-learning environment. The first and most important learning action therefore is to motivate them to want to work in another way and to give them a lot of training in relation to online tools, using a computer, communicating on the internet and so on.

The key to success in this field is *patience*. We must not think of e-learning in relation to these learners as something they will do, when the course begins. E-learning will, we hope, be something they can do, when the course is finished.

We must create an e-learning environment, that integrates the *learning of e-learning*, and at the same time: *the learning of learning*. This is what makes our e-learning courses very, very complex, and this is at the same time what defines the HQ of the learning environment. Because, at the same time the social workers must, during the same course, be able to:

- learn about the content of the course (the professional problems)
- learn to learn: take on the status of a learning subject and develop a *will* to learn
- learn to e-learn: develop a motivation for learning and working in a complex structure of professional work, on campus sessions and online collaboration
- develop new personal competencies
- develop self-confidence in the use of the new technologies.

## High Quality communication

The most important single element in e-learning is the *communication tools*. Most of the time the participants will work together in groups through the internet. This is very different from the forms of communication that the social workers are used to and very different from, what they want.

The e-learning process is therefore at the same time a very, very complex social and cultural challenge: the social workers like to talk with each other, they like to talk with their clients and patients. They are *not at all* used to write to each other, to a mentor or to themselves in their logbook. Most of them believe, that they are very poor writers: they make mistakes and are not able to express, what they mean.

The worst thing about online communication for these people is, that the other participants will be able to read what they have written. Once again we are facing the psychology of resistance and the lack of *technology fluency*. At the same time the ability to communicate through mails, conference programs and logbooks is perhaps the most important learning element in the e-learning environment.



So we are facing some major problems: *the participants resist exactly the most important processes in the e-learning course!* This contradiction can not be solved by some workshops or a precourse. It can only be worked through during the course itself. That is why we say, that e-learning is not something they do when they come, but when they go.

To make this happen, you must create some well organized, simple and practical communication tools. It must be very clear from the start what kind of communication we talk about. Who can read my notes and mails and in what contexts? Who can read and write in my group conference, in my logbook and in the general course conference? What happens if I make a lot of mistakes in spelling? What do you mean, when you say that I should comment the writings of my group? I'm not a teacher.

So all the fantastic potentials in online communication will depend on our ability to set up a very simple and safe conference room and will most certainly depend on our ability to motivate the participants to use the tools.

A wide range of considerations must be made: from the technical functioning of the conferencing software to the graphic interface of the logbook. We have chosen to create a simple conferencing room in our own First Class-environment: a course conference, a group conference (including a group logbook) and a personal logbook, in which you can make a process dialogue with the teacher/mentor.

In the precourse workshops the participants will be practising at some training conferences and will be able to send a lot of funny messages to each other – while sitting next to each other and thereby getting to know each other socially.

## **High Quality training**

The transformation of traditional short vocational courses to e-learning courses is not about working with the same content the same way and with the same goals.

For many people, and indeed for our social workers, joining an e-learning course means turning everything upside down: all the mental models about themselves, about learning and about being a subject or an object must change. Joining an e-learning course means deconstruction of many cultural traditions and opening the door to a new world: unsafe, but perhaps existing.

What we do not want to do, is to give the social workers some IT course and then asking them to join our e-learning courses afterwards. This is not going to work. The IT courses are abstract and the participants can not see the relevance of what they are asked to do. The IT skills, the *technology fluency*, the personal competencies to use the internet and the new media must be integrated in the courses, that primarily is about their job training. They must be able to develop IT skills during the same process, as they are working through their professional problems.

The High Quality of our e-learning courses exists exactly in the fact, that these courses integrate these dimensions as natural elements in the process. The participants can experience the relevance of the internet and of the media and they can learn on their professionalism from their working experiences, when they are confronted with all these unsafe technology.

At the same time the development of IT skills and of personal competencies will be integrated in their everyday professional performance on the job. The necessary training must be integrated in their lives, not separated from them. So in this case the HQ is about taking three integrated courses over a period of three months instead of taking one traditional course in a week. Most of the time the participants will be working normally in their jobs during the e-learning course.

There are, of course, no financial benefits here. Only extra costs. But in the long run society will get richer – in every meaning of this word.

## High Quality content

One of the most expensive fields in our e-learning model is the creation of original *multimedia content* for the courses.

We have established our own multimedia company *in house*, consisting of three very skilled and very creative multimedia- and web-designers, that work together with selected teachers to develop multimedia productions for every single course.

The vision is that all the on-line material should be integrated in one case based multimedia production containing all kinds of elements: text, websites, video, and originally developed material made for this special course.

The center of this case based online material is the original web-based multimedia productions, that are developed to the social workers with the most professional tools. The productions are designed with all kinds of graphics and all kind of aesthetics – everything made *in house* by creative people in and around the school.

The fundamental concepts – and in fact the fundamental reason for defining this work as HQ – is: our students and our social workers are not familiar with *abstract knowledge* in the traditional sense. They prefer movies, stories and plots in which it is possible to identify with a person or a moral conflict. So: our e-learning material and our learning concepts are based on *narrative* and not *knowledge*. We create a universe of narratives, cases and stories, and we invite them to tell their own stories in the group conferences and in their logbooks.

There is a beautiful parallel to this choice: their professional job consists exactly of working with narratives, destinies, people with difficult lives. Knowledge will not do the job for them. They need empathy, ability to understand peoples lives and they need to understand their own roles as social workers.

It is very expensive and very difficult to create multimedia material to our courses, but there are many positive effects: the school develops professional multimedia competencies, the selected teachers will be trained to develop their own materials and because the multimedia productions are online, we are 100 % free to change elements in the productions or to use parts of them for other purposes.

The development of inspiring learning materials, that uses a wide range of different expressions and media, is one of the *key challenges in HQ e-learning*. Every large scale production will suffer from the lack of ability to reach a special group of users with a set of specific learning styles.

## High Quality effects on the participants' professional and personal lives

When we, after some time, evaluate the effect of our HQ courses, we should not focus on the media skills of the participants during the course. Nor, at the end of the course, on the results of the work done.

The most interesting part of the evaluation is also precisely what defines the HQ of the courses: the impact of the courses on the social workers' attitude towards the new learning technologies and the degree of will to use these technologies for further knowledge, exploration and personal development.

The HQ e-learning courses should, because of the HQ, be able to make a measurable difference in the lives of the social workers:

- the courses should have built up their self-confidence in relation to the use of the learning technologies: the courses should have developed a personal drive towards a far more “natural” way of using the new media for professional and personal purposes
- the courses should have inspired the social workers to introduce some of the technologies and some of the new ways of communicating in their professional lives and among colleagues
- the courses should have developed such skills and technology confidence, that the social workers can join more straightforward e-learning courses in the future, and developed a wish to do so.

To support this continuity between the courses and the future professional lives of the social workers we invite them to keep on working together in the conference groups after the course. The school will provide support and evaluation of this continued netbased collaboration as long as the participants are interested. And it is, of course, also our responsibility to support this interest.

Almost all of the social workers complain about the lack of mutual support between colleagues. Their biggest problem in their professional lives is precisely, that they feel left alone with very complex and very demanding social problems – and with very few resources.

So the HQ of the e-learning courses is, last but not least, to provide the social workers with the skills and motivation to overcome this isolation in their professional lives with the use of modern communication technology. And do so, and that is very important, as learning *subjects* and not as educational *objects*.

This ambition of the HQ e-learning will be the most important and the most difficult – but also the far most challenging one.

### **The e-classroom: a critical comment**

A lot of work is done throughout Europe to fight *the digital divide* or the *social exclusion* of major parts of the population from the information or knowledge society. Everybody agrees, that the key to achieve important goals in this field is the new technologies and developing a *technology fluency* among the excluded groups and the groups, that are threatened with exclusion.

So a lot of e-learning activities are being launched, but many of them do not reflect the specific social, psychological and educational needs in these parts of the population. Many of the initiatives provide mainstream e-learning models, that presupposes the *existence* of social and psychological structures, that the learning processes should *develop*.

By offering these people mainstream e-learning with complex and text-based interfaces and content, we just make the digital divide bigger. Many of the e-learning models suffer at all levels exactly from the *abstractness*, that threatened these groups with exclusion already in public school. So what many of these people experience in e-learning environments is exactly the *e-classroom*.

The new learning technologies offer a lot of other ways of learning and working. They offer a number of ways out of the classroom – whether the classroom carries an *e* or not. A lot of the e-learning environments support this *abstractness* by being very *technologically* and by overkilling the participants with information, links, news and access to almost everything. The bottom-line of all this is *quantity*.

It might be that large scale e-learning is economically interesting. It might be that large scale LMS-supported or CMS-supported e-learning is technologically interesting. It might even be that it is rational to use these models seen from the point of view of an institutions' administration and organisation. And it might even be of educational value for some of the learners in the society. But when we want to *include the poorly educated* parts of the population in the information society, the mainstream e-learning models will not do the job.

If we are going to be successful here, we have to look for those special *qualities* in the learning environment, that can motivate precisely *this* group of learners. We have decided to look for such models. And learn from them by practising them.

### **...what does society get for the money?**

Providing this special quality is expensive. It takes time and it demands a lot of resources. So in the short run, this is not, financially speaking, a very good idea.

Why, then, should society use a lot of resources on HQ e-learning? What does society get back? Nothing in the short run, but in the long run things look quite different:

- the HQ e-learning is able to work with the participants psychological resistance towards *learning* and *change*
- the HQ e-learning is capable of establishing new structures of *responsibility*, personal and professional, in the mental models of the participants
- the HQ e-learning will, through the changed attitudes among the social workers and other poorly educated groups, contribute to the general change in the population towards public health care: *the learning patient*
- the HQ e-learning will contribute to the overcoming of the *isolation* of the social workers and to new forms of collaboration, that will lead to higher quality in the health care services and will reduce the amount of “burnt out” professionals
- the HQ e-learning is the first step of inclusion of large parts of the population in *lifelong learning*.

And a lot of other things...

The point is that HQ e-learning will support the *long run strategic goals* in the health sector. And that is, no doubt, extremely interesting financially.

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# DEVELOPMENT OF DISTANCE EDUCATION IN LITHUANIA THROUGH LIEDM NETWORK

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## **Introduction**

To become an equivalent country of European Union and eliminate unevenness comparing to other European Union countries, one of the most important tasks for Lithuania is to create a knowledge society, which could give an opportunity to all society members to study all life long. The main lifelong learning tool is distance education (DE) system. It means that we must create distance education system supported by information communication technologies (ICT) and accessible for all habitants of Lithuania.

To achieve this goal it is worth to accumulate all technical and technological recourses, education potential of the academic institutions. We must head all international and local overtures of all implemented programs into holistic and single-minded unit. During the development phase of distance education system the ICT appliance in DE classes will increase the quality and range of education services and territorial difference will disappear. The DE system will give the possibility for every Lithuanian habitant to seek for university, high school, vocational school, lifelong, in-service training diploma and study without leaving his/her office or house in convenient time.

ICT in education in the context of life long learning is one of the main research and development priorities in every country. The encouragement of life long learning and the successful use of ICT in the learning process should continuously expand if it is based on collaboration and dissemination of good practice.

## **Development of Distance Education in Lithuania**

The implementation of DE strategy is enhanced by a project "Development of Distance Education in Lithuania" (LieDM). Thirteen Universities and Colleges from eight Lithuanian cities are involved in the implementation of this project. During the project, in 1998-2003, there was created the infrastructure for a synchronous - real time based distance learning process.

The target groups of LieDM project are:

- full time students;
- part time students;
- teachers seeking to improve their pedagogical and vocational qualification;
- staff of the institutions of local government seeking to gain vocational skills in the administration;
- specialists from other fields seeking to improve their professional skills or re-qualify;
- unemployed seeking to change their qualification.

The project will be continued further including other target groups: pupils from schools-gymnasiums, secondary and high schools, staff of the state and private enterprises.



Figure 1: The integration of Lithuanian LieDM tele-learning videoconferencing network into Trans-European Tele-Education Network.

There were established 13 remote classrooms and three DE teaching video studios at Kaunas University of Technology, Vilnius University and Vilnius Gediminas Technical University. The study process is based on videoconferences.



Figures 2, 3: The videoconferencing studio at Kaunas University of Technology.



Figure 4: The videoconferencing studio's operating centre.

Figure 5: The videoconferencing class.

LITNET computer network and PictureTel equipment based on IP protocol have been used for videoconferences. During a videoconference a teacher may use application sharing capability, videotapes, and a document camera. Multimedia projection systems allow students to see a shared application window and video window in remote classrooms that are automatically switched to voice activated remote site.

## **Videoconference support system (VPS)**

In accordance with LieDM project there was developed a videoconference support system used to organize an interactive videoconference. The main purpose of this software is to facilitate the interaction between a teacher and students during videoconference. Students sitting in remote classes get connected to videoconference support system, follow the lecture, send their questions to the teacher, communicate among themselves, and follow teachers' instructions. The teacher can do the following things:

- Monitor the audience;
- Control the learning environment;
- Show the slides prepared in advance;
- Ask short Yes/No questions;
- Prepare quick tests, make quiz, watch the results;
- Answer students' questions sent to the frequently asked questions database;
- Watch students' discussion in a chat window.

In the future this software could integrate real video technology. In such case other Internet users could take part in the lectures delivered from the central teaching studio. Moreover, this software could also be used in other countries.

## **Eureka project TESTVIL - Tele-teaching Organizing and Support Environment**

As Lithuania enters European Union we will have more opportunities to participate in general research projects with scientists from Europe and other countries. Applied science research initiatives pursued according to EU Eureka program in Lithuania are being financed by Science and studies fund and Ministry of Economy. Those and other research activities increase Lithuania's competitive abilities in international community. While developing innovative and science based work products and services projects of Eureka comprise efforts of companies and science institutions and enable them to compete in the international market with success. Project TESTVIL – “Tele-teaching Organizing and Support Environment” is one of the projects coordinated by Kaunas University of Technology and executed together with Lithuanian company JSC "Mediaworks", Sweden Lund University and Greece C.E.T.I. Cultural and Educational Technology Institute.

In the context of globalization and European integration one of the basic features of our information society is constantly learning society. According to international and national projects there are running the following activities: implementation of methodical researches on effective distance learning; provision of various courses and studying programs; and formulation of related recommendations. Today the main problem in the established distance education videoconference network – LieDM – is that tele-teaching services are provided in specialized computer and videoconference classrooms that have limited number of learners. Next problem is that operating and supporting systems of tele-teaching process cannot provide sufficient interactivity when a tutor and learner cannot be in touch effectively during the whole process.

The objective of international project TESTVIL is to establish the system integrating videoconferencing and video material broadcasting technologies with feedback support devices and enabling virtual visual communication on the internet. This system is available for every internet user at home, at work or learning place and gives possibility to participate in a broadcast, video conference, or review former records, organize teamwork in internet as videoconferences. The project was confirmed at the end of year 2000 and will be completed in the middle of year 2003 (it is foreseen the continuity of this project). The system created in this project was grouped to subsystems and now we could present already operating Interactive Video Presentation and Lecturing System software called “ViPS”. The main object of ViPS is broadcasting arrangements of LieDM network on internet. The system can be used broadly – practically it allows to organize the broadcasting of event or lecture from anywhere with respect to sufficient internet connection. The example of such broadcasting could be TELEBALT conference which was held on 21<sup>st</sup> - 22<sup>nd</sup> of October, 2002 in Vilnius. It was the first time when ViPS system was tested in simultaneous broadcasting from couple sections and around 100 internet users participated virtually in the conference.

About 500 persons were registered and connected to review the conference records which are now accessible by the address <http://distance.ktu.lt/telebalt>.

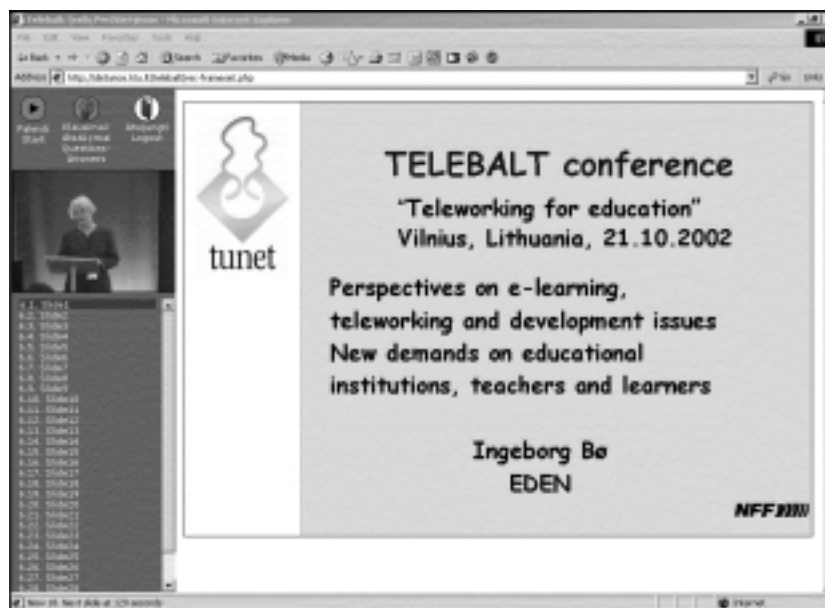


Figure 6. The page of Telebalt conference translation.

It is important for all event participants not only to watch the broadcasted report but also to deliver questions and be able to answer inquiries and organize voting. An example of the system applications could be a dispute “The future of Lithuania is educated person” held by LR Parliament Chairman A. Paulauskas and Minister of Education and Science A. Monkevicius. This discussion in a real time was broadcasted through Lithuanian Distance Education Network using ViPS (<http://distance.ktu.lt/vips>). The Chairman of Parliament made presentation and answered all the questions presented on ViPS system during live broadcast. Now all this material is available in the archive of the ViPS.

One important system function is convenient and flexible editing and publication of records. During the recording phase all the slides at the same time are synchronized with video file. There is a possibility to delete or replace the slides and change their content in a real time scale. Records in the archive are filed, every record has a quick access address and it is possible to publish direct references using this address in the internet. It provides the user with a possibility to connect directly to the exact record and review it.

Good functionality and flexible adaptation enables to apply this system not only in the field of tele-teaching but also in various virtual discussions seeking for sound arrangements. It is necessary to continue research in developing user connections and other functionalities.

During the pilot experiments and system testing all users responses were systematically registered and future improvements of the system were projected. For the year 2003 it is planned:

- prepare comprehensive system user guide,
- introduce full verbosity of the system,
- program exportation – importation of records, courses and users,
- create the subsystem of statistics accumulation and analysis (answers to tests questions, number of connections, etc.),
- introduce the fixation of questions and tasks in lecture records.

Some big Lithuanian companies showed their interest in Video lectures broadcasting system. They are planning to use it in local area networks for training their personnel. Lithuanian Republic Parliament has an interest in ViPS and discuss its possibilities for organizing virtual press conferences and broadcasting arrangements from Parliament.



In the future there are also plans to test the system in associated countries. This stage plays especially important role on system implementation, future usage and distribution not only in Lithuania but in European tele-teaching market as well.

## Conclusions

1. During the last few years there has been realized the importance and essence of ODL in Lithuania and has been started the initial works of applying the newest IT in ODL. The use of modern ICT as well as flexibility in teaching and learning provide new opportunities to create the information society and develop the individual skills of the citizens. The main purpose of ODL is to provide equal learning opportunities to all Lithuanian citizens. The establishment of new ODL teaching technologies may significantly improve education in Lithuania.
2. The integration of new means of mass media into the education raises important problems of the study reform. Along with the education production and learning software we should take care of a quick integration of new means of mass media into the education (as well as into teaching, everyday life of the university), employment of all means of mass media in the education process (e.g. in the interactive lectures and virtual laboratories) and the use of the newest information about education.
3. The synergistic effect of the shared experience of the participating countries is resulting in better training models and methods to develop personal growth. Information communication technologies help individuals, communities, and countries to collaborate, share ideas and good practice, and to understand different cultures better.

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# EUROPEAN UNIVERSITIES MANAGING QUALITY IN ELEARNING

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## Summary

The 52 Universities in Switzerland and in the EU regions “Four Motors for Europe” (Baden-Württemberg, Catalunya, Lombardia and Rhône-Alpes) were asked to fill-in a questionnaire trying to assess the quality of their eLearning activities, as well as some related eLearning management parameters. On the basis of the answers (60% of the group) further in-depth interviews have been done with some of the most active institutions.

The resulting picture shows an impressive grow in eLearning activities and in their quality, a few eLearning management models, as well as many issues/problems yet to be solved.

## Setting the scene: eLearning quality and management in higher education

When a new technology enters the – already crowded – communication market, the question on its effectiveness and efficiency usually arise immediately, dividing its (possible) target public into different parties, according to different judgements. This common scenario – deeply and extensively studied by the diffusion theories (Rogers 1995; Fidler 1997; Goldratt 2000, Cantoni & Di Blas 2002) – has been repeated also in the educational arena when new information and communication technologies (ICT) started to be adopted (Surry & Farquhar 1997; Fuller 2000). It is not, of course, the first time that education is challenged by technologies: on the contrary, it is usually a major test-bed for new “technologies of the word” (Ong 1982; Bolter 2001): here, people look for a confirmation of the social relevance of their innovations, as well as for economic investments endorsed by the social community.

While, at first, the attention of researchers was attracted by the issue of effectiveness of the use of new ICT, by comparing “traditional” courses with courses using those technologies (Phipps & Merisotis 1999), more recently it is becoming clear that the relevant question is not mainly if eLearning<sup>1</sup> is effective or not, but whether it is efficient, and under what conditions.

A wide corpus of research projects has shown quite clearly that eLearning can be as effective as learning activities without the “e” prefix, this kind of research has thus met that big impasse called “the not significance phenomenon” by Russell (1999).

A more promising research area seems to be that of teaching/learning quality: the problem is not any more whether or not to use eLearning, but how to implement it to offer a high quality learning experience (Phipps & Merisotis 2000; Peters 2002). Universities are among the institutions more studied and researched (Rowley *et al.* 1998), due to the fact that they implemented eLearning quite early, are relatively easy to study and willing to be studied, and because it is quite easy to gather information (a different situation is found in for-profit organizations).

Awareness of the quality issue is growing at the same time as the awareness of the management issue: the more eLearning enters an organization – leaving the status of trial or “technological gadget” and becoming an integral part of its educational activities – the greater the importance of its harmonization

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<sup>1</sup> The name and the definition itself of the use of new ICT in educational practices is far from being shared and fully agreed upon; in this paper we will use the term *eLearning* as it is defined by the Commission of the European Communities: “the use of new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services as well as remote exchanges and collaboration” (CEC 2001: 2). It is to be stressed that the interpretation of the above definition can range from an OR to an AND.

and deep integration with the institutional structure, its procedures and practices, its *myths* and *rites*. Again, the ecological perspective taken by diffusion theories can help better understand what is happening where eLearning starts to become flesh of an educational organisation: its nature changes somehow, everything has to be accommodated accordingly and nothing remains exactly the same.

Our research goes in this direction, trying to assess how some European Universities have integrated eLearning activities into their educational offer, and how do they perceive the quality of their own eLearning initiatives<sup>2</sup>.

## Method

In order to define a suitable sample – which could offer data comparable with those found in our starting point: the Swiss Confederation, and a manageable list of institutions – we focused onto the neighbouring regions, with similar characteristics and with the same language. The “Four Motors for Europe” consortium (founded in Stuttgart September, 9th 1988) seemed to quite perfectly meet research requirements. It includes Baden-Württemberg, Lombardia, Rhône-Alpes and the Spanish Catalunya (this last region does not share any border with Switzerland; nevertheless it was inserted in our sample). All these regions are characterised by intensive industrial production and can therefore be considered the economic engines of the European Union. In addition, data on geographic area and population suggest further similarities among them and between them and the Swiss Confederation (table 1). The complete sample consisted thus of all the 52 Universities in these five areas.

Table 1: the five selected European Regions

	Main city	Area sq km	Population	Working pop.	Gross enrolment ratios at the tertiary level of education (1996)	N. of Universities <sup>3</sup>
<b>Baden-Württemberg</b>	Stuttgart	35.752	10.408.370	4.970.000	47.00%	9
<b>Catalunya</b>	Barcelona	31.895	6.120.000	2.691.000	51.00%	11
<b>Lombardia</b>	Milano	23.860	9.065.440	4.020.360	47.00%	12
<b>Rhône-Alpes</b>	Lyon	43.700	5.648.800	2.159.596	51.00%	8
<b>Switzerland</b>	Bern	41.293	7.204.000	3.159.000	33.00%	12

Both issues have been studied through a questionnaire and in depth semi-structured interviews.

The questionnaire was composed of two different sections. The first one, structured in six sub-sections (University, eLearning activities, Staff, Funds, Didactics and Compiler), collected information about educational management in each University; while the second one assessed how they perceive the quality of their eLearning processes.

There are many proposals on how to evaluate quality in eLearning (Massy 2002, Eppler & Mickeler 2003), the quality criteria used in our research were adopted (with permission) from a research done by the American HIEP, the Institute for Higher Education Policy, and published in 2000 (Phipps & Merisotis 2000). The second part of the questionnaire presented thus the 24 *Quality on the Line* benchmarks (see Appendix I).

The questionnaires were sent – at first via traditional mail, and afterwards also via email – to persons well informed on the eLearning processes: mostly centre directors or eLearning project leaders. The distribution

<sup>2</sup> This research is actually part of a wider research on Educational Management ([www.edum.ch](http://www.edum.ch)), commissioned to the University of Lugano by the Swiss Virtual Campus ([www.virtualcampus.ch](http://www.virtualcampus.ch)), the main Swiss initiative in the field of eLearning in higher education.

<sup>3</sup> Only Universities and Polytechnics were taken into account, other higher education institutions (e.g.: Universities of Applied Arts / Fachhochschulen) were not considered.

of questionnaires started in April 2002 and filled-in questionnaires were collected by the end of October 2002. Collected data, and the very good response *ratio* (60%), offer valuable indications about main trends of eLearning in universities of the studied area, and open a number of issues to be further investigated.

Thirty-one questionnaires were collected: 7 out of 9 Universities from Baden-Württemberg (78%); 6 out of 11 from Catalunya (55%); 7 out of 12 from Lombardia (58%); 3 out of 8 from Rhône Alpes (38%); and 8 out of 12 from Switzerland (67%) (table 2).

The tool used for this research arises some relevant issues: multiple choice questions could be answered with little accuracy and are not so rich and informative as open questions would be. Also terminology caused significant difficulties, as words like “eLearning”, “online course”, “tutor” and “platform” can be used to convey quite different meanings. In addition, being our sample a rather restricted one, data cannot be used for inferential statistics.

Moving from the questionnaires’ answers, the second research phase took place, in which 16 in depth interviews with people working in some of the most active institutions.

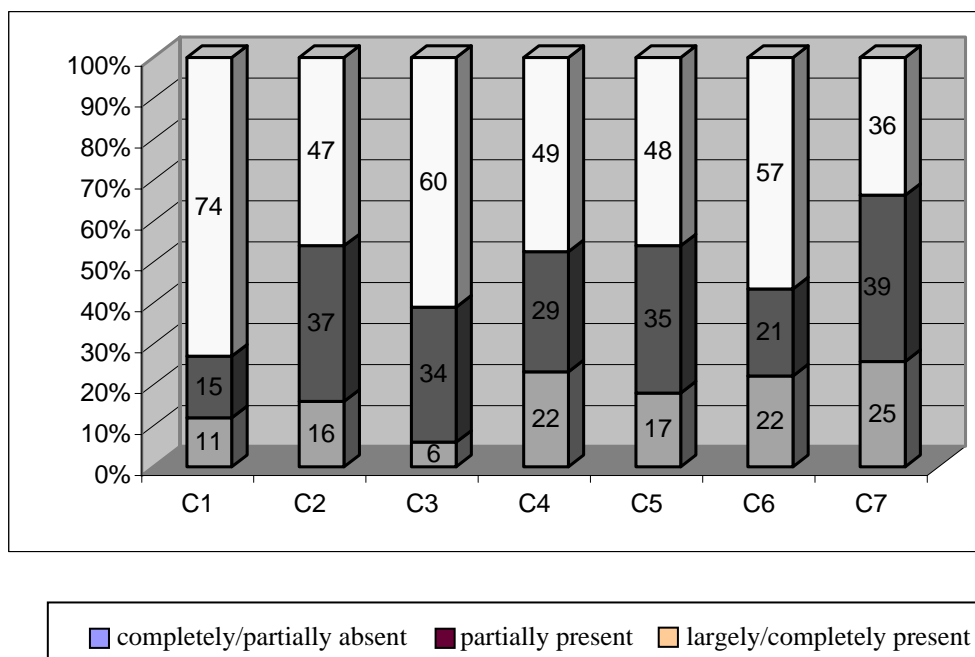
Table 2: answering institutions (by region)

Universität Freiburg	Politecnico di Milano
Universität Heidelberg	Università degli Studi di Bergamo
Universität Karlsruhe	Università dell’Insubria
Universität Konstanz	Università Cattaneo Castellanza LIUC
Universität Mannheim	Université Lumière Lyon 2
Universität Stuttgart	Université Jean Moulin Lyon 3
Universität Tübingen	Université Stendhal — Grenoble 3
Universitat de Barcellona	Università della Svizzera Italiana
Universitat autonoma de Barcelona	Universität Zürich
Universitat Politècnica de Catalunya	ETHZ Zürich
Universitat Oberta de Catalunya	Universität St. Gallen
Universitat de Girona	Universität Basel
Universitat de Lleida	Université de Lausanne
Università degli Studi di Milano	Université de Genève
Università Commerciale Luigi Bocconi	Université de Fribourg
Università Cattolica del Sacro Cuore	

## Quality issue

Compilers were asked to express a judgement on the presence of each *Quality on Line* benchmark on a five points Likert scale (plus an “I do not know” item). For the analysis, results were divided into three groups, as follows: answers 1 and 2: less or not present, 3: partially present; 4 and 5: largely and completely present. Data on quality benchmarks are synthesised in table 3: each column represents one of the seven categories of benchmarks (see Appendix I) and is divided in three parts, one for each class of answers.

Table 3: quality benchmarks (by category)



In general, benchmarks concerning Institutional Support (C1) were perceived as the most present, showing that institutions are making significant efforts to provide convenient infrastructures for performing eLearning activities in advantageous conditions. The category of benchmarks concerning Evaluation and Assessment (C7) is the less present. Taking into consideration only the “largely/completely present” answers, the quality categories rank as follows, from the most present to the less present: Institutional Support (C1), Teaching/Learning Process (C3), Faculty Support (C6), Course Structure (C4), Course Development (C2), Student Support (C5), Evaluation and Assessment (C7).

Relationships between quality and managerial parameters were studied both on the basis of the first section of the questionnaire and on the interviews. First results are presented in the following paragraph.

### Management Issue

The reported quality did not show a positive correlation with the number of students (although Universities with more than 30.000 students offer a remarkable number of online courses and research activities), while higher benchmarks values were scored where eLearning activities are integrated in curricula and complete degree programs are offered. Higher quality scores were reported when the single Institutes/faculty members can independently organise their programs, rather when eLearning management is centralised: this result reminds to the “lone ranger” scenario as described by Bates (2000).

When the goals of eLearning implementations are considered, one third of the Universities declared that their main purpose is to improve education quality, while economic parameters scored only 9% (table 4).

Table 4: reasons for the implementation of eLearning activities

to improve the education quality	33%
to increase accessibility and flexibility of curricula	26%
to offer technology experience to learners	15%
to answer the technology trend arising in the Higher Education sector	12%
to improve the efficiency of investments	6%
to reduce costs	3%
Other	5%

A section of the questionnaire was devoted to the (new) professions involved in eLearning processes; results (table 5) show a wide dispersion among different universities – the most shared item, “online tutor”, was selected only by 9 institutions – and a great linguistic and pedagogical creativity.

Table 5: answers to the question “Were new professional figures (e.g. tutors, planners...) created?”

Online tutor	9
Planner	3
Instructional designer	3
Coordinator	2
Director	2
Editor of multimedia	2
Technical support	2
Content developer	2
Classroom tutor, Web tutor, Tutor for student, Tutor for teacher, Teaching assistant, eLearning assistant, Counsellor, Facilitator, eLearning manager, Project manager, Media development, Web designer, IT manager, Programmer, Technical director, Graphics developer, Illustrator, Academic director, Didactical support, Research assistant, Evaluator.	1

This creativity has still to be integrated into well defined career paths, and clearly established professional role and professional requirements/skills.

If we consider the parameters of: a) *integration/substitution* and b) *type of public and space* (Cantoni & Di Blas 2002), the following management models can be identified.

*A) integration/substitution.* Universities adopting new technologies in their teaching activities can be placed on a *continuum* between the substitution and the integration of “traditional” activities (Bates 2000). While some universities, like Virtual Universities, intend to replace with eLearning all the services and processes belonging to presence institutions; others want to do only some activities, usually non compulsory ones, in eLearning, so that it is the student who chooses. Other academies integrate new technologies just as a support to better what already exists, but they do not delegate anything.

*B) type of public and space.* The type of public and the space reached by universities are important parameters in order to classify the existing eLearning management models. On one side, there are institutions, which wide their range of action offering continuous or vocational education, there are others, which want also to achieve different categories of students (working students or distance students); on the other side, there are universities focused only on the same target public of students, trying only to enhance their learning experience.

## Brief discussion

Results have shown quite clearly that the eLearning quality issue is considered by respondent universities, which have passed the first “to use or not to use” phase, thus entering – at different paces – the second “quality” eLearning phase. Suitable technological infrastructures are in place, and managed adequately (quality benchmark C1), eLearning processes are taken into consideration (C3) and support is being given to faculty members (C6). While more than 50% of respondent institutions scored high in the above three parameters, in the remaining ones – Course Structure (C4), Course Development (C2), Student Support (C5) and Evaluation and Assessment (C7) – there is room for further improvements. Anyway, the fact that Faculty support is in place is likely to have a positive impact onto the remaining parameters. In a sense, data suggest that eLearning experiences started in an institution- and teacher-centred frame, and are yet to move towards a more learner-centred approach. In particular, a major effort is to be devoted in designing and implementing evaluation and assessment tools and processes; maybe due to the fact that eLearning is just so recent, many institutions are focussing more on the creation of a suitable environment for it than on its evaluation. In any case, as long as this parameter remains neglected, it will be quite difficult to judge the cost/benefit ratio of eLearning initiatives.

This last consideration concerns also the eLearning management issue: as long as eLearning is offered through single and isolated initiatives, the question on its medium-term economic and organizational sustainability can't be properly answered. The same aspect is stressed also by the wide dispersion of answers concerning the "whys" of eLearning implementations: no answer was shared by more than 33% of respondents, and those related to costs – hence specifically managerial – scored so poorly (table 4).

Also incentives for professors who decide to enter the "terra incognita" of eLearning have to be better defined, as well as procedures for accreditation and copyright issues.

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## Appendix I: 24 quality benchmarks (Phipps & Merisotis 2000: 25-26)

<i>C1. Institutional Support</i>	<b>1.</b> A documented technology plan that includes electronic security measures (i.e., password protection, encryption, back-up systems) is in place and operational to ensure both quality standards and the integrity and validity of information.
	<b>2.</b> The reliability of the technology delivery system is as failsafe as possible.
	<b>3.</b> A centralized system provides support for building and maintaining the distance education infrastructure.
<i>C2. Course Development</i>	<b>4.</b> Guidelines regarding minimum standards are used for course development, design, and delivery, while learning outcomes—not the availability of existing technology—determine the technology being used to deliver course content.
	<b>5.</b> Instructional materials are reviewed periodically to ensure they meet program standards.
	<b>6.</b> Courses are designed to require students to engage themselves in analysis, synthesis, and evaluation as part of their course and program requirements.
<i>C3. Teaching/Learning</i>	<b>7.</b> Student interaction with faculty and other students is an essential characteristic and is facilitated through a variety of ways, including voice-mail and/or e-mail.
	<b>8.</b> Feedback to student assignments and questions is constructive and provided in a timely manner.
	<b>9.</b> Students are instructed in the proper methods of effective research, including assessment of the validity of resources.
<i>C4. Course Structure</i>	<b>10.</b> Before starting an online program, students are advised about the program to determine (1) if they possess the self-motivation and commitment to learn at a distance and (2) if they have access to the minimal technology required by the course design.
	<b>11.</b> Students are provided with supplemental course information that outlines course objectives, concepts, and ideas, and learning outcomes for each course are summarized in a clearly written, straightforward statement.
	<b>12.</b> Students have access to sufficient library resources that may include a “virtual library” accessible through the World Wide Web.
	<b>13.</b> Faculty and students agree upon expectations regarding times for student assignment completion and faculty response.
<i>C5. Student Support</i>	<b>14.</b> Students receive information about programs, including admission requirements, tuition and fees, books and supplies, technical and proctoring requirements, and student support services.
	<b>15.</b> Students are provided with hands-on training and information to aid them in securing material through electronic databases, interlibrary loans, government archives, news services, and other sources.
	<b>16.</b> Throughout the duration of the course/program, students have access to technical assistance, including detailed instructions regarding the electronic media used, practice sessions prior to the beginning of the course, and convenient access to technical support staff.
	<b>17.</b> Questions directed to student service personnel are answered accurately and quickly, with a structured system in place to address student complaints.
<i>C6. Faculty Support</i>	<b>18.</b> Technical assistance in course development is available to faculty, who are encouraged to use it.
	<b>19.</b> Faculty members are assisted in the transition from classroom teaching to online instruction and are assessed during the process.
	<b>20.</b> Instructor training and assistance, including peer mentoring, continues through the progression of the online course.
	<b>21.</b> Faculty members are provided with written resources to deal with issues arising from student use of electronically-accessed data.
<i>C7. Evaluation and Assessment</i>	<b>22.</b> The program’s educational effectiveness and teaching/learning process is assessed through an evaluation process that uses several methods and applies specific standards.
	<b>23.</b> Data on enrolment, costs, and successful/ innovative uses of technology are used to evaluate program effectiveness.
	<b>24.</b> Intended learning outcomes are reviewed regularly to ensure clarity, utility, and appropriateness.

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# COLLABORATIVE LEARNING IN OPEN DISTANCE LEARNING – THE NORDIC TRADITION AND QUALITY SYSTEMS

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*DEL – The Danish Institute for Educational Training of Vocational Teachers – is a national institution responsible for*

- qualifying postgraduate teacher training for vocational teachers
- professional pedagogic in-service and further training of teachers and leading staff at business colleges, technical colleges, labour market training centres etc.
- vocational pedagogic innovation and development work
- consultancy tasks
- documentation tasks, analysis and dissemination of knowledge

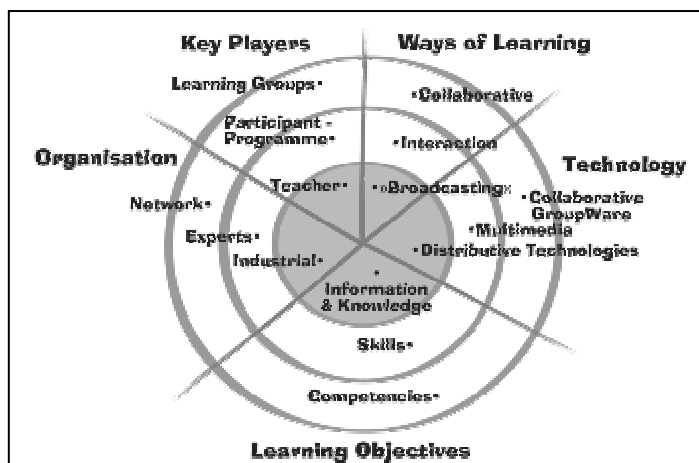
## Introduction

The Nordic tradition in education emphasising co-operation and dialogue has an important role to play in the further development of Open Flexible Distance Learning. Small is supposed to be beautiful but in the development and in the delivery of traditional distance education that is not necessarily the case. Developing major distance learning programmes based on a concept of broadcasting calls for big industrial organisations with a high degree of specialisation. But in a modern post-industrial world we also need other forms of Open Flexible Distance Learning that emphasise collaboration, co-operation and dialogue. And in this area the Nordic tradition of co-operation and also capacity for change will be important. The central issue will be how to develop the relationship between organisation, learning and technology in order to develop learning which can cope with the challenges of “Learning just in time” and “Learning just for me”.

On the major conference on Distance Learning in Copenhagen in the spring 2000 the Canadian practitioner and theorist Terry Andersson introduced the concepts of “Big” and “Small Distance Learning”. He sees Big Distance Learning as the major programmes developed and delivered by big providers for a big market, very often for the whole world. But according to Terry Andersson there is and will be a growing demand for “Small Distance Learning” where specific needs is in focus. These two forms should probably not be seen as contradictions to each other but rather as supplements. We have tried to describe the development from different angles. Focusing on the pedagogical, technological and organising perspectives. In a somewhat reduced form we can see a relationship between these different angles as illustrated in the model below.

The nucleus of the model shows the traditional distance learning which aims at distributing and providing access to information for a (large) number of learners. The technology should be designed for smooth delivery, which means that it could be radio, traditional mail or the Internet. This mode demands a high degree of division of labour between developers, experts in the subject matter, delivery and control.

At the next level we focus on skills. It could be language, math or vocational skills. Together they share the need for practise and training, and multimedia is often a good way to do that. Developing



quality multimedia is however a very expensive task. Therefore the market is often left to major commercial enterprises focusing more on mainstream accessible edutainment than on quality learning. Networks between colleges and private enterprises and European co-operation can be ways of overcoming this problem.

*Collaborative virtual and real learning processes are the most important form of learning in the network society.*

The individual learner constructs his or her own learning-portfolio (Learning just for me) but the collaborative processes opens up for developing competencies. Now we are at level three in the model. That kind of learning calls for a more flexible, simple and open technology than for advanced solutions. In this perspective the logic of the model might transform! The nucleus would then be that the individual learner develops his or her competency in learning groups working in collaborative GroupWare. And from there identifies the need for training skills or for getting a more formalised education. We are already now in the middle of such a development where individuals create their own learning portfolio related to worklife and personal development and seek the most relevant learning resources on a global market. That means that the learning environment becomes more local (combinations of work and private life) and more global (access to providers of education all over the world).

This is a development where the Nordic tradition in general (working in networks on a small scale but with a global market) and also in learning and education (dialogue and co-operation) has much to offer. But if this is to happen the institutions should be focusing on developing virtual dialogue, flexible learning together with the learners and especially combining the potentials of big – and small – distance learning.

*The tradition for quality-systems relates in general to level one and two of Open Flexible Distance Learning. - How do we cope with the important level three - Collaborative Learning? Self-evaluation is more important here than "tracing"!*

### ***Our Experiences***

We have developed Open Flexible Distance Learning for some years - also before it was called so. Our concept is to combine learning related to work and guidance and collaboration on the internet. This means that we have developed the concept of Action Learning over the years especially for professionals in Further Education (Teachers and managers)- and webbased support and resources. Within the last years we have seen new developments. One trend is a growing interest in performance - is it worth the time and money? Training (or competence development) is not longer seen as something beyond questions. Colleges have a very tight economy so there is a need for Return on Investment. The other trend is the growing individualization. According to the American professor James D. Duderstadt, among others, the educational landscape has changed. It has developed from "education-just-in-case" over "education-just-in-time" to "education-just-for-me"<sup>1</sup>.

At the same time the real synchronous learning spaces are replaced by asynchronous network learning, and learning can take place everywhere at any time. Therefore it is difficult to find your bearings with the old pedagogical theories and methods. New and innovative thinking is needed within the pedagogical field, because the field extends and changes.

To understand the pedagogical needs and the needs related to Quality-systems we first of all must define FDL. With reference to Keegan, we can point out that Distance Learning is characterised by:

- Teacher and learner are quasi-separated
- The existence of an institution scaffolding the learning processes – contrary to private studies
- Use of technological media to connect teacher, learner and the subjects
- Dialogue between the teacher and the learner – contrary to the "teach-your-self" media

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<sup>1</sup> In "Dancing with the Devil" by Richard N. Katz (S.F. 1999)

Furthermore Keegan points out the absence of a learning group. But on this point we don't agree with Keegan, a fact that illustrates the differences and difficulties in the definitions of FDL. Contrary to Keegan we find that the social dimension in the learning process can be vital and important. And this point of view is supported by the improvement of the theories about collaborative learning<sup>2</sup>.

The infinite access to information provided by the Internet makes it possible to "learn about", but not to "learn to be"<sup>3</sup> as Bruner points out. "Learning to be" depends upon social interactions and the competent combination of different kinds of teaching and learning processes in "Learning Communities", which can also be virtual.

In our definition of FDL:

- Teacher and learner are separated in time and space.
- Subjects and interaction are mediated by technology.
- Collaboration and personal communication are both scaffolding the learning processes and establishing a social practice.
- An educational institution delivers (the learning package).

And how does FDL differ from Distance Education? Sometimes it does not. It depends upon the individual learning possibilities. Some concepts for Distance Education are very flexible and give room for a variety of learning styles and collaborative processes.

*The vital Quality questions are then:*

- Does the teacher-learner separation enhance the possibilities for the learner both to learn and to complete the course?
- Does the chosen technology enhance flexibility and collaborative learning?
- Are the learning processes designed in the best possible way in relation to the learner's needs and potentials?

### **Technology – the conference system seen from the learner's point of view**

The conference system can be a key-point in FDL. When you choose a conference system, you should consider:

- Speed - How quickly can the learner get access, both to begin with and during the course?
- Cost - How much does it cost the learner to use the system?
- Interaction - How and with whom can you interact within this conference system?
- Total experience - How do speed, cost, interaction, goals, skills, subject and use relate?

It is important that the technology is not too advanced and complicated. Otherwise the technology can be the inflexible factor that blocks the essential: the enhancement of learning.

Again you must consider the following in order to enhance quality:

- The learner's needs, conditions and working tasks
- The wanted and expected learning process

Some very simple rules are important, when you organise and construct Open Flexible Distance Learning courses and resources:

- Keep it simple
- Show it

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<sup>2</sup> See e.g.. Anita Fjuk: "ICT-Mediated Learning in work organizations" Telenor 1999

<sup>3</sup> Peter Jarvis "The Theory and Practise of Learning" 1998

- Enhance transparency
- Consider the learner's point of view – over and over again

You have to structure virtual learning spaces, which scaffold the perception, the survey and personal task of constructing meaning and knowledge.

## **Pedagogical approaches and teachers' competencies**

The competencies of the teachers are another key to Quality FDL. Working with FDL is a didactic challenge rather than a technological challenge. The teacher must use the new learning spaces and design new teaching and learning strategies corresponding with FDL. This means that the teacher must improve many competencies. An HRD-strategy for improving the manpower part must consider the following:

- ICT-competence. To use the technology and give advice about common problems.
- Facilitator-competence. To guide in a way so that the learner feels motivated to go on. To use different kinds of guidance-strategies – based on both written and oral communication.
- Internet-communication-competence. To communicate concretely, clearly and constructively in an attentive way without being without taking over.
- Structural competence. To create structure. In the traditional school the structure is made up by the timetable, the classrooms, the architecture etc. A structure pointing out very clearly what school is all about. With FDL there also are some the signs – but the teacher plays a major part structuring and connecting things.
- Search and navigation competence. To search and navigate on the Internet and to assess material found on the Internet.
- Organisational competence. To organise and inspire. The teacher has to establish and improve the collaborative learning communities.
- Moderator competence. To moderate different kinds of e-discussions and to let the learners be in charge playing different roles.
- Meta-communication-competence. To be above the situation. The teacher should provoke the learner's thinking and acting.

## **The didactic competencies**

The teacher should be able to understand learners in flexible learning. The learners' needs, interests and also their lives and situations. The distinct problems compared to their classroom counterpart call for different competencies but also emphasise some of the competencies of the traditional teacher. First of all teachers of flexible learning must do much of their work before they know the specific students on the course. The content must be well structured and prepared beforehand, learning objectives clearly stated. It is important to create courses, which are open to being structured in a traditional flow, but also leaves room for a more holistic cyclic process.

## **Resources for Learning**

There is a lot of hype about Learning Objects right now. And it is important to take the "RAID"-approach (Reusable; Accessible; Interoperable; Durable) as claimed in the ADL framework for SCORM. But when you have to cope with level 3 simple Q-considerations are more important.

The learning resources should be easily accessible first of all. The materials should be developed considering demands like transparency and easy navigation. – And should also be simple in design and language. The important thing is to avoid that the learner feels confused or even stupid. Among other things that means that:

- The learner should know how and when assignments should be posted
- The learner should be sure which parts give credit in the assignments
- The learner should know where and when things are being discussed
- Which parts are optional
- What kind of learning is to be expected from participating in an activity

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# PROMOTING ADVANCES AND EUROPEAN MOBILITY IN HIGHER EDUCATION THROUGH ICT-SUPPORTED VIRTUAL MOBILITY TEAMS

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Many Higher Education Institutions report a decrease in demand from both students and faculty for participating in ERASMUS and LEONARDO mobility programmes. Final ERASMUS Institutional reports submitted in 2001 show 30,9% as average take up rate of all bilateral agreements for Teacher and staff mobility on European level, countries like UK, Germany, Denmark and Norway have even lower take up rates.

Participating in the mobility activities can make an important contribution towards an improvement in the Europeanisation, quality and relevance of a student's education and a faculty's teaching. However only a limited number of students and faculty can avail of such opportunities as: e.g. more adult learners, who are studying and working at the same time, participate in Higher Education programmes; students find it difficult to earn enough ECTS points when participating in study periods abroad; the grants do not cover real expenses; faculty find it hard to find time enough to participate; and the institutions have difficulties integrating mobility activities in the study programmes.

New ways of building up European mobility activities for faculty and students are needed to promote and sustain advances and Europeanisation in Higher Education in Europe. Using Information and Communication Technologies (ICT) to support a virtual mobility system for faculty and students is one of the ways. The European Commission Socrates, Minerva has just granted a project called EuroClass aiming at finding new ways of Europeanisation through virtual mobility activities.

The partners of the EuroClass project are:

- Buskerud University College, Norway
- ARCADA, Finland
- EuroFaculty, Latvia, Estonia and Lithuania
- Tietgen Business College, Denmark (project manager)

The successful realisation of the virtual mobility activities in EuroClass will rely heavily upon competent faculty and the use of various Information and Communication Technologies (ICT) for sharing and distribute knowledge. The EuroClass project is very much depending of a well functioning Knowledge management system. But research in Knowledge Management shows, that knowledge management technologies cannot distribute human intelligence, and that bypassing the distribution issue by compiling a central repository of data for people to access doesn't solve the problem either. The fact of information archived in a database or website doesn't ensure that people will necessarily see or use the information if the database or website is not a part of the person's daily routine. In the EuroClass project we have therefore chosen to test the mobility system using a conference system that the faculty and students are familiar with Black Board - Black Board does all the administration for the faculty members so that they can focus on teaching, is implemented in all the partner institutions as their e-learning platform, and is a daily tool for faculty and students in all the participating institutions. At the same time we have chosen to combine on campus learning and online learning using traditional methods as short, intensive training sessions followed up by classes and discussion fora on the web.

## **Aims and objectives**

The purpose and primary objective of the EuroClass project is:

*to explore to which extent competent cross border Faculty Mobility Teams using Information and Communication Technologies (ICTs) can support and sustain a system of Virtual ERASMUS Mobility integrated in full time business and social science studies.*

This will enable Higher Education institutions to provide an environment for all their faculty and students where they can participate in a European learning experience, work together to solve problems and carry out work for companies based in other European countries.

A series of Virtual mobility faculty and student projects will be conducted based on the research and technology developed in other EU supported projects as INTERN, Savie and BIC.

The faculty projects will be developed on how to use new technologies as web conferences, videoconferences in building up a virtual mobility system from a pedagogical approach. The project will be conducted in transnational teams on campus and online, and transferable strategies for competence development in the field of internationalisation and cross border teamwork using ICTs will be developed. Based on the faculty projects virtual mobility assignments will take place in a supervised Action Learning environment where the emphasis will be firmly placed on the European learning opportunity. Examples of the kinds of virtual mobility activities envisaged by the EuroClass project consortium include:

- Marketing projects in other countries using information technology e.g.: Students from Finland and Denmark work together on a marketing survey for a Norwegian company situated in Estonia. The survey is an assignment integrated in the curriculum in both institutions. Teachers from both institutions as a team plan, supervise and make sure that the project is relevant for both institutions syllabus
- Minor research assignments: e.g. students from Latvia and Norway work together on a law comparison between income taxation in their two countries. The assignment is integrated in the curriculum in both institutions. Teachers from both institutions as a team plan, supervise and make sure that the project is relevant for both institutions syllabus
- Analyses: e.g. students from Estonia and Lithuania work together on a macro trend report of their two countries for a Danish company. The assignment is integrated in the curriculum in both institutions. Teachers from both institutions as a team plan, supervise and make sure that the project is relevant for both institutions syllabus

All work carried out by the students and faculty will be supported by access to the World Wide Web and other electronic resources public as well as developed by the partner institutions. Communication with the students, faculty (and companies) involved will largely be electronic using various tools including Internet or ISDN-based videoconferencing.

In relation to the leading edge aspects of the project the processes, outcomes and output of the EuroClass project will be evaluated continuously by a Transnational Evaluation Team. The Transnational Evaluation Team will work independently of the project management lead by an external consultant, who is very experienced in managing and conducting EU supported projects in the field of ODL. In this way lessons learned in other ODL projects and best practices from other projects will immediately be implemented in EuroClass. The partner institutions large network of ERASMUS institutions and other international partners will be involved in EuroClass after the first pilot activities. The development strategy of EuroClass is a "waterfall" strategy and will be further developed during the project period and will be based on multi-sided development processes. Know-how already gained at Tietgen, Buskerud and ARCADA in the field of internationalisation using new technologies and new know-how gained in EuroClass will be transferred:

In phase 1: to the 3 EuroFaculty universities and to more faculty members at Tietgen, Buskerud and ARCADA starting with an intensive course for 3 representatives/future developers from each institution. The intensive course will be based on peer learning and networking in transnational teams followed up by discussions in the web based fora. From the recipient of the transfer of know-how a number - typically 2 - 4 developers, are needed. They are the persons acquainted with the local culture, but their competencies are not limited to that. The developers are the very basis for the success of EuroClass. Once started working on EuroClass, they will be extremely hard to replace without starting all over. That is a major reason why we have chosen not to limit the number of developers to a single person per institution. When choosing the participants the EuroClass management will make sure that the representatives hold the following practical proficiencies and experiences:

- Qualification in integrating ICTs in traditional courses,
- Syllabus development skills and practice,
- Experiences in teaching in higher education,
- Experience in training implementation,



- Experience in training evaluation, and
- Creative persons with ideas for co-operation projects area either theoretical assignments or assignments from companies.

The outcome of the intensive course will be an overall plan and content for min. 6 EuroClass rooms for students either based on practical assignments from companies / organisations or on more theoretical assignments. The overall plan and content of the 6 EuroClasses will be refined in the web based EuroClasses set up for the transnational faculty teams.

In phase 2: The action learning part of the faculty training - the 6 EuroClasses for students will be conducted as an integrated part of the faculty training. Each transnational team will be responsible for their own EuroClass room. The work in the classes will be evaluated by the Transnational Evaluation Team and supervised by the EuroClass management.

In phase 3: The developers, who have taught the EuroClasses at their institution will as a team teach other competent faculty members at the home institution how to create future EuroClasses.

In phase 4: The partners' ERASMUS network will be invited to participate in future EuroClasses using the same model described in phase 1 and 2. At the same time the ERASMUS partners will be encouraged to proceed with the development following the model described in phase 3 and 4.

In phase 5: institutions outside the ERASMUS partners will - on the project web and using direct mail to members from training organisations as EFVET, SIEC, EDEN and EAIE - be invited to register as interested in building up EuroClasses and to give input to future EuroClasses. When as a minimum 30 institutions have registred EuroFaculty will arrange an information seminar for the interested institutions with a workshop using the method described in phase 1.

In this way the faculties and students international contacts will be enlarged also to countries not directly participating in the project.

## **Innovative aspects**

The EuroClass project is innovative in learning terms with an innovative pedagogical approach based on action learning and represents an imaginative use of new technologies.

The Virtual mobility method envisaged by EuroClass is a new and highly innovative approach for building up close links between educational institutions in Europe using the possibilities given by the new technologies. In the more traditional mobility activities one student / faculty member travels to one institution and only 1-1 will they benefit from the exchange programmes. By using virtual mobility more students and faculty travel on the hyperway using Internet and videoconferencing to institutions in different areas of Europe. During the virtual exchange period the students' learning experience is supported by a team of academic staff from home and partner institutions which will put the assignments into a theoretical perspective and secure that the students earn enough ECTS points when participating in the study periods "abroad".

## **Pedagogical and didactical approaches**

The pedagogical approach in EuroClass is an Action Learning approach based on peer learning combined with a Knowledge management approach meaning:

- that the learning process is collectively organised with integrated peer learning
- that the learning process takes place in multicultural settings
- that a conscious synergetic process takes place
- that interpersonal communication is emphasised
- that the faculties working in European teams learn from each other
- that the students working in European teams learn from each other and the teacher's experiences

## **Who will directly use the results**

Academics of European Higher Education Institutions will through the EuroClass project be trained to use the new technologies for the internationalisation of their teaching methods and gain practical experience by participating and teaching in cross border faculty teams.

Managers / Administrators of European Higher Education Institutions will gain knowledge and experiences on how to integrate mobility activities in the study programmes to the benefit of students learning experiences and faculty's competence development.

Higher education students / adult learners, who are studying and working at the same time, will gain an international learning experience earning ECTS points without losing money.

Government and other public agencies including the European Commission with a vested interest in improving European Higher Education will learn more about strengths and weaknesses in virtual mobility systems seen from a practical point of view.

### ***The EuroClass seen in the EuroFaculty context***

The EuroFaculty study reform cooperation includes 8 “donor” countries (Denmark, Germany, Poland, Finland, Sweden, Norway, United Kingdom and the Netherlands) and 3 “host” countries (Estonia, Latvia, and Lithuania).

Guest lecturers are coming from donor countries to Baltic states to support the Baltic states in the transition of the university study programs.

The interest of EuroFaculty in the EuroClass project is based on four points:

- Reduce start problems (start costs) at guest lecturing, especially at short term lecturing of 10 to 20 lecturing hours.
- Replace teacher mobility for full semester courses.
- Make “daily meetings” on research problems possible.
- Distance learning can rise the quality of education by drawing on foreign research expertise.

### ***Student/teacher cultural difference***

For the purpose of this article it is relevant to call the result of 50 years suppression (which among other things has reduced the average income to 33% of the income in the donor countries) for “cultural differences”.

A major cultural difference is that the master students in the Baltic states predominantly are part time students versus full time students in the donor countries. Derived from this we get lower working moral, less strict demands to the students, and lower level of study plans.

On the teachers side we see that the teachers likewise are either part-time teachers or burdened with 16-24 weekly teaching hours. According to student evaluations they care less of the students and in own and some students interest lower the teaching level.

Besides the teaching in the Baltic higher education is not research based due to the heavy workload of the teachers.

### ***The “start costs” of foreign teaching***

Cultural differences gives rise in the “start” costs for the foreign-based teaching.

In general even without cultural differences the teachers lack of knowledge to the students gives start problems. Including the mentioned cultural differences the start problems are even higher.

A video meeting between students and teachers 14 days before the arrival of the teacher will promote the benefits of:

Presentation, discussion and acceptance of teaching plan in advance.

- What do the students already know?
- What is there educational level?
- Determination of what shall the teacher change in his presentation before he physically arrive.

### ***Replace teacher mobility for full semester courses***

The personal mobility from the donor countries is low. Family and carrier bind the donor countries teachers. This makes it difficult especially for researchers in the age group 35-55 to go abroad in the mid of their carrier and personal development.

Video based teaching can let the teacher teach from his home office.

### ***Make “daily meetings” on research problems possible***

EuroFaculty supported PhD students are connected to foreign advisers. The student visits the foreign lecturer abroad in 6 month or more and develops a cooperation pattern. When the student returns they stay in close contact with the foreign adviser through ITC. This can reduce the PhD students stay abroad, and to a great degree let the student stay in his own environment.

## **Summary**

Many Higher Education Institutions report a decrease in demand from both faculty and students for participating in e.g. ERASMUS mobility programmes.

Participating in mobility activities can make an important contribution towards an improvement in the Europeanisation, quality and relevance of a student’s education and a faculty’s teaching. However only a limited number of students and faculty can avail of such opportunities.

The purpose and primary objective of the EuroClass project is to explore to which extent cross border Faculty Mobility Teams using Information and Communication Technologies (ICTs) can support and sustain a system of Virtual Mobility integrated in full time business and social science studies. This will enable Higher Education institutions to provide an environment for faculty and students where they can participate in a European learning experience, work together to solve problems and carry out work for companies based in other European countries. A series of Virtual mobility projects for faculty and students will be conducted based on the research and technology developed in other Minerva supported projects as the INTERN project.

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## MARKET ORIENTATION, QUALITY IN OPEN ADULT EDUCATION

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### **Market and education**

Numerous strategies have been developed the alignment of supply and demand, some of which can be applied in adult education. ‘Flexible’, ‘Open’ and ‘Distance’ forms of learning that are designed to fulfil the social as well as the educational needs of customers are becoming increasingly prominent, especially in the field of adult or mature student education. In each case institutions may need to use different market oriented strategies and tools to gain the target group’s favour. A particularly challenging area for marketing of education exists when the target student groups are located in different countries, or even across continents.

A considerable number of higher educational institutions apply several techniques that have proved successful in profit-orientated marketing. In other educational sectors, to date such techniques seem to have been concentrated largely among privately owned colleges, where the aim is not only the transfer of knowledge, but also the achievement of profit. Whilst practice varies across countries, such a trend appears to apply among business-related colleges perhaps more than other types of educational or training establishments.

Across Europe, the market for adult education provision is fragmented, both along national lines and also according to the type of institution providing the service. The few pre-existent full-time and/or adult/continuing education centres that were directed centrally and easy to survey have altered significantly. Different kinds of institutions, firms and enterprises dealing with education and educational organisation have appeared, first of all in the language education market and then more widely across the field of training activity.

In most countries, the provision of education is an activity which is subject to a range of controls, - both statutory and professional. The existence of these conditions (whether or not they amount to a formal ‘licensing process’) is designed to ensure a degree of professional competence and skill and thus to provide a measure of re-assurance for the intending student and the prospective employer. There are therefore limits on the establishment of institutions to provide educational programmes, although the nature and severity of these controls varies from country to country. However, mere possession of an ‘official’ licence does not, in itself, provide any guarantee of acceptable quality, or educational standard or the availability of a recognised qualification that is really utilisable.

The growth of demand has attracted a large number of education organisations as potential providers. Each tends to have its own character, usually developed to serve a particular niche. Each has its own unique combination of ownership structure, mission, capabilities, courses offered, regional role, history, image and a way to develop its own competitive advantage. The market has so far been technically easy to enter. An entrant person or organisation, with an interesting subject, who can make its message heard, may become a successful niche player overnight. Investment barriers have traditionally been low – and still are for a small enterprise. Educational organisations with aspirations to grow and become large, influential players face increasing and serious investments in information technology and in development of both product and of key personnel.

The tertiary level of the official education system is an important part of the total adult education market. It is generally considered to do its job well, and increasing high proportions of national populations obtain Bachelor or higher levels of degree. Universities and polytechnics are also beginning to increase their stake in Open Adult Education (OAE). The market for OAE has, however, traditionally been largely in the hands of vocationally dominated adult education organisations. In many countries these have included private-sector providers, sometimes alongside public-sector institutions seen as representing a ‘half-way house’ between secondary education and conventional universities or polytechnics.

In The United Kingdom for example, the OAE market is dominated by approximately 250 Colleges of Further Education who receive at least partial state funding, plus an indeterminate number of private sector organisations. By comparison, in Finland, OAE is largely in the hands of a hundred-odd open vocational adult education organisations. These serve both the individual and the corporate market, offering a wide range of alternatives. Of these hundred, one third are large, established organisations, whilst the rest are vary considerably with respect to size and professional standards. Many of these organisations are very good in some subject areas; many are riding a fashion wave offering the latest 'ism' – and some are outright fly-by-night operators. The difference between corporate education and company-specific consultancy is sometimes hazy and now all levels of providers have had to learn to cope with increasing competition.

### **Some Characteristics of Educational Enterprises**

- Education is an infrastructure- and salaried staff-demanding activity. It requires significant investment in buildings and personnel and – increasingly – in computer-based technological infrastructures.
- It requires work force (teachers) with appropriate pedagogical knowledge. In many countries, there is no real problem securing employees for private sector educational enterprises since those working in state educational system may also be employed on a part-time basis.
- An educational 'business' enterprise requires a relatively low level of trade capital since education is predominantly a service, where the price (tuition fee) is normally paid partly or entirely in advance.

#### ***The customers***

A large part of the total volumes of money spent and student participation classified as 'Open Adult Education' in the statistics is not really professional or vocational in nature or intent. Rather, it is focused on programmes aimed at self-improvement, life-style and even recreational motives of the students. Retired persons frequent many such programmes.

The demand for 'vocational' adult education has grown dramatically over the past decade, both in the individual and corporate segments. Individuals see a need to prepare themselves for work and career development or change. Corporations wish to develop their human resources and may either organise company-specific programmes or support individual studies on the part of their personnel. It is estimated that corporations pay for more than 50% of the total spending for vocational adult education.

#### ***Student Segmentation***

The characteristics of the student potential in the 'individual' sector are changing rapidly and seem to be polarising into two categories: the smart and demanding ones (X) and those who look for more basic skills (Y). These categories require very different educational and marketing approaches.

**Category X** is the faster growing segment. A rapidly increasing proportion of these students have a knowledge of two or three foreign languages, English usually being at the top of the list. They tend already to hold university degrees and/or to have undertaken other prior professional training. They tend to be familiar with IT (in particular the PC) and to use a computer daily both at work and at home, typically with access to the internet. These students are already working in specialist or managerial positions. As customers they have very specific requirements for what they expect to buy, and expect value for their money, in the shape of practical, working, cost-effective solutions. Their motivation is high and they pay more – or at least as much – attention to what they really learn as to the diplomas. If they do not feel they get what they bargained for, they are ready to complain.

**Category Y** students tend to be those who left school at an early stage. Their knowledge of languages is superficial or non-existent in practice. They are frequently unemployed or work in routine positions. The better-motivated ones have sought and enrolled for courses at their own initiatives. Others are directed to

'appropriate' courses by the authorities or employers. Formal proof of attendance and of having 'passed' the course are very important.

In the corporate sector, companies are tending to increase their investment in education in the long term, but there seems likely to be much short-term variation in participation levels and topics. Corporate customers are outsourcing their own training functions and act very professionally as buyers. They are cost-conscious and expect a sharp focus on their particular needs in the programmes.

In domestic markets, institutions establish and maintain direct contact with their customers in both sectors, whilst in export markets it is customary for them to look for a 'local' educational organisation as a distributor and partner.

### ***Learner satisfaction analysis***

One key factor in an educational Quality Assurance system is the ability to measure responsiveness to customer demands, which in their broadest sense represent an articulation of real needs of society. We tend to interpret these needs as they are expressed by students or financial supporters as mediums or moderators but the real source of demand is rooted in the deeper need for professional/vocational skills improvement in the employment market.

The practice of following up graduates and assessing the relevance of their studies to real market needs provides a tool for ongoing quality improvement through feedback of survey data. It is important to examine the fitness of freshly graduated students for labour market requirements. The authors' own institutions have follow-up systems to track their graduates. These follow-up systems have some peculiar features to cope with the 'distance learning' environment and are complemented by the activities of alumni clubs. The system provides not only an analysis of a student's career but also an appraisal of the practical usefulness of their studies and projects undertaken.

One of the most interesting conclusions to arise from these follow up activities is the suggestion that adoption of distance learning has stimulated, if not actually generated, a need for life-long learning. Experience suggests that up to one third of graduated students undertake further studies.

### ***The Effects of Change on the Market***

Overall the educational marketing environment is typified by the transition from a supply/supplier-driven economy to more of a conventional 'market-influenced' – if not actually 'market-driven' scenario. The collective effects of all of the environmental changes outlined above is to increase the need for a well-qualified work force – and indeed for a well educated society as a whole. These facts have been recognised by government and encouragement has been given for development of programmes designed to enable individuals to:

- Gain additional qualifications to make up for non-achievement whilst in the school system;
- Update qualifications to cope with new/changing needs in employment/society;
- Undertake new studies purely for social/personal purposes, leading to personal development and hence societal benefit.

These same trends have been identified by many employers. Within the UK as a whole, employers have identified long-term shortages of new recruits possessing basic skills of literacy and numeracy as well as being well-qualified in basic areas such as engineering. The demand for enhancement of educational levels seems to be a long-term priority as well as a short-term opportunity for the education profession. As is the case with all promotional activity, it is extremely difficult to evaluate the effectiveness of any individual activity in isolation from the others.

There are some variances in practice, it may be concluded that all institutions are taking what they consider to be appropriate and affordable steps to promote their existence and the 'products' which they have to offer. The extent to which they all succeed depends largely on the motivations of individual prospective students. Whilst some students are driven simply by the desire to obtain 'a piece of paper'

signifying a qualification, many others are more influenced by the reputation of the institution concerned – even if that may entail some sort of financial or other apparent disadvantage in the short term.

### ***Managing the changes***

There are real changes occurring in the environment and the tempo of the changes is accelerating. The management in many of the organisations, especially those with a long history and an established, financially supported position, has concentrated on purely educational issues. An image built on past performance may be fading or even negative in the new situation. Financial support from sources other than students’ fees has become conditional or is dwindling away. Competition is real and intense. While education is the fundamental mission of these organisations, they have to be managed on business principles. This necessitates a conscious formulation and effective implementation of strategy. To be able to fulfil the mission, the objectives, concrete targets, investments and operational effectiveness of an institution need to be in order. In a fragmented market like education, there is no one formula for achieving this. Competitive advantage has to be built, based on the actual conditions and aspirations of the institution.

### **The market-orientation model of education**

The prepared model consists of 6 blocks, which I developed by adapting the market-orientation models explored in the secondary research to education. To do this, the starting point was provided by the impulse – organisation – reaction model. The components comprise several factors that are relevant for educational institutions from the point of view of the characterisation of market-orientation. The model is shown in Figure 1.

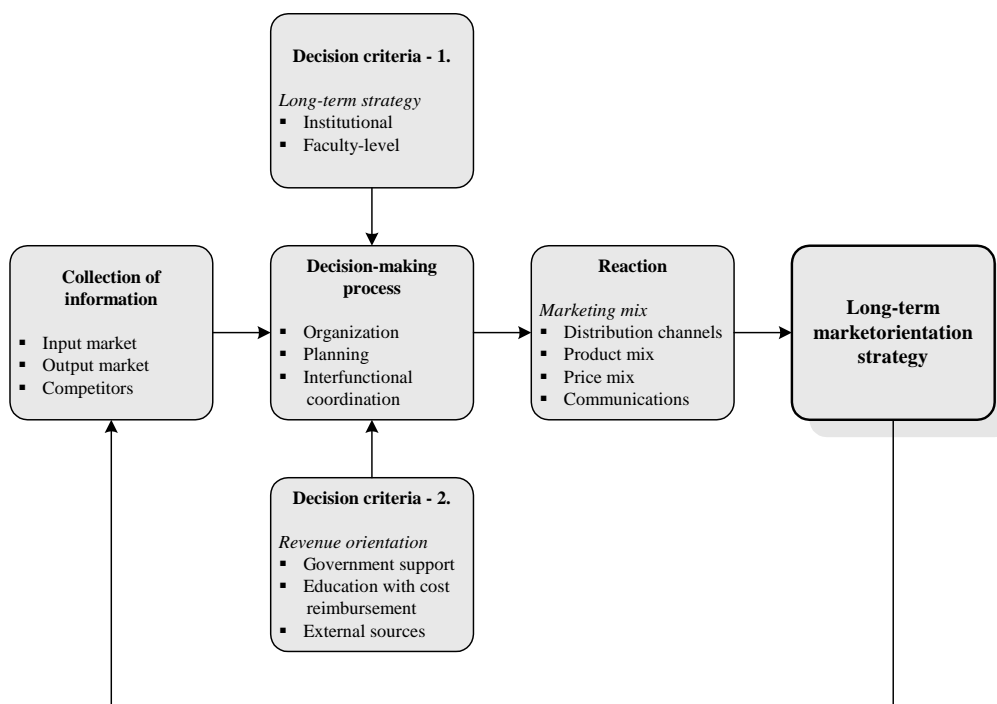


Figure 1. The market-orientation model of education

### ***Collection of information***

The first block of the model consists of the *collection of information* on the education market. For the research of *input information*, information about potential students as customers shall be collected from different partners. The source of the *output information* represents the information, collected from students who have graduated, regarding prospects for employment and success. What the market is looking for shall be determined, as well as the trends in partner institution selection by which potential students can fail or succeed in the labour market.

The *follow-up on competitors* is an essential field of the collection of information by the educational institutions. Information on the attitudes and development of faculties and institutions providing a similar education indicate the points where an increase may be expected in competition. Attention should be paid to the behaviour of private institutions of higher education and of the foreign educational institutions, as these are our competitors.

It is important to know the factors that affect the collection of information, (i.e. do the financial means, the experts available and the organisational structure meet requirements?).

### ***Decision-making process***

The second block of the model deals with the *process of decision-making*. The information obtained by the educational institution is analysed. A decision is then made regarding the behaviour of the institution.

Several fields must be investigated. Does an *organisation* exist to convert the information into action? Are there selected persons or separate organisational units to carry out the collection and processing of the information and to take charge of the preparations for the decision-making process? Do they participate in the market-oriented decisions? Are the *plans* also drawn according to an annual breakdown or are there simply action plans for individual significant events? The coordination in order to the market success works effective (interfunctional co-ordination)?

Are there any elaborated *strategies*? (1. *decision criteria*). If there are, then for what time lines, and do they only cover the institution as a whole or are there faculty-level strategies as well? Are these strategies part of the overall institutional strategy or do they appear on their own as well? What is the *revenue-orientation* of the institution? (2. *decision criteria*). What is the revenue structure of the university/college, how large is the proportion of government support, and how far should the institution rely on external revenue sources? Is the *market-orientation* a *long-term characteristic*, or is the orientation only short-term?

### ***Reaction***

The third element of the model deals with the *reaction* to the effects of the market. An institution of higher education must respond to the challenges of the market. Tools must be shaped, and the necessary resources should be raised.

The *key elements* of the reaction are the elements of the marketing mix: communications, the selection and operation of distribution channels, the price, and the product strategies. The tools of marketing *communications* are manifold, and these can be ranked in different ways for an educational institution. It is very important to carry out the *analysis of the effects* of marketing activities.

The *distribution channels* are comprised of the methods of transferring knowledge, that is, the forms of instruction (full-time education, distance education, evening courses, learning by correspondence, flexible learning, Internet and multimedia-based education, consulting system, entrance in the international education market etc.) at institutions of higher education. The *product strategy* is primarily comprised of the subject specialisations and the orientation of the syllabi. The *pricing strategy* is important – it is applied by universities to instruction with costs reimbursed. (In the framework of my research I focus on the *marketing communication*.)

### ***Results***

The results of the application of the model is the *long-term market-oriented strategy*. The suggested model assumes that sustainable competitive advantages are not directly measurable in the case of educational institutions. That which can be observed on the output side can be defined as a market success (raise of the rate of the market).



## Conclusions

- A significant market for Open Adult Education does exist and there are many providers and many options available in terms of the level of provision.
- The number of potential students is likely to continue to grow in response to both government policies promoting access to Adult/Higher levels of education, and also to generally increasing leisure time, which has the consequence that increasing numbers of people fall within the category of ‘senior’ students.
- The number of providers is continuing to grow as also is the number of course offerings – of all types and at all levels – whether or not they are award-bearing.
- The need for effective marketing strategies is apparent to facilitate effective competition and provision of appropriate levels of customer satisfaction.
- At the present time, it seems likely that much promotional activity is less than completely effective. Steps should therefore be taken to ensure that appropriate media are used and evaluated systematically, that more pro-active methods of communication are employed and (for ODE provision in particular), more imaginative use is made of websites – without losing the sense of personal involvement/integration of the students and the academic and administrative staff.
- In addition to issues associated purely with Customer Care, it is evident that there is an on-going need to place emphasis on issues of Quality Assurance to ensure consistency of product quality and also of service provision.
- Given that increasing use is likely to be made of ‘off-campus’ delivery methods, particular attention should be paid to the development of procedures to ensure uniformity of output quality and harmonisation of programme substance.

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# INFORMATION LITERACY DEVELOPMENTS IN EUROPEAN ELEARNING

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## Introduction

Information and communication technology (ICT) has become a powerful tool for information generation, delivery, interchange and use. The focus is still, however, on the technology itself. Information resources are increasingly available online, but many students lack the information literacy (IL) to transform information into knowledge and wisdom. There is little recognition of the central role of IL in support of the quality of education or in the development of lifelong learning skills. Many educators have extensively written about the need to promote IL as an integral part of the education process, but IL research is still in its infancy. Not only the number of completed studies is relatively small, the agenda is still ill-defined and suitable theoretical frameworks are only beginning to be explored.

However, it is to be expected that an integrated IL component in learning would have a positive impact on students' mastering of context, fulfilling research tasks and problem solving, becoming more self-directed, and assuming greater control over their own learning, enabling individuals to engage in a variety of learning situations and opportunities in optimal ways.

Christine Susan Bruce, a well-known Australian IL researcher, notes: 'The idea of information literacy, emerging with the advent of information technologies in the early 1970s, has grown, taken shape and strengthened to become recognized as the critical literacy for the twenty-first century. Sometimes interpreted as one of a number of literacies, information literacy is also described as the overarching literacy essential for twenty-first century living. Today, information literacy is inextricably associated with information practices and critical thinking in the information and communication technology environment' (Bruce, 2002). Indeed, since 1974 IL has been an area of increasing interest to librarians and information professional and there is a huge amount of literature on the topic. However, the majority of publications have come from the industrialised English-speaking countries, especially from the United States and Australia. There are also references to IL developments in Canada, China, Japan, Mexico, Namibia, New Zealand, Singapore and South Africa (Spitzer, Eisenberg & Lowe, 1998; Muir & Oppenheim, 2001; Rader, 2002a; Inoue, Naiti, & Koshizuka, 1997; Morgan, 2000; Moore, 2000; Lianza, 2001; Hepworth, 2000a; Karelse, 2000). Unfortunately, references to IL initiatives in Europe are quite rare and fragmented. The majority of publications come from the United Kingdom and part of the problem can be identified as language barrier. Many IL initiatives have been documented only in Danish, Dutch, Finnish, German, Spanish and Swedish.

IL literacy movement in the United States (Behrens, 1994; Spitzer, Eisenberg & Lowe, 1998; Seaman, 2001; McCartin & Feid, 2001) and Australia (Bruce & Candy, 2000; Bruce, 2001; CAUL, 2001) is quite extensively analysed and discussed and there have been significant initiatives in these countries. In the United States the National Forum on Information Literacy was established in 1989, the Institute for Information Literacy in 1998, two sets of IL standards were developed in K-12 education and higher education, and the US Department of Education included IL in its national education technology plan as one of the five goals in December 2000 (Riley, Holleman & Roberts, 2000; Muir & Oppenheim, 2001). The importance of students being able to access and evaluate information is highlighted several other strategic documents (Koch, 2001) and we may find 'best-practice' at various levels (Snively, 2002; Wilson, 2001).

In Australia the role of IL has been highlighted in several influential reports produced by the higher education sector and by the government. The Council of Australian University Librarians has developed IL standards based on the Association of College and Research Libraries (ACRL) ones (CAUL, 2001), IL strategies have been integrated into many university institutional plans: Central Queensland University (CQU)

distance education IL program has been a focus for numerous teaching and learning and research grants and recognised as a flagship program internationally, as well as within Australia (Bruce & Candy, 2000), University of Ballarat's policy documentation identifies IL as a key graduate outcome and as an integral part of an undergraduate curriculum model (Radomski, 2000) and the University of Wollongong has reported progress on integration of IL into curriculum (Wright & McGurk, 2000). Since 1992, successful national conferences on IL have been conducted every two years (CAUL, 2001).

This article reviews IL developments in e-learning in Europe and is divided into three parts. The first part provides the general context and overview about the concept used and discussed by European authors. The second part describes European wide IL initiatives. The third part follows IL initiatives in several countries in Europe.

## **Concept of information literacy**

During last years there is a considerable volume of interest in IL also in Europe. This can be illustrated by projects, conferences, workshops, working groups, adaptation of standards, development of Web sites and in the area of research. The increased attention to IL is partly the result of information overload which can be hazardous even to our health and has got also an official name 'information fatigue syndrome' (Wilson, 2001) and the new focus on student learning in a lifelong learning context that creates a need for a reconception of information professionals roles and responsibilities in a new learning environment. Although there has always been a need to find, evaluate, and effectively use information, the abilities needed to do so have just grown larger, more complex, and more important. There is also a shift to connect IL with an active, effective and responsible citizenship supporting personal empowerment and an enriched life through lifelong learning (Hepworth, 2000a; Correia, 2002).

Several European scholars have discussed the concept of IL. For example, Bawden (2001) attempted to relate this concept in the full context of all the other relevant literacies, Webber and Johnston (2000) have developed the idea of IL as a discipline of its own right, Hepworth highlights two main approaches to IL that are evident: the most common tries to identify discrete skills and attitudes that can be learnt and measured. The other emphasis the information literate mindset associated with how an individual experiences and makes sense of his or her world (Hepworth, 2000b, p.24).

However, Bawden argues that the term 'IL' has been widely, and confusingly used in the literature. A number of other related terms have also been used for the same, or similar, concepts including computer literacy (or information technology literacy, electronic literacy or electronic IL); library literacy; media literacy (or 'mediacy'); network literacy (or Internet literacy or hyper-literacy); digital literacy (digital IL); informacy (Bawden, 2001). He finds helpful to distinguish between 'skills-based literacies', such as computer or library literacy, which essentially indicate a competence in handling information in a particular setting or context or format, and more general capabilities. These wider conceptions of IL, for which the term 'informacy' has sometimes been used, stress capabilities beyond a simple competence in retrieving or communicating information. He highlights that to deal with the complexities of the current information environment, a complex and broad form of literacy is required. It must subsume all the skill-based literacies, but cannot be restricted to them, nor can it be restricted to any particular technology or set of technologies, and understanding, meaning and context must be central to it (Bawden & Robinson, 2002).

Several other terms have been also used by different authors: information empowerment, IL competence, information handling skills, infoliteracy, information competence, information mediacy, information problem solving, information problem solving skills, information fluency and even information mastery was proposed by Bill Nisen, Director of the e-Institute of the Strathclyde/Glasgow University, during the conference on Information Technology and Information Literacy in Glasgow in 2002. Part of the problem seems to be related with defining the concepts of competence and skills and connected with the usage of these terms according to the competing research approaches (rationalistic theories or interpretative approaches) to the phenomena of competence. In Finland the term *informaatiolukutaito*, in Germany *Informationskompetenz*, in the Netherlands *informatievaardigheden*, in Denmark *informationskompetence* and in Sweden *informationskompetens* have been used for IL.

Among many definitions perhaps the most widely accepted in higher education circles is the definition produced by the American Library Association (ALA): 'To be information literate, a person must be able to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information' (ALA, 1989, p. 3).

## European wide information literacy initiatives

In the context of knowledge-based society several studies have emphasized the role of knowledge and importance of using information as well as the capacity to use networks to access information although the term IL is not used (ERT, 1995; ERT, 1997; OECD, 1996; OECD, 2001a; OECD, 2001b; OECD, 2001c). The OECD report *The Knowledge-based Economy*, discussing the increasing demand for more highly skilled workers, includes the following observation: 'The knowledge-based economy is characterised by the need for continuous learning of both codified information and the competencies to use this information. As access to information becomes easier and less expensive, the skills and competencies relating to the selection and efficient use of information become more crucial... Capabilities for selecting relevant and discarding irrelevant information, recognising patterns in information, interpreting and decoding information as well as learning new and forgetting old skills are in increasing demand' (OECD, 1996, p. 7-19). OECD *Educational Policy Analysis 2001* states: 'The ability to produce and use information effectively is thus a vital source of skills for many individuals. So, the knowledge economy is based on the production and use of information and knowledge...' (OECD, 2001b).

From March 7-9, 2002, AOL Time Warner Foundation and the Bertelsmann Foundation sponsored a summit in Berlin, Germany, entitled 'Twenty-first Century Literacy Summit'. As a result of the summit 'White Paper: 21<sup>st</sup> Century Literacy in a convergent Media World' was prepared and it included IL as one of the main competences (White Paper, 2002). It seems that educational, business and political leaders alike have acknowledged that success in the new century will depend on being skilled at finding and using information.

However, Muir & Oppenheim (2001) state that while the European Commission (EC) is very active in Information Society initiatives, most of its efforts seem to be focused on getting the technological infrastructure in place and supporting the development of ICT skills, rather than IL. Ryyänen (2002) gives a little bit more positive view noting that the European Union has taken various initiatives in IL area, though the lack of coherent and long-term policy is clear. The spring meeting of the EC of Information Associations held in March 2001 in Madrid also highlighted that IL is a must in the information society.

However, some European wide collaboration in the field of IL in connection with ODL and eLearning needs to be mentioned. The EC funded the projects called *the End User Courses in Information Access through Communication Technology (EDUCATE)* and *the Distance Education Information Courses with Access Through Networks (DEDICATE)*. The *EDUCATE* project (1994-1997) was developed under the European Union Telematics for Libraries Third Framework project and was concerned with subject-related aspects of IL for scientists and engineers, and aimed to develop an online course in the selection and use of information tools which could be used in a number of settings, for self-directed learning or as part of a formal course about IL. *EDUCATE* led to two Into Info subject modules which were tested at ten universities. A practical example of the use of the Into Info programs in distance learning was *Infovision* – a project funded by the *Swedish Distance Education Commission* which provided a distance learning course on IL in energy and/or physics. The *DEDICATE* project investigated the feasibility of delivering programs about aspects of IL via distance learning. These courses were piloted at five sites in Central and Eastern Europe. These Web-based IL packages for engineering and the sciences are in use across Europe and Australia (Bruce and Candy, 2000; Fjällbrant, 2000a; Fjällbrant, 2000b).

Another EU funded project VERITY aimed at assisting young people in the age 13-19 to develop their information seeking skills in the Internet (Papazoglou, 2000, Big Blue, 2002). The project '*DELICIS: Distance Education for Librarians: Creating an Information-Competent Society*' (2000-2002) was financed by EC Leonardo da Vinci Programme and created distance education program in ICT competencies for library and information professionals in Lithuania and Latvia. Courses were adapted

from the Danish analogue provided by Aarhus County Library. Project had extensive partnership that consisted of 4 universities, 3 public libraries, 2 private enterprises and 1 university-enterprise from Scandinavia, East Europe, Central Europe, Western Europe and Mediterranean region (Virkus, 2002).

The importance of library and IL services for open and distance learning at European level led the European Association of Distance Teaching Universities (EADTU) to establish in June 1998 the Library and Learning Support Working Group (LLS WG) in EADTU. The LLS WG connects library and information professionals and educators from the EADTU member institutions (250 dual-mode universities and 7 open universities in Europe) and is committed to the development of library and learning support and IL services as an essential element in innovative and cost-effective approaches to learning. It aims to address strategic issues as well as seek to identify, disseminate and encourage good practice in supporting both on campus and distance learners (Virkus, 2002). During recent years the LLS WG of EADTU has provided several sessions on IL during EADTU annual conferences and at the International Conference on Distance Education (ICDE). The strategic aim of the LLSWG has been to share IL ideas more widely in educational circles than among librarians.

### **Information literacy initiatives in European countries**

In addition to the multi-country European Union's programmes there are IL initiatives in several countries. Several examples of good practice in the field of eLearning or distance learning can be followed in the United Kingdom. At the British Open University (OU) several models to deliver information skills have been tested: SAFARI (web-based tutorial) and MOSAIC (10 point module). Students will have the opportunity to work through a web-based teaching package to develop information skills, which will be assessed via coursework or the production of a literature review. OU approach may be described as integration with key skills initiatives and it is designed to complement study programmes or stand-alone (Dillon, Hodgkinson, Needham & Paker, 2002).

Several Scottish universities have developed extensive IL programs (Rader, 2000). The Scottish Executive's *Digital Scotland* consultation paper also notes that web navigation and information extraction skills are vital for young people (Johnston, 2000). The GAELS project at the Universities of Strathclyde and Glasgow developed online information skills course and many other packages for information skills training in subjects (Kemp, 1999; Joint and Kemp, 2000).

There are several the Joint Information Systems Committee (JISC) funded projects concerning IL in electronic environment which have surveyed practice and provided case studies: CITSCAPES project, based at Glasgow University, JUBILEE project at University of Northumbria at Newcastle, JUSTEIS project at the University of Wales Aberystwyth, etc. (Armstrong, Lonsdale, Stoker, & Urquhart, 2000; JUSTEIS, 2002). Hepworth notes that Web-based guides such as the guides to literature searching are increasingly common in UK. Guides that use examples from specific subject domains have also been developed in several universities. The University of Sunderland has secured European funding to help develop a virtual librarian that will facilitate the learning of information skills (Hepworth, 2000). Rutter and Matthews report their experiences developing "InfoSkills", Bournemouth University's Web-based library tutorial and refer to the self-learning principle of the tutorial allowing continuing reinforcement when required for specific user groups, such as international or late registration students. The sound pedagogic and generic basis of InfoSkills has enabled it to be seen by others outside the university as something that could be adapted for their own usage (Rutter and Matthews, 2002).

In the Nordic countries **Sweden** seems to be the most active in the area of IL. During the past two decades, Chalmers University of Technology has developed comprehensive programs both for undergraduate and graduate students utilizing project-based learning and web facilities (Fjällbrant, 2000a; Rader, 2002a). Spitzer, Eisenberg and Lowe (1998), note that in 1994, the Ministry of Education in **Finland** formed an Expert Committee to prepare a strategy for education, training and research in the information society of the 21<sup>st</sup> century. Among the elements were information skills for students, adults, teaches and business. *The Information Literacy Competency Standards for Higher Education* approved by the ARCL are reviewed and translated in 2001 in Finnish and the use of the standards in the Finnish higher education has been surveyed further by most of the Finnish university libraries (Sinikari, 2002).

In **Norway** IL developments are linked mainly with problem-based approach and has taken place for several universities (Hepworth, 2000b, p. 26).

The **Danish** Electronic Research Library (DEF) initiative has influenced greatly IL developments in higher education. For example, together with The Faculty of Modern Languages, the Library at the Aarhus School of Business (LASB) is at present partner in an innovative IT-project at the Aarhus School of Business: *IT-reorganization project – Faculty of the Future!* The project is financed by the Danish Ministry of Education in the years 2001-2004. In this project LASB is acting as learning and teaching support as regards IT-based presentation and dissemination of information as well as being content provider concerning electronic course packages. Since 1998 LASB has cooperated closely with the academic learning environment at the Aarhus School of Business on the integration of electronic library facilities into an e-Learning environment. This cooperation has resulted in the creation of several flexible netbased course packages on which the LASB has been professional backup on the following points: provider of electronic library resources, clearing of copyright material, teaching of information skills and creating it-solutions and platforms for the electronic course packages. The project METRO was also developed at the Aarhus School of Business as a joint venture between the Library and Faculty. It is a virtual learning resource centre using a metro map as a metaphor to guidance to valuable information and learning resources (Harbo, 2002; METRO, 2002). At Aalborg University Library project titled MILE (Model for Information Literacy Education) has initiated which aims to create and test a model for user instruction in IL based on innovative pedagogy and information and communication technology. The product consist of a combination of multimedia or web-based just-in-time tutorials, as well as live instruction integrated in the teaching/learning process (MILE, 2002). Several other interesting IL initiatives can be followed by the Web: SWIM (Streaming Web-based Information Modules), *Introduktion til biblioteket*, *Introduktion til informationssøgning* and *InfoTutor*, unfortunately these materials are accessible mainly in Danish (SWIM, 2002; *Introduktion til biblioteket*, 2002; *Introduktion til informationssøgning*, 2002; *InfoTutor*, 2002).

A new brainstorming group with participants from all the Nordic countries was invited by NORDINFO (The Nordic Council of Scientific Information) to discuss ideas for Nordic initiatives within the area of IL. The group has named themselves the NORDINFOLit Group and has formed under the auspices of NORDINFO. Plans are in process to establish also a Nordic Institute for Information Literacy.

In Germany both the University of Heidelberg and the University of Hamburg have been experimenting with courses in IL and online tutorials (Homann, 2001). There is also a German translation of the ACRL standards lead by Benno Homann and a research project of the German Federals Ministry of Education and Science Research at the University of Dortmund aimed to improve the conditions for effective use of electronic information systems (Homann, 2001). At Hamburg University of Applied Sciences an online-tutorial '*Der schlaue Det*' was also developed. The tutorial offers the users additional instruments for learning as for example questions for auto-control and communication to get in contact with the librarian as an expert of IL (Homann, 2001).

According to Nieuwenhuysen (2000) there are also IL initiatives in **Belgian** universities. He describes courses that are offered at two Belgian universities: the Vrije Universiteit Brussel (V.U.B.) and at the Universitaire Instelling Antwerpen (U.I.A.) which is part of the University of Antwerp (U.A.). The levels of the courses described are at the university 3<sup>rd</sup> study year and Master level. The need for a collaborative approach is emphasised to offer online IL courses.

## Conclusions

The initiatives outlined above represent only some examples that have been carried out at the European level. It is rather difficult to draw conclusions about IL developments in the whole Europe as material published in English is quite rare and fragmented. However, it is possible to conclude that there are activities in this area in several countries in Europe. Interest in IL can be illustrated by projects, conferences, workshops, working groups, adaptation of standards, development of Web sites and in the area of research. Websites of many higher education institutions show that there are several initiatives under way and collaborative approach seems to be appreciated especially in Nordic countries. It also

seems that the approach that IL instruction should be integrated into the curriculum rather than be taught as a separate unit is dominating. Successful initiatives report an integrated IL programs and are designed around collaborative projects by faculty and library professionals. Several European working groups have been established to discuss issues of IL and there seems to be a lot of parallel activities and not too much cooperation both at national as well as European level. However, the persons concerned are mainly librarians and information professionals and even the necessity to find and use information has been acknowledged, the term is not very familiar in other circles.

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# RE-USABILITY OF TELEMATICS COURSE MATERIAL WITHIN A EUROPEAN NETWORK: THE CANDLE PROJECT

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## Introduction

Reusability and standardization are issues that currently require a high level of attention in both journals and conferences in science of education (Wiley, 2002; Strijker, 2000). This is not only because of a need for higher efficiency but also a raise in quality is expected when course material and methods are used not only by the people who invent them but also by others being either in the office next door or at the other end of the world. Reusability in the context of this paper is perceived as the degree to which learning material can be used by third parties independent of the original author. Standardization in the context of this paper is seen as the supporting a method to exchange information to make learning material more accessible for a larger audience. Reusability has to deal with a number of problems. These are not only technical problems such as differences in infrastructures but also cultural differences (languages, learning styles) and organizational differences (credits, curriculum differences) do cause problems in reusing learning material (Downes, 2000). In a majority of cases compromises must be made to achieve an acceptable level of exchange of learning material. To maintain a level of order among a large set of reusable learning objects standardization is needed in characteristics to find the learning objects you are looking for. To achieve this goal learning objects are attached to metadata. Metadata describe learning objects on criteria defined to be important for using the objects in a learning network.

## The CANDLE project

In early 1999 within the EUNICE network (a European network of telematics education) a plan was developed to stimulate the exchange of each other's learning material. Thus both the quality and the efficiency of the material should be improved. The quality could be improved because every time the material is reused it is evaluated and the results are fed back to the other users.

The project aims at three major goals, represented in three components of the project. The first goal is to provide an information brokerage system for the exchange of course material in an international network of education. The second goal is to provide a set of reusable course components in the area of telematics education and to evaluate the reusability of these course components in a European wide testbed setting. And the third goal is to develop and evaluate a methodology for instructors to improve the reusability of the course material they develop for their classes.

The CANDLE project (Pras, 2001) has twelve partners from a wide range of European countries. Both universities and corporate are represented in the project. The project is differentiated in a series of workpackages representing the three goals mentioned, but also workpackages for external liaisons, evaluation and assessment and project management. Activities in the project can be roughly differentiated in three stages. The first stage of the project is characterized by research and analysis activities. During this stage primary attention was on using the SUNA (Scenario based Needs Assessment) method for analysing the needs of stakeholders for the CANDLE project and features that need to be served in the results of the project. The second stage of the project is characterized by design and development activities. During this stage the information broker is developed, which is the backbone of the project, but also tools to support those users working with the information broker and others dealing with the share and reuse of course material. Further a methodology for reengineering course material is developed. This method, called CREEM, basically deals with making course components smaller, more manageable and better findable. To support reusability metadata are added to course components during the CREEM process.

These metadata synchronize with international standards in this area. The third stage of the project is characterized by evaluation of the three components of the project, the information broker system and tools, the exemplary courses or course elements that have gone through the CREEM method and the methodology of the CREEM process itself. The evaluation is carried out in three parallel testbeds, in which both universities and corporate training settings are involved.

## **Pedagogical issues in CANDLE**

All activities in the CANDLE project are centred on course material that is to be used in an educational setting. And pedagogy should be seen as related to all those perspectives that deal with the interaction between people, course material and technology tools. Interesting aspects in CANDLE pedagogy are that course material is re-engineered for use in different settings, thus it has to be adaptable and flexible. And also in CANDLE collaboration is seen as an important issue. Thus interaction between teachers, learners or both of these groups should be part of the pedagogical setting in which CANDLE material is implemented. CANDLE had to be integrated in a teaching and learning paradigm dedicated to the opportunities provided by technology support such as discussed for example in Collis (1998).

Three topics will be discussed here that are seen as important in making pedagogy in CANDLE successful. The paper is mentioned to put these topics in the context of reusability and start discussion about their relevance in this context. These topics are metadata, granularity and collaboration.

### ***Metadata***

In CANDLE metadata are used to describe course material in a way to make it more reusable than it was before it was re-engineered. Tagging course material with metadata is an essential part of the re-engineering process. To adhere to international standards in CANDLE the LOM standard of the IEEE is used as a framework for the metadata (IEEE, 2001). But is this the right way to do? Isn't it better to define for each project individual metadata standards tailor made for the specific characteristics of the individual project? Considering the specific pedagogical context of the project and the results of the design of the pedagogical framework the project decided to extend the metadata set by a series of pedagogical metadata influenced by the activity theory framework (Nardi, 1996). These additional metadata characterize learning objects by their purpose (learning goals, assessment methods), structure (whether there is more or less flexibility in the learning path for students and/or instructors), context (complexity level, type of learners (face-to-face, distance), setting (corporate, university), estimated time for completion), tools (media needed to deliver the learning object), content (determination of the actual learning object) and roles (for instance whether the instructor role is explanatory, expository, coaching, consulting).

### ***Granularity***

This refers in the CANDLE context to two aspects, which are related to each other but also might be reason for confusion.

- The traditional perspective provides a continuum from high to low granularity where high granularity means having many small parts and low granularity means having a few large parts. The expectation is that learning objects with high granularity are more exchangeable than learning objects with low granularity.
- A new perspective sees granularity as the cohesion among a set of learning objects belonging more or less to each other (Longmire, 2001; Wiley, 2001). This 'more or less' is also the criterion for having a high or low granularity. High granularity means a number of learning objects closely related to each other. Their value lies in the links between them and thus they should be used only as a combination and not separately. Low granularity is then the same set of learning objects but with less coherence among the objects. One could then expect that learning objects having a high level of granularity, that means being less dependent on other learning objects, have a higher level of reusability as they can be more easily linked to already existing learning objects in a course.

## ***Collaboration***

Many projects focus their attention on collaboration among students. Even though this is an important aspect of making education more active and efficient another area of collaboration is the topic in CANDLE. This is the collaboration among instructors, more detailed, the exchange of information and experiences about the development and use of course material. Collaboration among teachers, learners and course authors is seen as one of the important objectives of the CANDLE project (Wetterling & Vehvilainen, 2000).

Considering all these aspects pedagogy in CANDLE can be seen as an important topic and the three issues mentioned form the backbone of pedagogical frameworks in the project. The link between pedagogy and the other components such as the information system and the course material is formed by means of the activity theory framework. This framework is based on an integration of how people learn, how people think and how people act. As glue between different workpackages activity theory is especially used as a foundation of the evaluation work (Stevenson & Earle, 2000). Further the activity theory framework has been integrated in the pedagogical metadata as well as the rhetorical structures of re-engineered course material according to CREEM (Stevenson, 2002). The testbeds as a central element of the evaluation are one of the major parts where all areas of the project come together.

## **Evaluation and Impact**

CANDLE as a project has three major goals: first the improvement of the quality of education in a European network of teachers and course developers working together in their domain. Second the improvement of efficiency by enlarging the economies of scale. And third the development of new tools and technologies for the support of flexible learning in networked environments.

The quality of education and learning is expected to improve when learning material will become flexible enough to be easily integrated in existing programs. Improvement of efficiency will be shown when a community of instructors in different countries within Europe evidently reuses course material. And the added value of telematics tools to make learning networks more flexible is also a topic to be investigated in the testbeds.

The CANDLE testbeds started in 2002 and currently are in their final stages. There are three testbeds: one in which university and corporate settings collaborate within one country, one in which universities in four different countries collaborate in both course development and delivery and one in which the reengineering and reuse of course material within one university is evaluated. In all three testbeds the CREEM re-engineering methodology is used and the tools supporting the structuring and metadata tagging process. Re-engineered learning material is made available in an information broker system for all three testbeds.

Testbed results provide information about the re-engineering methodology CREEM, the technological support tools (information broker, course structuring and metadata tagging tool) and the course material actually being re-engineered during the testbeds. These three perspectives cover the three targets of the CANDLE project.

## **Summary**

The needs assessment in the CANDLE project has shown a series of features that should be considered in the context of the three streams in the project. These features were implemented in an information broker system and accompanying tools for course structuring and metadata tagging. In parallel, a number of courses in curricula in the institutes of the project partners were re-engineered according to the CREEM methodology. And a pedagogical framework was set up, based on activity theory, flexible learning and active teacher – student interaction to be used in the testbeds where the exchange and reuse of the reengineered course material is to be evaluated. The testbeds, currently under way and expected to be finished in May 2003, will show whether intentions towards a better re-usability of re-engineered learning material is achieved, whether tools and methodology developed in the project perform according to needs

assessment results and whether the impact on efficiency by means of a larger scale of networked learning can be a successful approach for the future.

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## THE GEH-MIT-PROJECT: INNOVATIVE TEACHER TRAINING IN ICT

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### Introduction

In this paper we present an on-going eLearning project on teacher training in the use of Information and Communication Technologies (ICT) in the foreign language classroom, on the background of actual lines of thought and research.

In order to highlight the challenges of up-to-date in-service teacher training, recent research findings will be outlined, followed by a description and the objectives of the project. We will then give an overview of the project's methodology and the activities that are being performed, followed by a description of the evaluation methods. An outlook on the foreseen outcomes and the expected impact of the project will conclude the presentation.

### Background

Modern knowledge and information society has brought about changes in learning and teaching. A recent UNESCO study on the potentials, parameters, and prospects of technologies for education (Haddad et al., 2002) points out quite clearly that "the ancient objective of education, teach how to learn, solve problems, and synthesize the old with the new, is now transformed from a desirable to an indispensable one. To achieve these results, education must be engaging and authentic." Accepting the fact that, for the necessary changes in schools to happen, the teachers play a decisive role, we have to rethink the way teachers are trained.

Teachers, like all adult learners, have a need to perceive how they will integrate new skills in regular professional activities. So teacher training programs have to take the teachers, their expertise and their experiences seriously, they must be adjusted to the teachers' working conditions, needs and receptivity to learning, allow practical experiences and reflection about these experiences, so that innovation can start from the teachers' analysis of their own practices. Applying the constructionist learning approach (Papert, 1991) to teacher training we say that teacher trainees need to ask questions, investigate, research, and share results, while being engaged in the construction of something new and shareable, in order to induce long-lasting building of professional knowledge. Only in this way, teacher training can contribute to the teachers' personal and professional development, rather than just providing new information (Ur, 1996).

Many teachers today tend to feel intimidated, facing the rapid introduction of new Information and Communication Technologies (ICT) into school education. This introduction is often seen by them as a consequence of external factors like the impact of computers and new technologies in social and economic areas, rather than an asset for learning and teaching (Arscone and Bottino, 2000). Many teachers are still sceptical regarding the integration of new educational resources in their teaching. In the meantime, ICT is quickly entering all educational fields and subjects, including foreign language learning and teaching (Rüschoff, 2002). There is language teaching and learning material on the Internet, educational software for all the major languages is flooding the market, and "Internet Projects" for the foreign language classroom have become a standard advice for "modern" language teaching (Donath, 1998; Kallenbach and Ritter, 2000). Whether or not this development contributes to a substantial qualitative improvement of the foreign language teaching, depends not only on the quality of the available materials, but to a large extent on the quality of the initial and in-service training of the teachers (Rüschoff, Wolff, 1999).

A big challenge for trainers is the demystification of the computer, by showing that the use of ICT can be learned step by step and that very basic knowledge of the technical details can be sufficient to provide satisfactory and beneficial experiences in the everyday work place. Training can motivate teachers to enter a dialogue about their practical experiences only if it aims from the very beginning at showing how ICT can support and improve teaching and learning (Ulrich, Legutke, 1999).

In this context, the collaboration between teachers brings in fresh perspectives, as feedback from colleagues is both motivating and rewarding (Wallace, 1998). Collaborative learning within a project adds additional value to teacher training, because teachers can develop positive attitudes towards innovation (Tripa, Chagas, 2000), experiencing the benefits of a learning context that helps to overcome fears by providing slow, progressive and meaningful involvement.

Given the possibilities provided by new communication technology and eLearning systems, this collaborative context for in-service training can be built over beyond limitations of place. It can be a network of teachers in different school environments, a virtual society of learners. These opportunities have been used by a variety of long distance courses offering virtual components which allow teachers to benefit from the tutoring and interaction of an in-service course without having to travel long distances (Johnson et al., 2001). In Greece, an increasing number of teachers have been taking part in long-distance, in-service training or post-graduate programs such as the ones offered by the Greek Open University, but also by institutions abroad.

## **Description and Objectives of the Project**

The two year GEH–MIT–Project<sup>1</sup> was designed to meet the above described challenges of up-to-date in-service training for teachers. It aims at developing and designing a long-distance training course and materials, offering training opportunities and addressing the needs of German language teachers in schools and student teachers at university institutes, with the main subject being the application of ICT in everyday teaching.

The project aims at:

- Developing a flexible, modern training scheme. Applying eLearning methodology, it can serve the needs of different teacher individuals and provide support beyond limits of time and place.
- Creating a virtual open educational society in which trainees and trainers discuss, exchange ideas and get familiar with the use of interactive ICT tools, introducing the teachers to the idea of international cooperation and networking.
- Offering teachers the opportunity for a hands-on, in-service training in the application of ICT in everyday teaching within the various educational systems of the participating schools.
- Developing a pedagogical and methodological framework to support teachers in the use of ICT as a teaching tool in classrooms with a variety of learner types and levels of language knowledge.
- Bridging the gap between the didactic theory and teaching practice by developing a training methodology that takes into consideration the needs and expectations of the teacher.
- Helping the teachers overcome inhibitions and prejudices and provide them with arguments in favour of ICT applications in language teaching.
- Providing support for the professional development and the enhancement of the professional skills of the language teacher and develop his/her abilities to design and evaluate didactic plans, which make use of the computer as a language teaching and learning tool.

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<sup>1</sup> The GEH-MIT-Project is a European cooperation project (2001-2003), co-financed by the European Commission, DG Education and Culture.



The applied methodology has four constituent parts:

1. The creation of a link between theory and practice
2. The continuous evaluation and redesign of the produced training material
3. The adoption of a “hands-on” approach to ICT- training
4. The active participation of the teachers in the design of the curriculum and the material.

The collaboration partnership, made up of university experts, teacher training centres, technicians and German language teachers from a network of schools in Europe, provides the expertise and participates in all steps of the development, implementation and evaluation of the training material, using eLearning techniques and taking advantage of all the capabilities offered by the web.

Theoretical training and practical implementation in school evolve in parallel, as the program includes extended cycles of school centred work and practical application of the newly acquired skills and abilities. Teachers continuously give feedback to the trainers about their experiences gained in the classroom, and upon suggestions of the teacher trainees, the scientific team performs continuously necessary adjustments to the methodology and the materials. This not only increases the motivation of the teachers and their active involvement, giving value to their practical experiences, but also provides the necessary link between theory and practice, thus contributing to long-lasting professional and personal development.

## **Organization of the project**

The project partners work on two different levels: On one level, there are universities and training institutions responsible for the organization, for shaping the pedagogical framework, the methodology, the contents of the training curriculum and the training material. On the second level there are schools in Greece, Hungary, Italy, Poland and Portugal, where the trainees (student teachers and experienced teachers of German) work and where the developed curriculum and training material are being implemented.

Each cycle of implementation during the school years 2001-2002 and 2002-2003 can be divided into **five steps**:

- Step 1: The participating teachers (trainees) are provided with various examples of good practice (modules, project ideas etc.).
- Step 2: The trainees receive technical and didactical training and support based on individual needs.
- Step 3: The trainees decide for one or more examples and adapt them to their specific situation.
- Step 4: The trainees teach in their classrooms.
- Step 5: The experiences of the trainees are recorded and reflected, both through standardized evaluation instruments and direct feedback to colleagues and project partners.

Communication and exchange between the participants of the long distance training program play a crucial role in the project. It is based on

- face-to-face meetings and conventional training workshops,
- regular use of e-mail, including mailing lists for all the participating teacher trainees (geh-mit-teachers@ellinogermaniki.gr),
- the bilingual German-English web-site (<http://www.ellinogermaniki.gr/ep/geh-mit>), used by all partners as a forum of exchange and collaborative learning, providing possibilities to download material, take part in discussions, or find links to other sites,
- the permanently available help of online and local tutors.

The following contents of the training curriculum have been introduced to the trainees:

- Introduction in the usage of ICT: The PC and its peripherals (CD-ROMs, scanners, printers), the basic software tools (editors, spreadsheets, presentations, ...), and communication tools of the Internet (e-mail, bulletin boards, video-conferencing).
- Usage of educational software and Internet: A series of examples for Internet and multimedia applications in the classroom have been presented to the trainees, who have introduced selected samples into their classrooms and evaluated them. Trainees have been helped to evaluate existing educational software titles and web sites according to specific indicators and quality standards.
- Cross curricula applications and projects. Examples of larger scale multidisciplinary applications with the usage of ICT-tools have been presented to the trainees from all participating countries/schools, who have set up international and interdisciplinary projects, in which they design activities with their pupils to cooperate with each other, making extended use of computers as new information and communication tools.

The first two parts evolved in parallel, as the trainees were provided from a very early stage with examples of good practice for the use of ICT in the classroom, asked to choose modules for their classes according to their curriculum and apply them in the regular classroom, while learning the theoretical and technical knowledge and skills based on their individual needs. The educational context of ICT-applications was combined with the technical knowledge necessary to use them, thus securing a hands-on, action oriented and teacher-centered approach of the training rather than simple provision of computer knowledge (the traditional “knowledge transfer approach”).

All the material has been made available on CD-ROM and on the web. The trainees were provided with a printed Trainees’ Guide, and in each school, local tutors have collaborated closely with computer instructors and organized local mini-workshops and individual tutorials. These tutors play a central role in a decentralized, collaborative long-distance training program. They are the local “experts” for their “novice” colleagues working in the same school or region (Enza et al., 2000). At the same time, online tutors have been permanently available to help all trainees.

The feed-back from the teachers from the implementation has flown back and induces changes and adjustments to the training program and the material. Thus, the GEH-MIT project attempts to "empower teachers to develop their knowledge and skills actively and experientially, in a variety of learning environments, both individual and collaborative." (Carlson & Gaido, 2002: 121). In this way, teachers are put in a position which allows them to actively reflect on their teaching practices and consider how technologies might fit into their continuous effort to improve their teaching. A transnational dialogue emerges as experts, trainers and teachers have begun to form a virtual educational society.

## **Evaluation and Expected Outcomes**

The plan for the project’s evaluation includes both measurements and on-field observations for trainers and trainees. The evaluation of the proposed didactic approach is being performed on three aspects:

- **Evaluation of the teachers training.** The teachers’ engagement in the use of ICT in teaching practice, their developing of critical capacity and deeper understanding of ICT in school practice are primarily being examined.
- **Evaluation of the pedagogical framework.** The major theoretical issue underlying the project is whether the implementation of ICT offers a qualitative upgrade to the language teaching at the school level. Furthermore, it is studied whether the trainees have experienced personal and professional development through this new form of eTraining.
- **Ethnographic evaluation.** The attitudes of pupils and teachers with different cultures towards the implementation of ICT in language teaching as well as the attitudes between teachers themselves coming from different countries are being studied, taking advantage of the different school environments across Europe (Greece, Italy, Poland, Hungary and Portugal).

The GEH-MIT project is based on an **action research approach** which implies that the teachers reflect on their teaching by collecting data from their classroom and then, based on the results of this research, make decisions about how their future teaching practices should be adapted (Van Lier, 1996; Wallace, 1998). The following methods and tools have been introduced:

- Specifically designed questionnaires and scales, mainly Likert scales (Likert, 1932), and open questions.
- Standardized instruments like the HILVE-questionnaire (Rindermann, 1994 and 2001) to assess the teaching by pupils and the teachers' attitudes and expectations.
- Videos of workshops and classroom work.
- Interviews with trainers and trainees based on the videos.
- Log-books for the participating teachers.

For each evaluation step, written instructions for teachers and pupils have been developed. Through on-field observations, videos and personal interviews the evaluation team is accompanying the participants of the training. All evaluation tools (questionnaires, log-books, etc.) have been published on the GEH-MIT-web-site<sup>2</sup>.

The final outcome of the project will be a complete curriculum and training material for in-service training of German teachers in the use of ICT in the everyday classroom, accompanied by a Trainees Guide, a Trainees' CD-ROM, a Guide of Good Practice and a Project's CD-ROM.

For the remaining project period (school year 2002/2003), the implementation of the the GEH-MIT-training program comprises further usage of ICT-tools and of educational software and Internet, with more in-classroom experiences. But the main focus is on international, interdisciplinary projects, in which pupils cooperate with each other, making extended use of computers as new information and communication tools. Thus, the training program has proceeded from a first, guided phase, to a second phase, in which trainees work increasingly independently.

It is expected that the project will enhance the teachers' communicative competence, provide opportunities for a research and discovery-based learning experience and lead to increased learning awareness for the trainees, thus contributing to their personal and professional development. The training has promoted active, constructionist learning essential for the teachers' professional development, contributing to their abilities to cope with the mental challenges posed by the knowledge society and to be open to innovative change.

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## THE MUSE PROJECT: A PILOT PROGRAMME OF MULTIGRADE SCHOOLTEACHERS' IN-SERVICE TRAINING

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### Abstract

Multi-grade schools are considered to play an important role on providing access to education for all in remote, isolated and underdeveloped rural areas. Multi-grade schools are more than a reality in primary education in many regions of Europe and the rest of the world. In such areas, multi-grade schools not only aim to give enrolment and continuous attendance in school environments, but also to provide knowledge and pedagogy of good standards. Furthermore, rural schools are considered to play an important role in social development. Based on the above, the project MUSE (Multi-grade School Education) aims at designing and implementing a specialized programme for training multi-grade teachers in Europe. The project relies on a close cooperation between pedagogical experts, trainers, policy makers and teachers. It aims at enhancing professional skills of multi-grade schoolteachers as well as developing their abilities on using Information and Communication Technology (ICT) as a supporting tool in everyday teaching. It will provide multi-grade schoolteachers with continuous training and support, enhancing communication among remote, multi-grade school teaching environment and outside educational community.

### Introduction

Multi-grade schools can be defined as schools where groups of students of different grades are taught in a single classroom. In most cases, in a multi-grade school's classroom, pupils of two or more grades are taught by one teacher. The multi-grade class structure is known by various names in different countries; these include "composite" or "combination" classes, "double" classes, "split" classes, "mixed-age" classes and "vertically grouped" classes. Irrespective of the term applied, multi-grade teaching refers to classes of students of different ages, grades and learning abilities. In multi-grade schools a relatively small number of teachers try to be effective, while dealing with different student groups simultaneously.

Multi-grade schools are actually a more common situation than is generally admitted. They are a usual institution in European rural areas [1], [2]. Many countries in the Mediterranean, in Scandinavia and in Central Europe, have significant rates of multi-grade schools. For instance, in Finland, a country with many remote areas and islands, multi-grade schools represent about 30% of the total school number. In Greece (2001-2002 school year data), 44% of primary schools are multi-grade and 15% of teachers are working in multi-grade schools. In the United Kingdom, although there are not published statistics on the number of teachers engaged in multi-grade teaching, it is estimated that in 1997/98 6.3% of schools had enrolments of less than 50 children, giving rise to multi-grade teaching. The rate of UK's small schools is higher in areas with rural and scattered populations. Thus, while very small schools in England do not exceed 3.5%, in Northern Ireland, Wales and Scotland this rate is 13.0%, 14.6%, and 19.7% respectively (Department for Education and Employment, 1999).

The high number of multi-grade schools in remote and isolated areas certainly is not coincidental. Geographic, social, economic and practical reasons make in many cases multi-grade schools the only viable access to education for those who live in remote and isolated areas and have the right to get educated. In this sense, multi-grade schools are vital in the educational system, providing "solutions" that work in implementing important educational goals.

School enrolment in the European countries reaches very high levels; therefore the level of illiteracy is nearly zero. However the educational requirements certainly go beyond the standards of basic literacy. In Europe, high educational quality expected to be attained on every educational level. Any school, including multi-grade ones, not only should provide education but also should offer quality education.

One of the peculiarities in the issue of multi-grade schools is the big divergence between the importance attributed to them by policy makers and researchers in the field of education. The policy makers try to reduce their numbers in any achievable way, while researchers are debating on the educational value of multi-grade teaching. It is worth examining this divergence from two different aspects: (a) from the point of view of multi-grade schools as educational institutions and (b) from the point of view of multi-grade school teaching.

### **The importance of multi-grade schools**

Multi-grade schools consists an institution that plays educational and societal roles, which differ substantially from the corresponding roles of mono-grade schools. These schools operate in areas where other schools cannot be established, offering education for all even though at high cost [3], [4]. This finds an official theoretical backing on an international level on the “World Declaration on Education for All” [3] where it is indicated that much effort must be put on establishing the conditions everywhere, even in the most remote and almost uninhabited villages, so that local citizens have access at least to basic education. Multi-grade schools facilitate the accomplishment of such a goal, offering education to pupils who otherwise would have to decide whether to stay illiterate, study at home, or leave the place and go to the nearest town to be educated.

It is well established that the school not only facilitates the transmission of knowledge from teachers to learners but also acts as an institution of socialisation. The multi-grade school offers the opportunity to its pupils to get the benefits of the school environment in cases where practically no alternatives are available. Multi-grade schools play a vital role not only for the local educational community but also for the entire rural society. In many cases schools are the only state establishments in the area and, in addition to their use as educational centres, they should be seen as playing a societal role, as community centres that could foster local cultural and socio-economic development. Finally, multi-grade schools may be viewed as alternative educational units, where, in an attempt to improve efficiency, new differentiated approaches can be applied in relation to promoting independent and individualised learning [5].

Because of this multiple role, one would expect that multi-grade schools be given special attention. Instead, the usual situation is that multi-grade schools are ignored, or assumed to be non-problematic, or problematic with non-resolvable problems, or unimportant, or marginal. Bibliography on schooling in developed and developing countries implicitly assumes that schools are mono-grade. Rarely one finds specialized programmes and implementation methodologies referring to such schools and also rare is research on this issue. The university Departments of Education, which are institutions that deal with the development of educational models, methodologies and approaches, concentrate, almost exclusively, in mono-grade schools. National school curricula do not refer separately to multi-grade schools.

### **The importance of multi-grade teaching**

Multi-grade schoolteachers have a multidimensional educational task, which is more difficult than the one of their colleagues in mono-grade schools. In their teaching role, they have to deal with classes difficult to handle. Consisting of pupils of diverse grades, age, learning abilities and interests, these classes require specific knowledge, teaching abilities, skills and experiences. Multi-grade schoolteachers have to develop a wide variety of initiatives and teaching strategies [8], [9]. In their role of managing the school unit, they have to transform multi-grade schools so that can provide an appropriate school environment for learners. This means that teachers in these schools should be able to manage resources, organise an attractive school life and communicate with other groups and individuals in the school community.

Acting as promoters of multi-grade schools' social role, the teachers have to realise the importance of the school in the community. Moreover they should be able to use school resources not only serving educational goals but also to plan open learning activities with the active participation of the local society. They should be able to create links, communicate efficiently with groups and individuals outside the school community and transform multi-grade schools to centres of social development.

For such a multidimensional role, multi-grade schoolteachers should have qualities, which are usually met in: (a) senior teachers, who, after a long experience in schools, have developed skills and abilities to undertake difficult educational tasks, (b) teachers who, having attended specific training, are experts in multi-grade school teaching and have a good theoretical background in the field of multi-grade schools in general and (c) teachers who have access to supporting mechanisms, through which they can solve in-service problems. In this context, support could be offered either vertically by institutions, or horizontally sharing with other teachers their strategies and ideas, thus improving their repertoire of teaching methods [10], [11].

Although the above form a model of qualifications for a successful teacher in the highly demanding field of multi-grade schools, the actual situation is far from ideal. Thus instead of the desired characteristics, in multi-grade schools, teachers usually are young and inexperienced (mostly at the beginning of their professional career). Most of them are not professionally trained to face the multi-grade teaching effectively. Finally, they do not have the opportunity to be trained in service. The above result in a frustrating situation that has negative impacts on the multi-grade schools' efficiency.

## **The project MUSE**

The project MUSE<sup>1</sup> aims at the development of a new model of teacher's training that assists teaching in multi-grade schools. The project is based on a close cooperation between pedagogical experts, trainers, policy makers and teachers in order to develop and disseminate methods of fighting educational exclusion and school failure in rural areas, promote the integration of pupils with special educational needs, and provide equal opportunities in education. The project is based on the use of information and communication technology (ICT) in school education and in the training of the staff working in multi-grade schools. Further, the project encourages innovation in pedagogical methods and materials and promotes trans-national cooperation and communication between schools and teachers training establishments. The specific aims of the MUSE project seem to be exactly along with the aspects of multi-grade education mentioned in the above paragraphs. In detail, these are:

- To develop an in-service specialised training programme for teachers in multi-grade schools, aiming to meet the teachers' needs. It will include training on methodological approaches applicable to the multi-grade school environment as well as familiarization with the use of ICT and its applications on multi-grade teaching. The training programme will be delivered through ODL techniques.
- To enhance professional skills of multi-grade schoolteachers and improve their abilities to develop plans according to the needs of the specific school environment. The MUSE training programme includes extended presentation of case studies and examples of good practice that will help teachers to face the particularities of the multi-grade school environment. The participating teachers will be trained in designing and implementing cross-curricula applications, projects and activities.
- To develop a model that will allow for the continuous training and support of the multi-grade schoolteachers. The MUSE project will develop a platform for continuous interaction between teachers and trainers. The implementation scheme of the training programme includes extended cycles of school centred work. Teachers continuously will give feedback to the academic team about their experiences gained in the classroom during the implementation of selected applications.

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<sup>1</sup> The project MUSE (106231-CP-1-2002-1-GR-COMENIUS-C21) is co-financed by the European commission under the COMENIUS 2.1 framework of the SOCRATES action. The partnership consists of University of Aegean (Coordinator), Institute of Education-University of London, University of Dundee, Chydenius Insitute, Ellinogermaniki Agogi, Greek Pedagogical Institute, University of Cadiz and a network of schools in Greece, Finland, Spain, United Kingdom

- To provide training of multi-grade schoolteachers on how they can act as promoters of the local community development. Special attention will be given in training teachers to be able to serve the local community's goals. As already mentioned, the project is going to be implemented in rural isolated areas where the perspectives for economic development are limited. Teachers should be trained to fully utilize school resources for the benefit of the community while pupils' education should be planned taking into account the specific social, economic and cultural parameters of the communities' environment. The use of ICT is expected to contribute strongly in the connection of pupils' education with actual life in the community and the emphasis on the social role of the school is expected to promote and develop the local community's interests.
- To conduct an intervention study in multi-grade classrooms across Europe: The project will be implemented in multi-grade school environments in Greece, Finland, Spain and United Kingdom. Through a systematic ethnographic research, the partnership will study the perceptions of teachers of different cultures about the proposed approach as well as the attitudes between teachers themselves coming from different countries.
- To make recommendations on multi-grade teaching policy and practice. By the end of the project's life cycle a detailed report (a good practice guide) will be prepared and distributed to education policy makers of the participating countries. The project is designed to raise awareness of policy makers and planners on the size of the problems and needs of multi-grade teaching and learning environment.
- To enhance communication among remote multi-grade school teaching environment and outside educational community. The aim is to create a virtual educational society where teachers will communicate with the academic community and will be familiarized with the idea of international cooperation and networking.
- To initiate the formation of a European network on the multi-grade school education. The partnership aims to initiate a network on the multi-grade school education. In the framework of the project a virtual educational community (teachers, researchers and policy makers) will be formed in order to exchange experiences, proposals and ideas for the qualitative improvement of the multi-grade education.

Within the framework of these targets, the MUSE programme focuses on some issues that are considered of vital importance for providing solutions to multi-grade schools. These issues are (a) the integrated teachers' training programme, (b) the development of innovative multi-grade teaching methodologies and strategies, (c) the extensive use of ICT, (d) the application of open and distance learning techniques (ODL) and (e) the transformation of multi-grade schools into core nodes to the local community. These issues are discussed below.

### **Integrated teachers' training programme**

The MUSE Project aims to improve teachers' efficiency through an extensive integrated teachers' training programme, which is based on the following characteristics:

- It is adjusted to the conditions that give rise to the need for multi-grade teaching [6], [7] and at the same time it focuses in offering to multi-grade teachers adequate knowledge about the socio-economic and cultural background where they work.
- It inspires and motivates teachers, increasing awareness about their role in multi-grade schools and the local society.
- It promotes specific principles, such as collaboration, and it encourages teachers to undertake initiatives and to apply innovative educational approaches.
- It trains teachers in didactic and pedagogical techniques through which they will be able to cope with cross curricula teaching.
- It trains teachers in counselling, managing multi-grade school units, communicating and developing efficient links between the school and the local society.
- It trains teachers in regional planning.



The training programme is going to be implemented by highly qualified educators and will be delivered at a distance.

### **Development of innovative teaching strategies and methodologies**

The MUSE Project aims to develop a model of teaching strategies and methodologies applicable to multi-grade schools. This model is based on some principles as follows:

- It encourages work in groups and collaboration between pupils of the same grade but also of mixed grades.
- It promotes self-learning of pupils in the classroom and tutoring of younger children from older ones.
- It gives emphasis on approaches that promote the pupils' creativity, such as problem solving, the "project" method etc.
- It gets inspiration from the social, economic, cultural and natural environment and it gives emphasis on linking education to actual life.
- It motivates pupils to learn, through incentives (e.g. art competitions etc) and encourages communication with the local society.
- It encourages the teachers to work with pupils in the form of action research and to disseminate the results of their teaching strategies with other teachers.

The teaching strategies will be available to multi-grade schoolteachers on line and will be based heavily on ICT.

### **Extensive use of Information Communication Technologies (ICT)**

The MUSE Project is based heavily on ICT, acknowledging that the introduction of ICT promises revolutionary changes in any field of life, but is of specific importance for remote and geographically isolated areas. In this sense, ICT in multi-grade schools is expected to offer to teachers and pupils, as well as to other groups or individuals who will be involved in the project accessibility to information, no matter the area's size, geographic characteristics and the distance from the centre.

Although serious effort is made recently by national ministries of education and other educational organizations in many European countries with respect to ICT, most of the relevant programmes have been designed to address the needs of teachers of conventional schools and not those of multi-grade ones. The training programmes, where available, mostly face the introduction of ICT as a goal by itself, and do not focus on the exploration of multimedia, the Internet and special software as instruments that improve teaching and learning. Furthermore seminars are performed for specific periods of time and no measures are taken in support of the teachers' professional development.

In the MUSE project, the introduction of ICT in multi-grade schools will be based on the following principles:

- The use of advanced communication channels should focus on providing a high quality continuous training programme to the multi-grade schoolteachers. This will be based on an innovative methodological approach and will include the use of the Internet in order to develop a platform for training, collaboration, networking and exchanging of ideas between teachers, students and trainers.
- The use of ICT should also focus on (a) upgrading quality of multi-grade teaching, (b) supporting students learning and (c) fostering social development of the local community [13], [14].
- Specific emphasis should be given in the development, through ICT, of "technological culture" that is believed to upgrade the educational system in general, also providing valuable knowledge on using modern technologies in real life situations [12].

## **Support by open and distance education techniques**

In relation to the use of ICT, the MUSE project represents a paradigm of distance education scheme that aims at utilising the advantages of open and distance learning (ODL) instruments and techniques in order to provide:

- Quality in service training to multi-grade schoolteachers.
- Professional support to multi-grade educators.
- Support of pupils learning activities.
- Lifelong learning opportunities to the local community (as seen below).

The training programme is going to be developed by educational and academic institutions specialized in teachers' professional training and the same institutions are going to supervise and guide the implementation of the programme in each of the participating multi-grade schools. Under such circumstances, the implementation of a project like MUSE may be considered as a multidimensional case for studying the contribution of ODL in professional training and educational schemes. In this sense, the evaluation of the project's results with respect to the effectiveness of ODL could be used in support of implementing open and distance teachers' training programmes not only in remote places but in urban areas as well.

## **Transformation of school to a core node in the local community**

The MUSE project has set as one of the objectives to train teachers to become facilitators of social development of the rural community. This is strongly relied on providing a training framework, as part of the teachers' integrated training scheme that supports teachers in developing the multi-grade schools' societal role, transforming it to a node in its community. Without limiting its role as a formal education provider, the multi-grade school, in its social role, is expected, through this project, to act as a community centre serving (a) as an institution for life long learning activities and (b) as a vehicle for the delivery of wide range of services. Such a transformation is based on the following:

- School resources such as technology equipment and the school's well-trained staff can provide a range of educational and training opportunities for the community.
- The e-Learning solutions, that the project provides for the accomplishment of its educational goals, will be accessible (with the assistance of the teacher) to those members of the local community who are in need of continuous training/education. Apart from students, the local community in need of such support includes farmers, people in the tourist industry, entrepreneurs in small, family run businesses, etc.
- Horizontal links between a school or a group of schools and the local community will be promoted. [15], [16].
- Parents and other members of the local community will be recruited to support pupils' learning and possibly to provide material and financial help to schools.
- Experiences and skills that can help pupils in their future employment will be given priority. In this context there will be an attempt to promote and advertise the pupils' skills in the local community.

The social and economic conditions within which multi-grade school operates are such that co-operation between school and local community and reciprocal assistance is expected to favour both, quality of educational services and social development.

## **Conclusions**

The MUSE project is a rather ambitious and extensive attempt to examine in a global way multi-grade schools, which exist in many European regions, work under difficult conditions and form a neglected or ignored part of the educational system. Apart from the promises for providing solutions in upgrading the quality of teaching in multi-grade schools, the project considers as major challenges the attempt (a) to

change the attitude towards these schools, (b) to show that these schools could become active centres of development in their region through the right policies and the appropriate use of modern technologies.

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# TRAINING THE TRAINERS: A STRATEGY FOR QUALITY ASSURANCE

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## **Introduction: Challenges**

The main issues of this paper will be demonstrated and discussed in relation to a project recently carried through by NKS Distance Education and the National Office for Social Insurance:

- How to succeed in implementing Internet based teaching and learning in a large organisation with no previous experience with Internet based education?
- How to help such an organisation to help themselves? To evaluate what is good and bad practice? How to help them develop, administrate and tutor their own courses?
- How to create a positive attitude and energetic motivation for new ways of in-service training in a public institution with well-established traditions of training in face-to-face settings?

## **Background**

The National Office for Social Insurance is a service governed by the State. Its mission is to administer the National Social Insurance Scheme, including old age pension, disability benefits, rehabilitation benefits, medical benefits, family allowances, and more. The National Office has about 9000 employees, distributed in 520 regional and local offices around the country.

A strategic goal for the National Office is that its services become more user-oriented, and they demand that the regional offices develop strategies for front-line and service management. Such a requirement reveals the need for new competencies among the front-line employees.

The regional offices for social insurance in Hedmark and Oppland, with about 600 employees, therefore carried out a broad analysis of the competencies of their employees along with a gap analysis. The results of this analysis revealed more than fifty different learning needs, on different levels and in different subject areas. This, in turn, forced them to start thinking in new ways. It was obvious that with such highly differentiated and individual learning needs, the traditional courses at the main offices a few times a year was not the way to success.

A strategic choice was made to start the implementation of more flexible solutions. Analysing the competencies of each employee would be of little use if there wasn't also a way of offering a flexible way of filling the individual competence gaps. Both practical and financial reasons made new, flexible in-service training a necessity – if they were to take their own competence analysis seriously.

## **Project description: “Qualifying key instructors” in the regional offices of Hedmark and Oppland**

The offices in Hedmark and Oppland chooses to develop some of their own employees as core instructors (SCD-instructors: *Strategic Competence Development* instructors) as key personnel in the implementation of Internet-based open and distance learning.

In partnership with NKS Distance Education they apply for, and are given, project money from The Norwegian Institute for Adult Learning to carry out a project that shall enable the offices to meet the new challenges.

### ***Primary objectives***

- *Efficient service production.* All employees must be able to guide the users of the National Social Insurance Office quickly and correctly. This means that developing new competencies must happen at the workplace, as just-in-time training.
- *The development of methods, tools and organisation.* The project aims at giving the persons who are in charge of in-service training, the methods and tools for the administration of flexible teaching and learning.
- *Transferability.* The project should create the basis for a permanent platform for the in-service training, possibly nation-wide for all the National Social Insurance Offices.

### ***Secondary objectives***

Enable the instructors

- to develop and evaluate suitable methods of open and distance teaching and learning for individual needs
- to develop suitable learning material and setting up a suitable framework for the individual employee
- to organise the actual carrying out of the project

### ***Organizational model***

This is a joint project between NKS Distance Education and the two regional social insurance offices, and it is important to define from the very beginning the roles and responsibilities of each of the two parties.

NKS is project manager and they are responsible for the following areas:

- methodology to develop learning modules and course material suitable to fill the competence gaps that have been uncovered
- advice on how to organise the instructors throughout the project
- training the instructors
- supervising the development of the course material
- advice on how to organise the running of the pilot course.

The social insurance offices are responsible for organising the work in the two regions

- recruit the participating instructors-to-be
- set up the working conditions for the participants, giving them the acceptance, time and equipment needed for the project
- follow up the participants at every stage
- take care of all the practicalities around the meetings, workshops etc.

### ***Plan of action: Learning by doing***

The first job is to select a group of employees from the two regions of Hedmark and Oppland who are willing to be trained as course developers and instructors in open and distance learning.

#### ***First phase: the role of students***

The instructors-to-be become students in a five-week, part-time, Internet-based course about online tutoring. The course is an adapted version of an NKS course, *Online Tutoring*. The course will begin with a two-day face-to-face meeting, the rest will be organised at a distance via the net. This first phase must be evaluated before the next phase begins.

### *Second phase: the role of course developers*

The instructors-to-be change roles from being students to becoming course developers. Guided by experienced course developers from NKS, they will be responsible for developing an Internet based pilot course in a subject relevant to the needs of the Social Insurance Offices. Their first job is to select a subject area that is suitable for such a pilot course. A face-to-face workshop will be set up for a careful and thorough study of the NKS Development Guide, enabling them to start developing the course. They will be guided by the NKS course developers throughout the development phase.

### *Third phase: the role of instructors*

The instructors-to-be actually become instructors in this phase. Time has come to test out the course they have produced in a real setting. A group of employees from various local offices will be asked to volunteer as test students, and the instructors-to-be finally become instructors for their own colleagues. Again they will start out with a face-to-face meeting, and the next four weeks the students will communicate with each other and the instructors only at a distance.

## **What happened?**

### *First phase*

The *Online tutoring*-course was a success for the participants who actually completed the course. For most of them this was their first experience with the Internet as a learning arena, and for some this was even their first acquaintance with the Internet. They found it extremely useful to experience the role of a student in an Internet-based course and found that they learnt to trust the possibilities of using the Internet for the purposes and needs of in-service training.

But – many left the project at this early stage. They withdrew mainly because organisational matters had not been taken well enough care of. From the start many of the participants had been sceptical to the project management and the lack of clear and precise information. The project had not been clear enough about the need for an Internet connection in the office, the time needed to go through the course and the superiors of the participants had not been well enough informed what the project would demand of their employees.

The learning outcome of this evaluation for the project team was that organisational issues must never be underestimated.

### *Second phase*

The second phase started out with a two-day workshop, which all the participants found very useful and enjoyable. The difficulties started when they were on their own after the workshop. Some of them felt totally lost and never found the way out, while others did not give up. A core group of six persons from the original group of participants became the motive power in the development of the pilot course.

They chose the subject area of maternity benefits for the pilot course. The national scheme for social insurance entitles parents to daily cash benefits according to certain regulations. The course aimed at teaching the most basic elements of the maternity benefit scheme for employees who have very little experience with the helping clients to the correct maternity benefits.

The participants evaluated this development phase as difficult, but useful. They gained insight into the complexity of course development on the Internet and realised the importance of keeping it as simple as possible and asking

- who is the target group
- what do they need to learn
- how to organise the course with this particular target group and these particular learning objectives in mind.

### ***Third phase***

Fourteen employees from nearly fourteen different local offices volunteered as test students in the pilot course about maternity benefits. Four instructors volunteered to test their skills as online tutors, in the course they had just developed. They would have the ideal situation to test out what they had learnt in the first and second phase.

They had learnt from the first phase that arranging an initial face-to-face meeting would be of no use unless all practicalities were taken care of, so they took no chances. The initial meeting was a success in this third phase and so was the running of the course itself. All the participants completed the course, and the course evaluation showed that they were positive to the course itself and to this novelty of Internet based in-service training. All fourteen said that the course had matched their expectations. Eleven said that they would recommend the course to colleagues while four were more hesitant, and said yes, maybe. The greatest difficulty was finding the time to study during working hours. Only two out of the fourteen had had no trouble working on the course at work. "We had agreed, my boss and I, that I could take the course while at work. So it was my own sense of duty that came in the way and did not allow me to give priority to my own development."

### **Summing up**

#### ***The social insurance offices in Hedmark and Oppland***

##### *The core group of instructors*

The four instructors that never gave up reported a feeling of satisfaction for having completed all three phases. As to these four, there is good reason to conclude that the secondary objectives of the project had been met. They had reached the required competence level both as regards course development and online tuition. The fact that many of the other instructors left the project at an earlier stage was probably due to practical and organisational issues rather than the contents of the project itself.

The core group is now a highly motivated and competent resource for the management to use in their continued effort to implement open and distance learning.

##### *The management level*

Through this project the management have actually developed the methods, tools and organisation for implementing Internet based open and distance learning, giving all employees the possibility to be trained when the need for new skills and competence arises. They also feel that an important effect is that they are better equipped to make decisions about what they can actually develop themselves and when they need help from external consultants.

And above all, they see the importance of being advocates for implementing Internet based in-service training throughout the National Social Insurance Offices. It is important for an acceptance among their own employees that it is the offices themselves who advocate this challenge and not an external partner or consultant. Seen in this perspective the project may be small in scope, but it brings important issues to the foreground.

#### ***Transferability to other private enterprises or public services?***

The project management as a whole, and NKS Distance Education in particular, ask themselves whether the strategy of *training the trainers* is an effective way of introducing and implementing quality-based open and distance learning.

It is always difficult to make generalisations from a single project, but based on NKS's experience with other similar projects, we find it reasonable to assert that developing the competence of your employees is a prerequisite for a successful implementation of flexible, Internet-based teaching and learning:



- Only the employees themselves know the needs and the practical and cultural conditions well enough.
- It is easier for the management to get the needed acceptance from the organisation as a whole when the “changing agents” come from within.
- Only a competent, in-house resource is able to set up the suitable and accurate quality requirements for external contractors.

The methodology of *Training the trainers* gives a broad understanding of Internet-based learning. The participants gain insight and experience into the different roles of student, course developer and tutor. And, not least, it gives a deep-felt understanding of the importance of organisational matters along with the need to be clear and explicit about the scope and conditions of such an undertaking.

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# NEW TUTORING SKILLS FOR ONLINE LEARNING: ARE E-TUTORS ADEQUATELY PREPARED FOR E-LEARNING DELIVERY?

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## Introduction

Most traditional universities have a tendency to subsume open, distance and flexible learning activities within the resources of the broader campus-based remit (Cornford and Pollock, 2002:30). This poses a major problem for e-learning projects that often fall outside this traditional view of education. In fact, the e-learning implies much more than a simple technical exercise in which some materials or processes are simply transferred from the offline world to some ready-made online realm (ibid, 12). To compound this situation most e-learning projects start as small-scale departmental initiatives (Robinson, 2001). Therefore, the implementation of e-learning faces high level of risk because of its uncertain status and unfamiliarity.

The consequence of this is that e-learning is often the result of individual or small-team initiatives. Moreover, the drive is commonly on design and developing information and communication technology (ICT) based environments and insufficient attention is given to the delivery process. These efforts have little chance of succeeding without a tutoring team that has appropriate online tutoring skills necessary to explore and maximize the designed environments. Therefore, the tutoring team is at least as important as the design team and requires a careful selection process.

This does not simply mean selecting a tutoring team with subject matter expertise and/or technical skills, but choosing educationalists with information and communication literacy skills that are required to manage and facilitate online learning. Thus, the choice of a suitable tutor team with appropriate skills, or at least the willingness to acquire these, is essential to successful online learning.

## The Role of The Online Tutor

Online tutoring and leadership has been widely considered as a crucial factor in the success of computer-mediated collaborative learning activities. Different and alternative names have been used in the literature referring to the role of the tutor in on-line interaction, such as *coach* (Murphy et al., 1998), *leader* (Hotte and Pierre, 2002), *tutor* (Gerrard, 2002), *moderator* (Kerr, 1986; Feenberg, 1986; Salmon, 2000; Berge 1995), *facilitator* (Collison et al. 2000; Marjanovic, 1999; Berge, 1992), *motivator*, *mentor*, *mediator* and even *production coordinator* (English & Yazdani, 1999).

Nevertheless, most studies focus on online tutoring as provided by an assigned e-moderator (Salmon, 2000:7-11). These moderators were divided into institutional interveners, appointed interveners and natural interveners by Hotte and Pierre (2002), that is, tutors, experts, and learners. This paper focuses on the institutional interveners, i.e. the academic tutors that support the students throughout their learning process. In fact, by making the decision to adopt online learning delivery, educationalists will need to re-evaluate their roles as academic tutors, since familiar face-to-face teaching solutions may not work in an online learning environment. This, in essence, means that professional practices are indeed changing.

As McMann (1994) points out, roles that have to be performed as part of e-tutors' tasks are actually not very dissimilar in nature in relation to the traditional face-to-face tasks. Nevertheless there are significant differences that were identified from the very start of e-learning as a delivery mode. Authors such as Mason (1991) discussed the roles of e-tutors as involving responsibilities at both technical and educational level. Mason (1991) focused on the discussion of the educational role of the on-line moderator that involves three categories: the organisational, the social and the intellectual. Berge (1995), based on a thorough literature review, further developed this characterization and identified four main e-tutor roles:

- *Pedagogical or intellectual roles* are some of the most important for the e-Learning process (Paulsen, 1995). The e-tutor uses questions and probes for student responses that focus discussions on critical concepts, principles and skills (Zafeiriou, 2000:67). These roles may include a number of tasks such as: opening the discussions, focusing on relevant content and issues, intervening in order to promote interest and productive conversation, guiding and maintaining students' involvement in discussions, and summarising debates. Additionally, these roles may encompass directing and focusing discussions on vital points (Davie, 1989), synthesising points made by the participants (Hiltz, 1988) and providing summaries and interpreting on-line discussions (Feenberg, 1989).
- *Social roles* involve the creation of friendly and comfortable social environments in which students feel that learning is possible. McMann (1994) considered the social role to be one of the key critical success factors in on-line learning. In this context, e-tutors are responsible for: guaranteeing opportunities for participants to introduce themselves; identifying and dealing with lurkers who are reticent and sometimes reluctant to participate; ensuring that appropriate communication takes place; taking into consideration cultural and ethnic backgrounds by minimising humoristic, offensive and disruptive behaviour; promoting interactivity between students; and finally, dealing with flaming, should this occur, by reminding participants of the appropriate netiquette.
- *Managerial or organisational roles* involve setting learning objectives; establishing agendas for the learning activities; timetabling learning activities and tasks; clarifying procedural rules and decision-making norms (Paulsen, 1995; Mason, 1991). These roles also include: encouraging participants to be clear, responding to the participants' contributions, being patient, following the flow of the conversation and encouraging comments, synchronising, handling overload of information, encouraging participation, and ending the sessions (Zafeiriou, 2000:67).
- *Technical roles*, possibly the most daunting for academics, involve becoming familiar, comfortable and competent with the ICT systems and software that compose the e-learning environment. Additionally, this role includes supporting the students in becoming competent and comfortable themselves (McCreary, 1990) by providing technical guidance such as: offering study guides, directions and feedback on technical problems, ensuring that time to harness the ICT systems is made available and encouraging peer learning.

## Basic Online Tutoring Skills

From the characterisation above, it is clear that, although similar in many respects to face-to-face (f2f) delivery, e-tutoring differs in a number of ways as discussed by Gerrard (2002) since it:

- places greater emphasis on written skills;
- produces a more formal tone;
- does not follow a linear conversation but instead promotes multiple conversations;
- does not confine teaching to specific times;
- places greater emphasis on student-student learning;
- requires teachers to develop new ways of encouraging participation;
- requires teachers to assess the worth of online contributions.

Therefore, even for the more experienced f2f tutor, there is much knowledge to be acquired about the skills required for e-learning. Consequently, the e-tutor must in addition to the subject matter expertise and traditional pedagogical training, be able to demonstrate additional skills such as an ability to:

- plan and organise delivery by clearly specifying learning objectives and outcomes;
- set learning agendas and providing leadership and scaffolding in learning activities;
- welcome and embrace diversity of learning outcomes, attitudes and styles;
- adapt supporting styles to the needs of individual participants;

- provide advice on different levels of access to learning materials according to the needs of individual participants;
- create an atmosphere of collaborative learning of which the e-tutor him/herself is often an integral part;
- be able to cope with and resolve on-line conferencing conflicts and difficult behaviours;
- encourage active construction of knowledge by being actively involved in discussions, activities and debates;
- develop and implement methods for learner feedback and reinforcement;
- present advance organisers into the content materials and advice on learning pace so as to avoid cognitive overload and information anxiety.

This new set of skills poses particularly difficult challenges in the selection of online tutors. In fact, subject matter expertise is usually certified by either academic institutions or professional bodies and thus making it easy for selectors to identify suitable candidates. Similarly, traditional educational qualifications are easily recognised. However, e-tutors require the additional and crucial set of skills described above, which makes it very difficult for selectors to choose appropriately qualified candidates to fill this role. This is not to say that there are no appropriate candidates, but that it is problematic for them to provide evidence that they possess these skills. To compound this situation, there are now a myriad of short courses of varying quality that purport to certify e-tutors, but fail to adequately prepare them. On the other hand, there are a few well-established post-graduate courses in online learning that are very effectively preparing e-tutors. However, the graduates from these courses are clearly not enough to fill the current demand for e-tutors.

## Conclusions

This paper discusses the importance of online tutors in the success of e-learning solutions. Since online tutors play a critical role in e-learning, as the main people responsible for the delivery of the courses and the support of the learners, they must be equipped with an appropriate set of skills and attributes in addition to subject matter expertise. Therefore, the process of selecting the online learning team is probably one of the most important critical success factors in learner acceptance of e-learning. This process of selection is particularly important when changing the mode of delivery in HE from a traditional approach to an e-learning mode of delivery. However, due to the current difficulties in acquiring appropriately qualified and certified tutors, the team must at least include individuals with the willingness to acquire the necessary skills. This means that appropriate tutor support mechanisms must be put in place in order to provide tutor training prior to the actual delivery and just-in-time training during the delivery phase.

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# PERSONNEL TRAINING IN THE UNIVERSITY OF HELSINKI – IS IT REALLY AFFECTING THE ADOPTING OF ICT IN TEACHING?

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## The Educational Centre for ICT

The Educational Centre for ICT (Information and Communication Technology) was established at the beginning of 2000. Its main task is to promote the use of information and communication technology in teaching and studying, in order to create benefits from the opportunities that it provides for the quality of higher education.

### Main activities

- Co-ordination and strategic planning of virtual university activities at the University of Helsinki
- Personnel training for teachers and researchers
- Co-ordination of pedagogical support at the faculty and departmental level
- Video-conferencing aid
- Learning environment support (WebCT and BSCW)
- Consulting services for teachers
- Network-based support material
- Research and developments projects

The activities of Educational Centre of ICT in personnel training are based on Information strategy for Education and Research 2002-2004 Implementation plan (Ministry of Education). In this plan the goals for teaching personnel are stated.

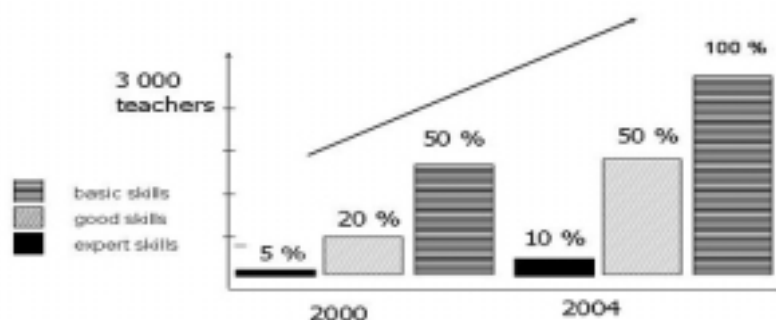


Fig 1. The numerical goals of personnel training

The basic skills level comprises knowledge about the common uses of a computer, mastery of word processing, Internet browsers and e-mail, and an understanding of the principles of educational uses of ICT. These are skills which every teacher must master. The good skills level provides skills in using ICT for educational purposes, which at least half of teachers must master. These include a versatile use of the e-mail, the www environment and groupware: generic tools, pedagogical applications and digital material available in the subject taught, and the principles of digital learning material production. After the second step, teachers are also able to follow developments in hardware and software and have an awareness of the social problems and challenges involved in ICT.

The expert skills level includes specialised knowledge, which about 10% of teachers must master. These are content-specific and professional applications, the production of digital learning materials, institutional information management, and an ability to assist, support and train colleagues, develop the school community and act as part of an expert network. The total extent of OPE.FI is about 15 credits. The education and training are provided by universities, polytechnics and the National Board of Education in collaboration. [1]

### **Description of the personnel training programme in the University of Helsinki**

The professional skills and competence of its personnel are critical success factors that the University supports with versatile personnel training. The educational Centre for ICT is co-working with The Human Resources Development Team and the Development of Studies Unit in the field of personal training. Together these three share the responsibility for arranging personnel training. The Educational Centre for ICT is responsible for personal training of information and communication technology and this ICT training is primarily for teachers and researchers (about 3500 in HU). In this article we focus only on the education and training given in the field of information and communication technology skills in teaching.

Participation in personnel training is free-of-charge to persons employed by the University and is based on voluntary participation. So courses are open to employees of the University of Helsinki, i.e. persons whose salary is paid by the University.

#### ***Short courses for technical skills***

These so called short courses for technical skills are training for all professional groups at the University. Although the main target group for training of ICT is teachers and researches. In short courses there are wide variety of different kind of courses. For example www-editors (FrontPage, Dreamweaver), presentation tools (Microsoft PowerPoint), photo editors (Photoshop) and learning management systems (WebCT, BSCW). The average time of course varies and it is between 8-20 hours per course. During one semester 15-20 courses are held.

	2000	2001	2002	2003*)
Courses		33	32	29
Participants		396	344	302

\*) by spring semester 2003

#### ***Learning and teaching in Virtual University (5 credits)***

This is a one term long educational programme which concentrates on the pedagogical and technical skills of ICT. The focus is at improving the quality of University teaching by using the opportunities offered by new technology. The level of skills achieved during this study unit is the good skills level. After finishing this study unit participants should be able to use ICT in their own teaching. For this purpose each participant chooses his own project to be carried out during the semester. The project can be eg. producing www-pages for additional course material, using discussion forums in the web to support interaction, making presentation slides or planning a strategy for enhancing the pedagogical and technological use of ICT in own work community. Each project guided by a mentor. Technical skills for the projects are obtained from optional courses. Each participant has the right to participate in two different courses. The project is documented in a digital portfolio, which is also the means for assessment.

The main pedagogical aspects of this training are that studying is done collaboratively in groups or teams and that technical skill are applied in teaching right away.

Faculty	2000	2001	2002	2003*)	2003 **)	TOTAL
Arts	7	5	6	12	8	38
Education	19	45	8		8	80
Medicine		2	3		7	12
Agriculture and	6	9	1	6	2	24
Science		15	19		12	46
Law		6			2	8
Theology	2	3	2		1	8
Social Sciences		8	1		5	14
Veterinary Medicine					13	13
Libraries		17	2		4	23
Language Centre		2	3	30		35
Other organisation	3	10	14		8	35
<b>Completed</b>	<b>37</b>	<b>85</b>	<b>59</b>	<b>48</b>		<b>229</b>
<b>Enrolled</b>	<b>50</b>	<b>106</b>	<b>71</b>	<b>63</b>	<b>70</b>	<b>360</b>

\*) tailored courses, only for three department (2002-2003)

\*\*) 23.1.2003 started 6<sup>th</sup> Ope.fi training, not yet finished

Fig 2. Participants of learning and teaching in the Virtual University 5 credit programme

### ***TieVie – a national networked ICT trainer development programme (10 credits)***

A networked training programme project by 5 universities: University of Oulu (responsible co-ordinator), University of Helsinki, University of Jyväskylä, University of Turku and Helsinki University of Technology. This programme is part of the Finnish Virtual University. University of Helsinki takes part on this joint venture as an organizer of the 10 credit Trainer development programme in ICT pedagogy. This study unit aims at increasing the amount of support personnel in Finnish Universities by educating consults, tutors, mentors and trainers. Pedagogically this project is based on a mixed mode approach: a combination of web-based networked modules supported by local and national face to face meetings. The leading themes in this entity are pedagogical, organisational and technical changes in Universities. This program has been in progress since 2001 and altogether 20 teachers from the University of Helsinki have taken part in it. [<http://www.tievie.fi>]

### **Is personel training really having an impact on teachers' teaching practises?**

The University of Helsinki carried out an international evaluation of its education and degree programmes during the academic year 2001-2002. Due to this process the interest of developing educational aspects increased in faculties. [2] At the same time the Finnish Virtual University Strategy [3] and HU Virtual University Strategy [4] were being processed. In addition faculties and departments were asked to write their own ICT strategies. This gave the Educational Centre of ICT a unique possibility to influence on the strategy processes both in the national and institutional levels. In the institutional level Educational Centre gave support to strategy work by arranging meetings, seminars and training for those involved in the strategy process. This education applied mostly heads of the institutes. Support was given also by the Strategy Service in the Web [5].

On the national and university level Educational Centre was an active and influential partner in the strategy processes. By the end of year 2002 most faculties and some institutes have written their ICT strategies. The educational use of ICT has because of these parallel processes moved from pilot projects towards strategic thinking, systematic development and a strategy-based system.

### ***Network of ICT pedagogical advisers***

Another prominent action was the foundation of a network of ICT pedagogical advisers in faculties and departments. This network started in the year 2000 and at the moment 23 persons are working in the field of ICT pedagogical support. This network is spread in all the nine faculties of HU. The persons involved in the network are doing the support work mostly part-time; their actual academic work is in the field of



research and teaching. This network is funded partly from Educational Centre and partly from faculties. The significance of the network comes from

- Being able to give teachers face to face support in their workplaces
- Sharing expertise and ideas
- Co-operation with IT Department, libraries and teachers
- Arranging training and education for faculties

Dr. Heikki Kynäslähti [6] writes that the significance of the network comes mostly from the fact that in addition to real help the pedagogical support persons had given, there was this feeling of possible help which encouraged people to experiment with educational technology in their work. It fostered an encouraging ground for experimenting with educational technology.

### ***Learning management systems WebCT and BSCW***

A very concrete example of the effectiveness of personnel training is the use of learning management systems. In HU teachers are free to use any environment they choose. Two environments however are chosen to be supported. The support consists of tutorials, personnel training and help-desk services provided by the Educational Centre of ICT. In the year 2000 WebCT was chosen to be supported by Educational Centre and the amount of courses has been growing rapidly since then. This points out the fact that personnel training is indeed very effective in providing technical skills. Most of these courses are part of mixed-mode teaching model and therefore used only as an addition to face-to-face teaching.

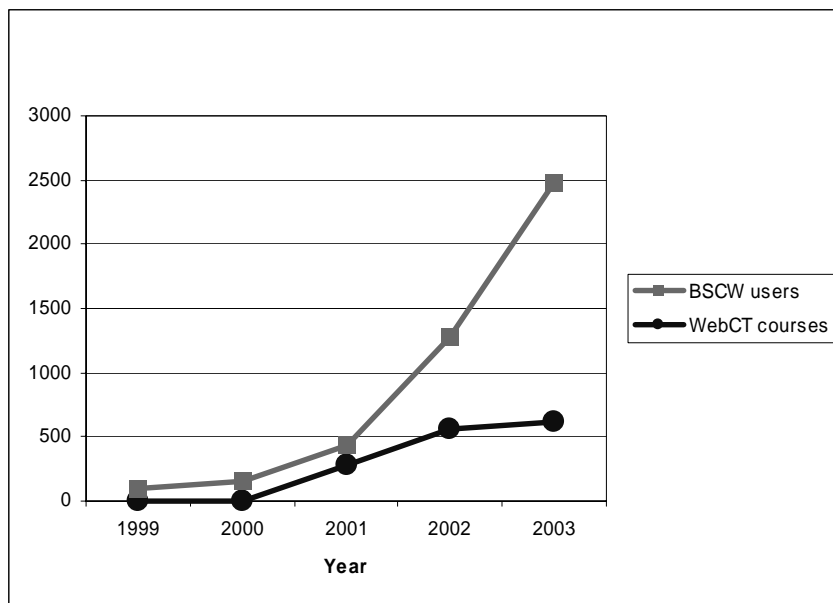


Fig 3. The growing amount of WebCT and BSCW use

### ***Feedback from the personnel training program Learning and teaching in virtual University***

The feedback from this training unit was gathered between 2001-2002. Every participant was asked if they thought that the training had an influence on their teaching practises. The question we asked after a study unit of "Learning and teaching in Virtual University" was, whether it inspired the participants to develop their teaching practises with ICT.

This result shows very clearly that teachers are willing to adopt ICT in their teaching after this personnel training unit. On the other hand the participants take part on voluntary bases, so their attitudes can be quite positive right from the start.

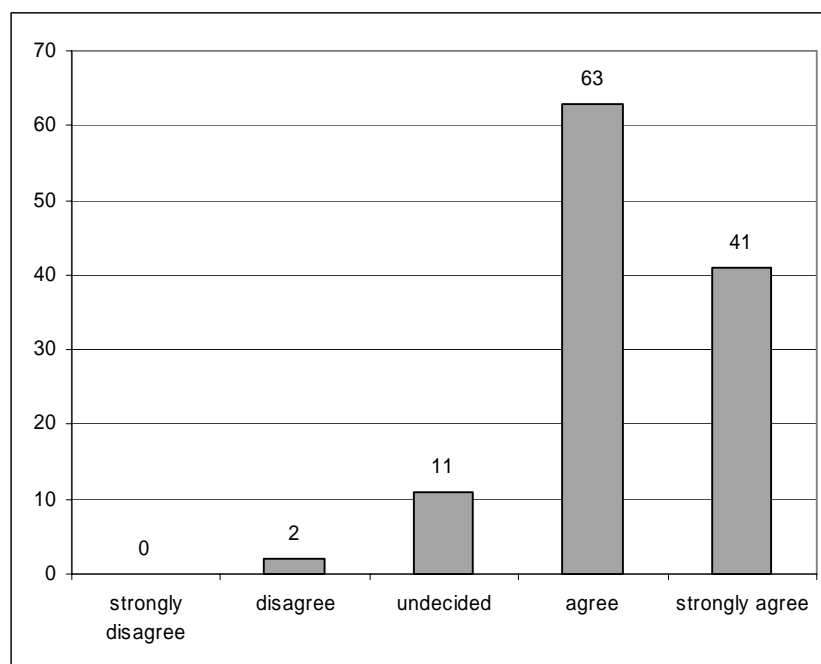


Fig 4. "Learning and teaching in Virtual University" study unit inspired me to develop my teaching practises with ICT (n=117)

## Conclusions

Matti Sinko and Dr. Erno Lehtinen [7] write about the reasons behind the limited use of ICT in teaching. In their studies the main obstacles were factors having to do with skills, support, time and attitudes. Personnel training in HU has been successful in managing the factors of skills, support and attitudes but the problem of the lack of time still seems to be a problem.

A crucial issue in the following years will be how the strategies written for 2004-06 are carried out in the faculties and departments. If sufficient resources are given to teachers, personnel training can have an effect in teaching practises.

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# ECONOMIC EDUCATION ONLINE: QUALITY ASSURANCE FOR SUSTAINABLE ICT-BASED TEACHER TRAINING AND FURTHER EDUCATION IN GERMANY

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## Introduction

The Institute for Economic Education (IÖB) is responsible for the scientific management of the project “Economic Education online”. The primary objective of this project is to develop and implement a complete ICT-based study course, ICT-based differentiated further teacher trainings and the preparation of a distribution of these educational services to Russia. An important intention is the sustainability of the services in future. That means, the services shall be self supporting after expiration of financial subsidise (7/2001-12/2004).

Actually, disillusionment determines the scenery of e-learning – like a shakeout under providers for learning management systems or ICT-based trainings. Results of research indicate that higher education institutions in Europe, Australia and the USA do not expect revolutionary changes in the educational system. ICT is not seen as a “straitjacket” that forces educational institutions into completely new forms of education. Rather than this, educational services change in a manner of “stretching the mould” (Collis; van der Wende, 2002, 7).

The IÖB works on strategic questions onto criterions of success with ICT-based distance learning, which are discussed in the literature (Western Cooperative for Educational Telecommunications, 2001; The Institute for Higher Education Policy, 2000). One of these questions is: How can the necessary innovation of traditional higher education services be supported with ICT-based distance learning under the conditions of internationalisation and therewith effect taking of market rules in the educational system?

Inevitable, the focus of concentration moves from technical possibilities of ict-based distance learning to aspects of quality assurance, a function which is traditionally rooted in business establishment – like customer orientation or effectiveness of work in educational institutions.

Therefore the subject matter of this article are the ways of quality assurance, realised in the project “Economic Education online”. Before this, the specific market situation of economic education in the German public school system is delineated, followed by the present coverage of the project through a public-private-partnership model.

## The market situation

The economic education in the German public school system is characterised by the following conditions:

- Approximate 75% of economic education teachers in public schools do not have any apprenticeship or training for that job.
- The mean age of economic education teachers is about 50 years.

Thus, a huge demand on apprenticeship and qualification can be agreed, but the covering of this demand must be realised under troublesome conditions:

- The “landscape of education” is composed by 16 federal states (Bundesländer). Each federal state decides autonomously about items of education. Therefore, 16 different syllabi of economic education exist, 16 different concepts of how to implement economic education in the school subjects and so on.

- In Germany, 5 different kind of public schools exist – all with their own concepts of economic education.

The further training of teachers is characterised by the following general conditions:

- The use of ICT in German schools is not as common as is sometimes seems. But the use of ICT is a constitutive element of the educational services within “Economic Education online”. So, psychological inhibition thresholds of the target group can be assumed.
- The methods of learning and teaching, used in “Economic Education online” are predominantly unfamiliar to the target group, doing their teaching job since meanly 20 to 25 years.

This short delineation points out the direction of necessary steps to quality assurance and success of the mentioned ICT-based educational services. To realise these steps, a solid monetary and cooperative fundament is necessary, which is outlined in the next chapter.

### **Public-private-partnership: basis for innovative development**

“Economic Education online” demonstrates a interstate cooperation of different actors in an exemplary way. Governmental departments, schools, business companies, foundations and science in the German federal states work together. Participants are:

- The Bertelsmann foundation
- Heinz Nixdorf foundation
- Ludwig-Erhard foundation
- Department of science and culture, Lower Saxony
- Department of culture, youth and sports, Baden-Wuerttemberg
- EWE stock corporation, Oldenburg
- Foundation of German economy, Berlin

At the beginning of the project, only Baden-Wuerttemberg and Lower Saxony planned a cooperation, to qualify teachers for economic education. A big demand for teachers in economic education in Germany caused that further federal states joined in the project. In four federal states ICT-based trainings take place since October 2002. Six further states start in spring 2003. Presently there are 150 teachers to be qualified, end of 2003 approximate 500 teachers will be in the programme. Inter-state training and further training of teachers in Germany is a novelty.

Furthermore, the IÖB cooperates with the Centre for Distance Education (ZEF, [www.uni-oldenburg.de/zef](http://www.uni-oldenburg.de/zef)) at the Carl von Ossietzky University of Oldenburg, which is experienced in many aspects on online distance learning and teaching. The cooperation between IÖB and ZEF serves improvement of the educational services, the securing, the formation and the development of ICE-infrastructure, data-security and the administration for learners. Additionally, the IÖB is assisted in questions of the transition from classroom teaching to distance teaching and learning.

### **Quality assurance in curriculum and course development**

The concept of “Economic Education online” is nearly equivalent to the curricula of economic education, which have been developed from the IÖB before and which have been proved and evaluated in several types of public schools in Germany (in North Rhine Westphalia and Lower Saxony). This curriculum is based on... The fundamentals for the synthesis of this curriculum was a German-wide analysis of 16 different existing curricula, syllabi and framework directives for economic education. At this way, the content developed in “Economic Education online” can be used in all 16 federal states. The teachers to be qualified, are not confronted with a fracture between the content of the ict-based qualification courses and the utilisation background in their schools.

The entire programme of “Economic education online” comprises 67 modules, which include seven basic modules, 49 advanced modules and 16 didactical modules. Each of the modules equals 100 pages of printed material.

The modules are developed at 40 professorships by leading experts in the fields in Germany and Austria. The material, characterised by high professional expertise, is processed to digital data and courses in a learning management system by a team with content-related, pedagogical and technical qualification.

During the process of content production and content processing guidelines are used, regarding standards for course development and instructional design. The guidelines ensure that content and courses are designed in a consistent structure, easily discernable to learners of varying learning styles. This allows learners an easy orientation and overview about planned learning outcomes and content structure.

The communication within the courses is realised in an asynchronous way with discussion forums, seamlessly integrated into the learning management system.

The character of the ICT structure (based on Lotus LearningSpace), the courses and the digital material are oriented towards the specific learner needs – not on high pitched technical possibilities. Digital texts, charts, pictures, java-based simulations, spreadsheets, glossary, register of keywords, bibliographical references and links are combined to a hypermedia-database with several functions, distributed via CD-ROM. The learning management system in use represents therefore a deep academic library, appropriate for ICT-based distance learning courses and the daily work: the preparation of economic lessons in school.

Decision-makers in the 16 federal states compose their individual qualification programs based on the 67 developed modules and courses. The programs differ on the number of modules, the duration of the courses which are designed as blended learning, the arrangements and the examination conditions.

A concept of customers care includes a permanent monitoring by the project team of all the nationwide ICT-based courses. Results of the monitoring are used for steady improvement and further development of concepts about content, learning outcomes and the technical design.

### **Quality assurance in the teaching and learning process**

The educational services developed by “Economic Education online” are organised as blended learning. Within a period of one year for example, 15 days of face to face learning take place. In both, distance learning and face to face sessions, learners are supported by tutors. The tutors (presently 37) have been qualified in a special 4-week online tutor training by the project team at the IÖB and ZEF.

To ensure the target groups’ learning process by reducing inhibition thresholds, the choice for the tutors was influenced not only by questions about their professional (economic education) and technical literacy. Teachers were chosen for economic education doing their daily work, with pedagogical experience and with the same sort of background as the target group – the learning teachers. Therefore, tutors are familiar with the specific needs of the target group and their specific general conditions: An important precondition for an emphatic way of (orchestrating) the ICT-based learning processes. Workshops for the tutors, organised by the IÖB, ensure a rising qualification and a steady enhancement of the educational services.

The learning methods of the ICT-based distance learning courses are oriented towards the specific needs of the target group. The courses are designed to engage the learners themselves in analysis, synthesis and evaluation. Several different assignments and selftests are supplemented by tasks to create concepts and materials for school lessons in economic education, based on the content of the modules. Thereby the learners are supported by special didactical services from the IÖB. For example: learning strategies in the form of

- Conjunctions between the content of the basic modules with the advanced modules,
- Conjunctions between the content of the modules/courses and the framework directives for the schools of the learners,
- Conjunctions between current exemplary political and economical events and the content of the modules/courses.

The following further issues are seen as key in quality assurance for the teaching and learning process. In the context of this article, they can only be outlined:

- The learning process is generally organised in virtual learning groups, managed by a tutor at a proportion of 1/20. The learning management system ensures this way of collaborative work in several ways.
- The tutors are responsible for pedagogical, social, organisational and technical support. They provide feedback to the learner's assignments and questions in a timely manner and in constructive and non-threatening way.
- The tutors endue about their own communication area with the function of peer mentoring resources. This is realized in a virtual discussion board, integrated into the learning management system. Furthermore they are guided by meta-tutors at the IÖB.
- The content/courses are separated into segments which can be used to assess learner mastery.
- Learners are provided with supplemental material which outlines the course objectives, concepts, and backgrounds and which summarises the learning outcomes of each course in a clearly written, strait forward way.
- The courses start with a one week face to face session. There the learners are informed about the concept, the content, the learning outcomes, the expectations about the amount of time and the technical requirements to determine their selfmotivation and commitment to learn at a distance.
- In the context of the first face to face session, learners are introduced to proper methods of effective distance learning and are trained to use the web-based learning management system.
- Learners and tutors have free access to an online database ([www.wigy.de](http://www.wigy.de)), filled with supplemental literature and articles about economic science, instructional design, most importantly, concepts and designs of school lessons in economic education, worksheets for economic lessons and so on.
- Learners and tutors have easily access to technical and organisational assistance during the courses via telephone and a special support area, integrated into the learning management system.

### **Further perspectives and sustainability**

The following further efforts are necessary to ensure the sustainability of the described educational services:

- The developed educational services of “Economic Education online” have to be certified and oriented towards the European and international standards, like bachelor / master.
- The effectiveness of the courses have to be measured with several methods and the outcomes are the future basis for advancing the content / the courses.
- The presently used ICT infrastructure (Lotus LearningSpace) has to be enhanced to a content management system. The content of this system has to prove compatibility to international standards like SCORM or LOM, so that future proposals of ICE-based economic training and further education are usable for webservices or learning management systems in other universities or countries.

- Incentives have to be developed and offered for the use of innovative methods and implementation strategies for ICT-based learning in higher education and further education programs. (Further information about efforts towards this intention in Lower Saxony are found here: [www.cdl-oldenburg.de](http://www.cdl-oldenburg.de)).
- The emerging extra work by realising ict-based higher education and ict-based distance learning programs has to be provided by professional incentives to encourage the development of distance learning courses.

Further information about the status of the project “Economic Education online” are presented at: [www.oebo.de](http://www.oebo.de). The activities of the Institute of economic education are summarized at: [www.ioeb.de](http://www.ioeb.de).

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# ESTABLISHING QUALITY IN FLEXIBLE DISTANCE-LEARNING: LEARNING TO TEACH IN BILINGUAL COMMUNITIES

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## **Introduction**

The Open University (UK) Flexible PGCE offers a different route into the teaching profession. It is aimed at those UK graduates training to teach through distance learning, who require an individualised programme taking account of their existing skills, knowledge and personal circumstances. Students undertake a Needs Analysis before a customised route through the training programme is agreed. Students, in consultation with their tutors, decide what to study, and when, in order to meet the Standards for Qualified Teacher Status (QTS). If experienced, they can take an assessment-only fast track route, but most opt for somewhere between full-time study of the whole course (one year) up to part-time study of the course over a maximum of three years.

Flexible PGCE students are trained and supported in three ways: a) through distance learning materials (including web materials, CD Roms, printed books and online discussion via electronic conferencing); b) by subject mentors and generic coordinators in partner schools during teaching experience; and c) by subject tutors who visit school placements, assess the written portfolio and teach at day schools. The first flexible PGCE students registered on the course in 2001. Currently, there are 500 students training across England, Wales and Northern Ireland in six secondary subjects classified as “shortage” by the government.

In the United Kingdom, particularly in England, the government has recognised a serious and growing shortage of recruits to teach in secondary schools. Subjects difficult to fill include: Maths; Science; Design Technology; Modern Foreign Languages; Music and Geography. The government have tried a number of policy initiatives to address this shortfall. One of these is to fund (through the Teacher Training Agency) the development of a flexible route into teaching. The Open University have been awarded the bulk of the places, and have designed a new programme from scratch to meet the flexible criteria (Needs Analysis, flexible start and finish dates, individualised training). Like all other courses of ITT in England, students on the OU Flexible PGCE have to demonstrate evidence of meeting the Standards for the award of Qualified Teacher Status (QTS), essentially a common set of competency statements.

This project draws on data from the various participants and partners in flexible PGCE. It takes a significant issue affecting an increasing number of schools in England: pupils from bilingual communities. It asks the questions: how do students on a distance learning flexible PGCE learn to teach in bilingual communities? How is the quality agenda, relating to a government push for a culture of inclusion in English schools and wider society, met on a flexible ITT programme? This is an important question for the Open University and ITT in England since partner schools are spread across England, Wales and Northern Ireland, and reflect the monolingual or bilingual make up of their communities. Some will contain a majority of bilingual pupils, others will have only a tiny minority. Given the important professional dimension to this issue, how are flexible PGCE students trained? Does training in relation to this issue come from the distance learning materials, the partner school mentor or the subject tutor?

## **The project environment**

### ***Policy documentation***

This case study of an under-researched area of UK Initial Teacher Training (ITT) investigates the common and unique features faced by trainee teachers in bilingual classrooms and the lack of guidance provided by policy documents. Although TTA Standards (2002) state that “trainers may provide

additional training... relevant to the traditions or needs of a region, such as training to work in multilingual classrooms”, there is a gap in exemplifying how such training should be carried out.

### ***Participants***

Several bodies are involved in preparing the trainee for Qualified Teacher Status (QTS) and these can be identified at different ‘levels’. Firstly, those policy-makers with statutory authority for National Professional Standards [(DfES (the Department for Education and Skills), TTA (the Teacher Training Agency), OFSTED (the Office for Standards in Education)]. Secondly, those advising and implementing policy at a local level (Local Education Authorities, accountable for policy implementation at a regional level and schools located in and serving the educational needs of their local communities and schools). Thirdly, departments and individual teachers or mentors operating within a school.

During the data collection, the research has tapped into these different ‘voices’, which are all involved in the ITT process. Participants interviewed for the research include: trainee teachers, school staff and LEA officers. Data from these participants:

- a) help build a complete picture of the trainee’s learning environment;
- b) triangulate perceptions of different viewpoints;
- c) critique policy documentation;
- d) provide insight into how Standards are interpreted and implemented at the school level and
- e) provide a unique insight into how regional and local issues, related to specific communities of children, affect the experience and training of the trainee teacher.

The trainee’s needs are conceptualised in relation to theories of situated learning and communities of practice (Lave and Wenger 1991). Learning to teach is viewed as context specific, highlighting the uniqueness of both participants and institutions in which practice is undertaken.

### ***Schools***

An Ofsted report on one school in the study states: “Progress in lessons is best for pupils for whom English is an additional language when support staff anticipate accurately the difficulties they will encounter”. Many schools across the south of England have pupils from ethnic minority backgrounds and more pupils than average with English as a second language; it is also important to bear in mind that amongst these bilingual pupils are those whose first language is sign language.

### **Methodology**

Viewpoints from an umbrella of research activities are being analysed to generate substantive theory, engaging with trainees’ “idealised notions of teaching” (Bramald et al, 1995) and seeking to establish how mentors “guide the seeing” (Maynard & Furlong, 1995).

This project also taps into a government rhetoric around inclusion in secondary schools and social inclusion in society. Although not all pupils will be placed in mainstream settings, the Special Educational Needs Code of Practice (2001) emphasises that: “the special educational needs of children will normally be met in mainstream schools or settings”. This provides an important context for the study, in evaluating how effectively student teachers are sensitised to the needs of bilingual pupils. For example, bilingual pupils may also be those who are deaf or hard of hearing and have as one of their languages a sign language; their needs are now addressed by the implementation of the Special Educational Needs and Disability Act (SENDA 2001), which imposes new responsibilities on mainstream schools from September 2002, “to ensure that deaf and hard of hearing pupils have the same access to educational opportunity as everyone else” (RNID 2002).

### ***Data collection***

An examination of the role of each of the bodies involved in the support of the trainee teacher in the bilingual classroom forms the focus of this research and methods of elicitation allow for comparison across and within the voices. These elicitation methods include:

- Questionnaires
- Interviews
  - Focus groups (trainee teachers)
  - One-to-one interviews (trainee teachers, school staff, LEA officers)
- E-mail discussion forums

All interviews have been audio-recorded and transcribed and are being analysed using qualitative data analysis software (Atlas Ti).

### ***Time-frame***

The phases within the project were as follows:

*Phase One:* Literature review: a review of the national, regional and local policy documentation as well as the academic literature related to a) student teacher development and b) bilingualism in education. Contact with schools and trainee teachers; establishing participating schools, students and subject areas.

*Phase Two:* Data collection: one-to-one interviews with a sample of flexible PGCE trainees, mentors, school coordinators and tutors. Focus groups: semi-structured interviews with groups of trainees. Collation of documentation (school policies etc.); overview of how the trainee is prepared:

- a) by government,
- b) by the LEA,
- c) by the school(s),
- d) by the Open University and
- e) by independent study.

Views will also be sought from LEA officers and TTA regional managers. Electronic conferencing: use of prompts to encourage discussion amongst trainees, mentors and school coordinators.

*Phase Three:* Data analysis and writing up. Data is being analysed using procedures from grounded theory (Bartlett and Payne, 1997) to generate theory from the data emerging from the fieldwork, building on theoretical propositions based on professional knowledge.

### **Conclusion**

The project enabled new relationships to be developed with a number of gatekeepers within the south of England, including: LEA officers responsible for teacher recruitment and bilingual policy, Development Strategy managers in Education Action zones and TTA regional strategy managers concerned with regional teacher recruitment. The project has also enabled research into the adequacy of the new Standards for Initial Teacher training (2002) in relation to student teachers learning in bilingual classrooms.

This paper reports on work in progress and focuses on trainee teachers' experiences of developing the Standards for ITT in bilingual contexts. The presentation of the data at the conference will include:

- initial findings from interviews with: trainee teachers, school staff and LEA officers in the south of England
- quality issues in flexible distance learning ITT
- vignettes of case study schools and their communities
- examples of 'best practice' for those involved in ITT
- areas for further research

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# **E-LEARNING AND BUILDING COMMUNITIES OF PRACTICE THE EDEN/OU/UCLES ONLINE DISCUSSION FORUM ON STAFF DEVELOPMENT AND TEACHER TRAINING**

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## **Introduction**

'Rethinking international co-operation' was the theme of the EDEN conference in Granada 2002. The online discussion forum which this paper describes both has its origins at that conference and also provides a valuable example of the kind of international development and collaboration discussed at that event. In a paper for the conference, Anne Gaskell and Roger Mills (1) proposed that EDEN could stimulate the inter-institutional and trans-national sharing of good practice in tutor development through an online discussion forum or conference, along the lines of the online discussions run by the Commonwealth of Learning (2). At the conference a number of people expressed interest in continuing discussions raised in this paper and in the paper by Chris Daw and Phil Riding (UCLES) about staff development and teacher training (3). The four authors discussed possibilities and proposed to EDEN a pilot of two or three topics to be discussed through an email distribution list early in 2003. The Executive committee of EDEN warmly supported this proposal and has been instrumental in enabling the discussions to take place.

This paper is written as the online forum ends its first week and gives an initial account of the establishment of the discussion and the topics discussed so far, organised around methods, agenda, results and conclusions. The authors intend to report more fully at the EDEN conference in Rhodes 2003.

## **Methods**

### ***Technology***

To support the conference community we used Mailman (<http://list.org>), a free, open source mailing list management product that has been used successfully by UCLES to support continuing professional development among teachers (4). It gives each mailing list a unique web page and allows users (in our case, EDEN members) to subscribe, unsubscribe, and change their account options over the web. It also allows us, as list managers, to administer our lists entirely via the web, and it supports built-in archiving, spam filters, bounce detection, and digest delivery.

Mailman, as its name suggests, is an email-based list management tool. This has the advantage over web-based systems in that messages are delivered directly to members' email accounts (i.e. it is 'push' technology), obviating any need for members to remember to visit a website ('pull' technology). This is, we believe, better for busy professionals who often have other priorities over engaging in professional discussions that are not part of a formal learning course.

### ***Running the list***

#### ***Building a 'critical mass'***

In order to build a critical mass of members we adopted a 'staggered launch' strategy. We advertised the conference via the EDEN website for some two months prior to the actual starting of discussion, asking people to 'pre-register' for the conference. Using this method we were able to build up a membership of around 200. On the official launch day, we sent a welcome message and the first 'facilitation' message.

### *'Rules of engagement'*

Before officially launching the discussion a message was sent containing the 'rules of engagement' for the community. In addition to the usual legal and 'netiquette' strictures, we introduced a rule that restricted the length of contributions to 200 words or less. We did this to try and encourage a more 'conversational' style to the exchanges and to discourage long messages.

### *Agenda*

Our previous experience of running on-line communities for professional development (3) has shown that although it is useful to have an agenda for discussion, it is important to be flexible and to allow the community to create and follow its own agenda if necessary. We did therefore draw up an agenda, but we were prepared to be responsive to the interests of the community.

This agenda consisted of three broad areas

- The underlying principles of on-line tutoring
- The roles and skills that on-line tutors need
- Practical issues of tutor development

Subsidiary topics and questions were formulated in advance of discussion, in order to have an 'armoury' of questions 'up our sleeves' ready to feed into discussion as necessary. These topics and questions included:

#### *The underlying principles of on-line tutoring*

Are there common underlying principles to which we all subscribe in considering staff development and tutor/teacher training? Or are there different approaches in different countries? For example, to what extent do we believe in the notion of the 'reflective practitioner' and the constructivist approach to staff development? Coomey and Stephenson (2001) argue that 'the technology of online learning appears to facilitate a migration from traditional didactic modes to more learner-managed learning modes if teachers and designers wish to take such a journey' (5). Is the learning the same whether we learn online or through other media? The authors of both original papers all work within a constructivist and experiential framework and invited the views of others.

#### *The roles and skills that on-line tutors need*

Salmon (2000) argues that 'successful online learning depends on teachers and trainers acquiring new competencies' (6) and Weller (2002) agrees that 'teaching via CMC requires the development of moderating skills that are different in nature or emphasis from those in face to face education' (7). How far would participants agree?

#### *Practical issues of tutor development*

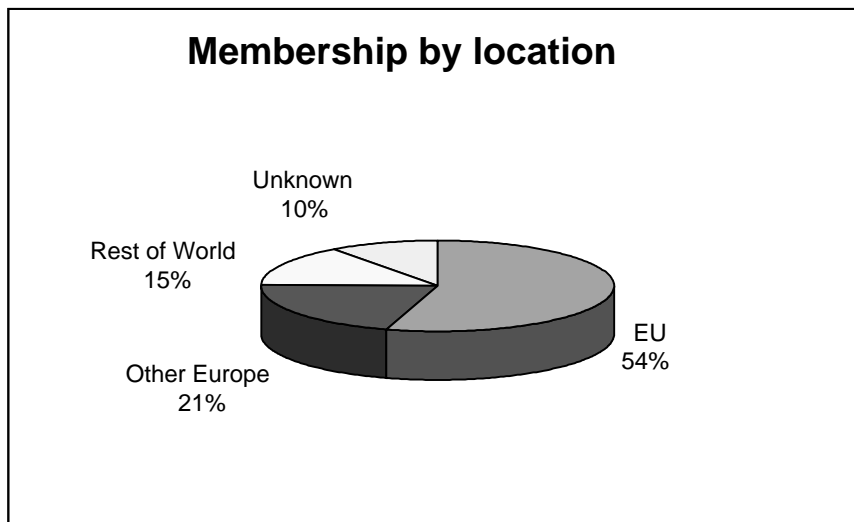
The authors of the two papers at Granada had all used experiential approaches to develop and train tutors and hope to learn more about how others proceed. How do we encourage a shift from a transmission to a facilitative model (if that is our aim)?

It was also hoped that we may be able to introduce a fourth element into the discussion, *viz.* issues of evaluation and quality assurance.

## Results

### *Membership*

As described earlier, the list was advertised through the EDEN website. On the 26<sup>th</sup> February 2003 (i.e. 4 days before the 'official' launch of discussion) the list had 199 members. The figure below shows the geographical spread of these members, as indicated by their email address domains.



EU countries – 109 members (13 countries)

Other Europe – 41 (14 countries)

ROW – 29 (9 countries)

Unknown (e.g. hotmail.com addresses) – 20

As can be seen, 75% of members were from Europe, and 15% from the rest of the world. We were unable to identify the location of 10% of the members because they were using web-based or generic email accounts such as hotmail. In terms of individual countries, the largest contingent was from the UK with 45 members, followed by Australia (14), and Germany (12).

### *The discussion*

There were 55 messages in the first week, from 27 different contributors and eight countries. This latter figure represented some 14% of the membership.

Discussion has been of very high quality and covered a wide range of issues. The initial question about principles of staff development and learning was quickly developed by participants into a conversation on a range of other issues. Among these participants discussed:

- Theories and principles of staff development and learning
- Comparisons between online and face-to-face learning
- Qualities and skills needed by tutors (this was introduced without our intervention)
- Teamwork online
- Online design, activities and assessment

## Conclusions

As noted, this paper only reports on the setting up and the first week of discussion. However, we can already note a couple of issues.

- The quick development of the discussion to reflect the interests and needs of the participants

We had thought this may happen, and, given the practising practitioner nature of the community, fairly predictable.

- The high proportion of inactive members

According to our analysis, more than 85% of the members were inactive during the first week! We do not feel that this is a problem, however. Apart from the fact that 'traffic' would have been rather high had everyone contributed, this phenomenon has been noted in many on-line communities, and evidence from our work with teacher communities in the UK (4) shows that these non-active members still find being a member of the community useful and a learning experience. However, one measure of a 'healthy' community may be a lower proportion of inactive members, and we will be monitoring this.

Some of the questions we hope to answer and some of the issues we hope to discuss at the Rhodes conference include:

- To what extent the community develops into a 'community of practice'.
- Whether the proportion of active contributors increases as the community ages.
- Whether the main contributors change as the discussion evolves (or do the same people dominate).

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# THE DESIGN OF AN INTERACTIVE WEB PORTAL TO SUPPORT LEARNING FOR SECONDARY LEVEL STUDENTS AND TEACHERS

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## Abstract

This article aims to describe the starting points emerging from user roles and needs that had to be taken into account in the design of an interactive Web portal to support learning targeted for secondary level students and teachers, and how they were carried into effect. The specification, design and implementation of the portal is made especially difficult by the fact that two entirely different user groups need to be taken into consideration in the design process: the students aged 15 to 18, and their teachers. Attraction factors also need to be considered, as the project is specifically aiming to attract the attention of young girls. The students and teachers in secondary level educational institutions taking part in the Learn project can be identified as the essential users of the Learn portal. One of the user groups is seeking for support for their studies and elements of entertainment, while the issues of critical importance to the other group include support for teaching and user management. The group of designers discovered a solution to this situation by surveying the needs of the portal users by means of Parolini's value net analysis, thereby identifying the processes that are critical from the customer's point of view.

## Introduction

The essential goal of the project is to motivate especially young girls to pursue studies in information technology. This is done by integrating 22.5 ECTS credits of information technology studies with the teaching in secondary level educational institutions in four locations in different parts of northern Finland. The study contents are produced in digital form at the University of Oulu. A network-based learning environment and the portal described in this article are used to distribute the learning materials and to support the studies. The teachers are offered tailored training aiming to support the use of ICT in their own teaching and to promote the introduction of a gender sensitive approach in practical teaching situations.

The Learn project is part of the nation-wide Mirror project network. Mirror is part of the Equal community initiative of the ESF aiming at the realisation of equality in education and the labour market. The project was launched on February 1, 2002 and it will continue until May 15, 2005.

## Pedagogical basis of portal design

Researchers agree to quite a large extent on the kind of questions that should be considered when starting to design the materials for online education. These are some of the main questions that keep coming up:

- What is the target group like and why are the materials made?
- What are the goals of learning?
- How can the special characteristics of an online environment be exploited and what additional value do we get compared to conventional teaching?

## *Target group*

Taking two entirely different target groups into account in the design turned out to be a major problem. The adult teachers use the portal to support their work, while their students aged 15 to 18 use it as a study and communication tool. The requirements of the section targeted to the teachers in particular were based on pedagogical issues.

The teacher's work with online materials is different from his traditional work. The teacher's role is not only to distribute information, but rather to make the students' autonomous work and study easier. An essential issue in the changed face of the teacher's work is thought to be the extent to which responsibility and freedom is given to the students in relation to their studies. According to Tella & al. (2001), the teacher's work can be divided into five roles:

- Teacher as motivator and activator
- Teacher as networker
- Teacher as organiser
- Teacher as communicator
- Teacher as supervisor

Similarly to all materials produced in this project, the portal shall support teachers in their work and their roles in its implementation. The roles presented above are not always very clearly defined and they overlap each other, but in most cases it can be seen that the focus is on a given role when the teacher attempts to achieve the goals set for teaching. Teachers are required to have many skills in online courses. The skill to use the available technology is one of the most important of them. The skills to use ICT are commonly divided into three levels: basic, advanced and expert. The basic level was chosen as the basis for portal design. There are great differences in both the teachers' and pupils' skills, but the basis was provided by the minimum skills obtained in IT lessons in primary and secondary education. This corresponds to basic skills in the above classification. Such skills shall be sufficient to use of the portal without any guidance.

The other target group required the design team to get oriented to the way of life of people aged 15 to 18 and to the rapidly changing youth culture. Special attention had thus to be given to the design of the outward appearance and metaphors, and an effort was made to adhere in them to quite permanent themes related to school life. Approaches related to motivation and attraction factors emerged as important variables. Because of the goals of the project, young girls and their motivation to use the portal emerged as an especially important target group.

### ***Goals***

Teaching, studying and learning is supported in the current implementation by including as one of its elements a portal to distribute information, present products and offer a communication channel. The provision and distribution of information mainly consists of one-way communication of information related to administrative or study-related materials. Production and publication refers here to the construction and publishing of any learning materials or products. The teacher and pupil can be equal as producers and publishers in this respect. The communication features of the portal support interaction and community between groups located apart. There can be interaction between various parties, such as the pupils and the teacher, or between workgroups or schools.

### ***Opportunities offered by online work in teaching***

For the design to be successful, it is necessary to consider the role of the portal in relation to the goals that have been set. The important question is: what is the value added to teaching and learning by the utilization of online resources?

The ways to use the portal and the materials available through it have a great influence on the value added by online resources to teaching. The model of the different uses of ICT introduced by Vahtivuori (2001) allows an examination of the different functions of use of ICT and online resources in learning and teaching. These functions can also be present at the same time, but with different focuses in terms of action, actors and goals. The four different uses in the model are the pedagogical, instrumental, collaborative and communicative uses.

## From the customer's value creation to a survey of user needs based on the value net

Parolini (1999) has discussed the value net to promote the customer's value creation process. The important thing in the value net theory is the end-customer's point of view and the processes of the value creation system. The value creation system can be understood as the set of activities that create value to the customer's consumption activities. In this case the theory can be applied to identify the factors essential to the customer's – in this case the users of the Learn portal – value creation process that the portal services should support from the customer's point of view. The use of value net analysis can be applied to any case to identify the processes that are critical to the customers and participation in the value creation system.

The pupils and teachers in secondary level educational institutions who are taking part in the Learn project can be identified as the essential user groups of the Learn project. Another user group is formed by the visitors. One of the user groups aims at study support and elements of entertainment, while the things critical to the other user group include support for teaching and user management.

Figure 1.0 is based on Parolini's (1999) value net perspective, outlining the essential requirements from the viewpoint of the user Student for the Learn portal. In Figure 1, the variables closest to "Portal usage: student" are critical from the viewpoint of the customer Student. Service immediacy, materials supplementing the studies, interaction with other users, entertainment and user support are immediately visible to the user. The operator's network services, content production, user interface design and software production are needed to provide these services, but the user is not directly interested in them.

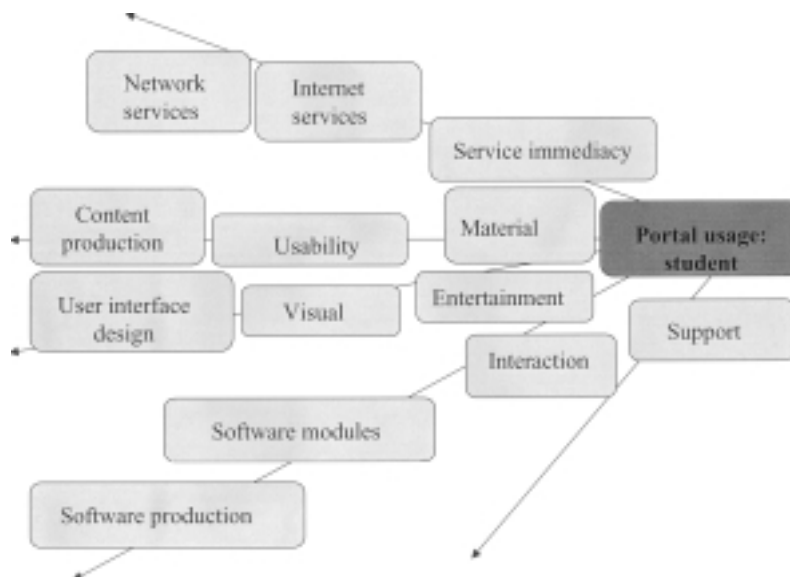


Figure 1. Critical factors in the use of the Learn portal from the student's point of view based on the value net.

In the case of the teachers, the requirements are partly the same, but there are also differences. The teachers need to have broader rights of use and an opportunity for portal and user management. To support the teachers' work, a special teachers' room was also developed, i.e. a private working space that can only be accessed by the tutor teachers of the Learn project and the university's project group. In Figure 2, the variables closest to "Portal user: teacher" are critical from the viewpoint of the customer Teacher. Service immediacy, user management, interaction with other users, materials to support and supplement work, the teachers' private working space and user support are directly connected with the user. The operator's network services, content production, user interface design, information security and software production are needed to provide these services, but the user is not directly interested in them.

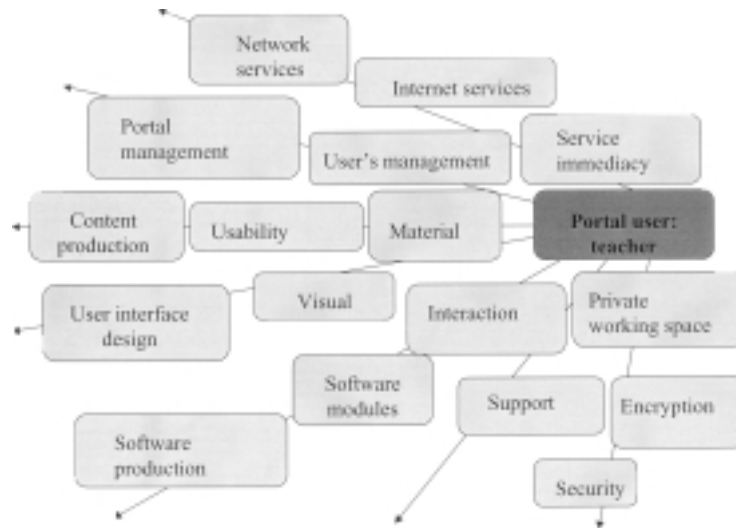


Figure 2. Critical factors in the use of the Learn portal from the teachers' point of view.

Based on figures 1 and 2, it is possible to identify the critical factors and processes that are important to students and teachers when the Learn portal is used. Having identified the critical factors and processes, the information in figures 1 and 2 helps to form a larger value net system, a so-called strategic map, in which nodes are used to describe value creation activities and the relations between them (e.g. links between the activities, including information flows) (Parolini 1999). Figure 3 shows a value net in which the key activities and the relationships between them have been identified. It can be seen in this figure that the activities and relationships indicated by dotted lines are activities and relations that support the use of the portal, while the activities and relationships indicated with solid lines are critical from the user's point of view. The users have participated in activities with a grey background.

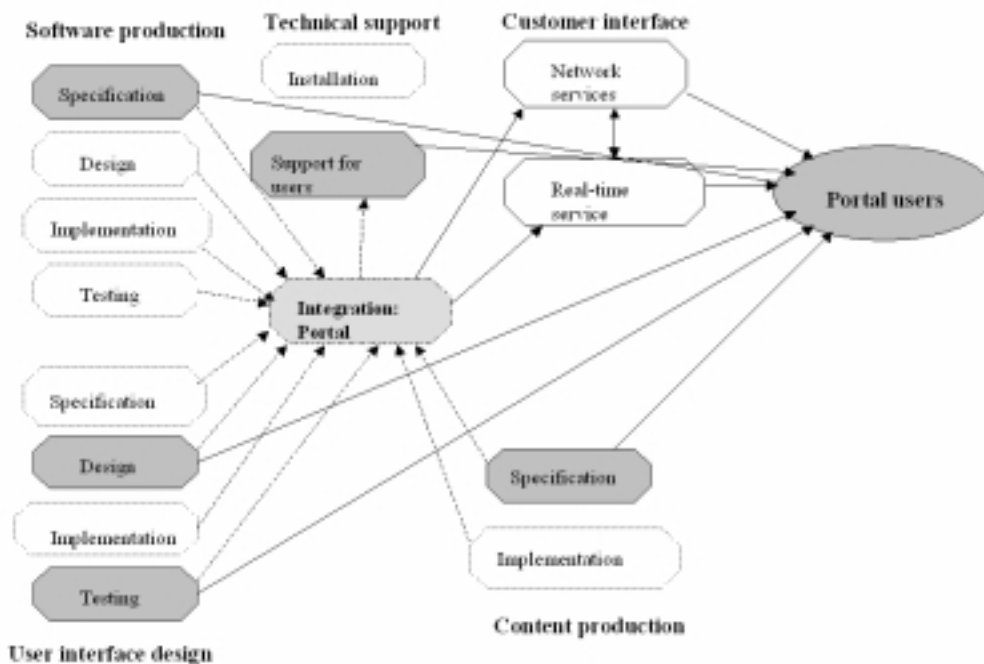


Figure 3. Key activities in the value net of the Learn portal and the relations between the activities.

It is obvious from Figure 3 that broader participation by the user in the specification, design, testing and implementation stages of the portal would bring added value both to the user and to the production. The users could, for instance, participate in the creation of software components or the user interface. They could also be already involved in the specification phase of user interface design.

## **User-centred design of a Web information system**

It is the function of a hypermedia application such as a portal to support activities that lead to the identification of the necessary information, its efficient utilisation and management (Lowe & Hall 1999). It is necessary to know the various user groups to achieve this goal: it is necessary to understand what information is needed by each user and how different users can utilise and manage this information most efficiently.

### ***User-centred design***

For Web information system design to be successful it is necessary for the designer to know the future users of the application. User-centred design is an approach that aims at making systems usable. User-centred design should be launched right at the start of a project, and the process should be run iteratively until the system meets the specifications.

When an information system is being designed, it is often assumed that the use of the system will be purely task-oriented: the user has a goal that he wants to achieve with the system, and the functional requirements that the different user groups have for the product can be specified in detail following the principles of user-centred design. It is recommended that attention should be paid in the user analysis of hypermedia applications to special characteristics like these of the different user groups: skills to use information technology, language skills, previous experience in the use of similar applications, cultural background, expected functionalities of the application, and age. (Lowe & Hall 1999)

The characteristics and expectations mentioned above can be measured and easy to record as user requirements, but as such user analysis does not necessarily give attention to binding the user to use the system, as the assumption is that the goal-oriented nature of the user's activity is sufficient to maintain motivation. The user often does not have a choice, as an information system may have been acquired for a work organisation, for instance, that must be necessarily used by all the members of the community – the user-centred design method thus primarily aims at meeting the prerequisites and requirements of the various user groups on the level of functionalities.

The situation is quite different when using a system is not immediately necessary for the user: the user can choose whether or not to use it. In a situation like this, where the system is expected not only to satisfy but also to attract the various user groups, user-centredness requires special consideration of attraction factors at the design stage. A Web information system that helps learning and also takes attraction factors into account thus requires a more comprehensive understanding of the principles of user-centred design. Issues such as aestheticism, interestingness and stimulation should be seen as part of usability. Luukkonen (2000) points out that a system based on network communication must simultaneously also offer experiences in addition to information; he considers the experiences to be essential to promote learning. Taking the experiential side into account also requires the understanding of the needs and preferences of the user groups on the emotional level, i.e. the system should also take into consideration the factors that may help to make quite different user groups commit themselves to using the system. Ylä-Kotola and Arai (2000) suggest that in practice usability research much too seldom involves experience, as usability is understood too narrowly.

### **Summary**

This article has aimed at introducing factors that need to be considered in the design of an interactive Web portal to support learning and teaching in a system with two entirely different user groups: students aged 15 to 18 and their teachers. When the portal was being designed, general design principles for Web information systems, pedagogical theories and aspects of value creation were considered, while the principles of user-centred design were applied throughout the design process.

In this portal the user groups participated in the system design process starting from its very early stages. Special attention was given in the preliminary specification to ways to commit young people to the use of the portal and to the teachers' requirements for the portal. The user groups' level of knowledge and skills in communications technology was determined at the same time. The user groups' expectations and requirements for the system were analysed through a user needs survey based on the value net – this allowed the identification of the most critical factors from each user groups' point of view. A demo

version of the portal was constructed on the basis of the customer's requirements, the expectations of the user groups, and the analysis that was made. In addition to the functionality of navigation techniques and the chosen metaphor, the usability test of the demo version paid attention to the characteristics of the portal in terms of its contents and external appearance; corrections were proposed on the basis of the results, followed by the final implementation of the portal.

Although the Web portal presented here is targeted for two different and closely defined user groups, the results can be applied more generally, taking into account the needs of different user groups. The design and user-centredness of information systems requires that an overall survey of the needs of the various user groups is made – the designers feel that even user needs that may seem secondary can be critical factors contributing to the motivation to use the system. The value net analysis introduced by Parolini (1999) was found to be especially useful. Based on our experiences we can also recommend it to other designers producing online materials to promote learning targeted for several different user groups.

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# EDUCATIONAL DESIGN METHOD AS A TOOL OF QUALITY IN WEB-BASED LEARNING - TEACHERS PLAY WITH BRICKS

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## Abstract

Educators use different means to foster learning in networked and web-based teaching than they do in traditional contact teaching. Contact teaching, like lectures, is based on the teaching process whereas Web-based teaching is based on learners' learning processes. In this paper, a concrete tool called "*Bricks for Constructing Web-based Teaching (BCWT)*" used in the design of Web-based education will be presented. BCWT primarily allows teachers to design and construct easily pedagogically meaningful Web-courses. On the other hand, BCWT is also an essential tool for ensuring the quality of education. The elements of pedagogical quality in networked learning will be discussed.

## 1. Introduction

The Web is an open learning environment (OLE): a tutor and a learner create content as well as maintain the learning process together. When considering the learning process and its content, an open learning environment is "open" in the sense that learners can produce new content, for example exercises (Lifländer 1989). In this case, the environment does not provide the pedagogical structure for activity. The teacher's main responsibility is to construct structures and scaffolds to support learning and students' activity in the Web-based learning environment.

Teachers need a wide range of skills, like expertise in networked pedagogy, and a lot of time to design and construct a Web-course from the very beginning. For example, most part-time teachers may not have the opportunity to participate in the design process from the very beginning – cognitive tools that facilitate this education design are obviously needed.

Developed at MJK Institute, *Bricks for Constructing Web-based Teaching (BCWT)* (Silander et. al. 2002) is a tool that easily enables teachers to design and construct pedagogically meaningful and functional Web-courses. From the organizational point of view, BCWT is an essential tool for ensuring the pedagogical quality of education that follows the curriculum and modern learning concepts.

MJK Institute specializes in vocational training and is a part of the adult vocational education system supervised by the Finnish National Board of Education. The part-time teachers of MJK Institute come from the business sector, universities, and other institutes of higher education. Since MJK does not employ its own teachers as regular staff, it is very flexible. Coursework at MJK follows flexible multi-training learning and supporting methods. This context creates its own challenges, but also provides opportunities to carry out Web-based education.

## 2. Bricks for Constructing Web-based Teaching – Easy-to-use Design Method for Part-time Teachers

Educators do not have the same means to influence students in Web-based learning as they have in a classroom. Therefore, it is important to design learning situations from the point of view of the learners rather than from that of the teacher. BCWT is a design tool based on the learning process approach (Koli & Silander 2003). The idea is to assist teachers in making a smooth and speedy transition from the culture of the traditional teaching into new, pedagogically meaningful Web-based education. BCWT provides teachers with an easy tool with built-in pedagogic elements that support learning in open environments.

This method enables educators to design effective learning situations on the Web even if they are not well acquainted with network learning.

The learning process is divided into several *learning situations* that give the learning process and students' progress structure (see table 1.). Each learning situation is construed using a combination of provided bricks (see table 2). The design of Web-based education is simply stacking up the bricks provided by the model on top of each learning situation.

Table 1. A form for designing web-based education with bricks. Teachers divide the learning process into learning situations and simply stack up the bricks above them.

Learning process constructed with the bricks									
	<b>C</b>	<b>R</b>							
	<b>I</b>	<b>C</b>	<b>L</b>	...					
	<b>A</b>	<b>Kb</b>	<b>F</b>	...					
	<b>W</b>	<b>T</b>	<b>I</b>	...					
Learning situations:	1 Web	2 Web	3 contact	4 contact	5 Web	6 Web	7 Web	8 contact	..

Table 2. The Bricks for Constructing Web-based Teaching provided to a teacher.

<b>W</b>	<b>Welcome to the Study Unit</b> – Description of objectives, requirements, and practices	<b>I</b>	<b>Introduction to the Subject</b> – Context creation, basic concepts, etc. – Setting up common goals
<b>A</b>	<b>Activating Questions</b> – Questions that active students' thinking and create motivation	<b>T</b>	<b>Study Task / Learning Assignment</b> – The idea is that students will learn something new by doing the task (not a test)
<b>C</b>	<b>Collaborative Knowledge Building</b> – E.g., in the Web discussion forum	<b>Kb</b>	<b>Knowledge Building</b> – Individual process – Doing a learning task, e.g. writing
<b>F</b>	<b>Feedback &amp; Tutoring</b> – Teachers/tutors provide feedback and tutoring – Individual vs. Collective guiding	<b>PF</b>	<b>Peer Feedback / Peer Review</b> – Feedback provided by other students – E.g. in the Web discussion forum
<b>R</b>	<b>Reflection (students' own)</b> – Process, learning – Products, results	<b>L</b>	<b>Learning Log / Learning Diary</b> – Students' notes about their learning

### 3. Bricks Model as a Part of Quality Management System

The Introduction of the Bricks for Constructing Web-based Teaching is an effort to standardize the process of learning and teaching as well as the design process. From the perspective of the organisation, this model guarantees that each teacher or trainer pays adequate attention to the process and does not simply draw up a number of study tasks. However, the model is not so restrictive that teachers cannot take advantage of their personal strengths in the teaching. What is not optional, however, is teaching based on the learning process, i.e. teachers first have to consider the process of learners and then adapt their actions and interventions to it.



Based on the preliminary results of a case study ((n=3) teachers; interviews and their Web-course designs), this model also seems to provide students with a number of benefits. As the process is well designed and transparent for students, they have no problem following their courses. From the very beginning, they know what they are expected to do. The objectives, requirements, and assignments, which make up a course, are clearly described and students can expect a certain structure that provides them with tools to monitor their learning processes and progress.

### ***3.1 Elements of Pedagogical Quality in Web-based Teaching and Learning Process***

For quality in Web-based education, it is also important to consider elements that contribute to learning and that are shared by several pedagogical models, like Progressive Inquiry (Hakkarainen et al. 1999, Hakkarainen et al. 2001) and the DIANA Model (Aarnio & Enqvist 2001) (a model based on dialogical inquiry learning, which is particularly adapted to vocational education), as well as Activating Teaching (Lonka et al. 1995, Lonka & Lonka 1991). The elements presented below form the theoretical framework of the quality assessment process used at MJK Institute.

*Learners' Prior Knowledge.* Learners' prior knowledge and their attitudes toward any subject studied have an influence on learning. New understanding will be founded on prior knowledge. Therefore, it is tremendously importance that learners first become aware of their prior knowledge. In order to help them do so, different methods, like unstructured writing or concept maps, can be used.

*Problem Oriented Learning.* Problems arising from learners' own interest (or from a workplace) are regarded as a crucial factor in learning. Questions and problems, set up by students, direct the knowledge building process.

*Authenticity.* The problems being solved during the learning process should be as authentic as possible. The same applies to learning assignments: they must not be tasks done just for a teacher. Authenticity requires that the culture of vocational expertise, i.e. a workplace with authentic tasks, methods, tools, and information sources, should be related to learning assignments.

*Knowledge Building.* Knowledge building and the construction of new knowledge, which is meaningful to a learner, have a core position in a learning process. Although learning does not equal knowledge building, it, along with the formulation of new knowledge, *can* be conceived as a metaphor for learning.

*Externalisation of One's Own Thoughts and the Process of Knowledge Building.* When learners externalise their own thoughts and simultaneously the process of knowledge building, they need to present these ideas in an abstract context. They can then learn from their own train of thought and deficiencies in their thinking may become apparent. This externalisation creates a need to produce more elaborate constructs.

*Collaboration.* The best learning is considered to take place in a social context based on collaborative knowledge building and shared expertise. The externalisation of one's own thoughts as well as feedback from peers plays a significant role here.

*Change in the Roles of Teachers and Learners.* Learners are seen as active processors of knowledge and as main actors in all these pedagogic models. Teachers are considered facilitators of the learning process, as well as experts on the substance of courses.

*Learning is a Qualitative and Conceptual Change in a Learners' Comprehensive Knowledge Structures.* The aim of processing information and problem solving (in a learning process) is to create conceptual change, i.e. genuine qualitative change in students' knowledge structures. Just adding new information to existing knowledge is not sufficient from the point of view of learning. A conceptual change is often a prerequisite for the capability to apply a learned substance in a different situation and in practice (transfer).

## Discussion

The implementation of the brick model has already shown positive results in quality management at MJK Institute. According to preliminary analysis of the case study, teachers state that the switch to web-based learning has proven less difficult than expected. In individual course feedback, some students mention that the process based on learning situations helped them learn. The model makes it possible to divide the course into smaller meaningful entities and thus, enables efficient learning along side full-time employment.

The case shows that a cognitive tool for educational design (like *Bricks for Constructing Web-based Teaching-method*) enables relatively rapid change in educational practices and the culture of teaching.

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# A QUALITY FRAMEWORK FOR PRODUCING CLINICALLY COMPETENT NURSES THROUGH DISTANCE EDUCATION

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Provision of distance education has been growing rapidly in recent years, primarily with the growth in online learning. Whereas traditional paper-based open or distance learning might be regarded by some as cumbersome, difficult to administrate and unresponsive to students' individual learning; online learning, in contrast, is often regarded as cost-effective, scaleable, flexible and student-centred. Yet, whether distance learning is delivered using conventional methods or through new technologies the need to ensure standards and enforce quality mechanism is paramount. The open and distance learning quality council note that as in distance learning 'the emphasis [is] on learning from oneself [...] methods, advice and support must all be relevant, reliable and consistent' (ODLQC, 2003). Indeed the isolation and poor retention often associated with distance learning act as an even clearer indication that such quality frameworks are necessary.

The rise in online distance learning often throws this sharply into relief. As the ODLQC point out many 'new, and often inexperienced, providers are moving into distance learning. They may not understand how to monitor and maintain quality' (ODLQC, 2003). If resources are made available to face-to-face students within an online learning environment then it is often perceived as an easy step to translate this into a distance learning course. However, the realities, as anyone involved in distance learning will be aware, are different. There is a need to produce high quality courses that are responsive to the needs of learners by providing opportunities for interaction and engagement. Yet, developing such courses and providing communication opportunities can be problematic. How can we ensure quality whilst at the same time encouraging interactivity and student engagement? It is this exercise that forms the basis of this paper.

At City University, online distance learning has been developed to deliver nurse education and training using an integrated model, where students undertake collaborative learning activities drawing on different learning resources (Mason, 1998). This model is highly suitable for autonomous learning in the renal care specialty in particular and is underpinned by the theoretical principles for adult learning and andragogy of Knowles (1980) which are:

- Adults need to know why they need to learn something
- Adults need to learn experientially
- Adults approach learning as problem-solving
- Adults learn best when the topic is of value.

For the post registration nurse, educators need to combine this understanding with an evaluation of clinical need and potential students' present C&IT skills in order to access and utilise learning resources. The nurse educator seeking to use e-learning resources needs to clarify the intention, purpose and benefits to be achieved by using learning technologies. E-learning is used here to engender collaborative learning between students and develop more self-directed learning skills. Having understood these principles the context of problem-based learning was considered as being a useful framework for the design of the training course in renal nursing as it necessitates that students are active participants in the learning process.

Understanding and using learning technologies in post registration nurse training and development requires understanding of the technology, the adaptation of education philosophy and assessment of different media of education delivery in order to ensure learning has taken place in the student to effect competent clinical practice.

Mason (1998) speaks of a pedagogical revolution in higher education in the rush to 'digitise, virtualised and globalise the campus'. But the importance of interactivity and the learning process may overlook the end outcomes to be achieved by undertaking this course.

Problem-based learning (PBL) is a concept of learning in which students focus from the beginning of their course on a series of professional issues, where the knowledge of the various academic disciplines that relate to these issues is integrated (Sadlow et al 1994). PBL is not a new concept in clinical education with the model being integrated into medicine 25 years ago. Historically education for health personnel has been based around separate academic subjects, which are further divided into theory and clinical phases. However these methods do not necessarily meet the variety of needs of the students or the clinical environment. Indeed it may actually inhibit the attributes desired of those completing courses where analytical thinking, problem-solving and imaginative powers are required in order to meet the diverse needs of the patients and families they meet. Studying *subjects* inevitably divides theory and practice and often leads to the criticisms that students are unable to use the theoretical knowledge in a practical way. Schon (1983) states that everyday problems that professional practitioners face do not present themselves in the tidy form of a textbook. This may be particularly relevant in the renal care environment where patients present with complex medical and clinical needs as well as diverse social, psychological and adaptive needs as they address chronic illness and the diverse challenges of including renal replacement therapy into their life. Education that focuses on academic disciplines and not on the knowledge the practitioners actually need may lead to the perception of irrelevance.

The World Health Organisation (1987) states, 'The explosion of scientific information makes traditional curricula increasingly irrelevant, because they are based on what is known today, to exclusion of how to learn what will be known tomorrow'.

Nurses need to be able to use strategies and frameworks to meet their patients needs and evaluate the ever changing and developing body of professional knowledge. Hence problem-focused education seems to offer the dual purpose of satisfying professional needs and the academic community as it conceives theory as central to the understanding of problems.

Further PBL is applicable as an education and training framework across the range of renal care delivery in the UK and across the world. Indeed it must be understood that the scope of practice of renal nurses in different countries is very different, as is the access to services that patients may have according to different country's health systems, and ability to fund and develop such a service. Hence if clinical educators are to address the professional and learning needs for best evidenced-based practice, then it is vital that education is matched to local needs. The PBL model used for this course development is regarded as a key element in addressing the diverse clinical needs of students who may access the course from around the world. A traditional or text-based course may impose clinical thinking and practices that are not relevant in all areas of renal care delivery and create a sense of professional snobbery instead of addressing the local care needs of the patients.

The purpose of the renal training course is to develop a clinically effective renal nurse. The course is aimed at nurses who have been qualified for a minimum of one year and have at least six months experience in the speciality before applying for the course. Hence the course aims to develop specialist skills that include technical skills, reflective/evaluative skills and communication skills (Del Bueno 1984). It is not aimed at 'value added' knowledge to enhance generic nursing skills. These renal nurses will eventually be caring for patients in the broad areas of haemodialysis, peritoneal dialysis, transplantation, in-patient services, and in clinics and the community where preparation for renal replacement therapy (RRT) is considered, and follow up and monitoring of conditions are undertaken. Hence learning that is structured around the acquisition of knowledge, the development of self-directed learning skills and the application of clinical reasoning in PBL stimulates a questioning attitude where the recall of facts is not as important as the understanding of ideas and principles. Indeed in the clinical environment nurses work as part of a multidisciplinary team in order to affect holistic and individualised care for the patient and their family. Within the PBL framework problems are viewed holistically, and students have to collaborate and communicate in order to achieve the best learning outcomes. Surely this mirrors best collaborative working practices in the clinical environment?

Using PBL in the e-learning environment has a number of clear advantages. The course leader created patient scenarios in order to stimulate interest for these distance learners. The scenarios are explored by the students and developed with new events and incidents happening to the patients as they continue along their life experiences each receiving a different form of RRT. Students are required to follow triggers and links to explore further knowledge concerning the theoretical and actual care needs that a

patient presents. This adaptation of PBL was utilised within the e-learning environment as our assessment and market research of potential students indicated that competent computer skills were often lacking. Indeed many of these potential students may not have experienced continuing professional development or other education opportunities in the recent past. Hence to expect the students to be able to use advanced C&IT skills would inhibit their learning. Additionally students needed to be able to access the learning resources when they are able, rather than at designated times. Shift-work, social and financial commitments prevent nurses from accessing more established forms of PBL or classroom-based learning. This was in contrast to enthusiasm for this mode of education delivery from both nurses and clinical managers as access to this specialist type of education was at best very limited, or at worst non-existent. Additionally the NHS strategy for change, outlined in 'working together' (DoH 2001) emphasises training and development issues in order that the nursing workforce is increased in number and provides effective and efficient care.

Of course there may be concerns that students using PBL in the e-learning environment for clinical training may not acquire sufficient knowledge for practice, or that the students' learning may be haphazard and not achieve competence (as defined by Benner 1984). However, there is little to reassure traditionally based curricula that learning occurs in students that have been taught subjects by experts in the classroom. During the distance learning renal nursing course the student is offered the opportunity to complete formative assessments in order to check their understanding and develop any gaps in their learning. The application of learning is also very clearly sought by the assessment strategy. Each student is required to complete two practice-based assessments (PBAs) of professional competencies that are assessed both by the clinical mentor and the academic supervisor. These PBAs form a professional profile that fits into established requirements by professional registering bodies for evidence of continuing professional development. Additionally students are required to write two research-based essays and complete a poster presentation. These assessments therefore assess the application of skills in the workplace, the skills of evaluation and reflection of the patients' experiences of healthcare delivery, and the student's ability to share and disseminate best practice information. Issues of potentially overloading the student with one patient's issues have been addressed by introducing new triggers at timed points during the course. Discussion boards and group email have provided the opportunity to discuss subjects, patient scenarios, ethical and professional issues. Some discussions have been instigated as triggers from the patient scenarios, and some have been left up to the students in order that they can discuss best practice, or reflect on clinical experiences.

The use of problem-based learning in the delivery of online renal nursing courses at City University illustrates how new teaching and learning methods can enhance the overall quality of the educational experience. In particular, it highlights how the Quality Assurance Agency for Higher Education in the United Kingdom Distance Learning Guidelines (1999) can be put into practice. The aim of these guidelines is to 'offer advice on assuring the quality and academic standards of higher education programmes of study provided through distance learning' (QAA, 1999). Whilst these guidelines are not legally binding nor do they constitute an official 'code of practice' they are a useful starting point for maintaining quality standards for distance education. However, one of the drawbacks of such guidelines is that they are rather vague in places. For example, 'guideline 5: student communication and representation' does not make any explicit suggestions or recommendations to how students should engage in the learning experience, but rather focuses on the dissemination of information to students. Likewise, 'guideline 6: student assessment' states that 'institutions should be able to demonstrate publicly that summative assessment procedures used for programmes studied at a distance are appropriate for the mode of study' but does not provide guidance on the design or development of such activities (QAA, 1999). Institutions, and course providers, are thereby left with the need to map these guidelines onto a pedagogical framework for distance course delivery that ensures that quality mechanisms are evident in a tangible form to both staff and students.

In attempting to practically apply the QAA guidelines for online distance learning courses, five clear precepts can be identified. These have all been implemented in the renal nursing courses offered at city.

*Distance learning courses should include mechanisms for interaction with the course team and other students.* The provision of online discussion boards or email groups can be used to facilitate peer support and enable the

creation of a sense of online community. Giving students a trigger to discuss from the patient scenarios, or giving them the opportunity to discuss issues in their own chat rooms facilitated this. Additionally, the course resources required interaction from the student so as not to be passive reader of materials.

*A rationale for the development of a distance course should be provided, including evidence of market potential and an awareness of the different needs of distance learners. This could take the form of departmental and school strategy documents and market analysis. Such information is required as part of the course review process. This document should address specifically how distance learning will be supported and administered.*

The course was developed in light of grounded market research and profiling of potential students around the UK by the course leader. Collaboration with renal professional organizations and clinical practice areas informed the course delivery and curriculum content.

*Course content development must make adequate provision for distance learner interaction and accessibility to online or off-campus resources. For example, online 'lectures' may include practical exercises or associated tasks. Students may be involved in more constructivist activities, such as problem-based learning rather than traditional learning techniques. Resource provision needs to be identified prior to the outset of the course and students need to be informed of specific resources they are required to purchase.*

PBL enables the student to interact with the materials and develop their own understanding and skills. Formative assessments during the course enabled the student to evaluate their own learning. Learning resources personnel were made available to the student to enhance access to additional learning resources, as were C&IT personnel and academic staff. Each aspect of the course has detailed learning outcomes and literature references to aid further learning and reading.

*Assessment must be appropriately tailored for distance learning, including the mode of submission and administrative arrangements. Tradition examinations may be replaced with other forms of summative and formative assessment which capitalise on online assessment or communication tools.*

Formative and summative assessments seek to assess the clinical and academic development of the student. A variety of assessments enable those with different learning styles to be assessed according to their professional skills rather than academic recall only. The assessments are designed to form the basis of a reflective professional portfolio that all qualified nurses are required to keep for professional accreditation and registration.

*Provision should be made for monitoring student activity to promote engagement and retention. Access to materials or responses to tasks may be recorded and checked to ensure that students are engaging and ensure that the resources remain student-centred. This can also improve the quality of the course materials.* The interactive elements of the learning resources ask the student to engage with the content. The VLE that is used enables the course leader to monitor the student's access and thereby can track how students are using the resources. There always needs to be clear understanding of how students use the materials offered and the variety of ways that learning will occur in individuals. The evaluation and feedback structure seeks to underpin the students' support and ensure that the student can utilise the resources as appropriate.

Using PBL in this context is new an innovative way to ensure students have the flexibility to learn at their own pace, and have access to resources needed to ensure learning rather than simply that the teaching has taken place. Collaboration between the academic and clinical environments has fostered relevant and careful course content, and direct application to the practice environment. Hence theory is not divorced from practice, and the student is encouraged to learn using resources for life-long learning. Necessarily having to study and develop professionally at a distance has enhanced the principles of PBL and provided opportunities to practice clinical work in a safe environment facilitated by an expert clinical academic. Students are able to access learning opportunities that are presented in a flattened structure, rather than a sequential linear process often represented in classroom delivery. Hence students are presented with a framework for learning that is more representative of the ways of working in clinical professional life, is more mindful of the processes of adult learning for effective understanding, and ensures that offering an education opportunity via the distance learning mode is mindful that these students are distance students and not distant students.

Quality education in the context of distance learning for nurses must ensure a quality experience for students that acknowledge the clinical and educational challenges. It is the PBL framework that has been able to address these diverse and dynamic challenges to ensure effective learning has taken place for nurses with varying clinical skills, varying access to educational opportunities, and from a wide variety of geographical areas and clinical contexts.

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# SYSTEMIC APPROACH TO INTEGRATING NEW MEDIA INTO ACADEMIC TEACHING – A CASE STUDY

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## 1. Introduction

In the [my:PAT.org] project, partners from four German Universities are developing a web-based educational system for the subject matter of process systems engineering. These new media will be a supplemental offer for the students to support the existing face-to-face teaching towards flexible learning. In this paper, we present our systemic approach, which provides a holistic framework for the development of educational media and its evolutionary integration into the curriculum. After exemplifying our approach in a case study within the [my:PAT.org] project we will discuss quality issues.

## 2. The systemic approach

Our systemic approach is based on the following assumptions: (1) The full potential of information and communication technologies in education only evolves if they provide solutions for specified pedagogical problems. (2) New educational media should not be considered as finished products which are introduced into a fix structure. Instead, we regard the production and the introduction of educational media as a process of organisational development which concerns the whole learning environment (cf., Reinmann-Rothmeier & Mandl, 1998). (3) Pedagogical quality is not inherent to the media, but rather depends on their integration into the didactical field (cf., Kerres, 2000).

### 2.1 Phases of educational system development

There is a vast number of process models and approaches for the development of educational media in the literature. According to Blumstengel (1998) these models derive from three different sources:

- Instructional design models, which globally describe the development process of learning materials from a pedagogical view (e.g., Issing, 1997).
- Phase models of software development, which focus on the technology (e.g., Denert, 1992).
- Specific (multi)media authoring models, which are pragmatic and product-oriented (e.g., Kerres, 1998).

The various models differ mainly in terms of the basic perspective and the level of detail, while there seem to be no important differences about the general phases of the development process (see Kerres, 2000):

1. Analysis: Specification of global goals and system requirements based on the analysis of the characteristics of the learners and the learning environment.
2. Design: Specification of teaching goals and learning contents. Decisions about the general features of the system.
3. Production: Technological development, programming, media production.
4. Implementation: Integration of the technological system into the learning environment.
5. Evaluation: Assessment of the achievement of the specified goals.

We conceive the development of educational media as a parallel-iterative process (Urbas & Timpe, 2002), in which the phases overlap due to the integration repeated cycles of formative evaluation in all phases (see figure 1). While the goal of formative evaluation is to gather information how to improve the quality of the system in the course of the development process, the final quality assessment is carried out in the summative evaluation.



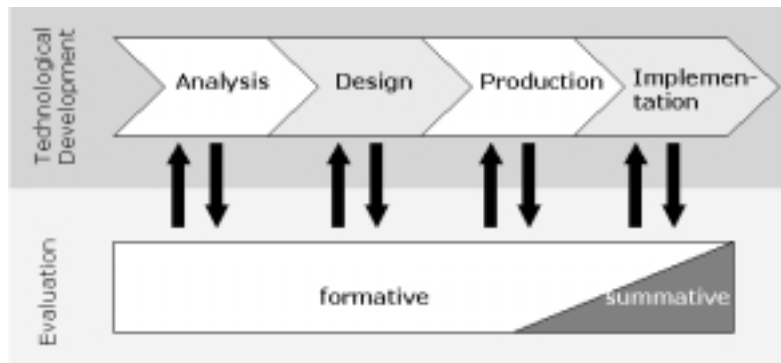


Figure 1: Phases of educational system development

## 2.2 Expanding the view

An advantage of a systematic process model is that it assures for a problem-oriented development. At the beginning of the process, the goals are specified according to the results of the requirements analysis. In our systemic approach, we further expand the view by explicitly adding the level of the curricular implementation to the development process. Instead of focussing on a single didactical element, we take into account the whole learning environment as the higher-ordered system. The development of this pedagogical-technological system is considered as an evolutionary process of organisational change. Thus, our systemic approach includes three parallel interdependent levels: (1) technological development, (2) curricular implementation, (3) evaluation. We will illustrate this approach in the following case study.

## 3. The case study

The case study concerns the development process at the Department of Process Dynamics and Operation (DPDO) of the Berlin University of Technology within the [my:PAT.org] project. We present the steps of system development from the start of the project in winter 2001/2002 to the current state (winter 2002/2003) on the three levels of our approach in a brief descriptive overview (see also figure 2).

### 3.1 Winter 2001/2002

**Curricular Implementation** The most important courses offered at the DPDO at that time were the lecture held by Prof. Wozny and the accompanying theoretical tutorial. These courses were determined as the primary field of application of the new educational media.

**Evaluation** The development process started with a broad requirements analysis, which included the evaluation of the courses at the DPDO. This analysis was carried out using multiple qualitative methods like interviews, questionnaires and workshops with students and lecturers. In the requirements analysis, the transfer of the theoretical knowledge taught in the courses to applied engineering problems was identified as the primary shortcoming of the students at the DPDO. Also the learning habits of the students, who only rarely prepared for the sessions by revising their lecture notes during the semester, were found to be sub-optimal.

**Technological Development** To support the transfer of the knowledge from the lecture, we decided to produce web-based learning modules. For these modules we developed an innovative didactical concept: the learning content of the lecture is presented in a new story-based framework. Additionally we designed a new tool for the navigation within the hypermedia modules. This navigation tool resembles the process control system of a chemical plant. We elected a central chapter of the lecture for a prototypic learning module to investigate the suitability and the effects of our design approach.

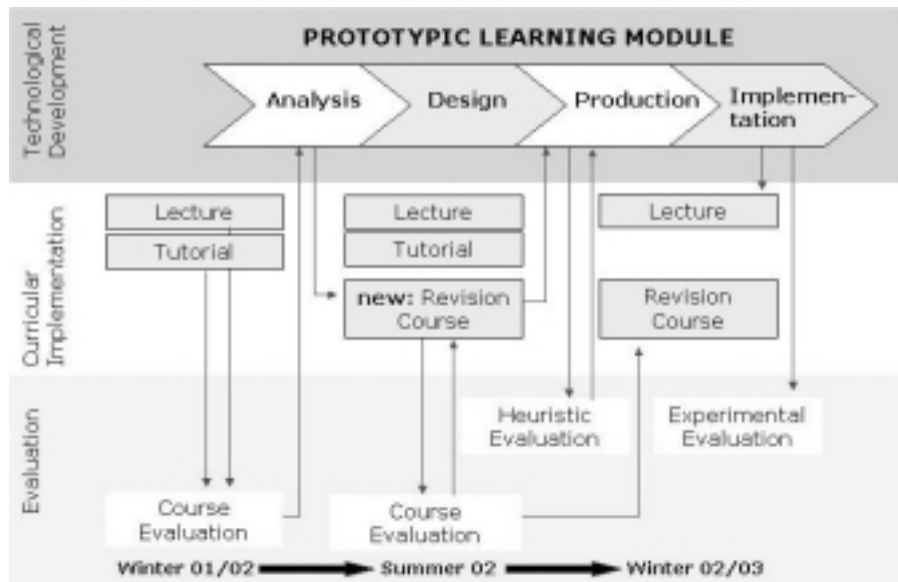


Figure 2: Steps of system development on the three levels of the systemic approach

### 3.2 Summer 2002

#### Curricular Implementation

As a direct response to the results of the requirements analysis, besides from the conception on the technological level, we decided to introduce an additional *Revision Course* into the curriculum. In this course, we implemented a new didactical concept with self-regulated teamwork and group discussions to deepen the knowledge gained in the lecture in an interactive, practice-oriented manner. Also, we encouraged the students to use a shared workspace on the department's server for communication and the exchange of documents.

#### Evaluation

The Revision Course was positively evaluated by the participating students as well as by the teaching staff. After the (common) drop-out of some students at the beginning of the semester, the remaining participants were highly motivated and rated their learning outcome as high. Nevertheless, the computer-based communication was rarely used by the students. Therefore we decided to revise the concept of the Revision Course for the following semester.

#### Technological Development

The prototypic learning module was developed complying to the SCORM standard (ADL, 2002). Technological development in this period consisted mainly in the programming and the integration of the process control navigation tool into the learning management system and in the production of SCORM-compliant content respectively the migration of existing materials to SCORM.

### 3.3 Winter 2002/2003

#### Curricular Implementation

We redesigned the Revision Course as a response to the experiences made in the semester before. The most important change was that we planned a hybrid concept for the course (i.e., a mixture between face-to-face and virtual parts) with computer based communication via e-mail, discussion forum and a shared workspace playing an important role. Indeed, only five students inscribed to the Revision Course in this semester (compared to 16 in the semester before), so that we had to change the concept because it did not make sense for such a small number of participants.

**Technological Development**

To reduce the risk of wrong design decisions during the early stage of the software engineering process, the prototypic learning module was iteratively optimised according to the results of repeated cycles of heuristic evaluation (see below). After experimental evaluation, the module was released in the world wide web and is now online for the students.

**Evaluation**

*Heuristic:* Different groups as subject matter experts, experienced software engineers and students took part in heuristic usability tests with single elements, paper and pencil mock-ups and finally prototypes of the whole module. The results of these tests provided useful information for the improvement of the module in terms of learning content and interface design.

*Experimental:* A highly developed version of the prototypic module was subject to an experimental evaluation study with 18 students during the lecture (Gauss et al., *in press*). Results showed that the design approach with the story-based framework and the process control navigation tool was widely accepted by the students. Not only subjective measures like acceptance and motivation but also the learning performance was positively affected by the new module. The scores of a knowledge test increased significantly after only 45 min. of interaction with the module.

**4. Discussion**

According to our systemic approach, the results of the requirements analysis were not only the basis for the development of media, but for a holistic didactical concept. The question remains if our approach had positive effects on the quality of the produced media in particular and of the learning environment in general. The most obvious criterion for the success of our measures is if they contributed to the solution of the pedagogical problem we defined as the initial goal. At the present time, we can not yet determine if the changes in the curriculum and the design approach of the learning module really enhance the students' ability of transferring theoretical knowledge to applied problems. Before we resume the quality of the systemic approach, we first discuss in particular the quality of our two principal products realised until now, our story-based design approach for the web-based learning modules and the Revision Course.

The strong positive effect of the prototypic module on learning performance in the experimental evaluation concerned lower levels of knowledge like recall and understanding. Arguing very carefully, these results just show that our innovative design approach did not disturb the students though they were unfamiliar with the module. Since the learning content is very complex we could not expect immediate effects on higher levels of knowledge like transfer after only 45 min. of interaction with the module. Such effects should rather appear in the long run. In a transfer of knowledge test carried out two weeks after the experimental evaluation of the module, the students achieved quite poor results. Since this test was only offered as a voluntary "knowledge-check" and the results of the test were fed back anonymously, the vast majority of the students had not prepared for the test nor had made use of the online learning module after the experimental evaluation. Therefore we decided to carry out a long-term study in which we will record the interaction with the online module while the students prepare for the oral exam during the next two months. In doing so, we will be able to analyse the effects of module usage on the performance in the oral exam where higher levels of knowledge are tested.

While the first Revision Course was widely accepted and positively evaluated, only very few students took part in the following semester, although we even had intended to optimise the concept. We suppose that the low demand was caused by the higher time requirements we expected of the students. The increased time requirements from 2 hours per week in the semester before to 4 hours per week seemed reasonable from "theoretical" didactical thinking and was in accordance with the results of the course evaluation. However, it seems to have exceeded the time resources of the students. In the curriculum, the Revision Course – as the former tutorial – is only a supplemental offer to the obligatory lecture. For the

following semester, we will reduce the duration again back to 2 hours per week and revise the hybrid concept. Regarding the team-oriented learning in the Revision Course we can only assume its positive effects from the subjective reactions of the participants. The effort to measure these effects on a behavioural level would be too high in our context. Since teamwork is of high importance in the future jobs of engineers the usefulness of team-oriented ways of instruction is barely in question.

So far, we have examined the quality of our products on lower levels of evaluation, referring to Kirkpatrick's (1994) *Four Level Evaluation Model*. On the first level, *reactions*, we found positive results for the prototypic module as well as for the Revision Course, even though the low participation in the second Revision Course led us to another redesign of the concept. On the second level, *learning*, we found strong positive effects for the module for lower levels of knowledge. These results are encouraging but they also point to the importance of a systemic approach. For instance, our prototypic learning module has shown to provide a very good support in the experimental evaluation. Nevertheless, the students did not use it to prepare for the transfer of knowledge test (as they did not prepare at all, presumably because the test was voluntary and anonymous). Once again it becomes obvious that the good quality of a particular pedagogical media element is essential but not sufficient for its effectiveness on learning. The organisational context and the integration of the particular element into the higher-ordered system are of crucial importance.

Our systemic approach ensures a holistic view on the learning environment. The development of this pedagogical system is seen as an ongoing structured process. The quality of this process can be determined by the quality of the educational products as well as by the increased awareness of quality at the University. We consider our systemic approach as a way to implement quality culture into academic teaching. Besides of the learning effectiveness of the products, which is often difficult to prove and influenced by external factors, the ongoing quality orientation through participation of the students, permanent self-evaluation and reflection of didactical issues is the most important benefit of our systemic approach.

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# DEVELOPING APPROPRIATE DL METHODOLOGY: RESEARCHING THE UNDERSTANDINGS OF TUTORS TO INFORM COURSEWARE DEVELOPMENT

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## Introduction

In this paper, we take the position that the quality of any DL provision is, in part, assured by a good match between the educational context(s) involved and the DL methodology/ies embodied in that provision. To this end, our research focuses on the development of a new generation of DL courseware for the established *MA in Teaching English to Speakers of Other Languages* ('MA TESOL') programme offered by the Hellenic Open University ('HOU'). The research investigates the understandings of the experienced tutorial team regarding the appropriacy of the DL methodology used in the 1<sup>st</sup> generation of the programme. It does so at the critical point when tutors' roles are expanding to include DL materials writing. The 1<sup>st</sup> generation courseware was provided by the University of Manchester ('Manchester') in the UK and then operationalised by the HOU. The 2<sup>nd</sup> generation courseware will be an in-house HOU development with the research findings informing the work of the tutors-as-writers.

## Developing Appropriate DL Methodology

We use the term 'appropriate methodology' to refer to the objective of developing educational practices which are appropriate for their educational and social contexts. Since DL has only recently become part of Greek educational practices (Keegan 2000, p135), the DL methodologies involved in the HOU development are to some extent products of other contexts. For example, our DL practice has been informed by the methodological preferences of highly respected DL writers (eg Race 1995, and Rowntree 1994) and broad though their perspectives are, nonetheless their insights are context-bound and may not always be appropriate for the contexts of a particular DL programme. Our purpose here is not to criticise these influential methodological insights but rather to emphasise the responsibility of all DL practitioners to consider what is methodologically appropriate for their own contexts of practice.

The objective of appropriate methodology requires us to take into account the many and varied influences which inform specific 'cultures of learning' (Kato 2001). These influences include: the student profiles; the tutor/teacher profiles; the content/disciplinary areas; the level of study; the vocational/academic orientation; the school/adult education orientation; the host institution; the national educational context; the mode(s) of study; the technologies used; and the influence of international educational collaborations and educational globalization (eg Mason 1998). Systematic mapping of such an array of influences is not easy<sup>1</sup>. Our research instead focuses on the insights that experienced DL tutors have about the important methodological influences at work in their programme context.

## Insights from the DL Literature

There is an extensive literature on DL materials design and methodology (eg Gachuhi and Matiru 1989, Holmberg 1989, Lockwood 1998, Misanchuk 1992, and Rowntree 1994) and also on the process of developing DL materials (eg Inglis 1996, Jackling 1989, Joughin and Johnston 1994, Kember and Mezger 1990, Macpherson and Smith 1998, Murphy 1989, and Taylor and White 1991). Although the phrase

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<sup>1</sup> Holliday's (1994) proposal - for ethnographic research involving the type of influences listed above and based upon the practitioners' emerging understanding of what works best in their culture of learning - is a useful suggestion in this regard.

'appropriate methodology' is not common in the DL lexicon there are lots of DL discussions which consider elements which can be seen to influence the development of DL methodologies which are appropriate for their contexts of use. These include considerations of particular national and cross-cultural contexts (eg Elsiddig 1993, Lyall and McNamara 2000, Murphy and Yum 1998, and Smith and Smith 1999). Another rich vein of work discusses the cultural implications of educational globalisation and the development of new technologies (eg Chen *et al* 1999, Collis 1999, Herring 1996, Kiesler 1997, Mason 1998, Warschauer 1999, and Wood 2001). Also of value in grounding the search for appropriate DL methodology are the studies dealing with factors such as: a) student age or national-cultural background (eg James 1984); b) student behaviours, expectations, learning strategies, study preferences, and support needs (eg Carnwell 2000, Fung and Carr 2000, and Morgan *et al.* 1998); c) culture and quality assurance (eg Allen 1993); d) of the textuality of DL materials (eg Marsden 1996); e) of task design and function (eg Valcke *et al* 1993); and f) pedagogic orientation (eg Garrison 1993, George 1995, and Young and Marks-Maran 1998).

### **The Collaborative 'Transplant' of DL Courseware Across Educational Contexts**

In the late-1980s, Manchester developed its DL-mode *MEd in English Language Teaching* ('MEd ELT') programme. Its objective was to provide experienced English language teachers with opportunities for structured reflection on their practice. The programme, which now has 150+ participants at anyone time and involves ELT contexts on five continents, was developed in accordance with the 'Principle of Equivalence' from existing on-site provision. Thus, the content and the training methodology (ie task-based and reflective-practitioner oriented) of the MEd ELT courseware were taken directly from the parallel on-site provision. The DL methodological design of the courseware was partly informed by received wisdom in the field and partly by an in-house perspective on the relationship between self-assessment tasks and the input (West and Walsh 1995) and the textuality of DL courseware (West 1995 and 1996). The desire to maximise study possibilities for all teachers - no matter what the characteristics of their context and no matter how limited their access to technology - meant that there was little use of computer mediated communications (CMCs) until recently.

The development of an open university for Greece was proposed in the early-1990s (Lionarakis 1996). Its development and the development of the Manchester-HOU collaboration have occurred side by side since 1997. The collaboration involved using the Manchester MEd ELT courseware as the basis for the HOU's MA TESOL programme. The resulting (1<sup>st</sup> generation) HOU programme adopted Manchester's structure of six-modules plus a dissertation and made extensive use of the Manchester largely print-based courseware. It made little use of CMCs and extensive use of face-to-face and telephone tutorials. To date, the programme has recruited 500+ teachers and involved 17 tutors. Participants typically complete in four years and the first ever HOU graduation ceremony took place in November 2002.

### **Developing New DL Courseware for HOU MA TESOL Programme**

The (1<sup>st</sup> generation) HOU MA TESOL programme was the first full programme offered by the HOU. Its development took place before the HOU had an established administrative and curricular structure. Not surprisingly, the structural and administrative features of this programme were influenced significantly by the established practices of the Manchester MEd ELT programme. The 2<sup>nd</sup> generation HOU MA TESOL programme not only needs new courseware but also operationalisation of these new materials in ways which are appropriate for the now established HOU educational culture. For example, the Manchester model of a masters programme involved six modules and a dissertation whereas the new HOU model has four modules and a dissertation. Similarly, the Manchester model involves assessment only through assignments whereas the HOU makes extensive use of examinations. The challenge for the HOU in producing the 2<sup>nd</sup> generation programme is thus to revise the 1<sup>st</sup> generation programme in terms of curriculum design, DL methodology, and administrative operationalisation. Our research is concerned with the second of these areas.

## Researching the Understandings of Experienced Tutors

The HOU development of its new MA TESOL courseware intends to make full use of the tutors who have been involved in the programme, in this way, maximising the value gained from their experiences of operationalising the Manchester materials within the HOU context. Our research develops out of the growing body of work of these tutors as they reflect on the emergent characteristics of the DL methodology of the programme (eg Agiakli 2001, Papaefthymiou-Lytra 2001, and Sifakis and Hill 2001). To find out more about the understandings of these experienced tutors regarding what DL practices are most appropriate for their programme context, we asked them how appropriate the DL methodological assumptions of the Manchester MEd ELT courseware were for the HOU MA TESOL programme. Using the in-house Manchester reflections on the Manchester DL approach (eg West 1995, 1996, and West and Walsh 1995), we extrapolated some key methodological assumptions underpinning the Manchester materials. The resulting thirteen assumptions were presented in a Questionnaire administered to the tutors (Appendix 1). The responses - which included comments as well as ticked boxes - were collated and analysed for patterns of response. These patterns were presented together with recommendations concerning the implications for the development of the new materials. These recommendations were circulated to the development team and have informed the discussion of the new courseware.

## Implications for the New Courseware Development

Here, we present the sections from the Discussion Paper produced for the tutors-as-writers.

*Q1) Although the tutors believe the Reflective Practitioner (RP) Stance is entirely appropriate in the new materials, it is not typically part of participants' existing academic/professional competence. Training is therefore needed. This can be provided through: i) the initial Contact Sessions; ii) the ancillary Advanced Study Skills materials; iii) the Year 1 Core modules; and iv) the later modules (perhaps to a lesser degree). Further, the input material needs to give participants worked examples of the RP stance in action, examples drawn from both an international perspective and the 'Greek reality'. They should also be provided with structured practice in developing their own RP competence. SAQs represent the most likely location for developing this RP stance. Assessed assignments (if designed appropriately and accompanied by appropriately-formed grading criteria and descriptors) can be used to assess participants' progress towards this competence with tutors providing formative feedback.*

*Q2) The new materials will have a contextual dimension that can be understood in terms of the following four types:*

A Range of Teaching Realities ...			
<b>(I)</b> <i>International, generalised, idealised, and notional teaching realities</i>	<b>(II)</b> <i>European-focused in keeping with, for example, EU directives</i>	<b>(III)</b> <i>Greek realities, focusing on the overall Greek situation in state and private English language education</i>	<b>(IV)</b> <i>The participant's own teaching realities, their classrooms, schools, problems and constraints, etc</i>

*The new materials should focus mainly on Types I and IV but also include Types II and III (unlike the Manchester materials). Type IV is important for the participants' RP stance.*

*Q3) The 'theory-in-the-service-of-practice' approach is closely related to the RP stance of the programme and participants need to be trained away from a theory-for-theory's sake approach and to be shown examples of, and opportunities for structured practice in, the preferred approach. The exemplification is suited to the input sections with the opportunities for structured practice appearing in the SAQs. The success of this training will be demonstrated in the assignments. Further, participants are not expected to slavishly follow received wisdom but instead to critically engage with the ideas presented and determine what is most useful and appropriate for their own practice. Here, 'rationale-based practice' and 'criticality' are key ideas which need to be exemplified in the new materials ...*



**Q4) and Q5)** *The new materials ... should retain the ‘tutorials-in-print’ approach. ... Tutorials-in-print have a complicated textuality and the writing task will be easier if writers think about the different purposes of the different chunks of their materials and explicitly adopt an appropriate text type and style for them. Also, this complex textuality does not provide participants with a good model of academic writing. Such models which will need to be provided elsewhere (eg through ancillary Advanced Study Skills materials and through Year 1 Contact Sessions). Writers must also be tutors-in-print, with their tutorial experience acting as a useful check on the usefulness of the new materials.*

*Sign-posting is important if not overdone. Presentational consistency is desirable across the new materials. Participants need training in actively using these instructional features to make their studies as effective as possible (eg through the ancillary Advanced Study Skills and through the Year 1 Contact Sessions) as well as in sign-posting their own work.*

**Q6) and Q7)** *Self Assessment Questions, which can serve many important study functions, are an important tool for developing participants’ RP competence. If they are not overused, they are essential in DL materials (they can be accompanied by an interrogative function in the main input texts). Both knowledge-creating (the more unfamiliar type) and knowledge-testing SAQs are required in DL materials. Writers may need help in developing SAQs, especially knowledge-creating ones. If SAQs are to fulfil their study functions, participants (who otherwise tend not to use them) need training to see the value and function of SAQs (in the initial Contact Sessions and in the ancillary Advanced Study Skills). The issue of answers (open-ended or otherwise) needs further discussion.*

**Q8)** *Chunking is highly desirable but not at the expense of textual coherence. The chunks should represent the amount of input that participants will typically be able to complete during a short burst of study. The participants may not have studied for some time so care needs to be taken over the level of links to previous sections and over cross-referencing in general.*

**Q9)** *... To develop materials which match wider reading expectations with actual access possibilities, the writers need to obtain a clear sense of how the HOU library and e-access will improve in coming months, ie what level of access is it reasonable to assume will be in place during the lifetime of the new programme? The use of Readers and Study Guides makes the programme much more directive with regard to the participants’ obtaining of core books but brings with it a fear of spoon-feeding. The issue of adequate access to wider reading remains however. Advice from writers (as tutors-in-print) about possible books and articles that participants should obtain is necessary within the materials. Networking and study groups need to be encouraged but tutors need to decide how this might be achieved.*

**Q10)** *Individualised study is appropriate but groupwork should be considered further. Assignments need to be reviewed in relation to how they link explicitly to expected learning outcomes from the modules (ie not assessing additional outcomes). Assessment of assignments should be reviewed to ensure a fair match between assignment scope and assessment criteria used (eg regarding the level of academic skills demonstrable within 1,000 words).*

**Q11) and Q12)** *There is a strong view that the Greek context requires a blended study mode with significant levels of face-to-face input. In fact, the HOU norm requires this. Tutors vary in their views about the purpose of such sessions and the relationship between them and the participants’ self-study of the materials. This purpose and relationship may vary from module to module. The implications of increasing e-access and the use of computer mediated communications also need to be considered when determining the characteristics of the face-to-face and voice-to-voice contacts. Participant training is required regarding the programme expectations in relation to the differing modes of study blended together in the programme.*

*The issue of the e-technology character of the new programme is critical given that the new materials will ‘be’ the MA TESOL programme for the next 5-10 years. Therefore, perhaps the best longer-term view is one that combines the pragmatic and progressive perspectives. The MA TESOL programme can, and should, drive the debate rather than be a victim of the current understanding of the e-technological situation. Further discussion (perhaps informed by the HOU in general) is required concerning how the new programme can be made more e-based (both in the materials and the programme communications surrounding them).*

*Q13) Regardless of the design of the new materials, participants need clear study pathways. Sometimes, these pathways will be common to all participants, and at others, more individualised. The new programme involves a greater predictability about the participant study pathways in terms of modules but there is also potential for individualised study paths within modules. This possibility needs further discussion. Once the issue of individualised study paths has been resolved within modules, as well as within the programme, the issue of self-contained modules versus inter-modular coherence needs further discussion.*

## Conclusions

Our research project has confirmed for us the fact that experienced DL tutors do have a wealth of insights concerning what works best in their DL programme. It also confirms that such insights can be gathered quite easily. In our case, the research was the easier to undertake because of the explicit statements (used in designing the Questionnaire) about the DL approach adopted in the Manchester materials. It was also facilitated by the collaborative development of the MA TESOL programme (1<sup>st</sup> generation) which tended to foreground the issue of appropriate DL methodology and provide an impetus and vehicle for reflecting on it.

It remains to be seen what part will be played by the tutor insights and our reflections on them in the development of the new materials. At the very least, all the writers are now explicitly aware of some of the issues which may contribute to the sought after methodological appropriacy and the writers' discussions of the new courseware involve DL methodology and administrative operationalisation as well as subject are content. It is too early to make predictions with any confidence, but it seems likely that the new materials will not be radically different from the previous ones. The writers, because of their positive assessment of the quality of the Manchester materials, are concerned to "*combine the best of both approaches*" (a comment by one MA TESOL tutor about the relationship between the Manchester approach and the HOU's emerging in-house approach to DL methodology). However, it is probably only because of the conscious process of reflection that the research has encouraged that writers are able to articulate which aspects of DL methodology they are taking from which approach and, more importantly, why they are doing so.

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## Appendix 1 - The Questionnaire

The Manchester materials are designed:

- 1) *for experienced language teachers; they therefore try to build in opportunities for teachers to reflect on their experience; such opportunities occur before, during, and after input from the materials writers and the literature more generally; they also form a major strand within the assignments set.*

<i>To what extent is a reflective practitioner stance (which assumes the participants have extensive teaching experience on which to reflect) appropriate for the new materials?</i>				
Entirely appropriate	Often appropriate	Rarely appropriate	Not at all appropriate	Not sure

- 2) *for an international participant body and tend to avoid context-specific examples and applications.*

<i>To what extent is an international rather than Greek contextual focus appropriate for the new materials?</i>				
Entirely appropriate	Often appropriate	Rarely appropriate	Not at all appropriate	Not sure

- 3) *with a 'theory-in-the-service-of-practice' approach; they therefore do not simply seek to present the theory and research in the field.*

<i>To what extent is a 'theory-in-the-service-of-practice' approach (rather than a simple presentation of the theory) appropriate for the new materials?</i>				
Entirely appropriate	Often appropriate	Rarely appropriate	Not at all appropriate	Not sure

- 4) *to be 'tutorials in print' rather than academic textbooks; they therefore contain direct appeals from the tutor/materials writer to the participants (eg advisory comments) as well as a relatively simple, not too formal style of writing.*

<i>To what extent is a 'tutorial-in-print' (rather than academic textbook) approach appropriate for the new materials?</i>				
Entirely appropriate	Often appropriate	Rarely appropriate	Not at all appropriate	Not sure

- 5) *to be 'instructional texts' rather than textbooks; they therefore employ a large and prominent amount of sign-posting (eg aims, objectives, bullet points, boxed extracts, etc)*

<i>To what extent are 'instructional texts' (rather than academic textbook) appropriate for the new materials?</i>				
Entirely appropriate	Often appropriate	Rarely appropriate	Not at all appropriate	Not sure

- 6) *to encourage participants to interact with the ideas being presented; they therefore include lots of activities (SAQs), before, during and after sections of input.*

<i>To what extent are interaction-encouraging activities appropriate for the new materials?</i>				
Entirely appropriate	Often appropriate	Rarely appropriate	Not at all appropriate	Not sure

- 7) *with both knowledge-creating tasks (ie where participants use tasks to assemble the meaning of the input) as well as knowledge-testing tasks (ie where participants test how much they know about the topic and/or how much they have learned from the study in question).*

<i>To what extent are both knowledge-creating and knowledge-testing tasks appropriate for the new materials?</i>				
Entirely appropriate	Often appropriate	Rarely appropriate	Not at all appropriate	Not sure

8) *in small, largely self-contained chunks in recognition of the short bursts of study time that participants may tend to study in.*

<i>To what extent are short, self-contained chunks appropriate for the new materials?</i>				
Entirely appropriate	Often appropriate	Rarely appropriate	Not at all appropriate	Not sure

9) *with a reasonably-accessible wider literature assumed to be available to the participants for their independent study over-and-above the input in the materials themselves.*

<i>To what extent is the assumption of easy wider reading appropriate for the new materials?</i>				
Entirely appropriate	Often appropriate	Rarely appropriate	Not at all appropriate	Not sure

10) *with an assumption that individualised study outcomes (eg assignments) are desirable.*

<i>To what extent is the assumption of individualised study appropriate for the new materials?</i>				
Entirely appropriate	Often appropriate	Rarely appropriate	Not at all appropriate	Not sure

11) *with little expectation of face-to-face (or even voice-to-voice, ie telephone) contact between tutors ↔ participants and participants ↔ participants; thus, the mode of study is 100% DL.*

<i>To what extent is the assumption of minimal face-to-face contact appropriate for the new materials?</i>				
Entirely appropriate	Often appropriate	Rarely appropriate	Not at all appropriate	Not sure

12) *with increasing expectation that participants will be able to take advantage of electronic resources (email, e-discussion groups, the internet, on-line resources, etc) to communicate with tutors and each other.*

<i>To what extent is the assumption that participants will be able to access electronic resources appropriate for the new materials?</i>				
Entirely appropriate	Often appropriate	Rarely appropriate	Not at all appropriate	Not sure

13) *with largely self-contained modules (divided into largely self-contained units) in recognition of the fact that participants may follow different pathways through the materials and the programme in general.*

<i>To what extent is the self-contained, modularised input and non-lock-stepped study paths materials design appropriate for the new materials?</i>				
Entirely appropriate	Often appropriate	Rarely appropriate	Not at all appropriate	Not sure

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# QUALITY ASSURANCE AND QUALITY MANAGEMENT IN ICT DEVELOPMENT FOR UNIVERSITY TEACHING THE CASE OF THE UNIVERSITY OF ZURICH

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In order to ensure a modern standard in e-learning, controlling and evaluation are central instruments of quality management and, as such, an indispensable part of the e-learning strategy. They are used for measuring quality development both during project development and after initial experience in using the e-learning product during term time, and finally as a strategic control function for arriving at an overall judgement of the effectiveness of the e-learning offering. These instruments therefore contribute to the assurance of a high quality standard in university teaching.

At the University of Zurich the ICT Department has been tasked with defining and implementing a modern e-learning standard through the promotion, coordination and support of both its own ICT projects and Swiss Virtual Campus (SVC) projects. The detailed and comprehensive evaluation concept drawn up by the ICT Department is aimed at enabling the systematic analysis and evaluation of e-learning in the context of teaching as a whole. The main focus is always on the provision of advice and support to the lecturers and their staff who are participating in the e-learning project. The quality assurance and quality development measures make it possible for those involved in the project to provide the best possible services, as compared with other services provided both nationally and internationally.

## Distinction between Project Reporting, Self-evaluation and Strategic Controlling

In the evaluation concept there is a difference between Project Reporting, Self-evaluation of the e-learning product after the initial period of productive use in the current semester, and Strategic Controlling.

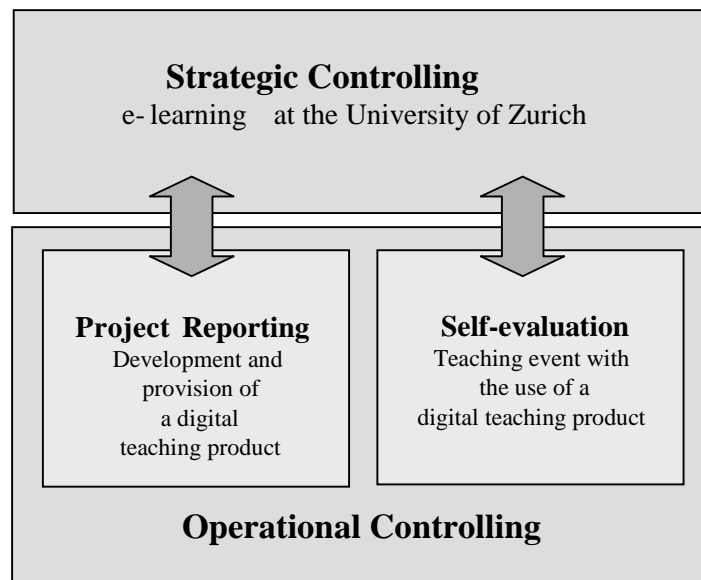


Figure 1: The three-part controlling and evaluation concept

### ***Project Reporting (formative evaluation at project level)***

Project Reporting is used for steering the process and is essentially a project management tool. A distinction is made between qualitative evaluation within the framework of personal consultations and standardised Project Reporting.

This helps those responsible for projects to achieve their set goals and objectives while not losing sight of the specifications laid out in the project remit. Project managers and team members can request a consultation at any time. The ICT Department is always available to help and support projects at any stage. This support promotes well-directed project work.

Quality assurance for the projects is documented in the form of regular reports (status reporting: every six months/financial reporting: annually) which are then evaluated. The staff of the ICT Department contact the projects at regular intervals, collect information from the relevant contact persons about the status of the project, and arrange personal interviews. The regular submission of structured project reports to the ICT Department by those responsible for the projects provides the essential basis for the consultations.

Examples of the results of Project Reporting are:

- Overview of the status of projects with regard to progress, deadlines and costs
- Thematically clearly differentiated findings regarding the project's need for consultative support
- Definition of a project-specific support scenario on the basis of identified differences between plan and actual statuses
- Useful input for the planning of future projects

### ***Self-evaluation of the e-learning product (summative evaluation at project level)***

The effectiveness of a teaching/learning method can vary greatly depending on a number of factors (e.g. the material to be learned/taught, the use of aids, the people involved, the teaching/learning environment). The use of the new information and communication technologies in teaching opens up a wide range of possibilities for communicating specialist knowledge, for interacting and for implementing self-organised learning and acting in a different form.

Self-evaluation of a semester event is used for checking the extent to which a digital teaching product achieves the objectives which were the impetus behind its development in the first place and thereby leads to an assessment of a multi-media teaching and learning product in a "blended learning" setting. It is a quality management tool for the teaching and follows the evaluation regulations of the University of Zurich and the evaluation standards of the Swiss Evaluation Society (SEVAL standards) issued on 5 December 2000. Unlike the above-mentioned standards, it contains no external evaluation element; however, the ICT Department assesses the results of the Project Reporting and the Self-evaluation. On the basis of this evaluation it derives experience for future projects and optimisation measures for the e-learning products currently in use. Project managers are of course at liberty to make their product available to third parties for evaluation.

Project managers are provided with support in the following areas: planning, design and execution of the Self-evaluation process, selection and use of suitable diagnostic tools, and specification of the questionnaire.

Examples of qualitative and/or quantitative Self-evaluation findings are:

- Statements regarding the change in the teaching and learning situation in the methodical-didactical and physical areas of the university
- Statements regarding the change in the support situation
- Statements regarding the change in economic feasibility
- Useful input for future e-learning products



### ***Strategic Controlling (summative evaluation at university level)***

Strategic Controlling is used to provide a general overview and assessment of the results of all the e-learning projects and the use of the resulting digital teaching products. In order to achieve a proper balance between conventional classroom-based teaching and remote teaching and to ensure the optimisation of university teaching, the results of the Strategic Controlling process are to be used as a basis for verifying the e-learning strategy of the University of Zurich.

Strategic Controlling is carried out on the basis of the data from the analysis of Project Reporting (standardised data), Self-evaluation (standardised and non-standardised data), and experience gained during the consultation process (non-standardised data) across all e-learning projects and e-learning products at the University of Zurich of which the ICT Department is aware.

In Strategic Controlling there exists an instrument for evaluating e-learning at the University of Zurich, in order to measure the success of previous activities and to guarantee a high quality standard. At the same time it is an essential instrument for developing strategy and planning, enabling continuous quality development and providing reports to the appropriate official body.

Examples of the results of Strategic Controlling are:

- Findings regarding methodical-didactical changes
- Findings regarding changes in the support provision situation
- Findings regarding changes in the study situation
- Findings regarding the relationships between conventional teaching and e-learning
- Findings in respect of completed projects (results, deadlines and costs)
- Overview of the number and type of e-learning events
- Findings in respect of the technologies used
- Overview of the development of the Online University (total offering, utilisation)
- Findings in respect of quality assurance and quality development

## How the entire controlling system works

The controlling system is based on the combination of three controlled processes. The first process is used to control each ICT project. The second process controls the productive use of a digital teaching product within the context of a teaching event. The third process controls the development and use of multimedia teaching and learning products at the University of Zurich and is based on findings from the Project Reporting and Self-evaluation processes.

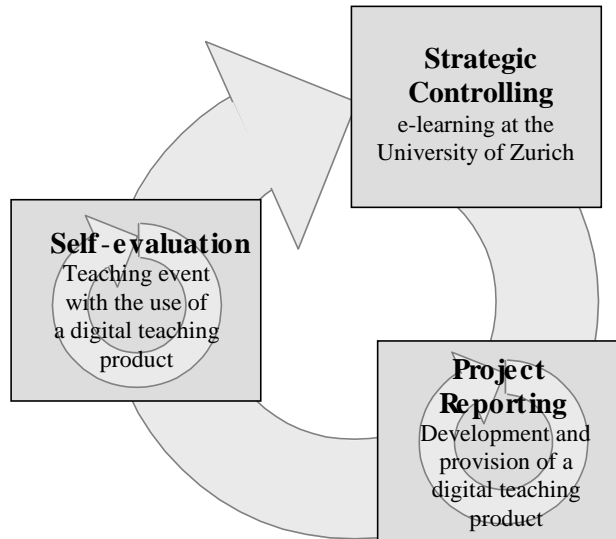


Figure 2: How the Controlling System works

Objectives, standards and framework conditions flow from Strategic Controlling into the development and provision of digital teaching products (top-down). Experience from Project Reporting and Self-evaluation flow into Strategic Controlling (bottom-up) and hence enable continuous optimisation of the specifications.

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# **ELEARNING QUALITY APPROACH IN PRACTICE: REALISATION IN OLIM<sup>1</sup> – ONLINE PERSPECTIVES FOR CONTINUING EDUCATION PROGRAMMES**

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OLIM is an eLearning project which is funded to 50 % each by the BMBF (Federal Ministry for Education and Research) and the state government of Hamburg from 1 April 2002 to 30 September 2004. The aim of the OLIM project is the development of the general framework and concepts for an e-learning course independent of time and location and meeting changed market needs. It will be developed and trialed using the modularised blended learning course.

"Management for Executives – Introduction to practise relevant topic areas"

In addition to teaching specialist knowledge, the distance learning programme also aims to improve media competence, soft skills and study skills. The project will also deal with:

- Media technology, media law and media pedagogy guidelines
- Implementation of a quality process as well as guidelines
- Concepts for the accreditation of continuing education studies and the development of a credit point system (ECTS)
- Concepts for the team development of modules, the teams to be composed of lecturers, professors, media educators, media technologists and representatives from the field
- Remuneration models for the particular needs of e-authors and e-moderators
- A programme to train e-moderators and authors
- Inclusion of an international perspective through the participation of the British Open University Business School

The modules will be developed in teams and will provide the participants with the opportunity to learn how to deal with new media and to employ them appropriately in teaching. The distance-learning programme will be provided using the learning platform WebCT, which is available to all Hamburg institutions of higher education.

In effect, the project leads to a practical concept for employing e-learning in university continuing education and its implementation in the blended-learning course "Management for Executives".

## **Target group of the continuing education courses**

By employing new media and through flexibility, modularisation and internationalisation, the Arbeitsstelle für wissenschaftliche Weiterbildung (AWW) aims to open up to a new circle of participants within the region and beyond. These new target groups also include those who have only had limited experience in the use of computer-aided learning and e-learning and initially need to be introduced to the medium.

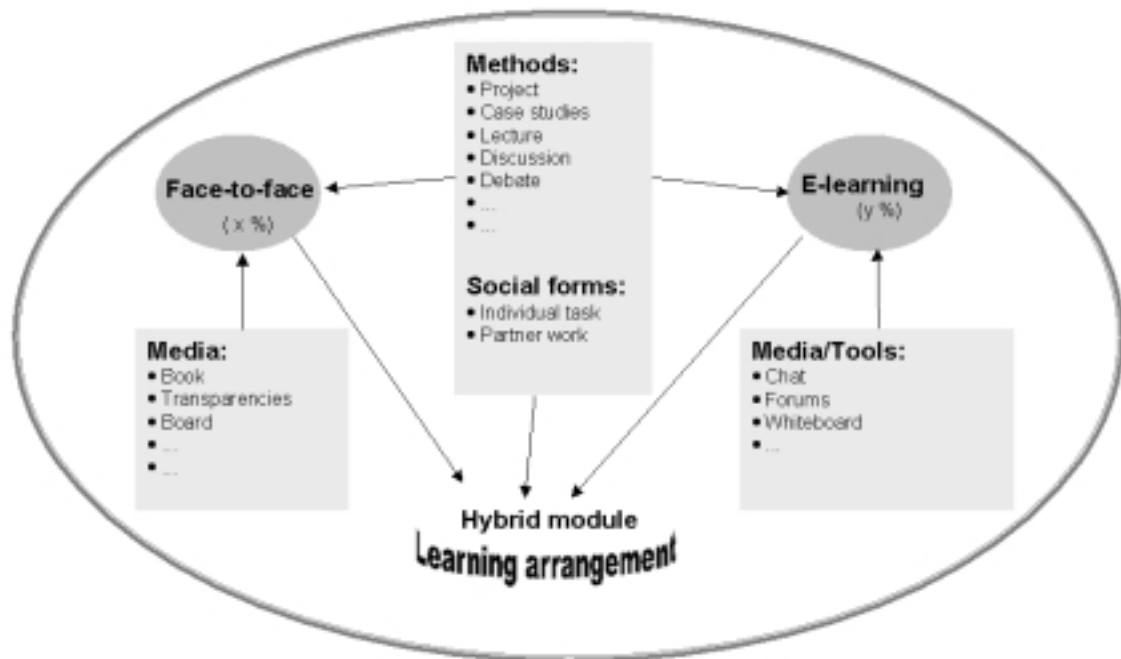
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<sup>1</sup> OLIM stands for: **Online-Persektiven für das weiterbildende Studium**

## E-learning competence of the teachers

All previous experience shows that competent support of Internet-based learning processes and the supervision of the learners on the Internet is an important, if not the most important, prerequisite for learning success in e-learning. Therefore the development and trialing of concepts for the further training of lecturers as authors and moderators of e-learning modules is an indispensable component of any development planned for the area of e-learning.

For this reason it is intended to enhance the skills of the teachers accordingly by the development and testing of practicable e-learning methods and concepts that promise success.



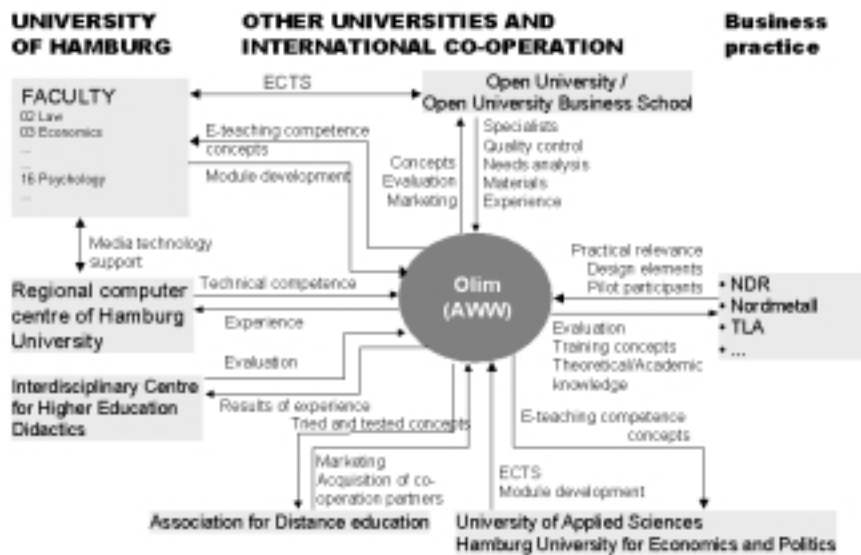
## Use of media

The quality of teaching and the efficiency of learning are not automatically improved by the use of computer and Internet. However, the development and use of methodological and didactical e-learning concepts or a meaningful integration of multimedia learning modules in existing learning environments can certainly lead to the expected progress. With the appropriate didactic preparation, certain skills can be specifically enhanced using the new media. Study skills and problem-solving as well as negotiating skills are advanced by communication and group learning, and by the interplay between work, learning and informing. The use of a learning platform that permits both synchronous and asynchronous work – also on shared documents – and communication, for instance in forums and chats, supports this goal.

## Co-operating partners

The AWW is responsible for the project management and as such in charge of co-ordination. Moreover it takes care of media technology and media pedagogy support as well as of the project evaluation and quality assurance. The content will be developed in the responsibility of the university professors involved. The AWW is also involved in the content design of the hybrid modules “Train-the-E-Trainer” and “Study Skills”.

## Participants' roles in the project



### Evaluation

All of the project phases will be intensively evaluated by the participating specialists.

This evaluation will take into account:

- the use of a learning platform for academic continuing education from the perspectives of both the lecturers and the participants;
- the quality and expense of specialist and organisational supervision of the students to accompany the courses of study;
- the preparation and implementation of a credit point system;
- the acceptance of hybrid modules by both the participants and the teachers, not only in the continuing education programmes, but also in the undergraduate programmes of study;
- the opportunity for team-based development of course content and course design and its effect on acceptance both inside and outside tertiary institutions.

In addition, learning success will be evaluated under the direction of Prof. Dr. R. Schulmeister from the Interdisciplinary Centre for Higher Education Didactics (IZHD) at the University of Hamburg.

### Definition of quality – a process of negotiation

On the background of the various stakeholders involved quality is not a static figure but rather a process of negotiation in the area of tension of demands which involves:

- Individual learners
- Mediatechnology
- Business
- Consumer
- Politicians in their responsibility for education
- Group work by learners
- Academics

- Didactics
- Provider

All this is to be regarded in view of a framework of funding conditions, experience and best practice examples as well as state of the art academic knowledge on the various aspects involved.

### **How can we measure quality?**

What is the process behind the measurement? There are three areas of quality:

- structure and production process:  
involves the organisation, the production team and technology and together with didactical eLearning concepts leads to a product which is a hybrid module.
- Implementation and timing of the course:  
this brings e-moderators and learners together and results in a
- Service which is not equal to consumption but to a product consisting of successful learning and acceptance.

### **Process-oriented quality process**

In OLIM we realise a 4-stage quality process in order to achieve a high quality product and process.

- Stage 1:            Planning:  
the planning process leads to targets and list of aspects that were regarded as crucial for a successful implementation of the project results. Workshops were held to further investigate on evaluation targets and the integration of theory and practice, technology and didactics. The whole process lead to a concept of teamwork.
- Stage 2:            Steering:  
this stage consists of the development and provision of guidelines to assure certain standards (didactics, style-guides, legal aspects), all of which were used to agree on milestones for the development of e-learning modules. Again workshops underpinned the procedure.
- Stage 3:            Safeguarding, measuring and assessing:  
reports focussing on results (positive and negative) as well as the evaluation of pilots and the documentation for modules are drawn up and introduce another phase of reflection.
- Stage 4:            Revision and optimisation:  
- Revision of modules  
- revision and further development of guidelines and checklists as well as further qualification of e-authors and e-moderators.

### **Example: development in teams and the use of checklists**

Teams consisting of representatives of didactics, technology, practice, academics/moderators undergo the above described quality process:

The *planning* process involves: teambuilding, time management and the milestone planning for the development and trial of a module.

The *steering* part in the process: includes the joint planning of the optimal mix of learning objectives, practical orientation of the product, didactic concepts and methods as well as the transfer to the workplace.

This is followed by the above described process of *safeguarding, measuring and assessing*.

The *revision and optimisation* phase in combination with reflection is supported by feedback from the different stakeholders. It concerns the checklists and guidelines as well as the modules and the whole process.

## **Summary**

The quality concept is not a fixed series of regulations as known from industrial production processes but rather a process which enables every single stakeholder to put forward their interests. This requires a team of developers in which the different disciplines and perspectives are strongly represented in order to secure the right proportions for a real good product.

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# BA NURSERY MANAGEMENT (E-LEARNING) A CASE STUDY IN INNOVATION AND WIDENING PARTICIPATION

*Tessa Owens, Petra Luck, Liverpool Hope University College, United Kingdom*

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## Introduction to the Case Study

Liverpool Hope University College has a 150-year tradition of widening participation and has over the last decade expanded degree provision to a number of Network of Hope locations across the Northwest of England to further provide access to those groups of students currently still underrepresented in Higher Education in the UK.

Against this institutional backdrop the BA Nursery Management commenced as a taught part-time programme for Early Years Educare practitioners in September 2001. To date this degree remains the only one of its kind in the UK providing a higher-level management qualification in a rapidly expanding Service sector.

## Service Sector Demands

The market in the UK for such a programme is large and is growing in line with UK Government initiatives. For example, childcare spending is set to double to £1.5bn in 2005-06. This should create 250,000 new childcare places by 2005-06 on top of an earlier target of new places for 1.6 million children by 2004. This expansion of childcare places is only possible through a rapid increase in the childcare workforce. According to the DfES the number of professionals in the childcare sector grew by 21% between 1998 and 2001, while the numbers of workers in nursery and after school provision doubled over the same period. According to Rosemary Murphy, Chief Executive of the National Day Nurseries Association, the number of day nurseries has risen by 42% over the last four years (Nursery World 14/11/2002). This rise in provision and staff involved in the sector is leading to a demand for higher-level management qualifications. Publicity in Nursery World and Nursery Management Today during 2002 about Liverpool Hope's BA Nursery Management generated 100 plus enquiries from across the UK and abroad.

To enable Liverpool Hope to respond to the demand from individuals and organisations in the Early Years Educare sector, the programme team explored a number of distance and e-learning modes that could be adopted to enable interested practitioners from across the UK to participate in the Degree. An adoption of a format that would allow students to participate from a distance is also in line with Liverpool Hope's mission to widen participation to previously disadvantaged groups. As stated by Hedge (1996, p 7) distance education "...represents opportunities for continuing education that are, already, enabling notions of lifelong learning to advance beyond rhetoric and into reality." Employer and employee organisations in the sector such as the National Day Nurseries Association are concerned that such programmes are available.

Tricia Pritchard, professional officer of the Professional Association of Nursery Nurses said "The government should be investing in training, developing a career ladder, improving salaries, tightening regulations and attracting the right quality of person into childcare" (Guardian, September 12<sup>th</sup> 2000). The Educare sector is set to continue to grow as though the private sector for nursery provision has increased by 400% over the last 10 years, it still only meets 2% of the current demand.

Significant child carer recruitment targets have been set by the UK government and this will require a considerable amount of training provision, much of which will need to be distance learning orientated. Due to the nature of this employment sector it is evident from OECD research that the current provision for training and development of child care staff is only of a pedagogic or vocational nature, with no specific training and development opportunities in child care management. Increasingly, though Early



Years staff are expected to perform these management roles. “In countries with complex funding streams, staff are expected to be social entrepreneurs to juggle various funding sources, compete for scarce resources and grants” (OECD 2001, p 96). This research further shows the need for ODL training. “Workers face many practical challenges to access in-service training, especially the difficulty of obtaining release time with pay to attend courses”. (2001, p 98) In addition to the training and management skills development, there are issues of equality of opportunities to address. The UK labour force survey 1991 – 1995 reveals that Nursery Nurses are 99.2% female with only 1% educated to degree level. These areas of development are further highlighted in the House of Commons Education and Employment Committee “Early Years” report from the 12th December 2000. Section 108 calls for all nursery managers to be qualified to degree level for professional management of the childcare facilities and provision.

## **E-Learning Rationale**

The BA Nursery Management programme team decided on an e-Learning mode, as this was seen to provide the best vehicle to widen participation. This delivery mode will provide an accredited route for the attainment of a relevant degree level qualification for carers and managers within the childcare sector, and assist in attracting suitable people into this employment sector to meet the childcare demand over the next 10 years. It provides a vehicle which enhances the skills in management which are now needed in this expanding sector and prepare students to meet the demands of future employment.

The modification from a taught mode to an e-Learning delivery mode will embrace the use of computer technology and communication systems through use of a Virtual Learning Environment and critical use of the World Wide Web. This allows the broadening of access to the target group, as delivery will be achieved while students continue to be active within the workplace. This will enhance the learning experience and the employability factors, as the knowledge will be directly transferable to the work environment.

Delivering the program via e-Learning means that instead of the students moving to the location of the resource provider, i.e. Liverpool Hope and studying at times convenient for the institution, the program is taken to the students and they can study at times convenient to. Through this mode of delivery, the BA Nursery Management E-Learning will contribute towards achieving one of Liverpool Hope’s prime strategic objectives, widening participation by providing study opportunities for groups of students previously excluded from higher education.

In deciding on an e-Learning mode the team takes cognisance of the fact that e-Learning can be misunderstood as an ‘information dump’ and not as a process. This is in response to Honey’s assertion that “The common thread running through ... forms of e-learning is that they offer the possibility of learning from information delivered to us electronically”. (2001, p 200). Honey furthermore asserts that “E-learning more often than not amounts to e-reading” (2001, p 202).

## **Learning & Teaching Rationale for Programme**

It is the stated aim of this programme that students will develop a knowledge and understanding of the educational and management issues pertinent to their sector, and that they will also develop the requisite skills to critically analyse, evaluate and apply this knowledge. As professional knowledge requires functioning knowledge that can be put to work immediately the management team choose to adopt a ‘Problem Based Learning’ approach for the programme. This approach has been widely used in Higher Education in recent years particularly in health related professions and has been found to facilitate the acquisition of professional knowledge along with the requisite practitioner skills (see, for example, Newble and Clarke, 1986).

Problem based learning simulates everyday learning and problem-solving. Knowledge is acquired in a working context and is put back to use in that context. Students learn the skills for seeking out the required knowledge when the occasion arises. They are motivated immediately by the interaction with a ‘real’ problem and are active early in the process. There is a large body of literature to support the

motivational aspects of collaboration on learning (Johnson and Johnson, 1989; Sharan and Shaulov, 1990; Dobos, 1996). Students are assigned to small problem solving groups and begin cooperating with tutors and peers, to build up a knowledge base of material; they learn where to go and check it and seek out more. They are guided to a wide variety of resources. Knowledge is elaborated, consolidated and applied.

The university college's chosen virtual learning environment is Granada's 'Learnwise'. This VLE has as one of its features collaborative 'Forums' in which students take part in asynchronous discussion in small teams and work on specific management and education problems. Wenger (1998) offers a perspective on learning that emphasises social learning processes within communities of practice where individuals engage in the negotiation of meaning and the mutual construction of knowledge. This contrasts to theories of learning that highlight individual and isolated cognitive processes and where learning is viewed as the absorption of an abstract body of knowledge that stands apart from its practice.

In the first session the students are presented with a problem. This will frequently take the form of a written 'case study' but can also be a video, or audio format. Simmons (2000) identifies the powerful role of stories in learning. Students attempt to broadly identify the problem and its key features and using their own experience and existing knowledge they generate a number of potential causes and solutions. This 'brainstorming' of ideas is permanently recorded in the forums and allows the students to create a picture of their group's collective understanding of the issues. They then convert their questions into learning objectives for the problem.

Once the learning goals have been identified, students share these out. They individually use the available resources to develop an understanding of the information, which they bring back to the group for the second phase. The students are strongly encouraged to get information and develop understandings relevant to the problem as their group defined it. The information they gather must be presented to the group in an easily understood and relevant format.

After further discussions the implications of the new information allows the group to refine their early assumptions and uncover their knowledge gaps. Students therefore develop their explanations of the problem and discover more pertinent information for resolving it.

The final session is followed by a period of reflection where students identify some of the barriers to their learning and issues they'll encounter when dealing with real problems. Students are also given an opportunity for two-way feedback; tutor to students and students to tutor. They describe the things they think worked well and those that could be improved upon. These can be incorporated into the learning objectives for this group with their next problem.

The tutor's role throughout this process is that of a facilitator. The tutor encourages the students to explore their own knowledge and determine their own learning needs and generally refrains from providing information, instead prompting discussion and learning amongst the students. The tutor will illuminate discussion asking pertinent questions and checking all lines of enquiry, the currency and validity of the information they provide (for example see, Goldsborough, 2001) and encouraging students to consider their priorities. They will also intervene in negative group dynamics to examine what may be going wrong and determine how to proceed.

Using a Problem based learning approach is particularly important as these students will be working at a distance and it is anticipated that the students will maintain their sense of belonging to the group and the programme by working together on shared problems. In so doing their skills of communication, self direction and team working, problem solving and creativity are all developed.

Collaborative learning is a natural process of social interaction and communication (Flannery, 1994; Gerlach, 1994) and by using problems to define the curriculum, students acquire necessary knowledge and skills. Honey (2001) identifies that 'learning has always flourished when it has been actively encouraged and supported'. The learning and assessment on the programme is aligned (Biggs, 1999) to their everyday work experiences. This type of social interaction, learning and decision making is expected in the workplace today and this approach should ultimately therefore promote a desire for and ability to partake in 'life long learning'. Students will have gained the skills for acquiring new knowledge and for

evaluating knowledge, whilst also understanding the necessity of analysing and reflecting upon the outcomes of their proposed solutions.

## Conclusions

The team has decided on a highly innovative e-Learning and PBL approach to satisfy the demands of an emerging student market. A cohort of 20 learners has been recruited for the pilot group and those students have started in February 2003 to work through their modules and group problems.

This is throwing up new challenges in terms of engagement between teaching staff and students. The team intends to monitor and evaluate student experiences and attainment. This is particularly pertinent as students are at a distance and “we need a way of giving our invisible and silent students a voice so that they can contribute to public evaluation processes”(Gilroy et al, 2001, p.17) To give students their ‘voice’ in evaluation, they will be encouraged to participate in Module evaluations as is standard practice at Liverpool Hope University College. In addition a continuous review of the programme’s coherence is undertaken via the VLE’S anonymous evaluation tool.

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# INTRODUCTION OF E-LEARNING FOR THE STUDENTS IN NATURAL SCIENCES AT THE SOFIA UNIVERSITY “ST. KLIMENT OHRIDSKI”, BULGARIA

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## Introduction

Developments in the sphere of information technologies (IT) marked a spectacular progress over the last decade. A major portion of the information is being circulated by using modern information technologies (radio, TV, video, various types of telephones, INTERNET, CD and others). The revolution in data transfer is based mainly on the fact that modern technologies allow storing a huge volume of information on a small surface whereas the information may be transmitted at high speeds to any point on the Earth. These developments are influencing also the methods of tuition.

Currently tuition in Bulgaria is still far from using IT achievements on a broad scale. The major reason for this is the relatively slow commissioning of expensive equipment needed for the implementation of modern tuition technologies as well as the lack of experience and traditions in this aspect. Electronic learning (E-learning) has been developing independently and in parallel with traditional methods in the USA and the states in Western Europe where these developments were initiated at an earlier stage, thus introducing a number of attractive features. As a result, E-learning is capable of meeting the requirements of a large group of students who could hardly attend regular courses due to social or health reasons. Recognizing these circumstances, the Center for Management of the World Bank loan for education at the Ministry of Education and Science has allocated a funding for a project on the introduction of E-learning for students of the natural sciences departments at Sofia University “St. Kliment Ohridsky”.

## Current state diagnostics

The successful introduction of E-learning at the high schools in Bulgaria requires the analysis of the current status in terms of:

- The available assets and the capabilities for the electronic transmission of information in Bulgaria.
- The availability and the quality of the curricula and of teaching programs adjusted to E-learning.
- The available material assets and trained professors capable of drafting the relevant and of conducting E-learning.

The analysis on the data base of (<http://europa.eu.int/ISPO/esis/default.htm>) has established that:

- Bulgaria is currently in a period of development of telecommunications and information technologies. The telecommunications market made a substantial progress from 1997 to 2000. The major portion of that market is attributed to conventional communication lines (Figure 1).
- Developments involve all aspects of telecommunications and information technologies, and the highest rate of increase is observed in the sphere of mobile communications (Figure 2).
- A comparable analysis of the development criteria in Bulgaria and the European Union (EU) member states<sup>1</sup> would indicate that Bulgaria is lagging substantially behind the EU member states in this sphere (Figures 3 and 4).

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<sup>1</sup> Two EU member states were selected for the purposes of the analysis: Greece as the EU member state being the closest to Bulgaria in terms of overall development, and Great Britain as a state with traditions in the sphere of E-learning.

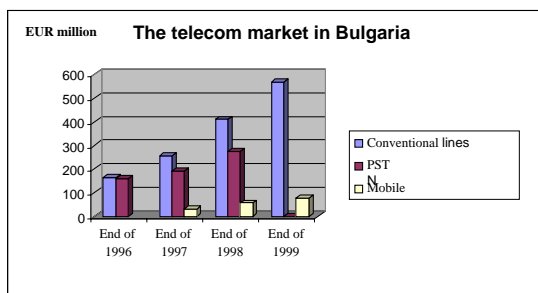


Figure 1. Development of the telecommunications market in Bulgaria between 1997 and 2000.

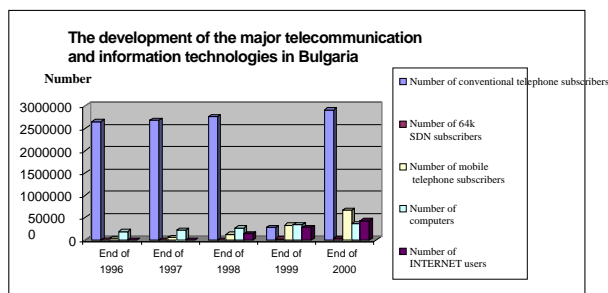


Figure 2. Number of telecommunications and INTERNET users and computers in Bulgaria.

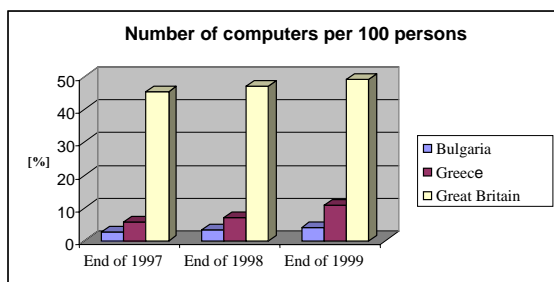


Figure 3. Number of computers compared to the total population of population in Bulgaria, Greece and Great Britain.

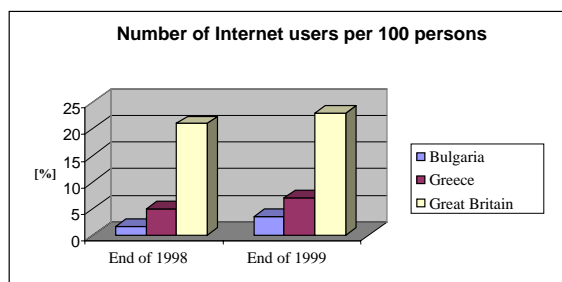


Figure 4. Level of INTERNET use in Bulgaria, Greece and Great Britain.

A similar picture may be obtained by comparing the number of domains with national URL addresses in the three countries compared to the total number of operative sites (Table 1):

State	Number of national-domain URL addresses	Total number of sites
Bulgaria	1 198	18 963
Greece	14 070	75 088
Great Britain	478 844	1 739 051

### Availability and quality of curricula and teaching programs adjusted to E-learning, and of experts who could be engaged in their implementation

Curricula have been drafted and E-learning is available for various educational degrees at a small number of universities in Bulgaria (for instance the New Bulgarian University). A number of other universities have drafted and are implementing curricula for individual courses containing E-learning components (for instance the Technical University, the Plovdiv University, and the Economic Academy “D. Tsenov” in Svishtov, the Sofia University “St. Kliment Ohridski”, and others). These developments are being implemented and financed within the framework of the “The PHARE Multi-country Program for Distance Education “Building Open and Distance Learning Networks in Central and Eastern Europe” (1994-1999) project that includes most of the universities mentioned herein, or within other projects financed by various EU programs. As a whole however the drafted materials fail to comply with modern E-learning requirements and, with a very few exceptions, do not cover the curricula of complete university courses. There are no curricula or teaching programs for the existing natural sciences and mathematics courses in Bulgaria that cover all levels of higher education and that match the needs of E-learning.

As a result of the Multi-Country Program, almost all Bulgarian universities currently employ professors that are acquainted with the basic principles of E-learning. Besides, some 30 university professors have been certified in this sphere on the basis of electronic distance education courses organized by the British Heriot-Watt University in 1999.

### **Tasks, objectives and action plans**

The natural sciences and mathematics courses provide numerous options for the application of E-learning as these courses employ a different illustrative material that is comprehensively accessible exclusively through IT methods and assets. These are charts and drawings, information arrays obtained from the global network, solutions to tasks and tests, self-test options, the development of various real-time models and solution scenarios, etc. A task of such a complexity could be successfully resolved by means of complex electronics-based regular and remote learning that includes:

- Distance (remote) E-learning;
- Discussions with tutors or eye-to-eye learning;
- On-site or laboratory studies of natural objects;
- Appraisal of the accrued knowledge by direct or indirect methods.

The major objective of the project is to develop the conditions necessary for the introduction of E-learning at the Bachelor of Sciences and Master of Sciences levels at the natural sciences and mathematics departments at the Sofia University “St. Kliment Ohridski”.

The natural sciences and mathematics courses have some specific features that prevent the use of E-learning for the comprehensive academic material (for instance practical and laboratory classes). Currently, there are no technical facilities available for the organization and the implementation of this type of tuition. Besides, the teaching personnel shall need additional training. These considerations imply the necessity to formulate the following components that would assure the achievement of the main goals:

- Adjustment of the existing curricula and teaching programs to the E-learning requirements and technology.
- The establishment of rules for the organization and implementation of E-learning at partner departments as well as within the University as a whole. The competent authorities may be required whenever necessary to propose amendments or supplements to the effective regulations applicable at a department, university or national level.
- The establishment and the equipment of educational multi-media computer centers at each of the participating departments.
- Training of professors in the methods and the technologies used to create tuition tools and to conduct E-learning courses.

### **Human potential and university structures involved in the project**

The project is being implemented at five of the departments of the Sofia University “St. Kliment Ohridski”:

- Geology and Geography;
- Chemistry;
- Mathematics and Informatics;
- Physics;
- Biology.

The working team includes two groups of professors. The first group incorporates the persons in charge of the project who have all attained an academic rank and who have demonstrated their abilities in the sphere of E-learning and their experience in administration and governance and who shall be active

participants throughout the project implementation (Deans and Deputy Deans). The second group incorporates professors at partner departments whose task is to adapt the specific curricula after they have participated in a seminar dedicated to E-learning technologies. The duration of the project is estimated at 18 months.

## Financial assets

The project is financed by the World Bank through the Center “Competitive system of education and higher education management” as well as by individual funds at the disposal of the Sofia University “St. Kliment Ohridski” (15.11%). The expenses are allocated as shown on the Table 2.

Table 2

Expense items	Financial assets (BGN ‘000) 1 BGN≈2 €
1. Materials and equipment	209.380
2. Consultancy and training services	8.880
3. Scholarships and grants	15.540
Total:	233.800

The major portion of the project expenses (89.55%) are allocated to the procurement of basic equipment required for the establishment of educational computer multi-media centers at each of the participating departments. The procurement list includes computers, multi-media and demo equipment. The software support is provided for by the University on a subscription basis. The computer configuration is designed to allow the generation and visualization of texts, photo, video and audio information and thus it covers all multi-media aspects.

The Sofia University “St. Kliment Ohridski” lacks the academic personnel with a sufficient experience in the implementation of projects of this type. The expenses allocated to consultancy and training services are designed to cover the costs for employing experts from other universities. The objective of the consultancy services is to assist in the commissioning of the project, to provide for the introduction of the new learning methods and technologies and to create the means for an external appraisal of the results.

Lecture services will be provided by professors at the Sofia University “St. Kliment Ohridski” and at other universities within the framework of the seminar proposed for the training of the academic personnel. All lecturers have acquired an experience in the sphere of E-learning and have developed a number of learning tools designed for their own specific spheres of sciences.

The funds allocated to scholarships and grants are intended to assist the persons in charge of the project in raising their knowledge level by participating in a science forum dedicated to E-learning.

## Appraisal of results

The successful implementation of the project is expected to yield the following results:

- Adjustment of the curricula and teaching programs is expected to create the conditions needed to meet the demands of a substantial target group of students who for various reasons are not able to attend regular university courses. Besides, quality of education will be enhanced as a result of the better options to search, use and update information by using electronic information media and the Internet. The adjustment of the existing curricula and teaching programs to the methods and the options of E-learning will result in raising the level of expertise of the academic personnel. These effects will be multiplied by employing the acquired knowledge and skills in the development of conventional learning.



- The process of adjustment of the curricula and teaching programs will require the establishment of rules for E-learning at the Sofia University “St. Kliment Ohridski” as well as at other higher schools training students at similar courses. The implementation of the project will establish the first comprehensive natural sciences and mathematics E-learning system in Bulgaria.
- The established multimedia computer centers at the partner departments will be available for use for the purposes of education as a whole and thus will bring about the comprehensive improvement of the quality of education.

The immediate result from the implementation of the project shall be the formulation of principles and methodological instructions on the adjustment of the curricula to the specifics of E-learning. The following basic principles have been adopted:

- The adjustment of the curricula and teaching programs to the needs of E-learning consists of bringing the educational courses in their logical completeness and sequence into compliance in terms of contents and methodology.
- Recognizing the specifics of educational contents and the logical sequence of presentation of the subjects included in natural sciences and mathematics, the adjustment of the curricula and teaching programs shall employ the mixed type of education:
  - Attended courses, and
  - Extra-mural (correspondence) courses.
- The quantitative allocation of the share of attended and extra-mural courses is specific for each individual curriculum and learning subject.
- Adjustment shall be conducted within the framework of and in compliance with the regulations applicable to education at the Sofia University. The legislative framework is set out by the Act on university education in the Republic of Bulgaria.
- The test of the acquired knowledge shall be made in two ways by using electronic technologies as far as possible:
  - Tests within the framework of continuous control in all its variations – for distance learning;
  - Final test by an examination – in person.
- Tests shall be made in two stages:
  - Self-test – by the students themselves on the basis of questions, tests or tasks whose correct solutions are accessible.
  - Tests or tasks set by the tutor and checked and assessed again by the tutor. The tests may be conducted either by attendance or by an extra-mural method.

### **Assessment of the risk and genuine difficulties related to project implementation**

The major risk factors that may obstruct the implementation of the project are as follows:

- Lack of knowledge about the nature and the capabilities of E-learning. Seminars with some of the academic personnel are planned with the objective to reduce the effects of this risk.
- Insufficient support for the project implementation extended by the academic and administrative management of the University. In view of the fact that the objectives of the projects match closely most of the priorities formulated in the University Strategy, this factor is expected to be of a minimum impact.
- Insufficient motivation of the academic personnel to become engaged in the project due to the absence of personal remuneration for the dedicated efforts. This problem may be partially overcome due to the fact that the major portion of the funds shall be invested in equipment made available to the departments, as well as by the options to raise the level of expertise of the academic personnel.

- Problems related to the relations with consultants and guest professors from this country and from abroad. Contracts shall be signed with all consultants and professors with the objective to minimize this risk.
- Drastic financial problems encountered by the state as a whole. This is a national problem and does not depend on the persons in charge of the project and on the project managers, whereas the financial support is fixed in euro.

In conclusion it must be emphasized that within the proposed project plan the risks for its implementation have been reduced to the possible minimum.

## **Conclusion**

The successful completion of the project is expected to result in the creation of the first comprehensive natural sciences and mathematics E-learning system in Bulgaria. The effects may be multiplied by applying the acquired experience at other departments of the institution called the Sofia University as well as at a regional and at national level at all higher schools in Bulgaria. This process will create the conditions necessary to raise the level of education in Bulgaria to the levels traditional within the European Union.

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# A TEACHING AND LEARNING TRANSFORMATION AS A QUALITY IMPROVEMENT OPPORTUNITY: A CASE STUDY

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## **A paradigm shift**

Developments in higher education policy in South Africa and developments at the Potchefstroom University for Christian Higher Education (PU), where newly instituted distance education programs influenced contact education, created an opportunity for a teaching and learning transformation combined with the establishment of a higher level of quality assurance mechanism.

In 1996 the PU launched the Telematic Learning Systems (TLS). The purpose was to bring affordable and accessible quality higher education programmes within the reach of those learners who qualify for enrolment, according to the admission requirements, but who are unable to enrol on a full time basis at a residential campus of the university. Selected programmes are offered in the TLS-mode by combining telecommunications, the use of carefully developed printed study guides and limited contact between students and facilitators at various venues throughout the country.

The TLS-decision was, amongst others, a result of the proposals in the report of the National Commission on Higher Education (1996) in South Africa with regard to a strategy for increased participation in higher education (pp. 118-124). On page 121 of the report it was stated: *“The commission believes that the key challenge in enhancing resource-based learning at contact institutions, and in expanding successful distance education provision, is the development of high quality course materials.”* One of the key elements of TLS decided upon by the Potchefstroom University was outcomes-based interactive study guides, by means of which active learning is stimulated and promoted. The study guides as a rule contain very little study material itself. Study guides already in use at the university were not interactive and many of them contained administrative particulars and outcomes only. It was in most cases compiled only by the lecturer teaching a specific module without any help from teaching and learning experts. A paradigm shift in teaching and learning, so aptly described by Barr and Tagg in 1995 was necessary. A paradigm shift is difficult to achieve, especially when the existing paradigm has been prominent for decades. Teaching and quality assurance on the micro level at the university were generally seen as the domain and responsibility of the teacher alone. To help facilitate the new paradigm a guide for developing outcomes-based, interactive study guides in the TLS-mode was developed. Academic Support Services at the PU had to guide faculty in developing the study guides and assure the quality of it.

## **Creating high quality learning environments**

On a senate meeting in August 1998 a task group advised the senate of the PU on a report by Academic Support Services on “The creation of high quality learning environments by the PU”. An academic process was approved, describing in precise terms the actions, completion dates and responsibilities of the various role players in the development of the TLS study guides. One of the prominent characteristics of the detailed academic process document was the quality assurance mechanisms. In the process document quality control actions by various role-players are stipulated. A prominent role is prescribed to the Study Guide Quality Committee, chaired by the director of Academic Support Services. This committee is responsible for the final quality control and approval of study guides. Another prominent characteristic was the team approach for developing high quality study guides and study materials. At the same meeting in August 1998 the senate of the university decided to implement a flexible teaching and learning approach. This decision opened the door for a transformation of contact education, which to a certain extent was still content and teacher centred with much emphasis on lectures. Contact education had to transform to learner centred, outcomes based education with various possibilities of delivery and a high level of interaction between the learner and the study material.

## Quality promotion in undergraduate and post-graduate level

According to a senate decision in 1992 the PU for CHE started with quality promotion in academic departments. The evaluations took place from 1993 to 1996. It consisted of a self-evaluation exercise according to guidelines, followed by a peer review. Sixty-six reports were compiled in the process. One of the main findings was that research and postgraduate education were not focused enough and that an institutional audit should be done.

Consequently a policy for quality promotion of postgraduate education and research was developed 1997 in consultation with the Centre for Higher Education Policy Studies (CHEPS) in the Netherlands. Implementation of the policy led to the formation of thirteen research and post-graduate education focus areas. The next phase was an external audit of this process. An audit committee consisting of both international and national members did this. After this the focus areas were developed further. The so-called Assessment Committee was set up to ensure quality promotion in research and post-graduate education.

## Quality assurance and newly developed programmes

The development of focus areas for research inevitably led to the restructuring of academic departments. All eighty-five academic departments were restructured into thirty-five schools managed by school directors. It was only logical that these developments should have an influence on academic programmes offered. These developments together with the Education White Paper 3 entitled “A programme for the transformation of higher education” (July 1997), SAQA-Regulations (March 1998) and the success of the TLS-learning programmes, served as catalysts for change. The TLS-offerings had an influence on contact education. Contact education students took notice of the comprehensive and quality assured study guides used by TLS-students registered for the same modules as their own. Inevitably they compared it to their own study guides and some of the lecturers even started using the TLS study guides developed for distance education, in the contact situation.

In June 1999 Senate decided to develop totally new outcomes-based and learner-centred programmes, according to a schedule for the whole university. The new programmes would be phased in, commencing 2002. The Director of Academic Services as the project leader reported to the Programme Committee consisting of the vice-rector, vice-rector (academic) and the registrar. The new programmes are geared to offer competence-based, learner-centred programmes, which to a larger extent will lay the foundations for life-long learning. The new programmes strive to make to a larger extent provision for mode 2 knowledge, which is more inter-disciplinary, contextualised and social responsive.

In each of the new undergraduate degree programmes compulsory modules, namely computer and information skills, entrepreneurship, learning and reading development, and philosophy of science (2 modules) were developed for the realisation of amongst others critical cross-field outcomes and thus developing students' capacity for life-long learning. A consequence of this was that existing programme structures became obsolete and it opened the way for outcomes-based programmes with much more interdisciplinary focus. The new programmes constituted a major transformation in programme outcomes, number of class meetings, the role of information technology in learning and timetables for class meetings. This “new beginning” opened another opportunity for planned quality development.

It was expected that the Programme Committee would have fulfilled its task by June 2000. It soon became clear that the committee fulfilled an important quality assurance task and senate decided on 28 March 2001 that the Programme Committee be restructured and henceforth be called the **Programme Quality Committee**. The Programme Quality Committee must give approval of any short course, programme or qualification. The Programme Quality Committee prescribes the format of the submissions.

## Quality assured study guides

Students as clients, but also as “products” of higher education, should have the benefit of quality development and quality assurance. Senate decided in March 2001 that quality assured, interactive and learner-centred study guides should be developed for all the modules offered in all programmes, not only the distance education programmes. This decision paved the way for the completion of the transformation process in teaching and learning at the university. Academic Support Services started training academic staff in developing comprehensive study guides for the new programmes. Due to the comprehensiveness of the study guide development, Academic Support Services immediately started with the training of

those faculty involved in study guide development for the first semester of 2002. Due to extraordinary efforts by all involved, the study guides were available at the time of registration for first year contact students for the first semester 2002.

The decision regarding the study guides for all modules necessitated a further mind shift for academic staff as the contact sessions had to change in nature due to the outcomes-based interactive study guides. Seminars were offered for the schools in co-operation with their respective teaching committees. It became clear that teaching methods would have to change when using comprehensive, well-planned interactive study guides. Much more emphasis can and should be on reaching higher order thinking skills and critical cross-field outcomes. The Study Guide Quality Committee had to evaluate all new study guides and a stamp of approval was needed before study guides could be printed. The development of guides is still done in close consultation with the division Study Guide Development of Academic Services.

The transformation of the learning environment has to be accompanied by a transformation in the perspective of academic staff on teaching and learning and many information and training sessions were needed.

## Results

Quality assurance measures introduced during the transformation in teaching and learning at the PU for CHE are rendering positive results. Programmes developed are more outcomes-based, learner centred, and flexible, interdisciplinary and to a greater extent make provision for the realisation of critical cross-field outcomes. There is a marked improvement in the quality of study guides and learning materials. Feedback from 61 (48%) academic staff involved in developing study guides for contact programmes for 2002 reveals that the majority (82%) are of opinion that their teaching and learning planning is better than in the past, 75% stated that the use of study guides focuses activities during class meetings on problem solving and application of skills and knowledge. The majority of respondents (69%) stated that they would have welcomed these types of study guides when they were students. The majority of respondents however agreed that their research time suffered because of the time spent on developing study guides.

Feedback from 1715 students in their first year of study in 2002 using the newly developed study guides at the university was positive. Nearly two-thirds of the respondents agreed that study guides facilitated independent study, 17% did not agree while 17% were unsure. There was general agreement that the effectiveness of the study guides gave teachers more time in class to focus on problem solving and application of knowledge in class (50% agreed, 28% unsure, 22% did not agree). Nearly half of the students (46%) agreed that the study guide was indispensable for their studies, 29% were unsure and 23% did not agree.

Comprehensive research about the impact of the transformation of teaching and learning on the success of students in reaching the learning outcomes, the pass rate of students and the success of the quality assurance policies, processes and procedures will have to be part and parcel of ongoing quality assurance and development at the PU.

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# QUALITY ASSURANCE: PROSPECTIVE PLANNING IN A DISTANCE LEARNING PROGRAMME, RETROSPECTIVE LESSONS LEARNED

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## Introduction

This paper draws together reflections on my experiences in three different roles with a quality brief – firstly as a subject reviewer for the UK Quality Assurance Agency (QAA), secondly as lead person for the QAA subject review my own department underwent and thirdly as the Director of a new distance learning pre-registration nursing programme at the UK Open University. This programme was validated by the (now defunct) English National board of Nursing (ENB) and is subject to quality reviews to ensure that it conforms to both the validation and supports more broadly a series of regulated competencies.

This is very much a grass roots account. The discussion does not focus specifically on quality assurance per se but on the pragmatic realities of developing a robust system which ‘answers’ quality assurance questions (i.e. can be seen to demonstrate those quality assurance procedures) when scrutinised. Quality assurance work is doing, of course, but one component of that work is also being seen to be doing. In other words procedures have to be manifest enough to be identified by external colleagues who do not have insider knowledge of an institution or programme.

## QAA subject reviews: reflections on the late 1990s through 2000

My experience as a QAA subject reviewer and more particularly as a lead person in our own subject review was that the quality assurance preparation process, largely speaking, was retrospectively oriented. The first stage in the process was to submit a self-assessment document (SHSW, 2000) which made claims for a variety of aspects of my department’s work. In QAA terms at that time the range of the review was curriculum design and development; teaching, learning and assessment; student progression and achievement; student support and guidance; learning resources and quality management and enhancement (QAA, 1998). The document was the epicentre of the review. What we needed to do was support our own claims, which were our own account of our own processes. After the submission of that document, about one year prior to the review date, I began with colleagues to build up a documentary archive, which provided evidence supporting the claims in the submission document. In this immediate context by ‘retrospective’ I mean that we made a case and then attempted to support it through the use of documentation which was already in existence and which had not been written precisely for the purpose of supporting the subject review claims. I have to say that we were quite successful in our attempt to support the case (we scored ‘excellent’ in our review).

My experience of setting up a base and a close study of other people’s documentation in my role as a reviewer made me appreciate the extent to which most institutional documentation is not developed to directly ‘answer’ quality assurance questions, particularly when the review a protocol is guided by fairly generic categories – the six areas outlined at the beginning of this section formed a tight protocol for QAA review (QAA, 1998). In institutions with good quality assurance procedures one can generally find the required aspects but they are embedded in documents which have been developed for different purposes and they may be quite embedded. Many documents straddle a variety of generic functions. For example in my own institution minutes of team meetings for courses in development are certainly likely to straddle teaching, learning and assessment and curriculum design. Moreover they also often have an immediacy about getting one particular job done or one crisis solved where although teaching and curriculum may underpin action notes they are generated to respond to a particular on the ground situation.

Casual conversation and some anecdotal evidence has led me to believe that ‘cutting the cake differently’ has been one solution adopted to deal with the fact that some working procedures in place do foreground

aspects other than the required generic aspects. And I think that occasionally some institutions during the course of the QAA reviews in the late 1990s and into 2000 began to organise their infrastructure literally through the six aspects required for review, which was, as it were, to prospectively orient documentation to the requirements and thus ensure that the aspects were less embedded and more foregrounded in that relevant documentation. This is, of course a perfectly acceptable procedure and orients to the notion that auditing is a good deal easier for external colleagues if structure, processes and outcomes are in line with audit interests. So two pragmatic audit problems are solved here, firstly that of embeddedness and secondly that of potential category mismatches.

In relation to my experience as lead person preparing for a subject review, I wasn't in a position at that time to reconfigure categories of work so that they were more 'upfront' in the review documentation. However with hindsight I would have proposed gathering the archive first and then developing a submission document to reflect the documentation that we had. Then I think I would have had more opportunity to identify what was more accessible from existing documentations and only use the documentation where aspects were seriously embedded as secondary.

### **Developing a validation document**

My whole experience in relation to the QAA was extremely interesting and has been very influential in the way that I have subsequently thought about and developed courses. I have become concerned to produce not only systems but learning materials which are auditable. And of late I have had a chance to build up a programme more or less from the outset and thus to consider what a prospective approach to quality assurance might be.

In the summer of 2001 I was asked to take the lead in my institution in developing a validation document for submission to the ENB in order that we could begin to develop a pre-registration nursing programme (SHSW, 2001). This programme was to be a supported distance learning programme leading to nursing registration. The programme was to be for health care assistants already in work and undertaking education for qualification while remaining partly in their own place of work. They were to be sponsored by UK National Health Service Trusts who would work with the Open University in partnership to support students with some supernumerary study and practice time, and practice placement allocations. The programme had to be laid out in a validation document for approval by the ENB.

In the light of my quality assurance experience I found that developing the document was a rather different activity from what it would have been a few years previously. I began to view the process of the development of the validation document both as essentially a quality assurance task and an audit trail in the making, in other words a prospective task. This validation document (and indeed any validation document) can be seen as a statement of intent of how an institution means to set up and run a programme effectively, with probity and in conformation to a series of external requirements. If it is accepted then it is reasonable to suppose that where and when review takes place from external sources that the validation document will be the document used to check how much the subsequent reality maps on to the proposed programme. It is therefore rather sensible to develop a validation document that is capable of being made operational. However at the time I had only to develop the validation document and was then moving onto other projects. So I did not have a chance to see how effective our validation document was in these terms.

After the validation was successfully obtained I moved away from the programme for some time. However about one year later I was invited to become Director of the programme. I became immersed in the process again and I now view my role as centrally involving turning the validation document from a *statement of intent* into a *document of execution* (for this insight I am indebted to my colleague Lin McDonagh). And it seems to me that what this means is anticipating how the operationalisation of the programme will be supported by documentation.

At the beginning of the development of a programme people are in the fortunate position of being able to also develop much of the supporting documentation, because they are developing new structures through which the programme will be manifested. For example in our case in the validation document we

proposed three main committees through which programme business would be handled. However in the first few months of the programme we have been exercised to find ‘real world’ distinctions between the committees all of which have some of the same personnel. It brings home to me the quite substantial difference between the theoretical description of a social system or systems and a system played out by people with all the complexities that arise through real time with real people.

It seems to me that to turn intent into execution is not necessarily a straightforward task and requires some adjustment and tuning but that if the tuning can take place prospectively as the programme is being built up that the quality assurance may well be sounder. There are two areas of the programme where we are focusing on this prospective auditing work, firstly in operational systems and secondly in the development of materials.

## **Operational systems**

In relation to operational systems there is a degree of complexity in this programme. Not only is the development and monitoring of Open University systems required but also the students are sponsored by NHS Trusts and undertake practice placements at various points in the programme. So the validation document as developed both proposes the generation of new systems and integration of various sorts with existing systems across a number of institutions. As the programme has been developed we have gone into partnership with a number of NHS Trusts and so we also have the variety of practice that that involves.

My solution to this complexity is routine ‘case law’ meetings with staff with key roles on the programme (several of whom have immediate working links with NHS Trusts and their systems and requirements). In these case law meetings the validation document stands as one reference point in discussions and incoming intelligence which is usually queries and problems (through a first class conference) as another reference point. (I shall mention a third reference point later.) The object of each meeting is to establish whether and how the incoming intelligence is to be integrated into the system as laid out in the validation document including where in the validation document it should be located and how it is to be supported including how it is to be documented. Colleagues can introduce anything they please at these meetings (at whatever level of structure, say from how do we deal with students who phone the Open University direct through to the point in the educational year when we expect educational audits to have been logged) and the eventual aim is that the cases of incoming intelligence will in effect have been saturated so that anything coming in is categorisable in terms of the case law which is the point at which the validation document can be described as adequately executed. It should be noted that the ‘case law’ concept is crucial here because it enables us to categorise activity in relation to the programme into categories recognisable in the validation (intention) document. Our experience to date is that in fact very little incoming intelligence is a one off, un-categorisable into a concern laid out in the validation document. So, in a sense we are taking activity and situations, working out resolutions within the framework of the validation document and thus giving them as sort of interpreted status through the minutes of these case law meetings. For example as certain issues have come in we have had a number of useful and consequential discussions about roles as outlined in the validation document – who does what, when they do it, how it relates to our description of the roles within the validation document and so on.

Obviously systems need to be set up in a ‘top down’ sense too (for example the three committees I have mentioned had to be set up in accordance with Open University Statutes). However the ‘bottom up’ incoming intelligence out of which nothing is deemed to small to be considered offers a huge resource to ‘test out’ the system and to develop a consistency of approach by categorising incoming situations and events as like each other and as requiring a specified consistent approach (which is of course one of the primary aspects of quality assurance work).

## **Materials**

The quality assurance requirements of this programme are not limited to the systems to support the programme. The third reference point at the case law meetings (and essentially thus an opportunity to



triangulate) is the programme's materials. The materials are the aspect of the programme most visible to everyone and to use a metaphor need to carry the DNA of the programme in a way recognisable to all.

Since much of the teaching is done through distance learning and since it needs to conform to various regulatory mechanisms (most notably a series of competencies) it is necessary to have a learning structure which is auditable in the sense of being able to show where and how the competencies are dealt with. The materials not only carry the competencies in the teaching workbooks they also carry them in the student practice assessment portfolio which the students carry into the place of work (the Trusts).

So materials are seen as important for a three sets of key players in the programme firstly for students so that they can routinely be able to demonstrate what might be described as an audit trail from practice to theory and theory to practice (thus replicating in their educational experiences in some way the accountability which is so central to nursing practice). Secondly materials are important for the new regulatory body (the Nursing and Midwifery Council, (NMC)), so that they can see clearly in their quality assurance reviews how the competencies are addressed. The third set of key players are people who work for the Trusts and Workforce Development Confederations (WDCs – the commissioners for education in local health care environments) as it is necessary for us to be able to show them how the educational aspects of the programme map onto the practice experience that students have and conform to what is required by the statutory body (the NMC).

In my view this transparency needs to be established as part of the materials as they are developed. In the validation document it was made clear that the (now) NMC competencies are the medium through which the curriculum is developed. Subsequently this has been done primarily through the development of a text template which offers a uniform approach for all the competencies (that is to say it supports each competency through specific reading, reference to textbooks, learning activities which orient both to practice and to underpinning knowledge). Again the use of the competencies from the outset as a way of organising the materials enables us to prospectively engage with quality assurance issues. The competencies are transparently available for examination. The links between theory and practice are similarly available. The competencies are available for examination in the portfolio too. Such transparency is a useful contribution to the quality assurance process.

## Triangulation

To return briefly to the case law meetings and the materials as the third point of reference, since the materials 'exemplify' much of the philosophy of the programme as laid out in the validation document it is appropriate that they make an appearance at the case law meetings. Taking a longer term view they may need to be adjusted as external systems alter (the portfolio is a particularly germane example here, it has to be in a form which fits with the real situations in Trusts). The case law meetings provide an opportunity to test something like the portfolio out against the systems and procedures offered in the validation document. The systems can inform the portfolio and the portfolio can inform the systems. With a new programme we can explore this while it is evolving with an eye to quality assurance and more positively to quality enhancement, which I like to see as *doing more than the validation document offers*.

## Conclusion

These three different sets of experiences first as a QAA subject reviewer, second as a lead person for a QAA review and third of developing a programme which has the *prospect* of a quality assurance process have been immensely valuable to me. I realise now looking back on my subject review experience as a lead person that my original submission document (or 'statement of intent') in fact actually followed the 'documents of execution' (i.e. the institutional and departmental documents which were our evidence) rather than preceded them. Fortunately our systems were sufficiently robust and transparent that the required QAA aspects were only buried in the documentation in fairly shallow graves! However, given a second opportunity to engage with quality assurance through the pre-registration nursing programme there was a real possibility of building quality assured process into the development of both the system

and the materials quite explicitly as a prospect rather than fishing around to try to confirm that we had done good work after the event. And moreover as I have suggested a prospective approach gives us more opportunity to engage in quality enhancement as well as quality assurance.

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# DISTANCE ELEARNING FOR THE HELLENIC AIR FORCE

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## **Abstract**

This paper presents a pilot tele-education system, appropriate for the continuing education of the officers of the Hellenic Air Force (HAF), on Computer and Telecommunication Networks. The program will be offered over the Internet. Currently the educational material consists of 22 chapters. This program will be offered via the Web page of the Hellenic Air Force Academy to HAF officers and will be updated with new material each year. The final goal of this project is to become an official distance learning program of the HAF; this will hopefully make the Hellenic Air Force to adopt distance learning for its continuing education needs.

## **1. Introduction**

In this paper a pilot continuing education distance eLearning program is presented, for the officers of the Hellenic Air Force, in the area of Computer and Communication Networks.

eLearning, along with e-Commerce, are two of the most rapidly developing services nowadays. This is due to the fast development of information technology and the large spread of the Internet.

Continuing education is a reality at the Hellenic Air Force Academy, but currently is implemented by conventional methods.

These methods require officers to leave their posts (and homes) for months, creating various problems. The author believes that the employment of eLearning can solve many problems created by the conventional continuing education methods, and also, save a considerable amount of money for the Hellenic Air Force.

Computer and telecom networks are rapidly growing today. New applications, new services and new protocols are announced every month, creating new knowledge & outdated old stuff. For continuing education purposes, the Chair of Computer Engineering of the Hellenic Air Force Academy has developed a post-graduate course presenting a lot innovations on Networks developed during the last 5 years. It is our ambition to offer this course via the web site of the Hellenic Air Force Academy.

## **2. Course content and organisation**

### ***2.1 Structure of the Distance eLearning system***

The eLearning system consists of the Tele-education Server, equipped with User and Supervisor interfaces, three Databases (User DB, Text DB and Exam DB), automatic Test Generation software and the Auto-correction software (see Figure 1). An advisory board examines the text and the whole system and proposes improvements and updates. The course is managed by a professor specialized in Networks. A more detailed description can be found in (Andreatos, 2000).

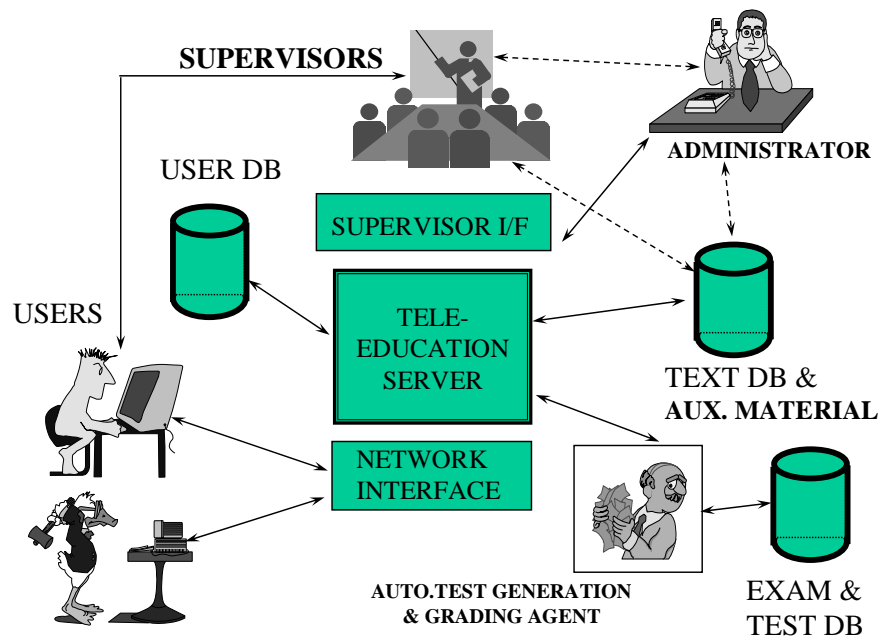


Figure 1. Distance eLearning system structure (simplified)

The course consists of:

- 1) User's guide (Instructions, reading suggestions, aim of the course and expected results)
- 2) The educational material (22 chapters)
- 3) A hypertext dictionary
- 4) A brief introduction to Networks
- 5) Auxiliary software (for user registration, attendance, support, navigation, exams)
- 6) Bibliography, further reading guide, useful links.

Most of the chapters are not connected to each other, as is the case of the chapters of a text book. Various classification schemes may be applied, but none of them is satisfactory. A possible (but non-uniform) classification is shown below in Table 1.

Table 1. A possible (but non-uniform) classification of the chapters

	GROUP OF CHAPTERS	NUMBER	PERCENTAGE
1.	Internet applications	8/22	0,36
2.	Telephone network applications	3/22	0,14
3.	ATM applications	3/22	0,14
4.	Higher layer applications	1/22	0,05
5.	Lower layer applications	4 /22	0,18
6.	Security issues	2/22	0,09
7.	Various applications of networks	1/22	0,05

## 2.2 About Petri Nets

The Petri Net (Danthine 1980, Billington 1999, Jensen 1997, [www.daimi.au.dk/PetriNets](http://www.daimi.au.dk/PetriNets)) is an alternative technique to a Finite-State Machine for formally specifying process evolution. A Petri Net has four basic elements: **places**, **transitions**, **arcs** and **tokens** (see Figure 2). A **place** represents a state, which the system may be in. **Places** are depicted as circles. A **token** (heavy dot) in place P, indicates that the system is currently in state P. A **transition** is indicated by a rectangular box. Each transition has zero or more **input arcs**, coming from its input places, and zero or more **output arcs**, going to its output places. A transition is **enabled** if there is at least one input token in each of its input places. Any enabled transition may **fire** at will, removing one token from each input place and depositing a token in each output place. If the number of input arcs is not equal to that of output arcs, the amount tokens will not be conserved. If two or more transitions are enabled, **any** one of them may fire. The choice of a transition to fire is indeterminate, and this is the advantage of Petri Nets for modelling non-deterministic processes (such as protocols), over Finite State Machines.

This latter feature can map the user passage through the educational material: rarely two users follow exactly the same way through the chapters. Petri Nets are thus used in this project in two points: first, to keep track of a user's progress (**Progress Petri Net**); and second, to assist the user navigate through the educational material (**Navigation Petri Net**).

Some chapters are prerequisites to others; in order for the user to guide his study, a special diagram called the **Progress Petri Net** (see Figure 2) is provided showing these relations. This diagram is also used by the system to track each user's progress. Each time a user completes a chapter, the corresponding "place" is marked and tokens to following places are generated.

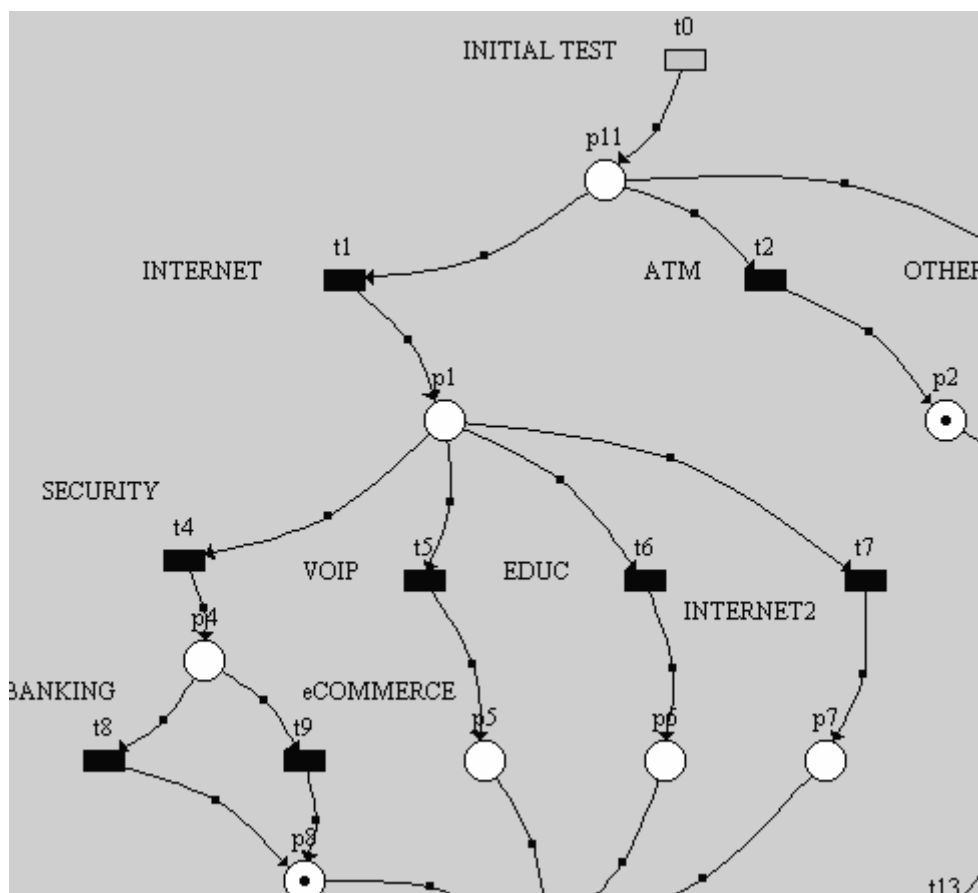


Figure 2. A Petri Net provides navigation through the educational material.

Places may be connected in various ways (mapping the prerequisites here): one to one, one to many, many to one. In order for a user to proceed to a new chapter, all prerequisites must have been successfully completed. This is easily mapped on a Petri net: finished chapters automatically generate tokens which (when all prerequisites have been completed), may fire transition to a following chapter. In order for the user to fulfill the course, the whole diagram has to be covered; then a final token fires the final exam. Each time the user finishes a chapter, he is prompted to take an exam. After satisfactory completion of that exam, the user is credited by a token shown on his progress map. There, he can check his progress.

The second use of Petri Nets in this project is to assist user navigation. This is called **Navigation Petri Net**. It is similar to the Progress Petri Net, but it furthermore provides hyperlinks to the corresponding chapters.

### *2.3 Structure and features of the educational material*

The educational material is structured according to the eLearning principles (Race, 1999), and the suggested guidelines for information presentation on the WWW (Avouris et al, 2001).

Thus, effort has been paid in order to make the material readable, pleasant and user-friendly. A lot of multimedia material has been incorporated in the text. There is also a user guide explaining course aims and providing user instructions.

The aims of each chapter are stated in the beginning, followed by classification information which allows the user to orientate himself through the material. Then comes the abstract, keywords and the required background. In the end of each chapter a synopsis follows, then supplemental bibliography and self-evaluation tests.

The most important features of the educational material are:

- The whole course is supported by an English-Greek vocabulary and dictionary of technical terms, and bibliography.
- Each group of related chapters is characterised by a uniform set of colours to facilitate navigation.
- Effort had been paid in order to make the chapters self-sufficient. Where this is not possible, links to other chapters, to the Introduction, the Web or the dictionary are provided.
- A special tool called the Navigator has been built, in order to facilitate the navigation through the material. The Navigator provides four different ways of chapter organisation, explained below.
- By the side of each chapter there is a colour bar showing user's position within that chapter, i.e. how close to the beginning or the end of the chapter the current line is.
- The user can keep track of his progress through his personal Progress Petri Net.
- To facilitate perception of user progress, Coloured Petri Nets (Jensen, 1997), are employed, where colours denotes groups of related chapters. Of course, the user may turn off prerequisite succession, if he feels that he has enough background in order to attend an advanced chapter.
- With the use of special software the material may be announced by the computer. This is particularly useful to users with special needs (e.g. blind persons), or users which learn better by hearing than reading. (For such an announcer, see for instance [www.ilsp.gr](http://www.ilsp.gr)).

### *2.4 Navigation tools*

Four ways of chapter classification have been provided, for the user to select:

1. In **alphabetical order**.
2. From **lower to higher** layers.
3. According to **network architecture**; in fact, three categories are considered: ATM, TCP/IP and all the rest (Telephone network, Frame Relay, etc).
4. By means of the **Navigation Petri Net**, explained above. This is a coloured Petri Net, where colours correspond to the groups of chapters of Table 1.

## ***2.5 Structure of the tests***

Exams are given at: a) The beginning of the program in order to check the required background; b) At the end of each chapter; c) At the end of the whole course (final exam).

An exam consists of four types of tests:

1. Multiple choice questions
2. Questions of judgment
3. Simple problems with arithmetic results
4. Composite problems with arithmetic results.

In multiple choice questions the user has to select among 3 or 4 answers. In questions of judgment, the answer must be given in text format and should not exceed a maximum number of words; in this way, superfluous words are avoided and automatic correction is facilitated (Andreatos, 2000). An auto-correction program is reading and grading the answer.

In simple problems with arithmetic results the answer is a particular number which comes out after calculations. An arithmetic error here is fatal. Finally, in composite arithmetic problems the correct result gives full credit, whereas an arithmetic error invokes the auto-correction program and perhaps a human, in order to give partial credit.

The final exam has limited duration, and is given on line. The user is registered during login process and disconnected when the time expires.

## **3. Pilot application of the eLearning program**

Initially the material will be available through the Hellenic Air Force Academy site to selected users with passwords. User comments will be gathered and evaluated, in order to improve the application and tailor it further to targeted needs.

During regular operation, users will be examined to check their background; users with adequate background will be registered, i.e. registered on a User Data Base (Andreatos, 2000). Beside the exams, the users will also have to fulfil a project.

During the pilot phase auto-correction AI software will also be tested.

## **4. Regular application of the eLearning program**

During regular application an educational information system will be built; this will consist of a management server and three Data Bases (DBs) a) Educational material DB, b) Test DB, and c) User DB (Andreatos, 2000). A management server will provide (among other modules) an account server, an automatic test generator and an auto-correction server (Andreatos, 2000).

In order for the Hellenic Air force to apply this program to their post-graduate schools, several issues have to be tackled such as authentication and security issues, continuous updating of the educational material and tailoring to the needs of the Hellenic Air Force. Some of these problems have already been discussed (Andreatos, 2000, Andreatos & Stefanias, 1997). Therefore, only a few of these issues will be discussed here.

### ***4.1 User authentication***

The schools of the Hellenic Air Force target to specific officer degrees. Candidate user ID will be compared against the official officer records. During the final on-line exams, user ID and presence may be checked by web cams. On a later phase of the program, user ID may be checked using biometrical methods, requiring additional equipment and software.

#### **4.2 On-line connection with Libraries**

Post-graduate projects ask for extended use of library. Through this program the user may have on line connection with the Hellenic Air Force libraries.

#### **4.3 Control and upgrade of the educational material**

The structure of the proposed eLearning system allows for easy control and upgrade of the educational material, by authorised boards of the Hellenic Air Force, Such as the Direction of Education.

### **5. Synopsis**

The aims of the pilot eLearning program presented in this paper are the continuing education of the Hellenic Air Force Officers in the area of Computer and Telecom Networks. It is a pilot application targeting at the introduction of eLearning. Author believes that Distance Learning serves perfectly the needs of the Hellenic Air Force, due to its geographic dispersion. The pilot application phase sought at the introduction and the familiarization of the Hellenic Air Force officers with Distance eLearning, in order to demonstrate its benefits and versatility, so that it will be officially adopted.

The Academic Network of the Hellenic Air Force, currently under development, will greatly facilitate the application of Distance eLearning.

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# IMPLEMENTATION STRATEGY OF AN E-LEARNING SYSTEM FOR A POPULATION OF 13000 STUDENTS IN CENTRAL EUROPE

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## Summary

In the first decade of the 21<sup>st</sup> century, higher education institutions are exposed to huge national and international competition, due to the globalization of this sector. No one of them is in the position to ignore the latest developments in the educational technology [5]. Even those, who have a good experience with traditional distance learning technology, are forced to use the E-learning systems in aiming to reach a larger student population, to better manage the quality and to reduce teaching costs. The authors met the challenge of choosing an appropriate strategy to implement an E-learning system with minimum disturbances in their properly functioning distance learning business in Central Europe, namely in Hungary and sub-offices in Romania, Slovakia and Serbia [1]. In this paper the authors are presenting their experiences in selecting a proper frame system, the integration of the current student management system with the selected E-learning frame system, and some experiences are also published on the teaching material development. The final conclusion on the economic operation of the E-learning system can only be drawn after some years of experience, but a good overview is already given on the difficulties (in both technical and human aspects) met during the implementation process.

## What does an E-learning frame system mean?

The publication and the use of teaching materials – with the involvement of a high number of students – shall be carried out by a properly chosen frame system. The required characteristics of the frame system are the following:

- Easy accessibility of teaching materials
- Not too high hardware requirements (download speed included)
- Inclusion of usual E-learning components (group, agenda, chat, self-test, student management, teacher management)
- Easy to use document editor
- Respect of existing E-learning standards
- Low operation costs
- Reliability
- Good quality/price ratio

### *Characteristics in detail*

The *easy accessibility* means that all documents are organized in a logical hierarchy, that provides easy structuring of the topic, resulting in easy usage of teaching materials.

The *hardware requirements* must not be too high as this latter can lead to exclusion of a part of the student population.

Practically all frame systems consist of the same range of E-learning components, however a difference in the use of these components may vary considerably. A good frame system has it's own student and teacher management system, however it has to allow easy cooperation with already existing standardized systems of the kind.

The *document editor* proposed by the frame system shall be easy to use, that is to say medium-experienced Windows users, having good skills in their respective tuition field, should be able to deal with the editor easily.

It is required that generally used *E-learning standards* (SCORM, LRN) are respected. The first reason of this is that one can only fill in the frame system with teaching materials properly if proceeding this way. The second and more important reason is that more flexible choices of development tools are allowed when standard requirements are fully respected.

The *low operation costs* means that the number of staff members that run the system is minimum, and that not too high qualifications are required from them.

*Reliability* means that the ratio of brake-down time over total operation hours is minimised. No data loss is tolerated. This aspect is extremely delicate when a system integration is carried out while a student management system, as it is the case in the author's school, already exists.

The elevated quality/price ration means that all the listed requirements are fulfilled on a high level while the overall price (or rental cost) is minimised.

### **How to choose and introduce a frame system?**

The financial resources of most higher educational institutions are based on governmental support. Central European governmental administrations are convinced that the restructuring of higher educational systems (concerning new technologies, such as E-learning) is necessary, but even in case of future EU member countries, the decision-making seems to be too slow for institutions that want to face the national and international competition. Furthermore the impact of the decisions is uncertain. It is obvious that the cheapest way of carrying out an E-learning investment is to use governmental resources, but private institutions can not afford months or eventually years of waiting for a centrally supplied frame system. That is why the Dennis Gabor College decided to finance this project itself.

The authors have been dealing with distance learning for more than 10 years, so they have enough experiences in organizing and running such activities [1]. The high number of students (active – 13000, overall – 30000) implies that a very careful intervention is needed whenever a minimal transformation is applied to the system. As the principle of the school is to provide teaching services to the enrolled students in any possible and available way, it is continued to provide traditional paper-based teaching material – as a support – for their students involved in E-learning courses as well. It means that the students have a choice to use traditional distance learning tools, beside the E-learning ones.

Most distance learning institutions, as the authors' school as well, has a limited number of full-time personnel at the school's headquarters. The role of this full time staff is the production of teaching materials, training of sub-offices' personnel and to assure the quality control of the whole system. Local teaching is provided by locally hired personnel, so it may happen that not properly qualified persons are enrolled in local teaching. By means of E-learning technology this problem can be solved easily.

When the decision on the application of E-learning systems is done, one should take into account the considerable investment and operation costs. The implementation of this new technology is a team work in any case. With respect to a minimum amount of useless operation that may occur, it is strongly recommended to start a project to resolve the problems. In this project, at first the goals have to be clearly identified, the staff members be selected, their contact addresses be published, and their respective roles be clarified. The leaders of the project have to establish an action plan in which all starting and due dates are visualized and the eventual parallelism of actions is also visibly represented. Such a network diagram is given in Figure 1.

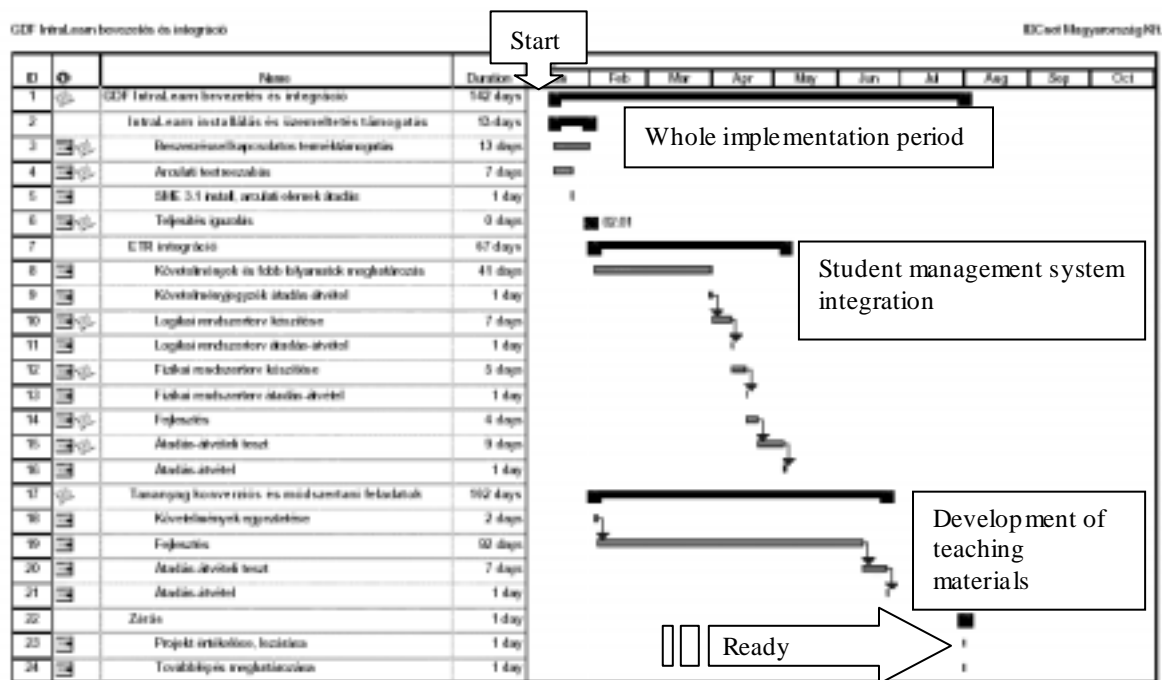


Figure 1. Network diagram of the implementation process

The most important decision at the very beginning of the project is to decide how to purchase the frame system. One option is to buy the whole system, the second another is to rent the system, a third one is to rent for a short period and then buy the whole system. The authors have chosen the third option. They decided to rent the frame system for a period of 6 months, within which they developed an implementation project led by the software supplier. During this time the authors' institution's staff members may become familiarized with the system, the first teaching materials could be developed and the operating personnel could get sufficient practice in the system's operation. At the end of the 6 months period, the evaluation of the project may justify the purchase of the frame system. Regarding the human aspects, it is natural that staff members, having long experience with traditional distance learning methods, will have some fears of the new technology. That is why it is extremely important that the development tools of the frame system are very similar to the ones previously used by staff members. Personnel should not be made afraid of the new technology!

Based on the above described analysis of frame systems of multiple software suppliers, the authors decided to introduce the IntraLearn system supplied by IBCNet [2].

### Development of E-materials within the frame system

All frame systems provide development tools for preparing teaching materials. Some development tools require programming skills, others do not. From the point of view of application, the best frame system needs no programming skills and the use of incorporated development tools is evident for all who have medium-level skills in usual Windows applications. By means of development tools and the basic set of Windows application software, the developer can create basic elements such as text, figure, animation, audio record and so on. Using the editor, the developer may incorporate these elements into the frame system. The frame system allows the developer to create a well-structured teaching material. The current position of the user within the material can be identified easily by a tree structure that is located preferably on the left side of the screen. Clicking on the desired title can initialize quick change in the position of the tree structure.

The second way of developing teaching materials is to use MS Word and MS Frontpage development tools and subsequent translation of these basic elements into the frame-systems environment. This method has the advantage over the first one, that staff members are more familiar with these tools than

those incorporated in the frame system. Whenever the translator unit is not incorporated in the frame system by default, it shall be subject to the software application agreement to provide such a translator as extra service.

### **Human aspects of development**

Teaching staff, having deep knowledge of each topic of content, will certainly be glad to have a choice of development tools. In normal cases development tools incorporated in the frame system will not cause any difficulties to use them for medium qualified personnel. However the availability of choice will decrease the natural resistance against a new software. Staff members must understand that via the electronic way, they will have more influence on the teaching process and that higher quality requirements can be fulfilled.

As no-one can afford to ignore dealing with basic software, potentially all skilled persons can and may develop their teaching material. Even preparing animations and pictures need no special skills, that is to say it may be expected that almost half of the staff members shall be able to prepare animations and other special files for their teaching material.

Besides self-moving action of staff members, it is necessary to appoint a responsible person to deal with translation and organisation of teaching materials received from the faculty. This person must have better knowledge on multimedia editing and a comprehensive overview of E-learning materials, as well as has to manage the frame system correctly.

During the implementation period a project manager is needed, who co-ordinates the activities of the participants. This person has to understand the frame system and multimedia editing properly, as well. Preferably this person is an employee of the frame system supplier. Beside this project manager, a person from the school's staff shall be assigned as well, in order to have leadership in the project on the school's behalf.

It is suggested to start the implementation with a one-year experimental period. The installation of the software and the development of some (4-6) selected teaching materials need about 6 months, the system integration included, then another 6 months period of testing is proposed. The result of the tests shall be evaluated by the project leading committee. The mass development of materials can be started on the basis of this evaluation. The authors trust that the success of the test period and the positive results encourage staff members to take further steps in the project implementation.

Regarding the use of the new system by students, a considerable advantage can be taken into consideration, namely that their autonomy could be much higher with the introduction of the new E-technology [4].

### **Development of E-materials by means of MS Office tools**

Teaching material development with MS Office tools, means respecting some formal contextual rules. It is suggested to create a template file, which contains all the allowed styles. The font type and size, colour, at least four levels of titles (the normal text and the headings) are all well defined in the file. The background of the pages are also part of the template. The authors have to apply the style and write their materials accordingly. The same style shall be used when the material is developed in MS Frontpage. The hierarchy of titles will assure that the document is well-structured. Using the prescribed hierarchy, finding and selecting operations could be carried out by the frame system after translation.

With respect to the content of the teaching materials a detailed guideline was prepared by the authors for obligatory use by staff members. An agreement shall be concluded with each staff member, targeting the teaching material development. In the agreement the contextual and formal requirements are well-defined as it is suggested in the guideline. Such a type of agreement shall be concluded with the editors of the teaching material. When the material is ready, it shall be submitted to a rigorous evaluation by a competent committee of the author's school.

## Quality assurance

Our experts have formulated 24 measures of quality in internet-based distance learning, based on international suggestions [3]. These benchmarks harmonise with the traditional institutional quality assurance system (ISO 9001:2000), which has operated in Dennis Gabor College for 5 years.

The benchmarks are currently divided into seven categories of quality measures in our on-campus education too. Many are common sense, but the practice validates their importance. The categories and benchmarks include:

### *International Support*

- A centralized system provides support for building and maintaining the distance education infrastructure.

### *Course Development*

- Guidelines regarding minimum standards are used for course development, design, and delivery, while learning outcomes – not the availability of existing technology – determine the technology being used to deliver course content.
- Instructional materials are reviewed periodically to ensure they meet the program standards.
- Courses are designed to engage students in analysis, synthesis, and evaluation as part of their courses and program requirements.

### *Teaching/Learning*

- Student interaction with faculty and other students is an essential characteristic and is facilitated through a variety of ways, including phone or e-mail contact.
- Feedback to student assignments and questions is constructive and is provided in a timely manner.
- Students are instructed about the proper methods of effective research, including assessment of the validity of resources.

### *Course Structure*

- Students have access to sufficient library resources that may include a “virtual library” accessible through the World Wide Web.
- Faculty and students agree upon expectations regarding times for student assignment completion and faculty response.

### *Student Support*

- Students receive information about the study programs, including admission requirements, tuition and fees, books and supplies, technical and assessment requirements, and student support services.
- Questions directed to student service personnel are answered accurately and quickly, with a structured system in place to address student complaints.

### *Evaluation and Assessment*

- The program’s educational effectiveness and teaching/learning process is assessed through an evaluation process that uses several methods and applies specific standards.
- Data on enrollment, costs and successful/innovative uses of technology are used to evaluate program effectiveness.
- Intended learning outcomes are reviewed regularly to ensure clarity, utility and appropriateness.

We apply the different topics of the above benchmarks in different stages of the introductory process. Every benchmark categories have the proper time to use during of the evaluation procedure. For example the institutional support and course development guidelines and faculty support benchmarks have already been used, but there are not enough experience yet to apply the assessment benchmarks.

## Expected output of the new technology

There are two types of advantages we can expect from the introduction of e-learning:

1. Brand new possibilities, like:
  - all to all communication
  - collaborative learning (the students help each other and the teacher helps them, as well)
  - new way of understanding by using multimedia tools
  - “just for me”, “just in time” characteristic of learning process.
2. Improvement of previous achievements:
  - increasing student autonomy
  - more student included in the studies
  - further access to teaching materials
  - cheaper way of renewing the materials.

We know that to introduce E-learning a big amount of investment is necessary, and that several years are needed to reach a financial balance.

## Conclusions

- Due to the high level competition on the higher education market, institutions are forced to provide teaching via electronic way as well.
- The selection of an E-learning frame system needs a detailed analysis of the aspects listed in this paper.
- The implementation is a team work, so in order to act with maximum efficiency a project shall be executed as it is suggested in this paper.
- Beside the incorporated development tools of the frame system, it is strongly recommended to assure the inclusion of commonly used MS Office tools such as Word and Frontpage.
- More appropriate quality assurance can be provided by using E-learning technologies
- By applying E-learning technologies it is expected that the efficiency of teaching process would increase in long term.

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## **A KIT FOR CHANGE**

### **WELL-DRESSED FOR LIFE-LONG-LEARNING IN A FLEXIBLE SOCIETY**

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In a modern society it has to be possible to combine family life and working life with studies. In order to promote life-long-learning, society's support has to be based on the needs of the individual as well as the needs of society and the labour market. Competence is directly connected to a nation's development and economic growth, and is as important as the availability of capital. It is, however, important to stress that lifelong learning is the individual's own project. A person has to have power over their studies and be able to influence its content, time, place and form. It is not just the material and the methods that have to be adapted to achieve flexibility, but also the organisation.

CFL is a state authority whose task is to support the country's development of flexible learning. Its activities are directed towards municipal adult education, popular adult education and other actors within adult education at upper secondary level.

CFL is increasing the accessibility of education and learning for adults, partly through distance learning which is aimed at adult students, and partly through developing methods, organisations and technology for popular adult education and municipal adult education. CFL optimises the student's chances of success through methods of study which encroach as little as possible into the student's everyday life with important commitments such as family, or work, or both.

This is done by

- giving information and counselling to increase knowledge about teaching materials, ways of working, and methods.
- assisting to raise the pedagogical and methodological levels of personnel, material and technology.
- supporting development projects financially or in other ways.
- working with dissemination of information about Swedish and international research and development.

#### **Information and counselling**

For this purpose a number of courses in distance learning methodology have been designed. The courses do not claim to be theoretical including huge amounts of reading, but instead work concretely to show how teachers can go about planning and carrying out distance courses. The teachers are put in a situation similar to that of their prospective students and get to experience, amongst other things, the frustration involved in not getting an answer as quickly as the new technology has made possible.

Included in this task is also the mission of showing teachers, who are not always inclined to change, that a new way of working is possible. There are preconceived ideas about distance learning such as it would mean: self-instruction, anonymity, a never ending stream of students, round-the-clock teacher availability, impersonal and that it is fixated on technology. Therefore it is important to stress that: distance education cannot be compared with self-instruction, teachers do not teach more students than they do in traditional teaching, teachers answer students' questions during working hours, teachers get to know the students as well, if not better, than in the classroom and that the decision about which technology to use is made locally.

It can be said that the view of distance education has changed radically the last few years, possibly sometimes for pragmatic reasons such as finances – educational establishments need to find new and other target groups than the traditional ones and these demand flexible solutions.

CFL is evidence that this is possible based on its forty year experience of adult education.

## **Courses in Distance Methodology**

The Basic course in Distance Methodology starts with an introduction day where the participants and the teacher get to know each other and also reflect over the expectations they have for the course. The course content and structure are presented; and then, after being divided into groups, the course participants, just like all CFL's students, have to make a study plan. This includes stating when the participant plans to do the different parts of the course. During the course the participants use different discussion forums: online chatting, telephone conferences, and video conferences. In spite of the fact that the course participants may work at the same school and may meet face-to-face everyday, the contributions, discussions and reporting, all take place in these different forums. The size of the group varies with the task and some tasks are done collaboratively. The final task is the evaluation of an existing distance course.

The tutor from CFL follows the discussions throughout the course.

The Basic Course is estimated to take around 40 hours.

The advanced courses are offered according to the following alternatives:

### ***Creating a Paper-based Study Guide***

1. This course begins, as the Basic Course, with an introduction day, however, the rest of the course done as a distance course.  
60 hours

### ***Creating a Web-based Study Guide***

2. Admission to this course is continuous and there are no face-to-face meetings.  
80 hours

Teachers often think when they begin to work with distance students that they, as usual, will produce their own material and their own study guides. On the way, and after they have become familiar with the existing distance study material, they come to the realization that it requires a lot of time and experience to achieve good results. It is not just a question of pedagogical competence, but also knowledge from other professions. Therefore they prefer, at least initially, to use the existing courses and material. 800 teachers from 84 different municipalities participated 2002.

For teachers working with adult education in the municipalities to be able to use the distance study material that CFL has developed requires a so-called "material certification". The purpose is to introduce the teachers to the course plan and the technical solutions, as well as, to discuss the course material's methodological design. The municipality's teacher contacts CFL's contact teacher and books a time for certification to take place when the following are discussed:

- Teaching aids and course planning
- Method
- Communicative support to the students
- Send-in tasks
- Examination
- Laborations
- Courses in the place of work
- CFL's tutor support

In summing up it can be said that CFL's in-service training gives teachers and groups of teachers a foundation for working for change. Teachers get the opportunity to talk about methodology and pedagogics. In this way they are able to come to a common basic outlook and attitude before working for change. They are also given the opportunity to broaden their knowledge and develop in their role as teachers.



## Content Management Project

“Secondary school on the Internet” is a project that aims at making digital education material freely available over the Internet. The project has had a few clear goals. A searchable database should be developed and be filled with material corresponding to 10 courses for upper secondary schools. The first aim is not to produce turn-key courses but instead produce a lot of independent learning objects<sup>1</sup> and learning resources, which can be reused in different situations, one by one or together with other objects. These goals are reached now when the project is ended on 31<sup>st</sup> of March 2003. The database, or as we call it The Course Builder Tool, is in full operation and teachers all over Sweden can freely register as users. In the Course Builder Tool the user can:

- Make structured searches in the materials in the database
- Build their own modules of existing recourses and objects
- Contribute with their own learning objects and resources
- Link to existing objects and to other interesting pages on the internet
- Review existing objects and resources

The material in the database can easily be adapted to different situations. Teachers can tailor make course material directly for a certain group or a separate individual. Students are able to study any time, any where at the speed best suited for them. The vision is that the Course Builder Tool will become a natural and well known gathering and meeting place for digital education material. The benefits with learning objects:

The project is monitored by the Swedish Agency for Flexible Learning, a government agency whose goal is to support and develop models for flexible and lifelong learning. A new project is starting when this project ends with the goal to produce another 15 complete courses for the upper secondary schools available in the same tool. The database is continually expanding with new objects and resources made by teachers from different schools in Sweden in their daily work and within different pilot projects testing the solution. Why develop content as learning objects? Learning content is currently developed for a specific purpose and not as object content for the sake of a collection of learning objects. The object content approach can satisfy both immediate learning needs – such as a knowledge-based or skills-based course – and current and future learning needs that are not course-based.

Arguments for designing and developing material to be reused as learning objects:

1. Flexibility
2. Ease of updates, searches, and content management
3. Customization
4. Interoperability
5. Facilitation of competency-based learning
6. Increased value of content

If material is designed to be used in multiple contexts, it can be reused much more easily than material that has to be rewritten for each new context. It's much harder to uncouple an object from the context of its parent course and then recontextualize it than it is to contextualize as part of design and development. Ease of updates, searches, and content management. Metadata tags facilitate rapid updating, searching, and management of content by filtering and selecting only the relevant content for a given purpose. When individual or organizational needs require customization of content, the learning object approach facilitates a just-in-time approach to customization. Modular learning objects maximize the potential of software that personalizes content by permitting the delivery and recombination of material at the level of granularity desired. The object approach allows organizations to set specifications regarding the design, development, and presentation of learning objects based on organizational needs, while retaining interoperability with other learning systems and contexts. From a business standpoint, the value of

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<sup>1</sup> “Learning Object: any digital resource that can be re-used to support learning” (David Wiley)

content is increased every time it is reused. This is reflected not only in the costs saved by avoiding new design and development time, but also in the possibility of selling content objects or providing them to partners in more than one context. Whatever development environment and tools are used, sound instructional design will remain important both for customized development and for template-based development. The most successful learning object delivery systems will be able to provide “not only learning object content, but relevant and meaningful context”, as well.

## **Methodology and LO's**

The methodology work done when developing flexible course material for flexible learning is important. We will see if the objectives of the LO is, defined explicitly, what type of knowledge is emphasised, what can be said about the presentation of knowledge, what is the nature of the learning resource provided, what role does collaboration have in the learning process, is assessments clearly mentioned, on what cognitive level is the assessment aiming, are there an outline or general advice on ways to use the LO is it possible to reach the presented goals?

One of the main tasks when developing content for flexible learning is to have a user needs perspective concerning on teachers expectations and beliefs about and skills of using new digital learning materials (Learning objects, LO's) and we try to deal with the preliminary findings based on pilot tests.

Questions that will be interesting is the need of different language versions, how often teachers and students use ICT and how functional these materials are in their own teaching? What can you expect from LO's and how likely would you use these LO types in teacher led instructions or in students group work assignments? Are teachers interested in producing their own LO's, producing LO's to be sold by publishing company, ready to share LO's with others and interested in using LO's made by others?

Based on the findings of pilot tests we can state there seems to be a clear need and demand for new types of digital materials (Learning Objects). To conclude these findings shortly we can found out that responded teachers had very positive attitudes towards the use of ICT and LO's in teaching, and their expectations of LO's where promising and optimistic in realistic way.

In addition the respondents seemed to be ready to firstly, use their own LO's or LO's produced by others in their teaching, secondly, to produce their own LO's within the limits of their own (ICT) skills, and thirdly, to share their own LO's with other teachers even without a financial reward. However, it must be noticed that these preliminary findings may be excessive positive, because the responded teachers were all very active users of ICT both in their free time and in teaching, and their skills of using technology were presumably higher than the average of Swedish teachers in general.

Swedish Agency for flexible learning will provide descriptions of pedagogical models to support the exploitation of more flexible forms of content in teaching and learning that are sensitive to context of use. Models will be developed that can be applied within the constraints of existing curricula and those that may imply more re-engineering of the education system. The models will be developed iteratively and enable further development based on the local conditions and cultures.

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# FROM ISO 9001:2000 TO THE EFQM EXCELLENCE MODEL IN A MODEL HELLENIC OPEN & DISTANCE ADULT LEARNING UNIT

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## **Introductory Notes**

This paper presents the second, of a three-part study concerning the design of an integrated Quality Management System (QMS) for a hellenic Open & Distance Adult Learning Unit (ODALU). In the first part (Palladas 2003), the need for quality and quality management in a hellenic Open & Distance Training Unit was initially outlined and substantiated. The paper continued by presenting the basics, as well as a special methodology (given the particularities of the hellenic relevant environment and conditions) for achieving quality and quality management. It concluded with a detailed presentation of the basis of this integrated QMS which is the organization and functioning of the Unit according to the ISO 9001:2000 international standard specifications (ISO 2000), appropriately customized. The hellenic economy and business reality, the contemporary specifications and requirements of business management models, as well as the needs of the candidate trainees (and of society, by extension) dictate, to an ODALU targetting TQM to operate nationally, with a differentiated methodology than the proposed general European guidelines (Hornman 2000) on course to Excellence.

The part of the study presented in this paper, (a) focuses on the necessary framework for gradually evolving the aforementioned basis, in order to enable the ODALU to reach the point of satisfying basic Total Quality Management (TQM) principles and implementing relevant practices, based on the European Excellence Model, and (b) proposes a relevant methodology. A summarized comparative overview of the ISO 9001:2000 and the current EFQM Excellence Model governing (quality) principles and criteria-specifications is given, highlighting their main common points and differences. This overview unveils the target action areas for the evolution of the ODALU's QMS. An appropriate self-assessment scheme, based on the philosophy and the guidelines of the ISO 9004:2000 International Standard (ISO 2000) is proposed for use in this endeavour.

## **Brief overview of the current hellenic ODAL environment and conditions, from a quality practitioner's perspective**

An ODALU's environment is composed of the Institutions offering ODAL (their administrative personnel and "trainers", content and technology suppliers), Students - Society, Certification/Accreditation bodies (their administrative personnel, auditors, assessors) and subject-related Associations and Networks.

Currently there is one ODL national and fully recognized University, the Hellenic Open University (HOU) with undergraduate, graduate and post-graduate levels and courses in several disciplines (Foreign Languages, IT, Natural Sciences, Banking, Urban Environmental Planning, and Business, Health and Tourism Units Management), with over 3.000 current students, currently offering, for 2003-2004, 5.000 student positions versus 52.346 applications. Also, there are some "conventional" national Universities, such as the University of Athens, providing short, highly specialized ODL courses. A significant number of students is enrolled in certain very well-known foreign ODL universities, such as the Open University of the U.K. Several hellenic training institutions are beginning to offer ODL courses, in a combined conventional (mainly) and ODL form. Some multinational companies (such as Microsoft, CISCO), as well as some U.S. (mainly) universities offer ODL courses, through the Internet, in their fields of speciality - activities, mainly in the IT & Communications fields. The above entities do not follow specifically designated training quality guidelines, nor are certified or accredited, with the exception of the U.K. Open University. At the moment, there is no national and independent entity responsible for accrediting ODL courses and/or (public or private) units offering ODL. Within the same context, there is no known national recognition scheme. Government infrastructure exists (National Education Ministry, Universities, EKEPIS,

DIKATSA, National Accreditation Council, ELOT - Hellenic Standardization Organization) but needs to be expanded in order to cover the still very new for the country, ODL type of education-training.

The current prevailing conditions are:

- (a) Heavy attachment to the conventional (“traditional”) education-training types and institutions (Palladas 2002),
- (b) Competition by the well established purely conventional training units,
- (c) Great demand – systems characterized as “open” but actually are not,
- (d) The existence of a wide variety of different titles of certificates, non-standardized/assessed for equivalencies and lack of official state recognition of non-HOU ODL certificates and diplomas and
- (e) Lack of basic Adult Learning and ODL principles and practices by personnel of the entities of the ODAL environment, and not well-informed society. Due to the particular nature of ODL, it is extremely important for the success of the endeavour, that those developing special QMS for ODALUs should have the appropriate knowledge backgrounds and be experienced both in ODL and Quality Management.

A general solution would include:

- (a) Creation of appropriate ODALUs, following quality guidelines – standard specifications and implementing an appropriate QMS from the start in their organization and designed operations. Appropriate consulting – guidance to units already offering ODAL courses, according to the same quality guidelines. These quality guidelines can be based on a model and a methodology basis such as the ones already proposed (Palladas 2003), or further integrated, as presented in this paper.
- (b) Extension, specialization, appropriate management and coordination of the relevant activities of the national entities (National Education Ministry, national universities, EKEPIS, DIKATSA, National Accreditation Council, ELOT - Hellenic Standardization Organization) in order to satisfy the relevant “market” needs, of all the stakeholders in the ODL field.
- (c) Enhancement of government initiatives such as “training the trainers” which has begun, but is still limited to selected few and does not fully include ODL providers, “trainers” or developers.
- (d) Use of the capabilities, potential and scientific resources of the universities and appropriate companies (leaders in their field), in their capacity to be, not only R&D partners/providers, but technology and/or content suppliers as well.

### The ISO 9001:2000 basic ODAL management structure foundation

The main processes and their interactions according to the ISO 9001:2000 compliant basic ODALU QMS – explicitly presented in (Palladas 2003) – are summarized and displayed in Figure 1.

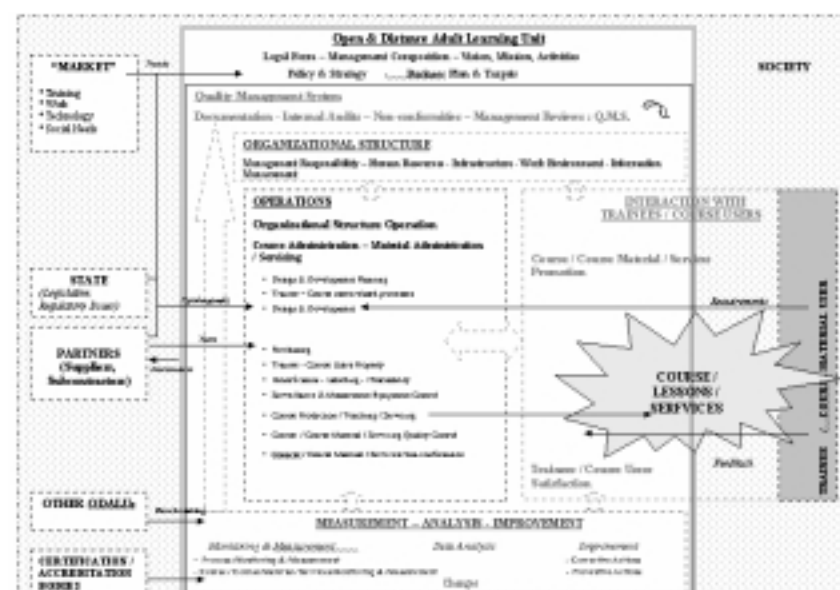


Figure 1: Main interacting processes of an ISO 9001:2000 compliant ODALU QMS

# ISO 9001:2000 and EFQM Excellence Model principles, specifications - criteria

Table 1: Summarized comparative overview of ISO 9001:2000 and EFQM Excellence Model principles and specifications - criteria

EFQM PRINCIPLES / CRITERIA: Enablers & Results	ISO QUALITY PRINCIPLES / ISO 9001:2000 SPECIFICATIONS
<p><b>LEADERSHIP &amp; CONSTANCY OF PURPOSE</b>  <i>The behaviour of an organisation's leaders creates a clarity and unity of purpose within the organisation and an environment in which the organisation and its people can excel.</i>  <b>Criterion 1 (Enabler)</b>  <u>Leadership</u>                      How leaders develop and facilitate the achievement of the mission and vision, develop values required for long term success and implement these via appropriate actions and behaviours, and are personally involved in ensuring that the organisation's management system is developed and implemented.</p>	<p><b>LEADERSHIP</b>  <i>Leaders establish unity of purpose and direction of the organization. They should create and maintain the internal environment in which people can become fully involved in achieving the organization's objectives.</i>                      § 5.1, 5.2, 5.3, 5.4.1, 5.4.2, 5.5</p>
<p><b>CONTINUOUS LEARNING, INNOVATION AND IMPROVEMENT</b>  <i>Organisational performance is maximised when it is based on the management and sharing of knowledge within a culture of continuous learning, innovation and improvement.</i>  <b>Criterion 2 (Enabler)</b>  <u>Policy &amp; Strategy</u>                      How the organisation implements its mission and vision via a clear stakeholder focused strategy, supported by relevant policies, plans, objectives, targets and processes.</p>	<p><b>CONTINUAL IMPROVEMENT</b>  <i>Continual improvement of the organization's overall performance should be a permanent objective of the organization.</i>                      § 4.1, 5.4.1, 5.6, 6.1, 7.1, 7.2.1, 7.2.3, 7.5, 7.3, 8.1, 8.2.2, 8.5</p>
<p><b>PEOPLE DEVELOPMENT AND INVOLVEMENT</b>  <i>The full potential of an organisation's people is best released through shared values and a culture of trust and empowerment, which encourages the involvement of everyone.</i>  <b>Criterion 3 (Enabler)</b>  <u>People</u>                      How the organisation manages, develops and releases the knowledge and full potential of its people at an individual, team-based and organisation-wide level, and plans these activities in order to support its policy and strategy and the effective operation of its processes.</p>	<p><b>INVOLVEMENT OF PEOPLE</b>  <i>People at all levels are the essence of an organization and their full involvement enables their abilities to be used for the organization's benefit.</i>                      § 4.1, 5.5.1, 5.5.3, 5.5, 5.6.3, 6.2, 7.3</p>
<p><b>PARTNERSHIP DEVELOPMENT</b>                      An organisation works more effectively when it has mutually beneficial relationships, built on trust, sharing of knowledge and integration, with its Partners.  <b>Criterion 4 (Enabler)</b>  <u>Partnerships &amp; Resources</u>                      How the organisation plans and manages its external partnerships and internal resources in order to support its policy and strategy and the effective operation of its processes.</p>	<p><b>MUTUALLY BENEFICIAL SUPPLIER RELATIONSHIPS</b>  <i>An organization and its suppliers are interdependent and a mutually beneficial relationship enhances the ability of both to create value.</i>                      § 4.1, 4.2, 6.1, 6.3, 6.4, 7.3.2, 7.3.4, 7.4, 7.5, 8.2, 8.4</p>
<p><b>MANAGEMENT BY PROCESSES &amp; FACTS</b>  <i>Organisations perform more effectively when all inter-related activities are understood and systematically managed and decisions concerning current operations and planned improvements are made using reliable information that includes stakeholder perceptions.</i>  <b>Criterion 5 (Enabler)</b>  <u>Processes</u>                      How the organisation designs, manages and improves its processes in order to support its policy and strategy and fully satisfy, and generate increasing value for, its customers and other stakeholders.</p>	<p><b>PROCESS APPROACH</b>  <i>A desired result is achieved more efficiently when activities and related resources are managed as a process.</i>  <b>SYSTEM APPROACH TO MANAGEMENT</b> <i>Identifying, understanding and managing interrelated processes as a system contributes to the organization's effectiveness and efficiency in achieving its objectives.</i>  <b>FACTUAL APPROACH TO DECISION MAKING</b>  <i>Effective decisions are based on the analysis of data and information.</i>                      § 4.1, 5.4.2, 5.5.2, 5.6, 6.2.2, 7.1, 7.2, 7.3.2, 7.3.7, 7.5, 8.2, 8.3, 8.4</p>
<p><b>CUSTOMER FOCUS</b>  <i>The customer is the final arbiter of product and service quality and customer loyalty, retention and market share gain is best optimised through a clear focus on the needs of current and potential customers.</i>  <b>Criterion 6 (Results)</b>  <u>Customer Results</u>                      What the organisation is achieving in relation to its external customers.</p>	<p><b>CUSTOMER FOCUS</b>  <i>Organizations depend on their customers and therefore should understand current and future customer needs, should meet customer requirements and strive to exceed customer expectations.</i>                      § 8.2, 8.3, 8.4</p>
<p><b>RESULTS ORIENTATION</b>  <i>Excellence is dependent upon balancing and satisfying the needs of all relevant stakeholders (this includes the people employed, customers, suppliers and society in general as well as those with financial interests in the organisation).</i>  <b>Criterion 7 (Results)</b>  <u>People Results</u>                      What the organisation is achieving in relation to its people.</p>	<p>§ 8.2.2</p>
<p><b>PUBLIC RESPONSIBILITY</b>  <i>The long-term interest of the organisation and its people are best served by adopting an ethical approach and exceeding the expectations and regulations of the community at large.</i>  <b>Criterion 8 (Results)</b>  <u>Society Results</u>                      What the organisation is achieving in relation to local, national and international society as appropriate.</p>	<p>§ 8.2.2</p>
<p><b>Criterion 9 (Results)</b>  <u>Performance Results</u>                      What the organisation is achieving in relation to its planned performance.</p>	<p>§ 8.2.3, 8.2.4, 8.4</p>

As reported by EFQM (EFQM 2001), ISO 9001 certification is often considered the easiest and most effective first step towards excellence. It can be obtained relatively quickly and due to the fact that it can generate confidence among customers that an organization is capable of supplying quality products and services, it is increasingly requested by the market. Today, ISO 9001 certification represents nothing less than the minimum level of quality any customer should expect and it is the most widely recognised standard. Approximately 75% of the European companies are ISO 9001 certified. ISO 9001 certification provides an instant overview of market requirements and a rigorous protocol for meeting these demands. The openness of the EFQM Model, on the other hand, provides much more room for variety, new ideas and creativity. According to H.F. Bühner (Infineon Business Excellence Manager): "An ISO certificate is proof that customer requirements have been taken into account and that actions are being optimized to meet them, but critical indicators such as business results and issues concerning people and society are ignored. These must also be considered in modern business. At BASF, for example, ISO 9001 is used to ensure high production and service quality, and for controlling accompanying processes, while the Excellence Model is used to develop an efficient business. Despite their different approaches, ISO 9001:2000 and EFQM's Excellence Model are complementary. While the EFQM Model provides a practical and quite tangible framework for TQM, ISO9001:2000 procedures can be deployed without the complexity of a holistic approach.

From the comparative overview (Table1), it becomes apparent that both ISO 9001:2000 specifications and the EFQM Excellence Model are governed by almost the same quality principles. Comparing the ISO 9001:2000 specifications to the Excellence Model criteria, in ISO 9001: the contents of (7) People Results, (8) Society Results and (9) Performance Results are from non-existent to extremely weak. Those of (1) Leadership, (2) Policy & Strategy and (4) Partnerships (with a significant lack in the parts concerning technology, finances and information & knowledge management) are limited, but those of: (5) Processes and (6) Customer Results are quite well covered.

Quantified comparisons (using the EFQM Excellence Model scoring system), carried-out during corporate and academic studies have revealed some interesting results. An ISO 9001:1994 certified organization would be expected to score around 250 points, while if certified according to ISO 9001:2000, the score would rise to approximately 350 points. This, of course, is due to the increased focus on customers, leadership, processes and stakeholders. Although the reliability of such figures is relative and agreement is certainly not unanimous, the comparison points out that an organization must cross a 'commitment barrier' if it is to reach overall corporate excellence.

The graph on Figure 2, provided by EFQM (EFQM 2001), shows the progression of an organization on its way to excellence. First, an organization tends to focus only on product conformity in order to obtain basic ISO certification (ISO 9001:1994). Then, it starts evolving (ISO 9001:2000, ISO 9004:2000) (Palladas1997). When it is mature enough, the organization is interested in the EFQM methodology with its holistic quality approaches. The ISO 9001 versions are gradually moving up the scale, while the new EFQM Recognition and Advice Scheme creates a new low-end emphasis for EFQM methodologies. The two methods are getting closer to one another and the range of methodologies is becoming more complete. Whatever the maturity of an organization, there will always be a logical next step for implementing excellence.

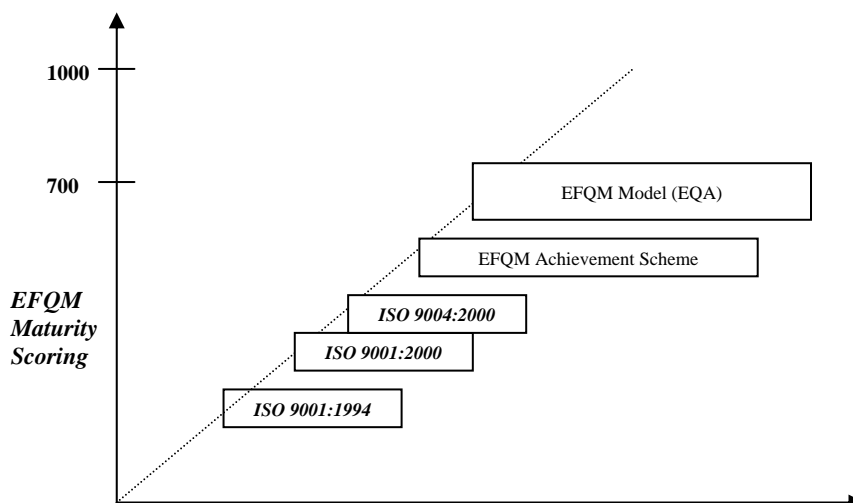


Figure 2: EFQM's "journey to Excellence". Time

Using this logical succession (Palladas 1998), it is natural to use ISO 9004:2000 as a stepping-stone to get from an ISO 9001:2000 compliant QMS to a TQM / Excellence System.

### Using an ISO 9004:2000 based self-assessment “en route” to Excellence

Based on the methodology proposed for the hellenic environment, already described (Palladas 2003), an ODALU, already implementing an appropriately customized ISO 9001:2000 compliant QMS, can make the next step towards TQM and Excellence, using an appropriate self-assessment scheme, based on the philosophy and guidance given by the International Standard ISO 9004:2000.

As stated in its introduction, ISO 9004 (ISO 2000) gives guidance on a wider range of objectives of a quality management system than ISO 9001 does, particularly regarding the continual improvement of an organization's overall performance, efficiency and effectiveness. Although not intended for certification or for contractual purposes, ISO 9004 is recommended as a guide for organizations wishing to move beyond the requirements of ISO 9001, in pursuit of continual performance improvement. When compared to ISO 9001, the objectives of customer satisfaction and product quality are extended to include the satisfaction of interested parties and the performance of the organization, thus approaching TQM principles - practices. Many models currently exist for the self-assessment of organizations according to QMS criteria. The self-assessment approach described below, is intended to provide a simple, easy-to-use approach to determine the relative degree of maturity of an organization's QMS, to identify the main areas for improvement and assess their implementation - benefits for the ODALU. An advantage to this approach is that results can be monitored over time and used to appraise the maturity of an organization. This approach to self-assessment is neither a substitute for internal audit of the quality management system nor for the use of existing quality award models.

Specific features of the ISO 9004:2000 self-assessment approach are that it can: be applied to the entire quality management system, to a part of the quality management system, or to any process (to the entire organization or part of the organization); be completed quickly with internal resources, by a multi-discipline team, or by one person in the organization who is management, form an input to a more comprehensive management system self-assessment process; identify and facilitate the prioritization of opportunities for improvement, and finally, facilitate maturing of the quality management system towards world-class performance. There are many ways to format self-assessment questions to evaluate performance, to indicate maturity ratings and to record possible improvement actions. The proposed approach is shown in Table 2.

Table 2: Self-assessment & Performance Maturity – Improvements Data Table

ISO 9001, 9004 / EFQM Clause	Question	Answer (Actual Performance Observations)	Performance Maturity Level Rating	Proposed Improvement Actions	Potential Benefits	Improvement Actions Realized
			1 to 5	(Stating: What / by Whom / When - by When / How / Resources needed / Related anticipated Costs)		(Stating: What / by Whom / When - by When / How / Resources used / Actual Costs)

Ratings of Performance Maturity Levels (according to ISO 9004:2000): (1) No formal approach (No systematic approach evident, no results, poor results, or unpredictable results), (2) Reactive approach (Problem- or corrective-based systematic approach, minimum data on improvement results available), (3) Stable formal system approach (Systematic process-based approach, early stage of systematic improvements, data available on conformance to objectives and existence of improvement trends), (4) Continual improvement emphasized (improvement process in use, good results and sustained improvement trends), (5) Strongly integrated improvement process, best-in-class benchmarked results demonstrated.

The questions addressed should not be limited to the ISO 9001:2000 clauses, but include ISO 9004:2000 specifications, as well as areas covered by the EFQM Excellence Model that are not covered by ISO 9001:2000.

### **Final remarks**

Despite the current environment and reigning conditions, hellenic ODALUs have to follow their “journey to Excellence” and be ready for the time when all the components of the national relevant infrastructure are in place and function normally. The entire three-part study including all the step-by-step targets and methodologies has been developed in a model form so that substantiated and internationally recognized quality principles, guidelines, objectives and practices in the field are built-in in the organization and operations of a hellenic ODALU, such as ANELIXI T&C, even from the its creation stage and initial development. ANELIXI T&C is a private initiative in the field of ODL and Quality expected to become fully operational by the beginning of the olympic year of 2004.

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# COMMUNICATION AND INFORMATION BETWEEN PARENTS, PUPILS, TEACHERS, SCHOOL AND ADMINISTRATIVE OFFICERS USING ICT AND MOBILE TECHNOLOGY

*Jukka Mäki, Media Tampere Ltd, Finland*

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## 1. Problems with Communication and Information

There are always problems to deliver information from school to parents and vice-versa. Very often there doesn't exist any communication between home and administrative officers outside school. Does it belong only to schools? Should everybody have the equal opportunities to receive and give information and also to make questions for others?

Information and Communication Technologies give help for this problem. When the school has connection to Internet and parents the same, it's possible to create a somehow like "intranet" between school administration and parents. Also pupils could use Internet for fulfilling their homework.

The administrative organizations in each school area have connections to schools. But if they leave this to happen only with papers and post, it takes too many days, before the information comes to the end-user (school). Email helps in this and also parents may have a need to communicate with local administration.

## 2. The solution

There is a solution to solve this kind of problems. Every school should create an Internet-portal, which has all the needed information. Using the Internet and the Intranet plus email and may be videoconferencing (web-based or ISDN-based), ICT helps to solve the existing problems. This needs a lot of cooperation between all participants and an infra-structure that is working.

## 3. The case study

We in Finland and in Tampere region are participation in a very new EU-project called **PAPÁS**, funded by **eTen**. Also Northern Italy takes part in this project as a test region. In Andalucia, Spain, they (SADIEL) have created a portal **PASEN**, which will be more developed and tested by Finnish and Italian schools. This new portal, **PAPÁS**, will also have an application with mobile devices.

This text is from the Project plan of **PAPÁS**: "As a result, the **PAPÁS** project will build up a **new access gate** for the citizen to the Educational Administrative Services offered by Regional Governments, which, while being in line with the technologies currently available in the Information Society, will coexist in an integrated manner with the traditional methods. Thus, through **PAPÁS**, the citizen will be enable to receive a unified, efficient and personalised reply when submitting an application or inquiry to the Regional Governments for Education, no matter if this application or inquiry is submitted personally, by fax, by phone or by email. As the system will be integrated and communicating with all the relevant sources of information, the reply that citizens get from the Public Administration will take into account all the knowledge acquired during the previous relations between the Administration and the citizens."

The interesting point is also that if there exist any cultural differences that might influence the formulation, the use, the communication, the way of information etc. between these different countries and cultures.

Mobile technology gives an added-value for the communication. They say that in the end of 2004 almost half of mobile telephone users have multimedia phones. This means for instance that also moving picture is possible to send and receive. Which will be the development of PDAs and other pocket computers or laptops – we can make just some guesses. A person needs often possibility to communicate, to send or receive information when he is moving from one place to another. That's why mobility in technology gives another extension in solving the problems mentioned in the beginning.

#### 4. Experiences of the Tampere City

The City of Tampere is very well-known as an information city. The practical implementation is the eTampere-program, which has the common objective to make Tampere the world's leading city in the research, development and application of the knowledge society. The Tampere urban region accommodates strong, world-class research in information technology and communication, innovative business and the ability to work in cooperation.



In the area of education the City of Tampere has created an own Information Strategy. This was an order from Ministry of Education that every municipality must have an Information Strategy by the end of the year 2002. Practically this means that all the schools have their own web-site and all the pupils their own email-address.

Every school has implemented their web-sites using school's own teachers and even pupils. Many classes have also their private classroom-site. Very many schools have started to make portfolios for each child. The general sites are open for everybody, but e.g. portfolios are usually seen only in the school intranet and even according to classroom. On-line courses are created even in elementary and in this way the pupils grow up together with information technology.



The web-sites offer information of the curriculum of each school. Every school is allowed to create a specialized daily program – so the decision making is delivered to the municipalities and so every school has a lot of autonomy when creating its own profile. In www-page of each school there is also information of the school, teachers, classes,

projects that they are working on, photos etc. Many schools have their own discussion pages for parents. They are usually open for all. Some schools have opened closed discussion and posting lists for their own teachers, parents and pupils. Usually every pupil has an own email-address from his/her school.

Before the “technology time” the pupils carried every day a note-book for dealing the information from school to parents and vice-versa. This was quite a hard job for a teacher to write often the same information to 25 notebooks. Now the information is written in the schools intranet and parents are able to visit there with a password.

The main thing is that everybody (administration, directors, teachers, parents and pupils) use the information technology, especially in communication. But there is also the possibility to communicate with the administrators of education sector of Tampere City. There is an open discussion list and many good opinions can be found there for developing the education locally and in larger areas.

Many pupils use also virtual library that exists in the Internet. The Ministry of Education and National Board of Education have worked well to have teaching material for teachers and learning material for pupils. It’s also possible to see the collection of the books, cd-roms etc. which are located in public libraries. So everybody can easily see, which is the nearest library that has the book that he is looking for. Then he can make a reservation for that certain book. And the library sends an email or SMS-message, when the book is available to pick up. But still more a teacher or pupil must go to get it manually (by walking), if it’s not in an electronic form... Also the schools can make reservations from Teaching Material Centre for technical devices using the Internet-based reservation calendar.

In Tampere we have started to communicate also with mobile phones. There has been done, together with Nokia, some pilot projects that the teacher sends the exercises or web-links in SMS-message to the Communicators (given by Nokia) and children have answered with email of a mobile telephone. The results have been very successful and the pupils (and teachers) have been very motivated in learning in this special way. Other project with good results (as an example) was that a half of the class went to the forest to learn about nature and they took pictures with a camera telephone (or Nokia Communicator plus

a digital camera), sent them to the second half of the class who were studying at school. Then these pupils made research through internet about the pictures (trees, flowers etc.) and sent this additional information back to other pupils in the forest. The main point is that learning happens in real-time. Books are always “old” after publishing. Teaching and learning is best, when they have good motivation and the new technology gives many possibilities to implementations.

There is about 5 million people in Finland and 4 million mobile telephones – the penetration is good and the calling quite cheap. Some teachers even give children exercises or tutoring using mobile. Like one first-grade elementary pupil said when starting the school: “I chose my school bag, because there was a place for my mobile phone.”

The information technology is a good client to help in communication and finding information. The Finnish Ministry of Education and the National Board of Education have given continuously training for teachers in the area of information technology (from 1995). And the Finnish infrastructure is very good in municipalities, in schools and at homes. Modems and ISDN-connections are starting to be the past; many people buy ADSL-connection for home.

So, Information Technology helps in many ways. You just have to find a good idea and make it. The **PAPÁS**-project is very interesting, because we in three countries, Spain, Italy and Finland, are able to test and develop the tools of ICT and mobile technology for communication and information between pupils, teachers, schools and administrative officers. Tomorrow is already today!

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# QUALITY IN THE MANAGEMENT OF TECHNOLOGICAL TRANSFORMATION: A FRAMEWORK FOR DEVELOPED AND DEVELOPING ENVIRONMENTS

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## **Abstract**

This paper suggests a quality framework for the management of technological transformation in higher education. This framework could be applied to other educational institutions such as in Europe even though this paper focuses on a developing environment through an analysis of technological transformation at the University of Botswana. The major findings of the paper suggest that learning technologies need to be implemented within a strategically developed framework based on a clear and unified vision and facilitated through dedicated leadership. It is further important to use a combination of top-down and bottom-up strategies during the diffusion process to ensure sustainability and ownership. The process of technological transformation is however complex and systemic in nature and leadership is therefore key in this process. The LASO model has been helpful and can act as a guiding heuristic for the technological transformation of higher institutions in general, and in particular in developing environments. The University of Botswana is experiencing positive progress in the infusion of learning technologies despite various challenges that are being addressed.

## **1. Introduction**

This paper presents a quality framework for the management of technological transformation in higher education by analysing the implementation of learning technologies over the last two years at the University of Botswana. These observations correlate with the writer's doctoral findings in New Zealand [1].

There are many aspects of the socio-economic and technological environment taken for granted in developed environments that need to be explicitly addressed when using learning technologies in developing environments such as in the case of Botswana. These include among other things lack of experience in the use of new learning technologies, inadequate telecommunications infrastructure, lack of reliable power supply, the education sector competing for limited resources and a need to provide basic educational facilities.

The findings of this paper is not only related to theories of technological infusion but also embedded in the practice of implementing learning technologies within developed and developing environments. The implementation of learning technologies at the University of Botswana is used to present some of the key elements of a quality framework for the management of technological transformation.

These elements have emerged during the two years that the writer has been responsible for spearheading the implementation for new educational technologies at the University of Botswana since February 2001. The writer further leads the Educational Technology Unit (EduTech) in the Centre for Academic Development (CAD) as Deputy Director: Centre for Academic Development (Educational Technology) and has also been leading the University of Botswana eLearning (UBel) initiative launched during 2001. UBel is intended to transform teaching and learning through the use of appropriate learning technologies.

This paper has also incorporated some of the key aspects of the doctorate research conducted by the writer from 1995 to 2000 in New Zealand on key management strategies for the implementation and organisation of eLearning in higher education [1].

## 2. Learning technologies in use at the University of Botswana

A technological transformation is occurring at the University of Botswana. Overhead projectors were first introduced on a large scale in 2000. Merely two years later, however, the University of Botswana is for example using an online learning management system where courses are offered via WebCT with various cutting-edge facilities and systems.

A state-of-the-art eLearning Support Centre has been implemented as the first wireless network application at the University of Botswana. Semi-embedded computers are used to facilitate eye contact among group participants. The computers are laid out in clusters to support collaborative work. A Mimio-board is used to display, via a data-projector, what is written or drawn on the white-board. Microsoft-Netmeeting is used to project the white-board or any other aspect of the instructor's screen on the screens of all the participants, or the screen of any participant to all other participants.



The eLearning Support Centre has been used to train more than 30% of the academic community of 680 staff in various educational technologies using more than 60 targeted workshops. A new *eLearning Certificate*, issued by the Centre for Academic Development, has been designed by EduTech and is being offered from 2003.

WebCT, an online learning management system was acquired in 2002 after a rigorous evaluation process. At present more than 20 courses are online with approximately 2000 (of the 12 000) students involved. WebCT 3.8 offers a full suite of online learning tools including chat facilities, bulletin boards, online calendar, assessment tools, student tracking, email, content uploading and student administration.

A video-conferencing system, POLYCOM was installed in 2003 for synchronous teaching and learning. The system links the main campus in Gaborone with Maun and Francistown via ISDN and leased lines. The University of Botswana can also conduct video-conferencing internationally through this system using IP addressing or ISDN.

The Internet and particularly the Web is playing an increasingly important role as eLearning expands. Student use of the Web has increased exponentially and so has the demand for more computers and faster access.

EduTech has a central equipment outlet and has seen a dramatic increase in the demand and use of laptops and mobile data projectors by academic staff. A satellite model is planned whereby each Faculty will have its own educational technology centre providing customised support, training and equipment services.

Implementation of a computerised system for issuing equipment using a bar-code system at the central educational technology outlet is at an advanced stage. In the future academic staff will be able to both check availability of equipment via the network and also reserve desired equipment online.

Various research projects in eLearning have commenced. A study was for instance done in 2002 to encourage open discussion, information-sharing and entry-level counselling on HIV/AIDS by all staff and students. The study involved the use of public Web-based threaded message boards as an anonymous Q&A forum where an expert answered questions [2].

An eLearning Smart Classroom has been co-designed with visiting consultants and constructed for technology-based, active and collaborative learning. This classroom is laid out in a similar fashion to the eLearning Support Centre, with semi-embedded computers using a clustered arrangement. The Smart Classroom also features a video-conferencing system and a number of motorized screens for maximum flexibility in sharing information.

### **3. Some of the key elements of a quality framework for the management of technological transformation**

Some of the key elements of a quality framework for the management of technological transformation that emerged over the last two years are:

- Vision, leadership and dedication
- Using a map for technological transformation to guide the implementation and selection of strategies
- Appreciation for the systemic nature of technological change in education and a commitment to work with strategic partners in related systems
- Addressing the complex nature of technological transformation.

#### ***3.1 Vision, leadership and dedication***

An inspiring vision for the use of new learning technologies has proved to be critical at the University of Botswana.

The critical importance of visionary leadership correlates with a central finding of Uys's doctorate research [1] that Rogers' diffusion of innovation theory [3], when the innovation emerges from outside of senior management, needs to be augmented with a top-down component that includes both senior and middle management in order to accomplish effective diffusion of technology-based education.

At the University of Botswana the UBEL programme links to Botswana's Vision 2016 [4] goals of being an educated, productive, innovative and informed nation as it aims to provide wider access and increase the quality and relevance of tertiary education in an emerging global information society.

The vision of the University of Botswana to transform its academic processes towards an increasingly technological base has strongly influenced the strategic implementation of learning technologies at the University. The stated vision of the University is further to strive for excellence in the provision of education to the nation and in particular to use ICTs in the teaching and learning process.

The Educational Technology Unit (EduTech), which is spearheading the UBEL programme, has as its vision, "to be a well-rounded, highly skilled and well equipped unit, respected in Africa and beyond in research, teaching and the provision of an extensive and evolving range of services in educational technology", and this vision is progressively being realised.

Vision without leadership, however, is at best a fantasy, and at worse a farce. Strong leadership for the use of eLearning, however, has been provided on various levels at the University of Botswana and confirms the view of Berge and Schrum [5] that the key to successful campus initiatives in technology-enhanced learning and distance education is the support of campus leaders. This further correlates with Drucker's [6] assertion that a successful innovation should aim at leadership from the beginning in order to be innovative enough and capable of establishing itself.

In this regard, the writer has provided direct leadership through EduTech, as champion of the use of new learning technologies at the University of Botswana and as chair of the UBEL Committee. The respective faculty representatives on the UBEL Committee have been providing leadership within their respective faculties.

Dedication and committed work from within EduTech and the UBEL Committee is making the vision for technologically based learning a reality at the University of Botswana.

### 3.2 Using a map for technological transformation to guide the implementation and selection of strategies

Once a clear vision and committed leadership have been established and there is adequate commitment to these, a map or model for the technological transformation process is required.

There is however no neatly formulated theory of generic change. Cannon [7] further points to the absence of a general theory of educational development and notes that educational developers therefore draw on theories from other disciplines to inform their educational practice. The use of models for educational change therefore becomes vital.

At the University of Botswana the LASO (Leadership, Academic & Student Ownership and Readiness) Model for Technological Transformation in Tertiary Education [8] guided the implementation and selection of appropriate strategies.

The LASO model emphasises the importance of integrated top-down and bottom-up processes, which is also proposed by Gunn [9]. The LASO model suggests that technological transformation occurs when leadership is integrated with academic and student ownership and readiness. Leadership is achieved through mechanisms such as defining a clear vision for the transformation, providing a reward structure for those engaging in the change process and the creation of a strategic framework to guide the transformation.



The LASO model was born out of the reality of implementing learning technologies in higher education in various settings such as South Africa, New Zealand and Botswana.

Ownership and readiness for change by both students and academic staff can be achieved by using strategies such as pilot projects, extensive training, establishing workgroups and learning communities in every faculty and using teams for online courseware development.

The curve of technological transformation is indicated in the LASO model as a ragged line to signify the complexities and dilemmas with which technological transformation in higher education is often associated.

A change model further needs to take cognisance of the systemic nature of technological transformation.



### ***3.3 Appreciation for the systemic nature of technological change in education and a commitment to work with strategic partners in related systems***

Technological innovation has often been implemented as an isolated, bottom-up initiative of academic staff for efficiency or experimental purposes. In this scenario the wider systems within tertiary education are often not considered and neither affected by the innovation. The senior management of an institute may thus feel justified in disregarding the innovation.

Likewise, solely top-down attempts have also regularly failed when the systemic nature of change and in particular academic involvement and ownership were not valued as a critical prerequisite to sustainable technological transformation. Tillema [10] points out that historical studies, based largely on experience in schools, show that top down attempts to achieve educational reform have failed, and suggests that they will be doomed to failure until they deal with the cultural and pedagogical traditions and beliefs underlying current practices and organizational arrangements.

Attempts to introduce any significant reform in an institution will impact on most of its sub-systems. Bates [11] contends, "...using technology to extend the campus on a global basis will affect all aspects of a university or college, but particularly administrative systems". Systems theory in general also calls for an integrated approach to technological innovation.

The technological change at the University of Botswana is also requiring systemic changes. EduTech considers integrative approaches with adjoining systems and sub-systems as imperative and is partnering with units such as the IT Department, the Library and the Centre for Continuing Education, and of critical importance, with academic staff. The IT department has an important role in providing a stable, sustainable and appropriate technological infrastructure. The Library needs to provide an increasing number of accessible electronic resources. Additionally, central access to networked computers must increase from the current 200 computers to 800 in the next three years. The Centre for Continuing Education (CCE) is committed to integrating Web-based learning into their largely paper-based distance education systems. CCE will also be the main users of the video-conferencing systems.

Academics are deeply involved in the reform process through the UBel Committee and the eTeams that have been established in each Faculty. Two academic staff members on the UBel Committee represent each faculty and these staff members lead the eLearning programme within their faculty through an eTeam. Academic staff members, through the UBel Committee, were central to the selection of the online Learning Management System. Academic staff members were also central to conducting a University-wide needs analysis and in the design of the 2003 eLearning pilot programme.

The University of Botswana experience concurs with Tillema [10] that engaging academics in the reform process is one of the significant management issues to address in educational reform and in education in general. In technological transformation in higher education, it therefore seems essential to address the concerns and perceptions of academic staff in the light of the need for changed attitudes and ownership by academic staff.

The training programme at the University of Botswana hence has been vital in preparing academics for this new role. In addition, involvement in training also leads to ownership of technological transformation by academics. EduTech has – as pointed out above – run more than 60 learning technologies workshops since February 2001, and these were attended by more than 30% of all academic staff at the University.

### ***3.4 Addressing the complex nature of technological transformation***

The implementation of learning technologies is a complex process due to its systemic dimensions and because people are central to this process ([1], [12], [13], [14]). It therefore deals with transformation not translation and contains many dislocations, dilemmas and uncertainties.

The ragged contour of technological transformation as depicted in the LASO model above has also been confirmed at the University of Botswana in contrast to the smooth contours of Roger's [3] diffusion of innovation curve.

Difficulties in human relationships, lack of resources at critical stages, bureaucratic interference, change fatigue and dealing with diverse expectations all contribute to the complexity of implementing and using learning technologies at the University of Botswana. Other complexities evident within the transformation process at the University include managing the relationships among UBel committee members, providing access for students to computers, instability of information and communication systems, lack of student participation, resistance to change among academic staff and extensive time delays due to administrative processes and procedures. There is further a tremendous need for basic computer literacy among both students and academic staff.

#### **4. Summary and conclusions**

This paper discusses a quality framework for the management of technological transformation. These findings could be used generically, but will be of particular value for ensuring quality in the management of learning technology implementation in developing environments.

This case study indicates that technological innovations need to be implemented within a strategically developed framework based on a clear and shared vision and facilitated through dedicated leadership.

It is an art to effect change and sustainable technological transformation since *people* are central to this transformation process. The LASO Model can act as a guiding model or framework for the technological transformation of higher institutions in general, and in particular in developing environments.

The use of learning technologies can be effective when the management of the transformation meets quality standards.

The systemic aspects of technological transformation need to be appreciated and addressed. The multi-faceted complexities and challenges that militate against the effective diffusion and adoption of ICTs particularly in developing environments need to be taken into consideration when designing quality infusion strategies for learning technologies.

The enthusiasm of academic staff and students about applying new learning technologies at the University of Botswana and the keenness of a core of academic staff to experiment with these learning technologies have acted as motivational factors for all involved in the UBel programme.

Expectations about the levels of energy and time required to achieve technological goals of high quality in developing environments might need to be adjusted, but EduTech has found no reason to modify its standards of quality or vision for the appropriate infusion of learning technologies at the University of Botswana.

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# THE QUALITY OF BLENDED LEARNING – CUSTOMISED SERVQUAL MODEL AND MEASURING TOOLS

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## **Introduction**

Blended learning – learning process composed of traditional teaching practices, computer-based teaching and online education has become a crucial part of modern studies' programs. It is a trendy idea which may lead to both increases in the effectiveness of the learning process and to cost reduction. Blended learning is defined as the use of state-of-the-art information and computer technology in order to enrich the process of knowledge transfer, consolidation and evaluation.

In Poland universities trying to remain competitive used to deploy e-learning programs, hoping that it would lead to higher quality of learning process and to the increase of the enrollment rate. In a few cases the lack of experience in this field or too chaotic and revolutionary decisions have led to the opposite results. Thus it has become important to measure somehow the quality and students' attitude toward the consecutive stages of e-learning program implementation.

The introductory part of this paper discusses briefly the customization of the SERVQUAL model to measure the quality of the e-learning program at the University of Information Technology and Management in Rzeszów, Poland. The main challenges were aligning traditional SERVQUAL model and finding the best possible set of statistical methods that would help to constitute qualitative and quantitative metrics of such concept. The closing part contains the analysis of results obtained in a pilot study.

## ***University of Information Technology and Management in Rzeszów***

The University of Information Technology and Management in Rzeszów (UITM, south-east Poland) is one of the earliest established private universities in Poland. For the last seven years the school has managed to place itself among the top-ranked private educational institutions. Current enrollment is approximately 10,000. Several semesters ago, the University board decided to launch the e-learning program that consists of CBT format (Computer Based Teaching) and the more professional and fully interactive WBT format (Web Based Teaching), which requires the use of a learning management platform. Students starting their education next year will have a chance to enroll in an almost total distance education program. As the school has the experience of over 30 various multimedia courses taught already, it has become essential to measure somehow the quality and the resulting effectiveness of its online courses.

## **Customised SERVQUAL model**

Parasuraman's conceptual model of service quality and the approach for defining and measuring service quality referred to as SERVQUAL can make a significant contribution to measuring the quality of modern learning processes consisting of a combination of traditional learning experience and modern ICT encouraged practice. Also, several later evolutions of the model may serve as the basis for such customization.

One of the main goals of the project was to find a general framework for assessing the quality of service at institutions of higher education. The services of these institutions, for the purpose of the project, should be understood as the teaching efforts composed of blended learning aspects.

The sub-goals were to develop the information collection tool (questionnaire) and to establish and validate a set of statistical methods which would allow conducting the empirical research and producing quantitative and comparable results.

**Model**

The general framework for measuring the quality of teaching services has been developed on the basis of the Parasuraman’s extended SERVQUAL model. The development process could be split into the following steps:

- Redefinition of the gaps, which determine the overall service quality. Participants that are considered in traditional model were replaced with students and university authority.
- Revision of the meaning of the service quality perceptual dimensions proposed in the basis model.
- Updating the items affecting the occurrence of service quality gaps. Several items affecting the gaps which are significant in the traditional approach are inadequate and several of those remaining take on the original meaning.

Detailed description of each step has already been qualified for a publication [1].

The diagram presents the framework of the customized extended SERVQUAL model

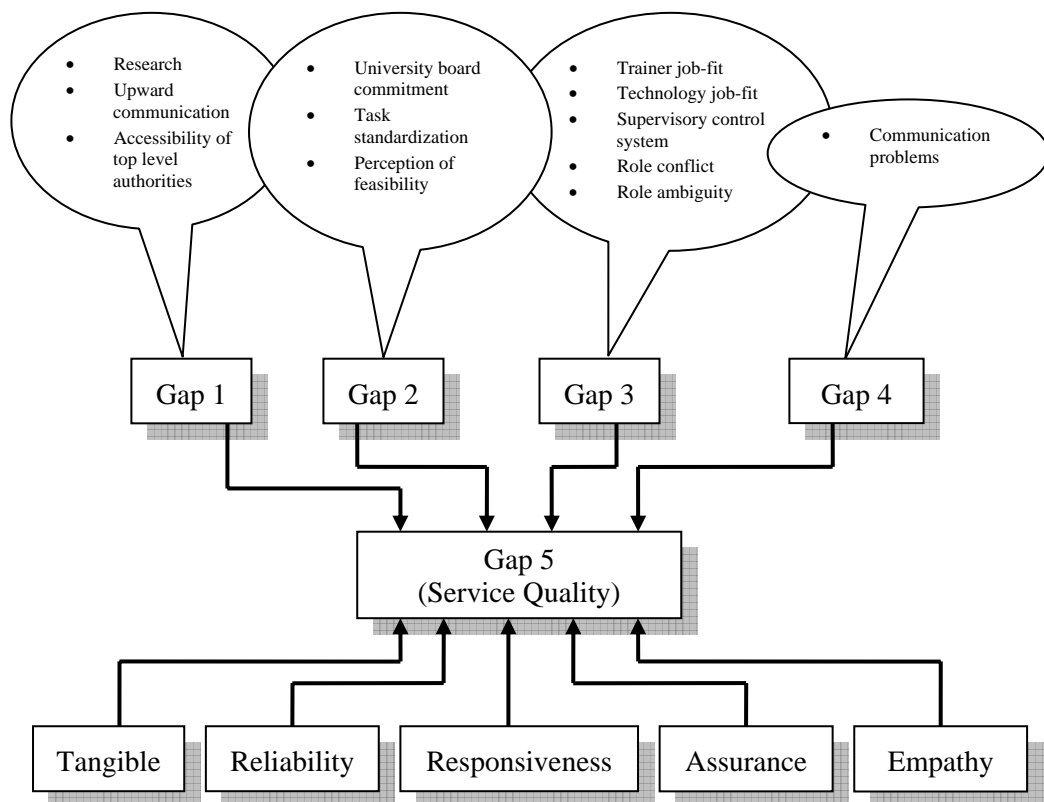


Figure 1: Extended model of service quality at universities.

**Questionnaire**

The next consecutive stage of the research project has been the development of a tool for measuring the e-learning quality on the basis of presented customised SERVQUAL model and the analysis of the results. The strength of the analysis depends on the data quality that in turn stems from optimal design of the data collection instrument and the collection procedures.

### ***Pilot survey***

The goal of the pilot survey was to research the sampling procedures and the framework of the questionnaire. Another aspect of the pilot research was to detect any flaws in the questioning tool and correct these prior to the main survey.

From over 7,000 UITM students, who had depending on their major and specialty, up to four lectures in the form of blended learning a small sample was chosen. Since a studied population of the UITM students could be considered as heterogeneous, where certain homogeneous or similar sub-groups (strata) can be isolated, the use of stratified sampling was legitimate. In this sampling technique, the whole population is initially divided into homogenous, exclusive sub-groups and then units are selected from each strata in proportion to the share of each sub-group in the whole population. The pilot survey was limited to the relatively homogenous group of exceptionally capable students. As many previous studies have proven that the results obtained from this strata are highly representative for the whole student population.

As a tool used for research on the basis of the presented model a questionnaire was developed. Its characteristic were as follows:

- The pilot questionnaire was not designed to measure the gaps between students' expectations and perceptions or "the zone of tolerance". Its main goal was to measure students attitude toward changes connected with e-learning program deployment.
- Structure and layout: the questionnaire consisted of twenty questions (four for each dimension of the model: Assurance, Empathy, Reliability, Responsiveness and Tangibles respectively) with the answers in the form of 5 point Likert scale and one open-ended question.
- Each of the twenty questions had the similar form as this sample question "How was the course navigation mechanism considering simplicity and intuitiveness?" There were five possible responses with only endpoints labelled "poor – excellent" and given numeric code ranging from 1 to 5. It is not possible to work out a set of universal questions, which could be used in case of each university which decided to launch e-learning program. While formulating questions each institution has to decide by itself which particular aspects will be researched taking into consideration the specification of the launched program.
- The open-ended question was added in order to obtain additional information and remarks on the e-learning program.

The pilot survey was carried out at the end of January (the end of winter semester) in the paper form among exceptionally capable students. As a result 139 questionnaires were collected. The key issue was to check the quality of the data collected and to verify the questionnaire structure. Basic statistical methods have been used to analyse the data.

For each question mean and standard deviation were calculated. Its analysis together with given consideration to graphs proved to be useful to determine weak points as for the quality of particular aspects of the e-learning program. Especially useful was the comparison of the quantitative indexes with the qualitative data obtained by analysis of open ended questions. As a result problems raised in some questions were analysed deeply and solutions were worked out.

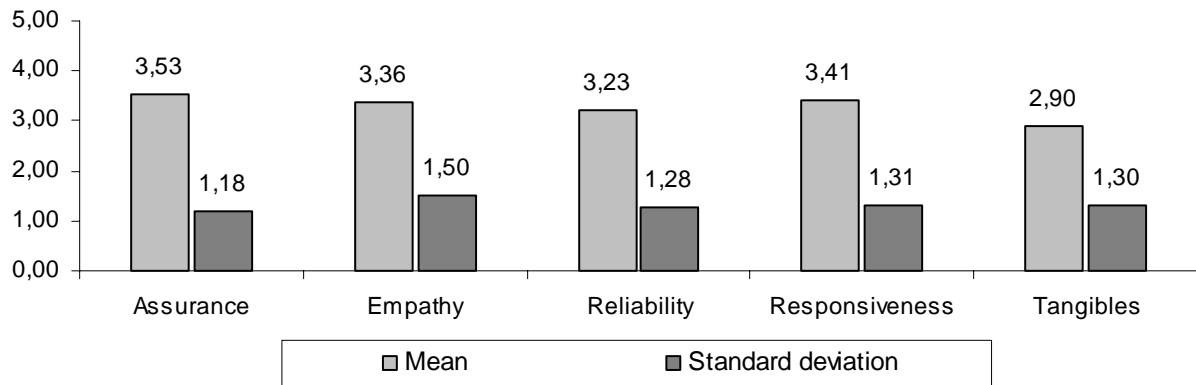


Figure 2: Aggregated mean and standard deviation according to the model dimensions.

In turn the analysis of the second graph, where mean and standard deviation were aggregated for each of the five dimensions indicates that there is a need to improve especially technological aspects affecting the teaching process (Tangibles dimension).

Although the output obtained from the questionnaire proved to be useful in case of improving e-learning quality at UITM, some problems arose, which affected the data quality (especially high level of the standard deviation indicates some problems). Moreover such construction of the questionnaire does not allow assessing the difference between students' expectations and perceptions. It is difficult to say whether for example the mean 3,53 in case of Assurance dimension is acceptable level or not. For some participants it was difficult to assess some aspects of the e-learning quality, as the consequence of the lack of similar educational experiences (the problem hardly appears while researching with the use of the SERVQUAL model for instance bank or insurance services). Therefore while making arrangements for main survey, some modifications as for sampling procedures and questionnaire have been made in order to obtain better quality data:

- Some language structures have been changed in order to make them less ambiguous for participants with low IT literacy level.
- Each question has the same scheme, presented by this sample question: "The course structure was logical" with the answers in the form of 5 point Likert scale. This time each possible answer was verbally labelled in the following way: "completely not meet the expectations, less than expected, as expected, more than expected, definitely exceed the expectations". Each answer was given a numerical code: -2, -1, 0, 1 and 2 respectively. Such response structure allows measuring the gaps between students' expectations and perceptions with the use of only one column of answers.
- Sampling procedures: the researched pilot sample was limited only to the group of exceptionally capable students. While conducting the main survey, it has been decided to rely on stratified sampling technique. The students' population will be divided into groups according to the participants' sex, marks' average and year of studies. The questionnaire will be carried out in an online form.

## Further work

The prospective stages of the project will involve:

- The further development and customization of the SERVQUAL model to fit it to the constantly changing university needs as for assessing teaching quality.
- Development of sampling procedures and frames to ensure that the researched sample is well adapted to the specification of students' society and it is of an appropriate size.

- Research the students' perception of service quality (blended learning) according to sex, year of studies, IT literacy and marks' average. Its goal is to check the correlation between these factors and the gaps between students' perception and expectations.
- Setting up and validating the set of quantitative metrics. Comparing them will allow to assess the quality of teaching services and to help in decision making at the university authority level.

The project still requires several questionnaires and data processing works to be carried out. Pre-analysis of the results seems to be promising enough to continue the SERVQUAL customisation which would eventually constitute the method of assessing the quality of blended learning.

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# THE MOTFAL PROJECT

## MOBILE TECHNOLOGIES FOR AD-HOC LEARNING

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### Abstract

The **Mobile Technologies For Ad-hoc Learning (MoTFAL)** project is a joint initiative of pedagogical, cognitive science and technological experts, educators, and psychologists to research the possibilities of using mobile platforms – mobile phones and PDA devices – with Internet access for educational purposes at school level. The project designs, develops, tests and evaluates a handheld learning environment based on emerging technology that facilitates in situ learning and maximize the impact of information that is provided when the motivation of the learner is highest. The proposed approach cross cuts the traditional boundary between the classroom, home, and other alternative educational settings (museums, libraries, archaeological and historical sites, etc.) as distinct learning environments. The goal is to shift away from classroom learning to “daylong” learning and to use the mobile technology to facilitate that shift. This paper presents the basic principles of the **MoTFAL** project, the theoretical background of its development as well as the possibilities for its educational exploitation.

### Introduction

The project **MoTFAL** is a joint initiative of pedagogical, technological experts, educators, and psychologists to research the possibilities of using mobile platforms with Internet access for educational purposes at school level. The partnership aims to develop, test and evaluate learning schemes that is implemented on a handheld learning environment based on emerging technology that facilitates in situ learning maximizing the impact of information that is provided when the motivation of the student is highest.

The **MoTFAL** learning environment includes full access to digital resources, cognitive tools, knowledge visualizations, software mentors to help with learning to use devices such as digital cameras, organise and recall images and sounds of people and situations, knowledge sharing between students in different environments, contextual personal tools that change their behaviour based on where they are and the activity in progress. Students have the chance to be linked to video clips, PDF articles, and Websites.

### The project's background

Over the last two decades, instructional computing introduced algorithmically based procedures and information-processing tools such as word processing and spreadsheets to enhance learning. The Internet added communication, connectivity and collaboration. *Education is no longer bound by a specific location*. Internet applications change the core relationship between teacher, learner and material, making guided and self-directed distance learning fully actualized. It is clear that ICT opens the door to “virtual schooling”. The web through conventional PC's is combined with a major disadvantage: it fails in mobility. Students can only access the web at school or at home. Modern educational theories though have proved the significance of informal learning in situ. It is proven that students are more motivated to learn about a historical site or a scientific application when they actually see it, in a museum or in a factory. Presenting information through the web implies that the teacher motivates the students in school or at home, where the motivating stimuli are not present.

It is obvious that for the expansion of the idea of learning and the creation of learning schemes that are based on the effective use of motivation that arises when a student is faced with the stimuli, mobile devices with Internet access can offer significant advantages. The advantages are clear: accessible resources wherever you are, strong search capabilities, rich interaction, powerful support for effective learning, and performance-based assessment: m-learning independent of location in time or space.

### **In situ learning and learning through mobile technology**

Classrooms, textbooks, lectures, and training sessions have at least one thing in common. As characteristic of learning opportunities, they take the learners out of the context of their everyday tasks and other activities and situations and put them into specialized learning contexts. Traditionally, this is the way people learned.

But there is another idea, one that promises to complement traditional dedicated learning situations with "contextual learning," in which learning is a dimension of those everyday tasks, activities, and situations. And this alternative approach is becoming all the more attractive in the light of current trends in work and learning, emphasizing *continuous and just-in-time learning*.

Learning happens in various ways. Students learn in classrooms, but they also learn by exploring streams and parks, trying and failing to perform tasks, talking to friends etc. Adults learn in many of the same ways, by experience, by involvement, by talking with peers and experts, or by delving into a practical problem. All of these can be legitimate learning activities. Virtually *any experience can be a learning opportunity, but often the resources to make it so are lacking*. We are used to thinking of knowledge as something "stored," "held," or contained in a "body of knowledge." That conception lends itself very easily to conceptions of learning as "acquiring knowledge," collecting it from books, lectures, and other media. We are following a different, complementary insight here, that *knowledge is something active in situations and contextual in its very nature*. Knowledge is something that happens rather than something that is stored and applied when appropriate.

The idea of contextual learning is fully supported in the framework of m-learning application. In the word *m-learning* "m" stands for "mobile", representing the back-stage mobile delivery technology.

### **Educational point of view**

#### ***Educational Theories***

The educational theories that are the basis for the development of the educational material as well as the educational framework of the **MoTFAL** project are the following:

- **Constructivism:** As a learning theory constructivism describes knowledge as being in flux, where an individual internally constructs knowledge through social and cultural mediation. Constructivists learning theorists contend that social activity and discourse play important roles for understanding to occur.
- **Collaborative learning:** In collaborative learning students generally work together in groups of two or more. These are usually face-to-face groups but, with the rapid expansion and availability of communication and information technologies such as e-mail, this can also be done effectively at a distance. The mobile application of the MoTFAL system enhances students' collaboration as it gives them the possibility to communicate and cooperate just by using the project's platform.
- **Contextual learning:** Contextual learning is learning that occurs in close relationship with actual experience. Its main principle is to motivate students to make connections between knowledge and its applications to their lives. In the framework of the MoTFAL project students have the

opportunity to study their curricula in real environments, they have for example the possibility to learn about the Parthenon while their looking at it.

- **Autonomous learning:** Autonomous and self directed learning views learners as responsible owners and managers of their own learning process. The main principle of the pedagogical theory of autonomous learning is the conscious involvement of the learner in some or all of the learning process. The MoTFAL project supports the autonomy of the learners by providing them with a variety of resources and materials, with an open environment for learning and collaboration and also with opportunities to work alone or with others.
- **Learning by doing/ Experiential learning:** Experiential learning takes place when a person is involved in an activity, looks back and evaluates it, determines what was useful or important to remember and uses this information to perform another activity. The application of the MoTFAL project supports the pedagogical method of experiential learning as it gives students the opportunity to get personally involved in the learning activity and not just to learn and think about it.

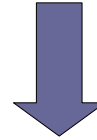
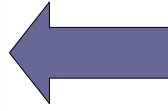
### ***Educational Scenarios for learning through mobile devices: History Education, an example***

Research on the methods of teaching history in the class has proved that: The main difficulties that students face are related to the understanding of historical terms, the placement of historical events in space and time, the proposition of multidimensional causative relationships, the considering of every event as a unique product of a society. They also face difficulties in understanding that historical studies are not political, military or diplomatic events but the every day life of people of an epoch. Contextual learning in history education and the scenario design method offer a different approach and perspective to history teaching and learning.

The educational approach, which is adopted in the framework of the **MoTFAL** project, is to use scenario-based design method as a means of defining suitable educational applications of the mobile technology. Scenario building is one main design technique to explore new forms of interaction in which the physical environment is able to react to human behaviour, using handheld devices as a mediator. The project includes an extended period of school-centred work. The aim is to help both teachers and students to actively participate in the development of the **MoTFAL** platform by giving their input and contributions. Furthermore the project is using a student-centred approach in order to assure the maximal usability of the new tools as well as a realistic evaluation of the pedagogical effects.

In the framework of the **MoTFAL** project a series of scenarios as well as the relevant educational material are being designed and developed in order to be used during the implementation phase of the project. An example of a learning scenario is presented above.

The teacher of a high school class takes the students to a field trip to Parthenon. As they are visiting the monument the students are requested to connect to the specific area of the platform where the teacher has already uploaded the selected material concerning the history of the monument. Students are able to see pictures of the monument during the time, to see drawings of the monument enriched by animations. They can also have access to a video presenting how the monument was and how it was related to the everyday life of the people living at that time. They can even find sound and video recordings of remarkable events of this specific period. Furthermore students are able to capture moments of their visit with the camera of the device and upload them to the server for future reference and also to add their comments and to continue their research by accessing relevant web-sites.



*High school students are visiting a historical monument, like Parthenon. In the framework of their visit they are using PDA devices with Internet connection. The PDA devices give students the possibility to have access in further information about the monument and in related sites. They can also capture moments from their visit just by using the camera of the device and also make their own comments. They can even communicate with students that they are visiting a museum and exchange their experiences, views and ideas.*

### **Technological point of view**

A true m-learning environment resembles in principle a sophisticated content and data management system, with development, delivery and control of the content and the learning progress. Its main objective is the learning of the material. Based on this definition, m-learning should be described as part of an integrated global learning strategy, encompassing a variety of instructional methods, learning content management and services that supply the learner with electronic information and educational content regardless of space and time.

### **Technical description**

The main technological aim of the **MoTFAL** project is the development of a platform that makes Internet services available anywhere, anytime. The **MoTFAL** system is composed by a handheld device, a GPRS capable mobile phone and an open web platform. The open structure of the platform gives teachers the possibility to develop and upload the teaching material that it is useful for their lesson.

The project develops methods and software for storing, retrieving and dynamically synthesizing educational modules to meet each learner's goals. To achieve this, the content is broken into small, independent multimedia educational modules. These are stored and retrieved using a database management system. Content modules present domain topics in many different formats. Meta-data are used to describe the modules. Aspects to describe using meta-data include the format of module and other technological aspects, its technology requirements, its duration, its role in the learning cycle etc. A set of software modules is also used in order to synthesize and educational course-based on the specific scenarios.

At the time of access the learner informs the service provider of her/his terminal characteristics (display dimensions, computing capacity, graphic processing capacity, etc.), and the provider transmits the required information, adapting representation to the indicated characteristics. Consequently the same

information is presented in different ways, according to whether access is from a desktop computer or from a mobile terminal.

The platform services are delivered via an advanced user-interface, where the user has to log in. The first major component of the user-interface is the Personal Learner's apprentice: This is the core software agent of the system and the main part of the user-interface. It is responsible for interacting with the user. It will:

- Manage the user-system dialogue
- Support students in declaring their goals
- Pro-actively suggest content to the student, based on his/her profile
- Attend to users queries about content and suggest modules that meet his/her declared needs, based on the available educational modules
- Decompose the user queries and goals into sub-goals to be met by the system and then co-operate with the response planner in order to compile a list of suggestions
- Monitor the correct delivery of courses and record user's learning behaviour in order to update his/her profile
- Optimize the delivery of content with respect to momentary network availability and device capabilities

A Multimedia Messaging Platform (MMP) is being developed that will provide two-way communication. The MMP is the second major component of the user-interface. A web-based application provides the interface for the delivery of the multimedia messages. A web server is used to collect user responses either through the web or directly from the mobile network. Certain work can be delivered to learners using this platform and questions or feedback can be collected from them. Collaboration among the learners is enhanced with such a service that allows for easy and immediate exchange of information (transmission of quality photographs, sound and video is possible enabling instant, high quality collaboration among the users).

### ***Usability issues and the project's technological requirements***

Learning through mobile technology has been slow to grow because most wireless devices to date have small screens, low resolution, slow processing, and limited storage capabilities. Likewise, difficulty connecting various types of devices to the same network is a real limitation. Given these limitations, "mobilizing" existing learning applications can result in a frustrating or nearly unusable mobile service. The solution exists in taking a different approach to how the information is streamlined and targeted to the user. The first step toward this solution is to integrate a user centered investigation into the m-learning system's development cycle. There comes a time when the design of a system is no longer driven by technological advances, but instead drawn forward by the users who have expectations of usability and take for granted the basic performance. The methodological approach of the **MoTFAL** project plays a fundamental role for the development of such a system: *user-centered design* and *scenario based design* are means for assuring that the final system is appropriate to the user and to the context of use.

The system of the **MoTFAL** project fulfils the following requirements:

- **Interactivity:** it should provide means of communication between learners and teachers. It should allow for feedback by the teachers that will be accessible to learners.
- **Interdisciplinary:** content should be presented in an interdisciplinary way incorporating information of different disciplines, thus promoting the idea of informal learning.
- **Unobtrusiveness:** so that the student can capture situations and retrieve knowledge without technology obtruding on the situation.

- Availability: its functions should be available anywhere and it should provide seamless communication inside and outside buildings.
- Adaptability: it should adapt to the learners' evolving skills and knowledge.
- Usefulness: it should be suited to everyday needs for communication, reference, and learning.
- Suitability: content should be corresponding to specific learning needs of users, e.g. content for the same subject should be presented in several ways and provided according to the specific users' profile.
- Easy to use: it should be intuitively easy to use, by users with no computer experience.

## **Conclusions – future work**

The MoTFAL partnership considers that the challenge for the future generation of educational systems at the dawn of the third millennium is to develop didactic environments for mobile phones and mobile devices as the availability of mobile devices spreads to a billion of users. The mobile telephone is becoming a trusted, personal device with Internet access, smart card usage, and a range of possibilities for keeping the learner in touch with the institution's student support services, in contact with learning materials and fellow students, while at home, at work or travelling.

During the application an extensive usability evaluation that will offer the guidelines for the human computer interaction and psychological contents required for the development of the final version of the MoTFAL system. The consortium aims to investigate the impact that handheld technology has on how final users experience wireless m-learning applications.

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# ACHIEVING QUALITY IN MULTIMEDIA DESIGN: SYNERGY BETWEEN SOUND AND PICTURES

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## Abstract

This paper argues that quality cannot be achieved by experimental or by summative investigations in the absence of a comprehensive *pedagogical screenwriting* framework. Following a summary of relevant literature, such a framework is offered, consisting of micro-level design guidelines. These guidelines concentrate on achieving pedagogic synergy between audio commentary and visual elements. The framework derives from the author's experience of producing multimedia packages at the UK Open University.

## Introduction

Van Merriënboer (1999) notes that little is known about the optimal combination of audio or speech, screen texts, and illustrations in pictures or video.

In fact, some substantial papers do exist, written by educational technologists such as Laurillard and Taylor at the UK Open University. These address a few detailed design techniques, which appear below, but mainly they discuss global, macro-level questions, such as how learners might cope without a fixed linear narrative (Laurillard, 1998; Laurillard et al, 2000) and an *analytical framework for describing multimedia learning systems* (Taylor, Sumner and Law, 1997). However, there seems to be no published comprehensive design framework for optimal integration of visuals and audio. This is despite the many investigations into the use of audio commentary in multimedia presentations. Some of these investigations are summarised below, exemplifying the mixed results in the comparison of screen text with audio commentary.

The major part of this paper presents a framework of design guidelines for multimedia packages. These guidelines are in the form of practicable, micro-level pedagogic design principles, such as

- there are occasions when the audio commentary should come first, in order to prepare the viewer for the pictures, such as, In the next animation, concentrate on the arms of the spinning skater  
<ANIMATION STARTS WITH SKATER'S ARMS HELD WIDE, THEN PULLED IN>

The framework has been compiled from the practices of designers of multimedia packages at the UK Open University. It incorporates an abundance of *practitioners' knowledge* regarding optimal design of audio commentary and graphic build-up. The width and depth of the framework offers a substantial basis for future investigations – a set of design guidelines that can generate fruitful hypotheses.

## The literature relating visuals and audio commentary

Tabbers, Martens and Van Merriënboer (2001) report several recent studies by Sweller, Mayer and others, in which multimedia presentations consisted of pictorial information and explanatory text. Many of these demonstrated the superiority of audio text (spoken commentary) over visual, on-screen text. In various experiments learners in the audio condition spent less time in subsequent problem solving, attained higher test scores and reported less mental effort. The investigators attributed these results to the *modality effect*. This presupposes *dual coding*, whereby auditory and visual inputs can be processed simultaneously in *working memory*, thereby leaving extra capacity for the learning process.

In their own study, Tabbers et al (ibid) presented diagrams plus audio commentary to one group, but to a second group they replaced the audio commentary with identical visual text, on screen for the same duration. They found that the audio group achieved higher learning scores. However, when two other

groups spent as much time as they liked on the same materials, the superiority of the audio condition disappeared. The authors conclude that the purported modality effect of earlier studies might be accounted for in terms of lack of time rather than lack of memory resources. (Mind you, the students in the visual text condition had to spend longer on task to achieve their comparable scores, so the audio condition could still claim superior efficiency).

Others have found that addition of audio need not be beneficial to learning. Beccue, Vila and Whitley (2001) added an audio component to an existing multimedia package. The audio was a conversational version of a printed lab manual that college students could read in advance. The improvement in learning scores was not statistically significant. Many students suggested that the audio imposed a slower pace than they were used to. The authors theorized that the pace set by the audio might be helpful for slow learners and detrimental to fast learners.

Kalyuga (2000) observed a similar effect, finding that *novices* performed better with a diagram plus audio than with a diagram-only format. However, the reverse was found for *experienced learners*.

Kalyuga (ibid) conducted another experiment in which an audio explanation of a diagram did indeed result in better learning, but only when the identical visual text was absent. Kalyuga's interpretation was that working memory was overloaded by the necessity to relate corresponding elements of visual and auditory content, thus interfering with learning. He concluded that the elimination of a redundant visual source of information was beneficial. However, this interpretation should predict that elimination of a redundant *audio* source would also be beneficial. Yet the visual group did *not* learn better than the visual plus audio group. Hence a more convincing explanation is a *split attention* effect. In the visual conditions, students had to split visual attention between the diagram and the visual text, whereas in the audio-only condition, they had only one thing to look at (the diagram) while listening simultaneously to a spoken explanation.

Concerning *split attention*, Tabbers, Martens and Van Merriënboer (2000) compared two strategies for decreasing extraneous load: *preventing split-attention* (preventing visual search by adding visual cues) or *presenting text as audio* (replacing screen text with audio commentary). They found that students who received visual cues scored higher on reproduction tests. However, the modality effect was opposite to that expected, in that visual text resulted in higher scores than audio commentary.

The authors advanced some speculative reasons for this reversal of previous findings. However, a fundamental cause could be the complexity of the task. Students studied how to design a blueprint for training in complex skills, based on Van Merriënboer's *Four Component Instructional Design* model. This task necessitates self-paced, head-down, concentrated study of complicated diagrams. As argued by Koumi (1994), such tasks cannot easily be supported by audio commentary, because this is a time-based (transient) medium. Instead, what's needed is a static (printed) set of guidelines which students can revisit repeatedly while they carry out intensive, self-paced study of the diagrams.

Hede (2002) notes that the conflicting results are not surprising, considering the myriad of contingent factors that have been shown to moderate multimedia effects, including:

- nature of visual and audio input
- positive and negative modality effects (dual coding vs interference)
- interactivity and cognitive engagement
- cognitive overload

Another set of factors that would confound the above comparisons derives from the pedagogic design of a package. The set includes

- navigational guidance
- extent and nature of student control
- use of language
- layout of screen (e.g. use of sparse vs. dense screen-text)
- relationship of (sparse) text with conversational audio commentary



- synergy between visual layout and commentary
- design of interactive features
- balance between structured narrative exposition and independent student exploration

These are some of the category headings for the design guidelines proposed later in this paper. It will be argued that the micro-level design principles in these categories are important for optimising the pedagogic efficacy of a multimedia package.

The above experimental studies, in manipulating the format of a multimedia package, may have introduced debilitating distortions into a previously harmonious pedagogical design. If so, the inconsistent results might be artefacts of design distortions. Moreover, the experimenters cannot easily control for these distortions, because to date, there are no published micro-level design guidelines. This paper aims to provide such a framework.

## **The provenance of the Design Framework**

UK Open University multimedia packages are typically produced over several script conferences by a team of experienced teachers who know their target audience well. For such a team, permitted sufficient thinking-time, the ensuing learning material is based upon several lifetimes of teaching experience.

Successive script conferences build creative momentum in which the critical analysis becomes deeper and deeper. Effectively, the team is carrying out a whole *series* of developmental re-evaluations, as *thought experiments*, each member of the team repeatedly taking on the role of a hypothetical student. In addition, many of these design teams include an educational technologist, who contributes research experience and knowledge of current learning theories. Over time, the team will have developed a consensus design model, even if it is rather vague and intuitive.

This paper seeks to pull together these intuitive design models and make them explicit, in the form of the framework below. The framework has been successively refined through the author's appraisal of UK Open University multimedia packages and those of other institutions. Critical comments regarding this first published attempt will be welcomed.

## **The Design Framework/Handbook**

A multimedia package might include video clips containing their own commentary. The screenwriting principles for designing video commentary are beyond the scope of this paper. Chapters 5 and 6 of a forthcoming book by Koumi (2003) provide a framework of such principles. A pre-cursor to these chapters is the paper by Koumi (1991).

However, when the rest of the multimedia package also contains an audio commentary, there are further screenwriting principles to consider. These principles/guidelines are summarised in section 4 below. This section is preceded by some practical points, regarding graphics in section 1 and regarding the production process in sections 2 and 3. The full handbook is much longer, including examples and subsidiary principles. It forms Chapter 8 in Koumi (2003).

### ***1. The visuals***

The visuals can be equations, printed text, (both often built up line by line from top to bottom of the screen), diagrams, animations, video. Usually, the screen would be divided into sections, e.g. video on the left, text on the right.

In all cases, the visuals could be *pure source material*, which the audio teaches about, or can *incorporate their own teaching*, in the form of visual text, which the audio elaborates on. Or, there could be a mixture, that is, there would be some screen text accompanying the visuals, giving an outline explanation, and the audio would elaborate on the outline.

Some of the text would be in the form of interactive dialogue boxes whereby students carry out activities, inputting their own text in response to questions.

## **2. How to prepare for the production**

### **2.1 Consider / Specify:**

- the learning tasks in this week's syllabus that would benefit from a multimedia package,
- the intended learning outcomes,
- learning context,
- target audience characteristics.

### **2.2 Decide on software and delivery platform**

Which programming environment should be used? Should the package be delivered on a CD-ROM, via the Web, or both? Should there be links to commercial software? For an informative discussion, see Taylor et al (ibid).

### **2.3 Decide on type of visual materials**

For example, is video needed? What kind of animations should be designed? Should the visual text always be in the same portion of the screen?

### **2.4 Compose an Outline, on paper, of the multimedia "screens"**

A **screen** consists of a sequence of visuals/graphics that develops autonomously over time. For example, a title might appear at the top, followed one second later by an equation on the left. This might be followed, after a sentence of audio commentary, by a second equation, followed 2 seconds later by a phrase of printed text. The next **screen** of graphics starts when the student has elected to move on, e.g. by pressing **NEXT**.

It is a good idea for the screens alone to constitute a full outline of the content, sufficient to enable busy colleagues to evaluate your design without listening to the commentary.

## **3. The Production**

3.1. Record a first draft audio guide-track and programme the visuals to appear at particular words.

3.2. Finalise the *screens* and get a print-out.

3.3. Rehearse then record the final sound track. On both occasions, someone should take on the role of the student, i.e. look at a printout of the screens while hearing the speaker. There will be one or more occasions when the match between the commentary and the graphics can be improved by changing one or the other.

3.4. Digitise, into individual files, one for each screen, lay onto multimedia package audio-line

3.5. Adjust the picture build-up so that it is geared to the final sound-track (until this stage, the pictures were geared to the guide-track).

## **4. Pedagogic guidelines for screen/audio design for multimedia**

The guidelines are divided into several categories:

- Navigational guidance and student control
- Use of language
- Layout of the screen
- Relationship of screen text to audio commentary

- The speaker should be like a personal tutor
- The visuals and the commentary should reinforce each other
- Interactive elements
- Educational narrative – judiciously balance *effective exposition* by the teacher, against *independent exploration* by the student

#### *Navigational guidance and student control*

- 4.1. Start with a *Contents page* from which learners can access the different sections (normally in whatever order they wish). The *Contents* page should record where students have been (e.g. the title of a section should get a marker once a learner has accessed it).
- 4.2. An *audio-bar* should move to indicate how far the audio file for that screen has progressed
- 4.3. Each audio file corresponds to a screen. That is, the graphics build-up finishes at or before the end of the audio file. Hence students have a visual indication of the progress of the screen information.
- 4.4. As noted by Taylor et al (1997), when students are re-visiting a *screen*, they do not always want to listen to the audio track. This can also be true of experienced students visiting for the first time, as discussed by Beccue et al (2001) and Kalyuga (2000). It could also be true of busy colleagues who are formatively evaluating your design, as discussed in item 2.4. User choice of whether to hear the commentary can be achieved by including a *skip* button (next to the *audio-bar*), with which learners can jump to the end of the current audio file. This would also skip past the graphics build-up, jumping straight to the fullscreen-graphics.
- 4.5. More generally, students should be free to skip to any section/chapter of the package, in any order they wish. They might thereby lose the narrative. However, the contents page (or map), tells them the teacher's intended structure.

#### *Use of language*

- 4.6. Long sentences should be avoided. They might exceed the listener's memory span and they often contain conditional clauses, which are difficult to bear in mind.
- 4.7. The narration is audio not print, so write *conversational speech*, to be spoken and listened to, *not* to be read. Here is one way to achieve this:
  - draft out the *screens* before writing a commentary script
  - working from this draft, speak your first rough commentary, in a conversational style, straight into a tape recorder
  - listen to the tape and transcribe it, then work on the transcript to improve it (but keep it conversational)

#### *Layout of the screen*

- 4.8. Students cannot easily process dense visual layout while listening to commentary. In particular, concerning visual text, a rule of thumb is to use only 25% of normal print density.
- 4.9. Even when the text is sparse, the standard technique is to *develop* a screen of graphics line by line.

#### *Relationship of screen text to audio commentary*

- 4.10. The first question that arises – why include explanatory screen text at all? Could the audio commentary not suffice? One reason for *succinct* items of screen text, is that these can serve as visual reference points, which anchor attention. They can also prevent overloading auditory memory.
- 4.11. Many multimedia packages with audio commentary present *identical* visual text simultaneously – a practise which is emulated by most of the comparison studies discussed earlier. However, literate students can read faster than you can speak. Consequently, the asynchronous semantic processing of

the two sources causes mutual interference. This can be avoided if the screen text is a judicious précis of the audio commentary, not a duplicate.

- 4.12. It is impossible to make hard and fast rules about how to phrase the screen text so that it anchors the audio commentary rather than interfering with its apprehension. However, following the initial design, many ad hoc refinements can be made through adopting the role of the learner during rehearsal and recording of the audio commentary.
- 4.13. It is useful to include a transcript of the audio commentary that students can access for each screen by clicking on a *SCRIPT* button. Then, for example, if students are revising by skimming/browsing through the screens, they can have immediate access to the whole commentary relating to each complete screen. (In any case the transcript is essential for deaf students).

*The visuals and the commentary should reinforce each other*

- 4.14. Make teaching points about a visual when students are looking at it, and not in a wordy introduction while they are looking at the previous visual.
- 4.15. However, there are occasions when the words should come first, in order to prepare the viewer for the pictures, such as, *In the next animation, concentrate on the arms of the spinning skater.*  
<ANIMATION STARTS WITH SKATER'S ARMS HELD WIDE, THEN PULLED IN>
- 4.16. Give students enough time to digest the visuals. A notorious error is to position the words at the beginning of the audio file rather than preceding the words with a pause, say for 2 seconds.
- 4.17. Indicate clearly where to look on the screen. This often requires a visual cue such as highlighting an item in a long list when it is mentioned.

*Interactive elements*

- 4.18. Whenever students carry out an activity, they should be able to keep a record, inside the package, e.g. typing into a *notepad*, rather than on a scrap of paper, as exemplified in the Homer package (see Laurillard, 1998). This serves to preserve the narrative that has been *co-authored* by the package and the student.
- 4.19. The package should provide appropriate *scaffolding* for student activities. For example, if a student types an incorrect answer into a dialogue box, there should be an option to be told the correct answer, or to get one or more hints, or to try again. If there is no "correct" answer (as in open questions), the package should still afford feedback, in the form of a model answer (Laurillard, 1998). For more on scaffolding, see McLoughlin, Winnips and Oliver (2000).

*Educational narrative: judiciously balance structured exposition by the teacher, against independent exploration by the student*

The efficacy of narrative structure has been proposed by many writers, such as Gudmundsdottir (1995), Gibson (1996), Laurillard (1998) and Laurillard et al (2000). However, how can a narrative structure be maintained when the package allows the learner considerable freedom of random access? This question will be tackled in the next section, after *narrative structure* is defined, in terms of the guidelines below.

The guidelines are intended to be applied flexibly to each *chapter* of the narrative. They are treated only in outline, adapted from the principles for pedagogic video design, in Koumi (1991).

- 4.20. **Signpost:** Clearly indicate where the story is going, what is happening next, why it is happening, what to look out for.
- 4.21. **Facilitate concentration:** e.g. short pauses for contemplation, encourage prediction.

#### 4.22. *Encourage/enable constructive learning*, e.g.

- concretise: that is, relate to (hence *activate*) students' previous knowledge
- support/scaffold the learner's construction of knowledge, e.g., concerning problem-solving, Merrill (2002) and Van Merriënboer (1999) recommend several techniques, such as: show a worked example of a similar problem before asking students to solve a problem OR show a simple *half-way-there* problem before posing the full problem OR divide the problem into sub-problems OR pose a sequence of successively more difficult problems
- the type and extent of scaffolding depends on the ability of the learner in relation to the material; some target audiences need little or no scaffolding and in any case, the scaffolding should be withdrawn little by little as learners progress

#### 4.23. *Elucidate*: moderate the load, pace and depth, maximise clarity

#### 4.24. *Reinforce* (e.g. give more than one example of a concept, use *comparison* and *contrast*, ensure *synergy* between commentary and images)

#### 4.25. *Conclude* (e.g. summarise and consolidate where necessary)

Given all the above, it should be clear that you cannot design a perfect picture-word package with your first draft. Moreover, the programming modifications that are required to implement each draft will rarely produce precisely what you envisaged

### **How can narrative coherence be salvaged**

Gibson (1996) expects that multimedia authors will continue to incorporate many different layers in a single work and to enable *a wide variety of paths through (the material)* (p19), so that learners can piece together their own, idiosyncratic stories. The design considerations for such multi-layered works are rather complex, in that the diverse possible narrative structures of the viewers need to be borne in mind when constructing the hyperlinks in the multimedia package. This task can only be managed if authors restrict attention to a small subset of all the possible narratives.

Many learners would welcome the security offered by a coherent structure. The more adventurous learners who stray radically from the core narrative have an independent learning style that enables them to prosper with minimal structuring. In addition, as exemplified earlier, some strategies for preserving the narrative are discussed by Laurillard et al (2000) and by Laurillard (1998).

### **Postscript**

Two types of research papers were outlined at the beginning of this paper. One type reported on experimental studies of individual audio and visual variables. The other type, by UK Open University writers, were summative studies that dealt primarily with macro-level design issues. How do these two sources relate to the above micro-level design guidelines?

The guidelines derive from practitioners. They are more detailed than the levels of investigation carried out in the above experimental studies. This discordance is natural. The variables that can be investigated using a scientifically acceptable experimental study are simpler than the complex integration of design principles that must be used by practitioners.

On the other hand, these design principles are intuitive and have not been studied scientifically. The set of design guidelines is offered as a fledgling design theory for researchers to investigate the practitioners' intuitions. It would be heartening if this paper could start an iterative process whereby researchers and practitioners collaborate to improve the design of multimedia packages.

Finally, the above micro-level guidelines might serve to add flesh to the further development of the overarching issues espoused in the macro-level papers by Laurillard, Taylor and others. In return, such issues need to be borne in mind for future development of design guidelines.

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# MAPPING THE CLASSROOM INTO THE WEB: CASE STUDIES FROM SEVERAL INSTITUTIONS

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## Abstract

The paper describes our research with a system that automatically produces web based education out of regular classroom lectures. In the classroom, the lecturer writes on a wide pen sensitive display in place of the traditional chalkboard. The system records all actions and makes it possible to replay the lecture from the web at any time. Remote students follow the lecture looking at the dynamic board content and listening to the recorded voice of the instructor. In addition to drawings, the new chalkboard handles a range of multimedia elements from the Internet. Using handwriting recognition, mathematical expressions can be evaluated and functions can be plotted immediately on the board. Since the first release in early 2002, we have gained practical experiences with different use cases and scenarios which we present in this paper.

## 1. Motivation

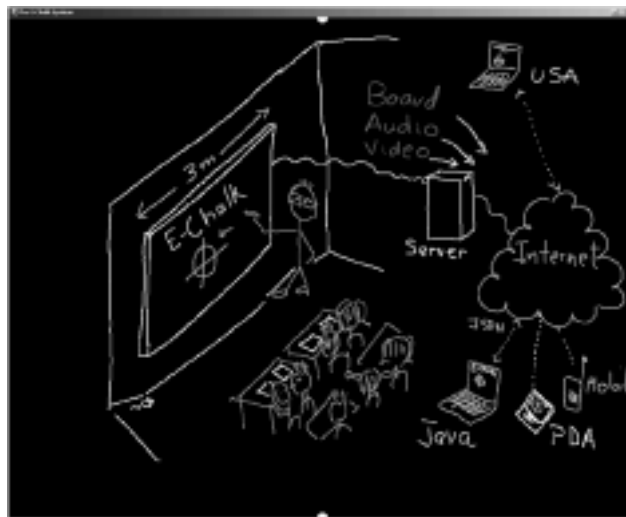


Figure 1: E-Chalk sketch of E-Chalk

In many disciplines, especially in the natural sciences, the chalkboard has been an unmatched teaching tool for ages. Lecture participants can see how ideas are developed instead of being overwhelmed with complete results. The initial idea behind the development of our system, E-Chalk, is to preserve the pedagogical advantages and the easy handling of the traditional chalkboard, while extending its reach to distance learning. A good chalkboard lecture automatically results in a good e-learning lesson. Furthermore, we enhance teaching quality in the classroom by allowing the instructor to integrate multimedia elements and to interface certain external programs. In the classroom, the lecturer works directly on a pen-active display or uses a digitizer tablet. At the same time, the lecture is being saved and transmitted live over the Internet without any additional effort. The ratio of production time versus duration of the produced learning unit using conventional authoring systems is typically a two to three digit number. The main reason for this is that traditional teaching know-how does not easily match contemporary authoring tools. Besides technical efforts, they require a huge amount of work to structure pedagogical content for the web. With standard video web cast tools, the technical quality of the recording is not appropriate for educational content. Writings and drawings, either from slides or from the chalkboard, are poorly encoded since video compression omits sharp edges.

## 2. Software

Our main objective is to present teachers the environment they are used to (Rojas et. al. 2000). The lecturer steps into the classroom and starts teaching on the board like he always does. In addition to the standard drawing functionalities, the lecturer can place images on the board loaded from the Internet. CGI scripts in the web delivering text and pictures can be queried inside the board environment. A lecturer can paste an interactive Java Applet to the board and interact with it. The Applet behaves the same way on the receiving side, while the program is used on the server side. Additionally, there is an interface to a computer algebra system via handwriting recognition (Tapia, 2003).

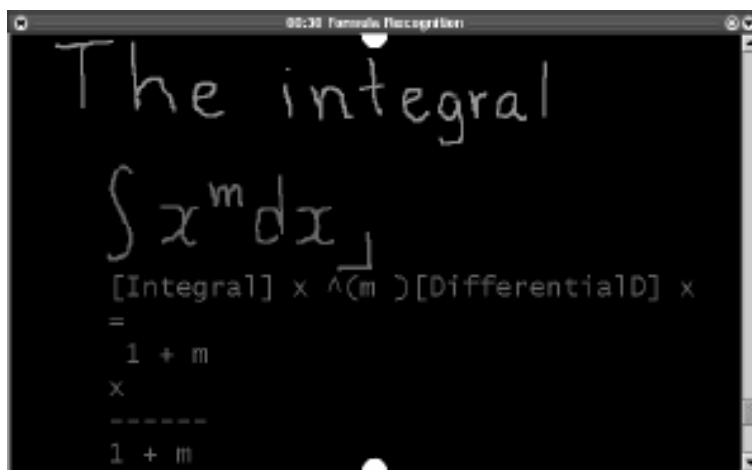


Figure 2: Handwriting recognition as an interface to an algebraic system

Using a microphone and/or a web cam, audio and/or video of the instructor can be transmitted and archived. When the live transmission of a lecture has ended, the lecture is archived in a way ready to be played back with any Java-enabled web browser. A printable transcription of the board as Adobe PDF file is also included. The entire software system (board application, audio system and video codec, streaming components, PDF converter) has been written in Java. The system is used on Linux, MacOS, and MS Windows platforms. For the optional postproduction of lectures we developed a generic multimedia editor named Exymen (Friedland, 2002).



Figure 3: E-Chalk lectures as seen in a browser



### 3. Hardware

In order to use the E-Chalk Software in the classroom, you need a pen based input device and a wide display (Friedland et al., 2001). The following list is a selection of commonly used devices:

- Digitizer tablets with LCD projection or tablet PCs  
Digitizing tablets are comparatively cheap and easy to transport. Using a tablet with integrated display one can write like on a sheet of paper. Optionally, the computer screen can be projected against a wall.
- Digitizing whiteboards  
Several companies distribute digitizing whiteboards. These are wide, perpendicular mounted digitizing tablets (up to 80' diagonal). The screen content is displayed on its surface by an LCD projector.
- Retro projectors with pen tracking  
The advantage of using a retro projection system as wide display device is that nobody can interfere with the projection beam. Contrast and luminance are much better than those of an LCD projector, which makes them usable without darkening the room. Disadvantages are their heavy weight and the high purchase costs.

### 4. Practical Experiences

An idea like E-Chalk depends on instructors' and students' preferences. Since the summer term of 2001 the computer science department of the Freie Universität Berlin has been regularly using E-Chalk for courses. In the beginning many professors were afraid of trying yet another e-learning technology. However, E-Chalk is now used more and more since last year's release. This makes it possible to study the different types of applications that people have found useful. The following sections present a selection of them.

#### 4.1 Classroom Scenarios

Having many students in a lecture room requires a very big display surface. The practical solution is to use a digital whiteboard or a digitizer tablet as writing surface plus an extra projector that projects the board content widely. This way, board content is better readable than on a regular chalkboard. The Technical University of Berlin uses this setup regularly for the mathematics lectures for beginning engineering students.

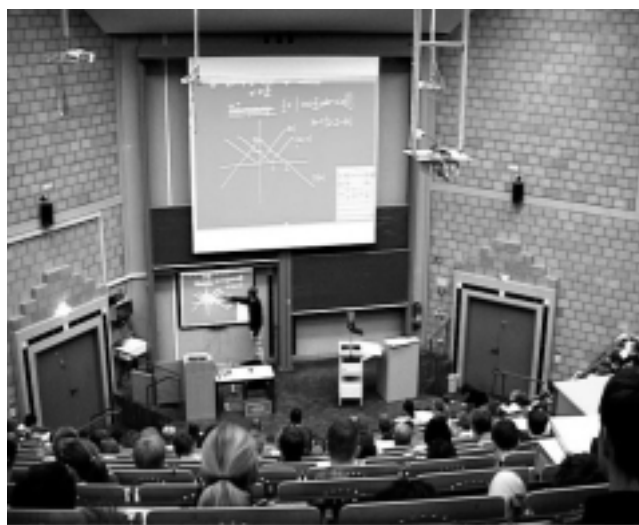


Figure 4: Mathematics lecture at the Technical University of Berlin using a digital whiteboard and an extra projector

For smaller seminars we often use a setup with several digitizer tablets, enabling students to directly participate in the lecture. In the case shown in the picture, the geology teacher uses a rear projector and the students use small digitizer tablets to work on geographical maps.



Figure 5: Geology seminar at Freie Universität Berlin using rear projector and several tablets

A handicapped professor for Arabic linguistics was glad to be able to give a chalkboard lecture while seated using a digitizer tablet for himself, instead of writing on the rear projection screen. This scenario is also useful for a German high school: The computer room of this school is so small, that neither a chalkboard nor tables for the students big enough for a computer and writing space fit in. The teacher uses E-Chalk with a digitizer tablet and projects the board content onto the wall. The generated PDF of the lecture is printed out at the end of the class, so that the students can get a copy of the class even though they do not have enough space for writing.



Figure 6: Computer science class at a high school: E-Chalk helps to handle the space problem

We use E-Chalk also in combination with videoconferencing systems, which enables us to have audiences in different universities at the same time. The chalk content is synchronized with the video conferencing system. This enables us to follow chalkboard lectures from important personalities that are held at a different place.



Figure 7: A cooperative lecture between FU Berlin and Kyoto University of Education (view in Japan)

#### ***4.2 Off-Classroom Scenarios***

Because everything is recorded for the web, it is also possible to give a lecture at home and present it later. Many school teachers told us, that they find this a practical feature because they can easily create classes for the students to see at home. This makes it possible to teach more content, as students can repeat material at home.



Figure 8: Using a microphone and a digitizer tablet lectures can also be recorded at home

Recorded lectures are also useful for students not being able to be present in the classroom for different reasons, for example scheduling collisions. The most frequent use of recorded lectures is for exam preparation. Students use the classroom recorded lectures to prepare for oral or written examinations by again listening to parts of the original lecture. Listening to a given lecture does not require a computer: Students have also converted the audio to use an MP3 stick plus the PDF printout to prepare for an examination in the subway. High school students gave us feedback, that they used a lecture for undergraduate students to get an impression of our university.

The live transmission of the lecture also helped to relieve classrooms. Students that did not find a place in the lecture hall used the PC pool and ear phones to follow the lecture.

## 5. Current Work

We are working on the integration of E-Chalk into different E-Learning platforms, such as Blackboard and WebCT. The advantage is that the produced lectures can easily be managed together with announcements and exercises.

In cooperation with the Berlin school administration, we are conducting a field study to evaluate the use of E-Chalk in schools. E-Chalk is used in combination with different kinds of digital whiteboards in elementary schools and in the three types of high schools that exist in Germany. A preliminary result is that elementary schools seem to be the type of school where the concept fits best. The reason may be that in elementary school the chalkboard plays the most important role. A final result of this study is expected at the end of 2003.

## 6. Summary

With the system presented here it is possible to produce distance lectures as a by-product of classroom teaching. Different hardware configurations are used for different classroom situations. Our distance lectures are not meant to substitute classroom lectures but to support them. They help a student to rework the material and provide a living and active script, where asides are not lost. In the long run we hope that a broad usage will substantially improve teaching and learning quality. Remote students do not need any special equipment or software other than a computer with a web browser. Only a browser is needed. All substantial information in the form of audio and dynamic board image can be received with low bandwidth requirements.

E-Chalk was awarded the European Academic Software Award 2002. The web site of the project can be visited at <http://www.echalk.de>.

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# THE EUDOXOS PROJECT TEACHING SCIENCE IN SECONDARY EDUCATION THROUGH A ROBOTIC TELESCOPE

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## Abstract

The **Eudoxos project** aims at using the possibilities the Internet offers in order to transform the classroom into a research laboratory. The project studies the applicability of the emerging technology in the school sector and provides a platform that allows the students to use the AM Telescope of the Eudoxos National Observatory for Education and Research in the framework of their school curriculum. The Eudoxos project aims at demonstrating in practice how e-learning can improve and enrich the quality of the learning and teaching process in science and technology and thus should constitute an element of a new educational environment.

## The project's background

The sky is a vast and unique laboratory of science, always in operation, accessible to everybody at all times, where all sorts of interesting physical phenomena take place most of which is impossible to reproduce in any scientific laboratory. The project takes advantage of the natural tendency of children and youngsters to pursue pleasure and research in their activities and the fact that the observation of the sky always fascinated mankind and motivated the studies of nature and the physical laws. Furthermore, the project provides students, even from remote schools with elementary technological infrastructure, the possibility of using a technologically advanced research instrument, to comprehend scientific issues.

The aim of the **Eudoxos project** is to utilize the 'Andreas Michalitsianos' (AM) telescope, a 60cm Cassegrain type **remotely controlled robotic telescope** with large-format CCD camera (Fig. 1), in order to develop a framework to teach science subjects to High School students through an interdisciplinary approach.



Fig. 1. The Andreas Michalitsianos robotic telescope on location (Ainos mountain, Kefallinia island, Greece).

The robotic telescope is installed in the **Eudoxos National Observatory** on the Ainos mountain of Kefallinia Island (Ionian Sea), Greece. This large scientific instrument has been developed with funds from the Greek Government. The Eudoxos project is a collaboration of the **Institute of Nuclear Physics at the National Centre for Science Research "Demokritos"**, the **Greek Naval Academy**,

**The Pedagogical Institute and the Prefecture of Kefallinia and Ithaki**, to be used for educational and research purposes as **a working example for Distance Learning and Research** [1].

The robotic telescope was installed in August 2001 and it is now operational. One is able to remotely request a specific observation schedule and subsequently receive the resulting photographs via the Internet, to be used for educational purposes or for scientific analysis.

### **The project's pedagogical approach**

The proposed approach cross cuts the traditional boundary between the classroom, home, scientific laboratories and research institutions as distinct learning environments. It aims at involving the users (students, teachers) **in extended episodes of playful learning**. Learning involving a fun element can be more effective [2]. According to Lepper and Cordova [3] learning embedded in a motivating setting (such as an observatory) improves the learning outcomes. One implication of this model is that students should be assigned activities that reflect the application of the content knowledge as it is practiced outside the classroom. The goal is to induce the learner into a **"culture of practice"** which makes the knowledge meaningful. Within this general framework the new technology application of **Eudoxos project** supports the **pedagogical method of autonomous self-directing learning** and allows for a self-directed acquisition of skills to meet users individual communication and learning needs. The self-learning method is supported by elements of entertainment (**play and learn**) in order **to enhance learning by using the new communication technologies to transfer the magic of an observatory into the classroom**. A learner support is supplied through an on-line manual that acts as an **on-line tutor**. The on-line tutor serves as the guide to the students' work. Methodologically it is based on the learning scenarios and the lesson plans that have been developed in order to support the project's application.

### **Project's Activities**

In the framework of the project a user-friendly **web based educational environment is being developed** in order for the telescope to be operated via queue based scheduling by high school students and their teachers (Fig. 2). The development of the educational environment is the outcome of the collaborative effort of scientists, pedagogical and software experts, technicians, teachers and students.

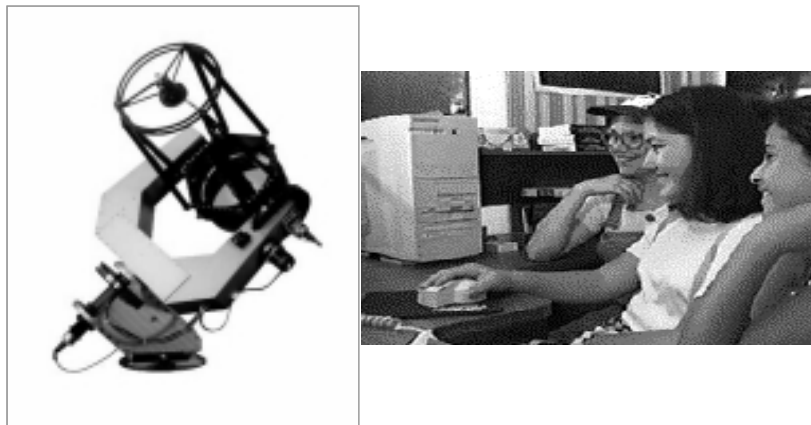


Fig. 2. An advanced remote robotic telescope is transferred into a typical classroom enabling the students to perform their own astronomical observations.

The partnership plans to adopt a heavily user-centered approach in the development of the tool. In order to do so the project's implementation includes **two cycles of school-centered work** in real school environments. For the first cycle an adapted curriculum is developed around a solid educational framework that captures the main learning objectives of the project (observation of the sun, the moon, planets, galaxies, nebulae, variable stars, eclipsing binaries), while during the second cycle the students and teachers of the participating schools will have the chance to design and perform their own projects by

using the telescope (as for example the determination of the orbital elements of asteroids and other ambitious projects and experiments) from their own direct astronomical observations. The project was set on experimental operation for one year in five Greek schools. Following the successful completion of this pilot operation, a two cycle school centered work was designed.

During the first cycle it is implemented in schools in Greece, Italy, Spain and Austria, while during the second cycle of the school centered work more schools will be allowed in the network from other European countries. The project's evolution relies in parallel on **the further development of the telescope** (improvement of the access to it through the development of a highly user-friendly user interface, in order to be used for educational purposes) and **the design and development of a pedagogical framework for the introduction of the scientific inquiry in science teaching at school level**. The pedagogical framework includes the necessary adjustments to the normal school curriculum, teachers training (on-line seminars and workshop) and support, development of lesson plans (Fig. 3.) for the project's implementation in the classroom and development of educational material (conventional and electronic).

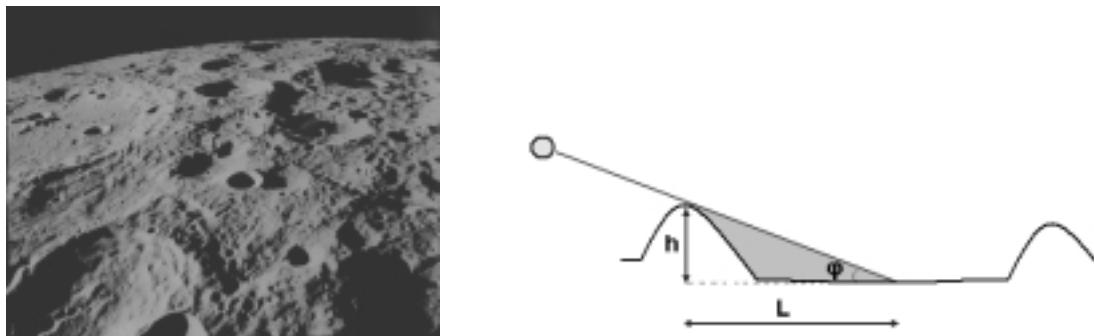


Fig. 3. By observing the moon craters and with the use of elementary mathematics students can measure the height  $h$  of a moon crater through its shadow ( $L$ ). With this lesson plan they are able to understand the relative positions of the earth, the sun and the moon and realize that the source of light is the sun.

### Project's Objectives

The main aim for the Eudoxos project is to take advantage of the popularity of the subject of Astronomy and the attraction of the idea of using directly a first rate scientific instrument, in particular a high grade telescope, to teach students concepts and ideas of science, of a multidisciplinary nature spanning through the areas of mathematics, statistics, chemistry, physics etc. and of course astronomy, astrophysics and cosmology. The objectives of the project are:

- **The development of a pedagogical framework that allows for successful application of the advanced technology in science teaching:** The project develops an innovative educational approach, which guides students through the learning process in science, by using real-time astronomical observations as possible subjects of both formal and informal investigation.
- **The enhancement of a constructionist approach in science teaching:** Usually pre-designed experiments are used in science teaching. In the framework of the project students use the telescope to set up their own experiments and observations, which they conduct autonomously. In this way the procedure of scientific inquiry is fully simulated: formulation of hypothesis, experiment design, selection of time and sky area, implementation, verification or rejection of hypothesis, evaluation and generalisation are the steps that allow for a deeper understanding of science concepts.
- **The enhancement of motivation of students:** Students are more likely to feel a sense of personal investment in a scientific investigation as they actively participate in the research procedure and add their own aesthetic touches to their observations.

- **The development of critical capacity:** Too often students accept the readings of scientific instruments without question. When students get involved in the project's activities they should as a result develop a healthy scepticism about the readings and a more subtle understanding of the nature of scientific information and knowledge.
- **To make connections to underlying concepts:** In the framework of the project's application to the school communities, students are asked to design their own projects. During this procedure students figure out what things to measure and how to measure them. In the process they develop a deeper understanding of the scientific concepts underlying the investigation.
- **To understand the relationship between science and technology:** Students participating in the project gain firsthand experience in the ways that technological design can both serve and inspire scientific investigation and *vice versa*.
- **The development of new learning tools and educational environments:** The Eudoxos project gives the opportunity to use a remotely controlled telescope in a real-time, hands-on, interactive environment to students around Europe. It enables the students to increase their knowledge of astronomy, astrophysics, mathematics and other science subjects; improve their computer literacy; and strengthens their critical thinking skills. A **User-friendly Interface** has been developed to be an adding tool that bridges science teaching and technology. This software educational tool supports teachers and students in a new learning environment and is at the same time compatible with graphics and analysis software components, so students can easily investigate trends and patterns of the data they collect by using the telescope. Students are able to graphically view all quantities under study and the data correlations through a scatter diagram on the computer screen. This specially developed interface is also used for data download (transfer from the telescope), analysis and presentation of data, in an organized educational way. The project also has an equally important goal at the level of the social dimension of learning. It attempts to overcome the limits of the classroom by having a network of schools gathering and processing the same type of data and asking the students to compare their findings and exchange their ideas. Research thus becomes a collective process, whereby the interactions are not merely at the level of data analysis but also at the level of the formulation of hypotheses, exchange of opinions, announcement and communication of results using the collected data that are regularly submitted to a Web database.
- **The development of a concrete evaluation scheme of the educational and technological aspects:** Evaluation of both aspects of the project (technology and pedagogy) is done according to well-defined methodologies. The aim is to develop a better theoretical framework on how different types of tools and instruments support different types of thinking, reasoning and understanding. The research process that is adopted in order to study the impact of the proposed educational approach includes both measurements (achievement tests) and on field observations (video captures of the activities). In the educational aspect there will be a complete evaluation of the student's learning and of the pedagogical framework, while in the technological aspect there will be a complete evaluation in the quality, the user-friendliness, the flexibility and durability of the products. The evaluation of the didactic approach will be performed on three aspects: evaluation of student's learning, evaluation of the underlying pedagogical framework and ethnographical evaluation.

## Added Value

Although the Eudoxos project is using a front-end technological device, the aim is not to test this technology but to focus on the results and changes on the qualitative upgrade that it can produce in the teaching procedure. The Eudoxos challenges the most difficult objective of **the development of a better understanding of the opportunities, which are associated with e-learning methods, contents and resources and their impact in education in terms of organisation and management**. The partnership believes that the new systems and educational tools have to start from the user. They have to be so transparent that the user can understand them and be in control of what she or he is doing.



Recent studies<sup>1</sup> normally describe science lessons by means of negative indicators. Students behave passively and their learning outcome is mostly not seen as a basis for the acquisition of new knowledge and for further activities in the area [4]. Students seem to be far away from skills proposed by “scientific literacy” to become reasonable and responsible acting citizens [5], meaning in short they are far away from presenting, discussing and criticising science related topics of society. The Eudoxos project contributes in changing the present situation by implementing the following innovations:

- Teaching science through the use of an advanced scientific instrument.
- The new technology offers to the participating students and teachers a unique possibility to use a scientific instrument remotely. The students are able to observe the sun, the planets, the stars, the galaxies on line. In this way their classroom is transformed into a scientific laboratory. The partnership believes that students can come to view the astronomical observations as a craft that rewards dedication and precision but simultaneously encourages a spirit of creativity, exuberance, humour, stylishness and personal expression.
- Reinforcing interdisciplinary approaches.
- The main link usually missing in the learning process is that students do not learn sufficiently through experience but through a systemic model based approach, which should be the culmination of learning efforts and not the initiation. A particularly disturbing phenomenon, that is common knowledge among educators, is that students fail to see the interconnections between closely linked phenomena or fail to understand the links of their knowledge to everyday applications. Therefore, in recent years, there is a clear focus on interdisciplinary education. This approach supports that educational experiences should be authentic and encourage students to become active learners, discover and construct knowledge. Authentic educational experiences are those that reflect real life, which is multifaceted rather than divided into neat subject-matter packages. The Educational context of Eudoxos is not transmitted in a theoretical way but rather in a biomatic way in the form of a real life experience. Observing the sky and using a telescope is a highly interdisciplinary subject and its implications give topics for discussion in Astronomy, Cosmology, Physics, Chemistry, Mathematics, Mechanics and clearly expanding the learning resources for students. Additionally, teachers are faced with a real challenge. Having specialised in an academic discipline may cause frustration to them when it comes to creating interdisciplinary, cross-curricular activities. Such activities demand considerable knowledge in many areas, something they may lack. Collaboration with their colleagues may help them overcome this challenge, develop positive attitudes to interdisciplinary learning and gradually adopt it and make it part of their teaching practice.
- Promoting behaviour and process oriented learning.
- After the familiarization of the students with the use of the telescope, projects are assigned to them. They are let free to approach the phenomena and the astronomical objects (sun, planets, stars, galaxies, etc) they want to study. The students are requested to develop real problem solving practices, letting themselves free to handle situations and study them. By using the telescope and the user interface to compose their own scientific inquiring strategy, the partnership expects students to be able to engage in more meaningful and motivating science-inquiry activities. In this way these assigned projects promote creativity through new forms of content combining highly visual and interactive media with the use of innovative ways of design, delivery, access and navigation. The versatility of the tool and results is one of the most compelling factors of the project. The students are encouraged to present and further develop their results in settings that go beyond the school boundaries. Finally, the partnership believes that at the end of the project students will not see the advanced electronic equipment like the telescope and other similar measuring devices as black boxes, but as something that can “take it apart and built it again”.

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<sup>1</sup> The TIMSS Videotape classroom study, National Centre for Education Statistics, US department of Education.

## Future plans

The project is now (January 2003) on its fourth month of operation, the lesson plans and the user interface are being developed. The first stage of the implementation is planned to start in two months. The project will be further developed and optimised through the following tasks:

- The development of a web based educational software that will give the opportunity to students across Europe to control the telescope and perform observations. In this way the observatory could be operated via a queue-based schedule and a network of astronomical observatories in schools across Europe will be established.
- The upgrade of the observatory with a much smaller component that will allow the students to observe on-line the sun during the day (solar telescope).
- The collection of input of information to the database from other more powerful telescopes including the Hubble telescope and radiotelescopes or other astronomical instruments located on earth or in space, will also be used to enhance the validity of the scientific ideas and the educational value of the project.
- The addition of new exercises to the lesson plans to cover as many scientific topics as possible.
- The development of a model telescope with the use of Lego® toys and the Lego Mindstorms® software which will resemble the real telescope and simulate its motion.
- The organisation of “Astronomy Nights” which will include real time observations with the AM telescope, speeches of invited scientists and other events.
- The optimisation of the internet connection of the telescope through the Greek satellite to be launched in the forthcoming months. Towards this direction a collaboration between NRC “Demokritos” and the Greek Telecommunications Company (OTE) for the remote operation of the telescope has already been developed.

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# AN AFFORDABLE AND EFFICIENT IN-SERVICE TRAINING SCHEME FOR THE SCIENCE TEACHER

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## Abstract

In this work a scheme for continuing in-school training of primary and secondary school Science teachers is presented. This system, using extensively the Internet and based on distance education methods, exhibits significant advantages compared with other forms of training. The proposed system may also be used as an on line help provider to the school personnel, a feature not possible under most of the current teacher training schemes; this feature is useful for schools in isolation or at hard to reach areas. This system has the advantage to be affordable to all the teachers, irrespectively of the location of their schools, and uses wisely time, resources and human capital. It requires a good operational scheme, which may be developed, and an infrastructure, which is already present in the schools. It eliminates the teacher mobility due to personnel participation in short term training schemes. This characteristic is very important to the school operation. The operational scheme and the infrastructures required for the operation of the proposed scheme may also be used for the communication – cooperation within the framework of other school activities or participation to (competitive) programs, e.g. COMENIUS.

## Introduction

Research<sup>1</sup> and development<sup>2</sup> interest on the effective Science and Technology Teaching is continuously increasing. Due to the rapid advances the necessity of a literacy in Science and Technology has emerged as fundamental worldwide crucial matter, a right to the democracy<sup>3</sup>. This literacy may be achieved in a generalised way, addressed to all the prospective citizens, only through the compulsory education. This perspective necessitates to raised expectations on the specific skills<sup>4</sup> from the compulsory (primary and secondary) Science and Technology teacher. The primary teacher, usually, teaches all the subjects of the curriculum (“general teacher”) and his (her) education is mainly based on psycho-pedagogic matters. The secondary teacher is usually a “specialty teacher” with an assumed sound knowledge of his (her) field but not specifically educated as a teacher. In both cases the skills referred to previously are not included to their initial education and have to be developed through further individualised training. It seems that although some teachers may posses some of the skills, prevailing more significant skills do not exist; all are required for an effective teaching<sup>5</sup>. These observations may explain, partly, the peculiarities of the

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<sup>1</sup>See for example in ‘Advances in Research on Teaching’, Vol. 2, 1991 ‘Teacher’s Knowledge of Subject Matter as it relates to their Teaching Practice’, edited by Jere Brophy, JAI Press Inc.

<sup>2</sup>See in University of Cyprus, ‘1<sup>st</sup> IOSTE Symposium in Southern Europe – Science and Technology Education: Preparing Future Citizens’, Paralimni-Cyprus 29/4-2/5 2001, proceedings Vol. I & Vol. II.

<sup>3</sup>See for example a/UNESCO, The project 2000+ declaration the way forward. UNESCO, France, Paris 1994 ([http://www.unesco.org/education/educprog/stp/projects/2000/index\\_2000.htm](http://www.unesco.org/education/educprog/stp/projects/2000/index_2000.htm)), b/Holbrook, J. & Rannikmäe, M. ‘Supplementary teaching materials-Promoting scientific and technological literacy. Paris, France: International Council of Associations for Science Education/ UNESCO, c/ICASE. SEAMEO-RECSAM, UNESCO, The Training of Trainers’ Manual for Promoting Scientific and Technological Literacy (STL) for All. Bangkok 2001: International Council of Associations for Science Education, Southeast Asia Ministers of Education Organisation; Regional Centre for Education in Science and Mathematics and UNESCO Principal Regional Office for Asia and the Pacific.

<sup>4</sup>for example a good knowledge of the basic principles and the skill to relate this knowledge to cases from the everyday life, the skill of using experimentation and scientific inquiry towards the development of creative thinking, the skill to contact teaching through the assignment of projects, etc.

<sup>5</sup>Deborah Loewenberg Ball, ‘Research on Teaching Mathematics: making Subject-Matter Knowledge part of the Equation’ page 3 in ‘Advances in Research on Teaching’, Vol. 2, 1991 ‘Teacher’s Knowledge of Subject Matter as it relates to their Teaching Practice’, edited by Jere Brophy, JAI Press Inc.

Science and Technology teacher education<sup>6,7</sup>. In all modern, technologically advanced societies, special measures are taken for an effective Science teaching<sup>8</sup> with the necessity for a generalised Science and Technology Literacy an explicit objective<sup>9</sup>. This literacy, in order to be useful as a right to the Democracy must be focused on principles and methodology rather and not being limited to factual knowledge on specific data, techniques or themes. This implies that in order to be understandable and assimilated by the students, the scientific knowledge that the Science and Technology teacher possess has to be transformed appropriately to teaching activities but it seems that teachers lack, in general, this skill. As a consequence, Science and Technology are considered as difficult subjects<sup>10</sup> although they are rather simpler<sup>11</sup> and possess inherent advantages<sup>12</sup>. This constitutes a significant problem in most of the advanced countries (see references in footnote 3). Another relevant matter is the existing outline of the Science and Technology subject matter and the way of teaching. In the majority of the cases the subject matter does not include advances like relativity or quantum physics that are known for more than 5 generations and require a (qualitatively) different approach than the Aristotelian one of classical physics<sup>13</sup>. The teaching is in general narrative<sup>14</sup> with the teaching book as the only resource<sup>15</sup>. This practice implies that scientific inquiry skills, an explicit common objective of the Science curriculum, are not developed. As a further consequence, a difficulty seems to exist to discriminate between observations' data and their interpretation<sup>16</sup>. The remedy of the situation described previously may be achieved through a new planning:

1. Of the education and initial training of the Science and Technology (S&T) teacher in the compulsory, especially, education.
2. Of the continuous in-school training of S&T teacher in order to maintain and improve their proficiency.
3. Of the teaching approaches, a matter closely related to teacher's proficiency.

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<sup>6</sup>P. G. Michaelides, "The Science curriculum in the Department for Primary teacher` Education of TheUniversity of Crete", pp. 941-951 of the proceedings of the 7<sup>th</sup> Pan-Hellenic Conference of the Greek Pedagogic Society, Naupaktos November 13-15, 1998 (in Greek).

<sup>7</sup>P. G. Michaelides, "Polymorphic Practice in Science", pp. 399-405 of the proceedings of the 1<sup>st</sup> Pan-Hellenic Conference on the Didactics of Science and the introduction of New Technologies in Education, University of Thessaloniki, Thessaloniki May 29-31, 1998.

<sup>8</sup>see for example a synopsis for the case of England in Susan Barker and Pilar Reyes, 'Why be a Science Teacher?', pp.57-68 of Vol. II of the proceedings of the University of Cyprus, '1<sup>st</sup> IOSTE Symposium in Southern Europe – Science and Technology Education: Preparing Future Citizens', Paralimni-Cyprus 29/4-2/5 2001.

<sup>9</sup>See for example: a/for the USA the activities of the 'Institute for Science Education and Science Communication' related to the teaching of Science and Technology to students of a non Science related career, b/for England and Wales, 'Science: The National Curriculum for England', c/for a more general review, Karidas A. and Koumaras P. 'Scientific (and Technological) Literacy for All: Presentation of a Research Model and an Attempt to Constructing a Relevant Proposal', pp. 89-97 of Vol. I of the proceedings of the University of Cyprus, '1<sup>st</sup> IOSTE Symposium in Southern Europe – Science and Technology Education: Preparing Future Citizens', Paralimni-Cyprus 29/4-2/5 2001.

<sup>10</sup>Krystallia Halkia, 'Difficulties in Transforming the Knowledge of Science into School Knowledge', pp. 76-82, of Vol. II of the proceedings of the University of Cyprus, '1<sup>st</sup> IOSTE Symposium in Southern Europe – Science and Technology Education: Preparing Future Citizens', Paralimni-Cyprus 29/4-2/5 2001.

<sup>11</sup>As may be inferred from the fact that, in human history, they appear and advance earlier than other sciences.

<sup>12</sup>For example their subjects of study are easily perceptible through the senses, an irrefutable advantage for most of the compulsory education students who, in a Piagetian context, have not as yet reached the formal logic stage.

<sup>13</sup>For the necessity on the modernisation of the Science curriculum see George Kalkanis 'Which (and How) Science and Technology Education for Future Citizens?', pp. 199-214 of Vol. II of the proceedings of the University of Cyprus, '1<sup>st</sup> IOSTE Symposium in Southern Europe – Science and Technology Education: Preparing Future Citizens', Paralimni-Cyprus 29/4-2/5 2001.

<sup>14</sup>Deborah C. Smith and Daniel C. Neale 'The Construction of subject-Matter Knowledge in Primary Science Teaching', pp.187-243 in 'Advances in Research on Teaching', Vol. 2, 1991 'Teacher's Knowledge of Subject Matter as it relates to their Teaching Practice', edited by Jere Brophy, JAI Press Inc.

<sup>15</sup>A. Athanassakis "Environmental education and teachers' tendencies", Department for Primary Teachers' education of The University of Crete, Ph.Ed. dissertation, 1992 (in Greek).

<sup>16</sup>P. G. Michaelides, "Understanding difficulties in Science observations", oral presentation, 2<sup>nd</sup> Pan-Hellenic Conference on the Didactics of Science and the introduction of New Technologies in Education, University of Cyprus, Nicosia May 3-5, 2000, book of abstracts page 26 (in Greek).

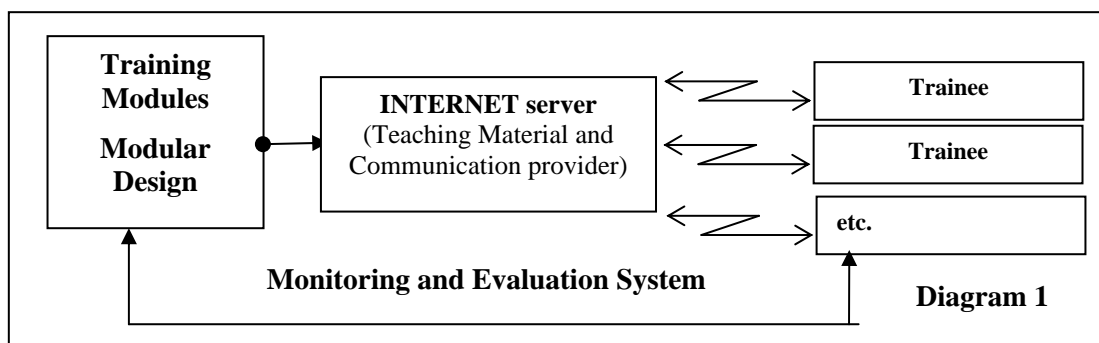
On the education and initial training (point 1. - above) see existing studies elsewhere<sup>17</sup>. The other two points may be met efficiently through the appropriate training of the S&T teacher. As these points refer to the acquirement or the development of practice skills, for which apprenticeship teaching is more advantageous, the continuous informal in-school training is more appropriate. In-school (or on the job) training programs, in order to be effective:

- Must be individualized to the needs of everyone of the trainees,
- Must be focused on very specific themes of the subject and its teaching,
- Must be from the school's program (daily teaching) in order to easily link "theory" and "practice",
- Must be on a large scale,
- Must be incorporated into the daily teaching in order to avoid interferences on the school activities,
- Must be affordable on their requirements on cost, human potential (trainers), operation, development and infrastructure,
- Must meet adequately the lack of experienced teacher trainers,
- Must be based on the assumption that every trainee works on his own, not relying, in general, on peers help (the day to day operations of schools, even in the highly populated urban areas, leave, in general and the S&T teacher especially, to work with his (her) class in isolation from his (her) peers. Assembling teachers together, in order to cope with this problem hinders the individualization of the training, interferes with the school operation, requires training centre facilities, etc.).

These requirements may be solved by the training scheme proposed in the following sections and combining INTERNET with Open and Distance Education techniques. This training scheme is presented in the following sections together with some comments on its feasibility.

### An in-school training scheme for the S&T teacher

In Diagram 1 a conceptual model of the basic parts of the training scheme proposed is depicted. The basic functions of the INTERNET server is to provide a reliable communication system to support the training with the use of distance education modules. On this server, a database of training themes may also exist to be used either as reference material or as training assignments. The system may be developed



in continuous stages as depicted in Diagram 2 with the advantage that every developed module may be used immediately. It may be implemented within a context of in-school training and it uses equipment and facilities already existing in schools.

The monitoring and evaluation system will include also a number of officials ("councillors") who will regularly visit the training centres (i.e. the schools) to provide face to face guidance to the trainees, especially during their first encounter with the system, and to collect information relevant to the operation of the system. They could be the education inspectors or councillors or just experienced fellow trainees.

<sup>17</sup>See for example P. G. Michaelides, "Education of the Informatics Primary School Teacher", proceedings of the 6<sup>th</sup> Pan-Hellenic Conference on the Didactics of Mathematics and Informatics in Education, University of Thessaloniki, Thessaloniki October 12-14, 2001 (in Greek). For Science see references in footnotes 1, 6, 7, 16.

The main characteristics of this system are:

- It may be evolved gradually and put into operation from its early development stages.
- Every theme may exist in more than one modules addressing different teaching strategies, and (or) teachers' backgrounds.

**Diagram 2 – Development of the training scheme proposed.**

1. Locate training themes,
2. Development as teaching modules in an Education at a Distance form,
3. Implementation through the INTERNET,
4. Monitoring and evaluation,
5. Enriching – adaptation and addition of more themes.

- Its development may be continuous without interference to its operation.
- It is easily integrated to the daily school operation which may be improved without the interferences due to replacements for the teachers on training.
- It may be operated within the existing infrastructure without the need for special resources in equipment, buildings, etc.
- It requires high managerial skills (see next section).
- It meets adequately the problem of the lack of experienced teacher trainers<sup>18</sup>,
- It may be upgraded easily. Every new module may be added to the existing ones so that, gradually a database may built up. Teachers using it may add their experience a very significant characteristic for the adaptation of the training to different school contexts.
- There is no need for the trainees to suspend their work in order to attain training. Consequently the cost of replacement personnel and the interference to school operation due to the personnel mobility are minimised<sup>19</sup>.
- The trainees may remain in their work places (in their schools) and, hopefully, will be able to implement directly their training into the teaching of the day.
- The trainees may manage their time more effectively. Also, every trainee may access the training themes database and build his (her) own training program from the existing modules, the links between these themes and the expertise of previous trainees<sup>20</sup>.
- Requirements in buildings, equipment, operation costs<sup>21</sup>, etc are minimised because the scheme uses the existing infrastructure of the schools and the training may be incorporated in the daily school operation.

If universities are involved in this scheme a synergy (and cross-fertilization) process may be an added value<sup>22</sup>.

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<sup>18</sup>The few experienced teachers who are appropriate to be used as in-service trainers (“masters to train their apprentices”), in order to retain their expertise must not be absent from their professions, e.g. being elsewhere in order to train other teachers. With this scheme their expertise may be useful to a wider group without the need to suspend their work for extended periods.

<sup>19</sup>This could be proved an inconspicuous drawback in cases where teachers (and would be trainees) consider their training as part of their duties (consequently it has to be done in replacement of their work) and not as a means towards their personal development or towards improving their job skills. The fact that in-school training is mostly informal (no certification or other formal assessing mechanism is, in general, envisaged) may enhance this drawback.

<sup>20</sup>This could also be proved an inconspicuous drawback if there is a lack of willingness and self-discipline.

<sup>21</sup>Consumables, equipment etc are the same that are used for the daily school operation. As long as a training theme is developed there is no more any need for a multitude of trainers to deliver it (one or two are still necessary in order to maintain, adapt and enrich it).

<sup>22</sup>Many tertiary education departments (e.g. departments of education) whose a substantial percentage of their graduates may become teachers in schools can incorporate the development and maintenance of training themes into their education and research activities. Apart from the benefits of the immediate links with educators in pre-tertiary education, they would have a supply of data, useful to their work and to their students.

- It treats teachers in isolated areas on a parity basis with the ones near the training centres.
- An added value also may result from the use of the system in order to establish a fast communication system between the teachers in schools so that peer discussions may arise. The same system may also be used as a fast communication between every school and the (central) administration.

Although the characteristics described above are possible, their actual occurrence depends on many factors which may disable the whole operation of the training scheme. The most prominent of these “feasibility factors” are discussed in the next section.

## Feasibility factors

**Management.** The management of the system is crucial. It includes:

- The administration of the INTERNET server as a service available continuously. The experience from other activities (i.e. web site developments, e-commerce, etc) is valuable. On this level a problem may be the hiring of personnel able to develop and maintain the site.
- The coordination of the team developing initially the training themes. The experienced teacher who will supply the fundamentals of the training themes has, in general, to be supported by an expert on distance education and both of them will probably need the services of a computer specialist in order to produce training modules that could be used by the average teacher in the school.
- The set up and operation of a system that will interlink related training themes. In order for such a system to be useful it has to be complete but not complicated. It must also incorporate the trainees experience from the use of the different modules of the system and any necessary adaptations<sup>23</sup>.
- The construction of individualized training patterns, the guidance and the monitoring of the progress of every trainee is a requirement of the education authorities who, normally, will finance the whole scheme.

**Reliable communications.** It is the prerequisite for the whole operation. Communications must be inexpensive, reliable, fast<sup>24</sup>, with high availability and easy of use. This type of communications is more or less available to the schools and, in any case, its cost is, in general, significantly lower than the cost of commuting to a training centre. Modern web techniques permit the concurrent transmission of text, sound, images, motion, hyperlinks and other hypertext in real time conditions while the various kinds of applets permit more complicated tasks in an easy way. The problem is to find the correct balance between the flexibility of operation (implying the use of dynamic programming e.g. scripting) and the protection from malicious attempts to the system software (viruses, hacking, etc). Another problem that may arise here is the lack of tradition (“culture”) to consider this operation as a service with reliable and uninterrupted availability, for example, in a way similar to the provisions of electricity<sup>25</sup>.

**Support centres.** The schools themselves may be used as support centres for periodic face to face discussions and monitoring purposes. As local agents school inspectors or councillors may also be used.

**Equipment.** The necessary “client” equipment is cost affordable and accessible to the trainees on a private (and possibly subsidized) basis. Alternatively the available school equipment may be used. However there is a need for fast, reliable, powerful computer systems to be used as the INTERNET server of the training scheme. The capacity of the system must be high enough to serve trainees request which are expected to show high demand peaks in pace with the school timetable.

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<sup>23</sup>Care must be exercised in order to avoid issues of © conflicts.

<sup>24</sup>For techniques to improve communication speed see in P. G. Michaelides, “4<sup>th</sup> Conference: A Test for Electronic Communication” Opening Speech to The University of Crete, 4<sup>th</sup> Pan-Hellenic Conference on the Didactics of Mathematics and Informatics in Education, Rethymno, October 1-3, 1999, proceedings pp 14-19.

<sup>25</sup>See reference in the previous footnote 24.

**Computer literacy skills.** They refer to the use of computers from the trainees. It is a temporary problem and may be easily solved e.g. by a small scale practice or resorting to the advice of a colleague. The appropriate user interface may also facilitate the situation.

**Self-discipline and concentration.** It refers to the trainees and is crucial. Whenever it appears, its solution may be facilitated by the system monitoring the progress of the trainees. The delivery of the training modules in the form of consecutive projects may also be useful and is consistent with the framework of the S&T teaching (see later on).

**Possibility of practice.** This is inherent in the proposed scheme provided that the trainee possess the skill to adapt his (her) teaching to new challenges<sup>26</sup>.

**Cost.** In comparison with traditional training, the proposed scheme's cost avoids completely the cost: of buildings, of delivering the training modules, of commuting of trainers and trainees, of replacement teachers, of the print (of the training modules). The cost of the (initial) development of the training modules is estimated to be less or comparable to the cost of developing traditional training material, even when taking into account the necessity of cooperation of more than one person (e.g. subject specialist, distance education specialist, computer specialist). The cost for the maintenance and adaptation of the training of materials is significantly smaller. The cost for materials (consumables) and equipment may be kept minimum provided that the training is used to the daily classes of the trainee. A new cost is the cost of INTERNET communication which is estimated to be significantly less than any of the avoided costs. It may be reduced more by special arrangements (large scale activity → scale economies) or by a combination of on-line and off-line communications.

## Content of the training modules

Apart from the type of its delivery, the effectiveness of any training depends heavily on its content, especially its format and subject matter. It should be:

1. Flexible in order to have the possibility of individualisation to the needs and requirements of every trainee. Consequently, a modular form is necessary. This modular form may be accompanied with examples of training patterns (sequences) to follow.
2. Effective in order to be useful. *Effectiveness of science teacher education is indicated when teachers show<sup>27</sup>:*
  - *Good understanding of the required subject matter, professional knowledge and skills;*
  - *Proficiency in choosing suitable teaching-learning strategies and available resources;*
  - *An emphasis on developing students' comprehension and problem-solving skills;*
  - *Enthusiasm in promoting positive attitudes to science and technology in society*

**Format of training modules.** Project based training is the most appropriate form to develop the skills required from the S&T teacher. It is also compatible with distance education methods and, also, may serve as a real example for the actual teaching of Science and Technology in schools<sup>28</sup>. Project based

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<sup>26</sup>When used for in-service teacher education, exemplar *STL* materials can be incorporated into day seminars or short residential courses in the same way as they are used in a full-time teacher education programme. However, time constraints will require that the modules should be used very selectively for this purpose. The advantage of this opportunity, however, is scope for participants to try out and evaluate the materials in their own school, whereas full-time students on teaching practice do not normally have freedom for such initiatives. Distance-learning programmes provide even better opportunities for micro-studies of the use of *STL* materials. The ideal situation would be to incorporate one selected module into the programme, provide participants with detailed guidance for its evaluation, and ask them to write account of the project in their school (from UNESCO's Project 2000+ at [http://www.unesco.org/education/educprog/ste/projects/2000/in\\_service.htm](http://www.unesco.org/education/educprog/ste/projects/2000/in_service.htm)).

<sup>27</sup>Project 2000+, a collaborative partnership between eleven major international agencies and inter-governmental organisations with particular concerns and responsibilities for research and development in the field of science and technology education (<http://www.unesco.org/education/educprog/ste/projects/2000>).

<sup>28</sup>Project based teaching facilitates the socialisation of students from different social classes, with different skills or abilities or from different cultures (as the cases with schools with immigrants) especially when it is combined with groupwork. Groupwork teaching is a common aim in many school curricula.



teaching is also appropriate for the development of problem-solving skills and creative thinking, in general. It seems as the natural choice for the training modules to be developed as it also facilitates the monitoring of the study progress of the trainees. In these modules, the scientific inquiry steps<sup>29</sup> should be incorporated. In order for these modules to be really valuable, they must include experimental activities. Distance education methods are not, in general, appropriate for teaching including experimental activities and, in general, for the development of psycho-motive skills. In this case, however, this is not a real problem because:

- On the issue of equipment and facilities needed, the school equipment and facilities (e.g. laboratories) may be used.
- The issue of the (minimum) psychomotive skills required from the trainee in order to conduct experiments. It may be met by optional general introductory courses with many audio visual explanations, a very inexpensive feature to produce, adapt and maintain with modern web communication techniques. As the trainees are already teachers, their physique should not show relevant defects.
- Issues of safety could possibly be a problem. However, for the elementary Science and Technology, data are mostly collected from observations and, in most of the elementary school curricula, the necessary (small scale) experimentation do not exhibit problems of safety. The secondary education school teacher is by his (her) education trained to this issue.

**Subject matter of training modules.** The training modules' subject matter should preferably: Be chosen from the school curricula in order to become easily incorporated to the daily classes. In this way the benefits of immediate feedback of the training will be enhanced with a minimum to the school activities. From this view point, the use of "Polymorphic Practice"<sup>30</sup> is useful.

Be developed with a focus either on different teaching strategies, on different teaching patterns referring to differences in the organization of the school curriculum or on the subject matter itself. The inclusion of common misconceptions and of methods to spot and cope with them is necessary.

Should use everyday observations<sup>31</sup> and experimentation with simple equipment from the students' environment to the maximum possible extent. This way the relation and consequences of Science and Technology to the everyday life becomes direct.

Should include topics on modern (and recent) advances either dispersed into the modules with a related content or as separate modules. Apart from being used as reference sources to the teacher (trainee) they may also be used as an experimentation towards their introduction to the school curriculum.

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<sup>29</sup>(Planning of observations), data collection, data manipulation in order to locate patterns and relations, hypothesis forming and (experimental) testing, formation of models and induction.

<sup>30</sup>Polymorphic practice (measurements, experiments...) in Science includes a common psychomotive activity (doing measurements, experimentation...) which consequently is morphed into different levels depending on the (previous) cognitive attainment and/or the mentality of the students (see reference in footnote 7).

<sup>31</sup>P. G. Michaelides, "Everyday observations in relation to Natural Sciences" στο Learning in Mathematics and Science and Educational Technology, University of Cyprus July 2001, Volume II pp. 281- 300

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## **NEW APPROACHES TO DIMENSIONS IN DISTANCE LEARNING: SUCCESSFUL CONSORTIUM MODEL IN THE DISABILITY/REHABILITATION FIELD**

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### **Delivering Master's level online degree programming in Rehabilitation and Disability Studies in Ireland by use of a Consortium Model**

The importance of disability in the equality and rights agenda is increasingly recognized internationally. In the European Union disability has been prioritized, along with age, as one of the key areas for development of new methods of inclusion. Despite this, unlike the United States, in Europe there exists no dedicated profession to secure the increased participation of people with disabilities in mainstream society. Varying national standards and definitions are complicated further by the fragmentation of research, policy and practice regarding rehabilitation and the experience of disability. An ongoing, and growing need exists for high quality education and training of professionals who practice in the diverse fields related to serving the needs of people with disabilities.

This paper looks at the need for professional training and quality practice at postgraduate level for rehabilitation practitioners. It examines the experience of translating best US practice in a specifically Irish context, but with significant European implications. It looks at the methods used to date. Finally, it outlines the innovative consortium being established in a community based distance-learning centre, with added value in terms of socio-economic development and multiple agency involvement.

Cooperative distance education modalities have previously been successfully utilized to enhance the quality and quantity of disability/rehabilitation practitioners in Ireland. This achievement was demonstrated by the successful delivery of a US-accredited Master's Program in Rehabilitation Counselor Education in Ireland [1], [2], and was presented in the 2002 EDEN Annual Conference in Granada, Spain. The current presentation expands on the previous report by exploring the rationales for enhanced sponsorship of the education effort, integration of newly developed technology, and development of a strategic consortium approach to embed distance learning in the context of local needs and national strategy.

### **Rehabilitation Professional Needs: Irish background**

The economic advances made by Ireland in recent years have underlined the structural inequalities faced by diverse groups in relation both to labour market access and also in regard to exclusion and discrimination. This situation, common to many European countries, has called into focus the need for strategic national planning to address social exclusion. It has also frequently underlined the lack of policy driven research as well as the dearth of specific tools and interventions available.

Official national policy in Ireland is based on a partnership model where the social partners (employers, trade unions, agriculture and the community/voluntary sectors) collaborate to define priorities and agree on actions within the framework of national social and economic planning. This partnership model has underlined the need for improved approaches to equality and legislation in promotion of equality of opportunity.

In the field of disability and rehabilitation practice, in particular, issues and concerns have arisen because of the socio-historical configuration of disability policy in Ireland. It is an area that has largely operated within a medical model of understanding. It is also an area where the State has played little direct role – preferring instead to delegate responsibility for rehabilitation interventions to charities or Church-originated

voluntary associations. This has produced a plethora of organizations with varying degrees of capacity and expertise. These organizations are further divided along various sectoral levels in terms of geography, disability category, public or private status and program orientation.

Agencies (and there are over 175 in the State) range from the very small and disability specific to the very large indeed (the Rehab Group is the second largest service provider in Europe after ONCE in Spain). This raises important issues in terms of staff qualifications and professionalism. Traditionally low levels of funding and under-resourced human resources development policies, mean that agencies have operated with a varied mix of professional competencies. Apart from psychologists, medical personnel (doctors and nurses) and social workers, staff in the Irish rehabilitation sector have been significantly underdeveloped in terms of both training and qualifications.

Accession to the European Union in 1973 dramatically altered the landscape for service provision and available funding. Rehabilitation interventions, if related to labour market progression, could be eligible for training support under the auspices of the European Social Fund. A specific element of this was related to staff training and qualifications. The coordinating authority for Ireland, the National Rehabilitation Board (NRB), stipulated that 3% of all ESF money had to be spent on staff training and development (the “Training of Trainers” measure).

This raised specific and immediate concerns as to what courses and programs were suitable and applicable to a new profession in an evolving Irish disability context. Apart from post-graduate academic programs in medicine, psychology, education or social work few, if any, Irish courses made even passing reference to disability or rehabilitation practice.

In 1988 a full time staff training and development function was established by NRB. This built on links already developed with the National Training Authority (FAS), various universities and relevant government departments. As a result of this work and the availability of significant financial resources from the ESF, key developments over the next few years would see the creation of several innovative rehabilitation-related academic development programs.

These included:

- Foundation Certificate in Training and Development (FAS/National University of Ireland – Maynooth): included a module of disability.
- Diploma in Disability Studies (National College of Ireland/Center for Independent Living).
- Diploma in Social and Vocational Rehabilitation (Rehab Group/University College Dublin)
- Certificate in Disability Equality Training (National University of Ireland – Cork)
- Diploma in Training (Special Needs) (NRB/National University of Ireland – Maynooth).

These courses reflected an emphasis on vocational training aspects of disability and rehabilitation. Key issues in the areas of assessment, needs identification, counselling, service planning, policy evaluation, psycho-social aspects of disability and rehabilitation administration were not addressed. For NRB’s own staff as well as those in Regional health Boards, service providers and training agencies this gap became ever more significant. There was an identified need to develop enhanced professionalism – stemming from both national policy and requirements of the ESF Human Resources strategic objectives.

An additional aspect was the need to address the geographically dispersed population of rehabilitation service providers and the fragmented nature of their work. The growing importance of adaptive technologies and the possibilities inherent in new technologies for distance learning were key factors - and opportunities. In addition to staff development requirements and pedagogical opportunities there was a parallel development in the Irish disability policy field.

Two key reports stand out as framing Irish policy regarding labour market access for people with disabilities. The first was the report of the European Social Fund Evaluation Unit. Published in December 1995, *Training for People with Disabilities* gave a comprehensive overview of the origin,

nature and structure of training and employment initiatives for people with disabilities in Ireland. It made a series of wide-ranging and comprehensive recommendations for policy makers and service providers alike. In particular it queried why targets for vocational training were at variance with the stated objectives of the ESF itself.

*If the necessity for adjusting what are considered to be acceptable outcomes of a training programme are made on the basis that those presently considered acceptable or successful are unlikely to be attained by a significant proportion of the target group, this suggests, among other things, the need for:*

- A re-examination of training objectives, process and content
- A more differentiated, focused and tailored approach to the development of training programmes for the target group
- A more discriminating approach to matching potential trainees to training programmes
- An examination of supplementary and/or alternative ways of attaining objectives [3]

One of the main issues concerning mainstreaming addressed by this Report concerned the role of segregated and special schooling in perpetuating and maintaining a system that influenced deeply transitions to employment. Low levels of educational attainment have been noted regularly in all studies regarding participation of people with disabilities in the labour market.

Many people with disabilities are particularly vulnerable in terms of gaining employment on account of low levels of educational attainment. The transition from school to training can be very difficult for people with disabilities, partly because of very different sets of expectations operating in the two systems. Inadequate educational and vocational training provision for people with disabilities in schools has implications for the structure, content and process of ESF training for people with disabilities. [3]

The ESF Evaluation Report identified one final relevant point. It was among the first published reports to consider the stated policy of mainstreaming from an Irish perspective where agencies were rooted in structures and practices of the voluntary sector. The Report cautioned against a one-dimensional approach to mainstreaming without a comprehensive analysis of other relevant factors.

*It is NRB's policy to promote the development of mainstream links between training provided by specialist training agencies and also to increase access for people with disabilities to education and training in mainstream settings. While inadequacies in mainstream structures and systems are certainly among the reasons for less than satisfactory participation rates by people with disabilities in mainstream education and training, it is also the case that structures, systems and beliefs within the specialist training arena work to maintain the status quo. Apart from differing ideological viewpoints, some of which hold that segregated interventions and settings are more appropriate and effective for some people with disabilities, it is important to bear in mind that the fact that the rehabilitation industry employs significant numbers of people means that a move towards mainstream provision could be perceived as a threat to the livelihoods of some or all of these people. [3]*

The second key report was published in December 1996. This is the final report of the Commission on the Status of People with Disabilities, ***A Strategy for Equality – The Report of the Commission on the Status of People with Disabilities.*** [4]

This contained over 400 recommendations concerning policy changes felt necessary to improve the lives and opportunities of those with disabilities in Irish society. This report has had a major effect on the development of structures and directions for national disability related policy. The Report acknowledged its reliance on a system of inadequate statistics and research. It also highlighted a legacy of inadequate legislation and poorly developed professional competence.

Further policy development in relation to the employment needs of people with disabilities was reflected in the ***White Paper on Human Resource Development*** [5]. This considered the rapidly changing nature

of employment, the growing role of competitiveness and the need for well-educated and appropriately skilled and flexible workers.

In December 1997, the NRB produced *Employment Challenges for the Millennium* [6]. It highlighted the persistently high rates of unemployment for people with disabilities and difficulties in accessing open employment. The Report emphasized the need for ongoing placement supports for employers and the need for incentives and awareness. In relation to service provision the Report indicated that there were concerns around:

- The lack of minimum standards regarding delivery of sheltered work, sheltered employment, supported work or supported employment
- The difficulties of developing an enterprise culture in 'not for profit' service organizations
- The need for innovative and creative work activities in sheltered work settings

The Government dissolved the National Rehabilitation Board in June 2000. The National Disability Authority was established with a remit to develop standards and to monitor policy in relation to disability.

A parallel development of significance was the establishment of the Equality Authority. The Employment Equality Act in 1998 and the Equal Status Act in 2000 outlaw discrimination under a number of headings, including disability. The linkage of disability to other categories of social discrimination emphasized the de-medicalization of disability, viewing it rather as a category of legal discrimination.

Employers have also taken the initiative in their recruitment and staff training practices and procedures. This has resulted in codes of good practice for the inclusion of people with disabilities from both the employers' body (IBEC) and also the trade unions (ICTU). At a time of unparalleled economic growth in Ireland there has emerged, for the first time, a labour shortage. In place of traditionally high levels of emigration Ireland is now a net importer of labour. This should, in theory, produce significant opportunities for those with disabilities. Yet evidence indicates that unemployment rates among those with disabilities are persistently high.

Continuing problems and difficulties identified by research and practice in the area of employment for people with disabilities remain. There are significant issues involved in the lack of co-ordination of existing services. Many tend to function in isolation. Frequently there can be duplication of effort. Many express frustration with the lack of guidance or information and the inability to find one central decision point regarding all aspects of disability. Despite the recommendations of the Report of the Commission on the Status of People with Disabilities and the action indicators in the recent *Programme for Prosperity and Fairness*, there is still no overall national plan or strategy in the area of disability service provision. Comprehensive research is significantly lacking. Professional development has been limited by inadequate specialized post-graduate training in disability related studies and practice.

The common theme of these reports on disability policy in Ireland can be summarized around defined needs for:

- Adequate educational levels for labour market aspirants
- Appropriate training geared to labour market conditions
- Disability awareness training for employers
- Adequate income maintenance and other supports
- Disability proofing of employment policies
- On-job supports
- Other supports in relation to transport, benefits, advice, medication, etc.
- Advocacy and appropriate guidance
- Adaptive and assistive technologies and job modifications where required
- Flexible allowance and benefit schemes to allow return to work.

## Meeting Needs: Accessing US Postgraduate programs

Within this context the NRB/Maynooth Diploma program established contact with similar distance education postgraduate approaches developed by the University of Illinois at Urbana-Champaign in 1994. A survey of professional development needs undertaken among NRB's staff in 1996 indicated a clear need for postgraduate programs, using flexible timings and advanced technologies. It was agreed that this would be best achieved by an innovative link with an existing program like that of Illinois.

This was subsequently achieved by a collaboration between Universal Learning Systems (Dublin) and the Tipperary Institute. A full Master's course was developed and delivered in Ireland (1997-2000). The evaluation of this initiative shows that considerable potential exists for ongoing professional development in the Irish rehabilitation sector - but now linked to an expanded European context.

The strategy adopted for the Illinois-Ireland program was essentially a hybrid distance-non-distance educational approach. Its principal design features provided for:

- a) local control/administration of content to assure cultural relevance
- b) pedagogical needs of the post-graduate students and tutors (*e.g. interactivity*)
- c) point-to-point video-conferencing for two-way live communications (*synchronous*)
- d) synchronous presentation of course materials /slides
- e) asynchronous access to videos/slides, library resources and group communications (*e.g. email*)
- f) simplicity of set-up and operation for the ICT systems
- g) initial real/local tutoring for each individual module
- h) work experience /thesis elements
- i) effective library access
- j) a 'high touch' local Program Director
- k) a local Advisory Committee
- l) cost effectiveness.

## Current and Future Developments: Quality Professional Training

To maintain the momentum of the Ireland/US joint venture in postgraduate training for rehabilitation professionals a number of agencies and universities have come together to explore a consortium approach to course development and delivery. The advantages of this proposed consortium model have been identified as:

- Opportunity for mutual benefit
- Universities having consumers for their educational services
- Service providers equipped with greater technical skill – from universities that have met external professional standards of preparation
- Rehabilitation industry provided with more highly qualified work force
- Persons with disabilities have improved professional services
- Expanded use of innovative pedagogical technologies

Problem solving in facilitation of the consortium model will focus on:

- Equity in partnership benefits and outcomes
- Political management

The *International Consortium for Development of Rehabilitation Professionals* was formed in late 2002 with these objectives in mind. This transnational consortium recognizes and values best practices and excellence in rehabilitation. It is committed through its active partnership to providing rehabilitation training to professionals utilizing multiple technology modalities advancing empowerment, research and professionalism and shared practices in rehabilitation practice and disability studies.

The identified *objectives and methods* are:

1. To identify the challenges of forming transnational partnerships in providing culturally sensitive training in rehabilitation services.
2. To identify the processes for transnational training that encourage participation by multiple stakeholders.
3. To describe innovative techniques for integrating rehabilitation theory and research into transnational training curricula in the areas of vocational evaluation, job analysis, socio-cultural awareness and orientation to advanced research techniques.
4. To Identify transnational models for delivering training utilizing multiple technology modalities and conducting ongoing evaluation of the learning outcomes.
5. To develop strategies for a transnational partnership that emphasize the development and collective sharing of best practices in rehabilitation to improve cultural practices.

The *content* focuses on the need to:

1. Provide strategies for forming a collaborative mission, values, objectives and program focus that is the foundation for a mutually beneficial transnational training partnership in the area of providing rehabilitation services and programs.
2. Develop techniques for encouraging transnational communication and fostering active involvement by multiple stakeholders in the training process.
3. Provide examples of how to integrate theory and research integrating rehabilitation theory and research into transnational training curricula in the areas of vocational evaluation, job analysis, social cultural awareness and orientation to research techniques.
4. Provide process for delivery of innovative transnational rehabilitation training through multiple technology modalities and encourage ongoing evaluation processes.
5. Discuss approaches for sharing best practices in rehabilitation to improve cultural practices.

The efforts and results put forth by the Illinois-Ireland program provide a firm foundation for the successful future of this expanding, forward looking, innovative, cooperative effort. The initial work has paved the way for future development of distance technology-based coursework in the area of disabilities. It has demonstrated the functionality of support services in Illinois and Ireland, as well as technological feasibility of continued cooperative effort. Even more advanced technology is now available including developments in both hardware and software (for example, "Blackboard" and other asynchronous course-support) which give content experts the freedom of placing the focus of their efforts strictly on advancing their course content. The Consortium, which builds on the strengths of its original partners and adds new physical, political and intellectual capital, is now poised to move ahead with confidence in its development of expanded course offerings in Ireland in the area of disability studies. It may also begin exploration of delivering disability and other content in other educational markets in Europe.

The present partners in the Consortium are:

- University of Wisconsin-Stout
- University of Illinois at Urbana-Champaign
- Louisiana State University
- Universal Learning Systems (Dublin)
- National University of Ireland - Cork
- Waterford Crystal plc
- Dunhill Community Learning Centre (Waterford)

The Consortium intends to develop and provide an accredited online master's degree program in Ireland utilizing sponsorship by four different universities, industry and community based learning centres. Each brings a significant degree of capacity and experience to developing innovative and quality driven postgraduate teaching. Each reflects a different aspect of best practice in meeting the needs of adult

learners – learner centred, industry involvement, collaborative academic direction, multidisciplinary approach, community based, international perspective, advanced technologies and potential for extension to other sectors outside the purely rehabilitation.

While each partner brings particular strengths, the decision to locate future course delivery in Dunhill Learning Centre is particularly innovative. This centre, operated by DFBA Community Enterprises Ltd., was established by local community volunteers in a rural area of County Waterford to promote a multi-project approach to rural regeneration. It has been extensively supported by regional and national agencies and focuses on environmental preservation, enterprise creation, cultural and social development and innovative learning programs.

The Dunhill Learning Centre was established in November 2000 with the latest technological capacities to provide continuous learning programs including adult education, re-training, community development and ECDL. Its multimedia centre and linkage through fibre optic cables have enabled it to substantially expand its remit as one of the foremost community based learning facilities in Ireland. The linkage to enterprise creation, social inclusion, accredited institutions, international perspectives, rural development and innovative course provision made it a particularly attractive partner for the proposed Consortium.

Dunhill learning Centre now comprises a:

- State of the art video-conferencing centre
- Dedicated environmental library
- Recognized FAS Net College E-Learning Centre (internet based learning courses)
- Recognized outreach centre of the National College of Ireland (courses in Management Supervision and Management/Employee Relations)
- Designated adult education centre for University College Cork

The fact few accredited postgraduate courses exist for rehabilitation professionals in Ireland points to an opportunity rather than an impediment. Building on past success and experiences, the Consortium has identified several innovative aspects in their strategic orientation. These include international collaboration, innovative distance learning technologies, involvement of universities/industry/community sector and responsiveness to identified needs of individual professionals and their employers.

Disability is only a subset of the wider world of social exclusion and marginalization. It is also one of the last identified areas of civil rights struggle. People with disabilities have themselves identified a number of needs for their full inclusion in mainstream society both in the United States and throughout the countries of the European Union. Among these needs is the right for professional competence and excellence (in a non-medical model) among those who intervene in their lives and decision-making processes. Disability and its concerns are not of peripheral concern to our societies. The long established US competence in rehabilitation research and technical expertise in vocational evaluation can be complemented by the European focus on equality legislation and social rights in a powerful and innovative way to advance this inclusion-driven agenda. It is appropriate that Ireland, which stands mid-way between these two traditions, should now be the locus for such experimental course development and delivery.

It is even more appropriate that meeting such professional development needs through distance learning should be located in an innovative Learning Centre at the heart of community based efforts to promote rural regeneration and sustainable economic development. Linking rehabilitation professional development to environmental, employment generation and community perspectives through international collaboration is significant and innovative. Such a perspective has led Dunhill Learning Centre to promote the concept of a European network of community based learning and distance learning centres which will promote courses and mutual learning in a variety of disciplines.

Quality of life will be the outcome of quality in transnational collaboration - in meeting the needs of those with disabilities and the professionals who work in associated rehabilitation fields. That quality in turn is based firmly on an understanding of equality



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# **FOR PEOPLE WITH DISABILITY – A SENSE OF BELONGING REAL BENEFITS FROM VIRTUAL PRESENCE ENHANCING THE QUALITY OF LEARNING BY FOSTERING ONLINE COMMUNITY GROWTH**

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## **1. Introduction**

Our sense of identity is a reflection of the many communities to which we belong, family, social groupings, learning, work, and society at large. This sense of being interconnected with the world is important to all of us. Many people with special needs however often find themselves excluded, because of their disability, from membership to some of these communities. The result – isolation, lack of motivation, low self-esteem, and in turn further exclusion.

This paper will briefly discuss the National Training and Development Institute's (NTDI) distance learning programme for people with disabilities and the services and supports the organisation currently provides as an integral part of the programme. The programme is currently largely print based. However current technological and pedagogical transformations are leading to changes in the way that people learn, with increased focus on the educative value of interaction and the social factors involved in the learning process. This paper examines how these changes are being reflected in the development of communities as a medium for learning.

## **2. Background**

### ***2.1 NTDI's Current Distance Learning Programme for People with Special Needs***

NTDI is Ireland's largest non Government specialist training organisation and has more than 50 training centres around the country catering for around 2,500 students annually.

The aim of NTDI is to assist people who face major obstacles in their search for employment by offering training that takes into account the personal, social and environmental needs of the individual.

As well as offering a number of centre based courses, each year our training organisation offers a number of places to people with disability, who are unable to attend the centre, to join a distance learning programme. The course participants are provided with a multimedia PC, including whatever assistive technology best suits their needs, for the duration of the course. While on the course they learn basic word processing, spreadsheet and database skills, as well as becoming familiar with e-mail and internet usage.

### ***2.2 Course Delivery***

At present course delivery relies mainly on the use of printed manuals, supplemented with home visits by the tutor to each student. Students work through the printed course material and submit exercises to the tutor via e-mail as they progress. Further assistance is given to the student through an Individual Programme Planning process. This goal focussed and holistic approach allows the student to focus on his/her specific educational needs and vocational goals, while at the same time acknowledging and dealing with any environmental and social constraints that exist.

While the existing framework of supports provides a unique opportunity for people who experience isolation through disability, the course itself is rather limited in its scope, relying heavily on the use of printed text for course delivery. Given that multimedia PCs are available to each student for the duration of the course, there is an opportunity to enhance course delivery by developing additional supports online.

Many aspects relating to the structure of the course are currently under review by the organisation. However, the challenge now for NTDI is how to further maximise learning by developing additional innovative online learning supports to meet the needs of these particular students.

### **3. Changing Technologies – Changing Pedagogies**

#### ***3.1 From First Generation to Third Generation***

NTDI's current distance learning programme is reminiscent of the traditional Distance Learning approach cited by Soren Nipper. Nipper (1989) refers to traditional print based courses as 'first generation' distance learning. This type of learning relies heavily on the instructivist model of learning. It tends to be "authoritarian" by presenting learners with written learning material from which they can elaborate on the points raised in the printed text. The required learning outcome is seen as the "acquisition of the information given by the study material" with the student having the opportunity to reflect this learning in written course assignments. This type of environment views learners as passive recipients of knowledge.

#### ***3.2 From Instructivist to Constructivist learning***

As French (1999) points out however, there is a move away from this traditional view of learning to a more self directed learning approach, one in which learning is not just about the acquisition of knowledge but one that also acknowledges the social processes involved in the construction of meaning. More and more it is being recognised that learners need to be actively engaged in creating their own meaning from their learning experiences, and developments in computer technology are allowing them to do that. The construction of meaning is not however an individual process and relies heavily on collaboration. That is not to say that constructivist learning ignores the needs of the individual, but rather it acknowledges the influence of factors external to the individual as an integral part of the learning process.

#### ***3.3 The Need for Dialogue***

According to Mayes (2001), learning occurs in three stages. During the first stage, *conceptualisation*, the learner is exposed to new material and comes to "an initial understanding through contact with, and exploration" of the new material. The learner then moves into a construction stage. *Construction* "involves some activity in which the new understanding is brought to bear on a problem, and feedback about performance will be gained". In the third stage, *consolidation*, the learner integrates the new knowledge into their existing framework of knowledge. Dialogue is central to Mayes model of learning.

If we are to ensure quality in online education we must embrace the need for dialogue. Presenting information is not enough on its own. Providing a tutor with whom the student has infrequent access is not enough on its own. There must be dialogue, an opportunity for learners to share their learning experiences, insights and difficulties, an environment where learners can support each other in achieving a deeper understanding of their topic of study. In other words there must be an opportunity for learning that acknowledges the social factors which may not be directly related to formal learning but which nonetheless influence learning.

### **4. Learning Communities**

#### ***4.1 What is Community?***

According to Kok and Brown (1998) "community is needed to create and achieve goals that could not be achieved by an isolated individual". A community is formed where people who have something in common form a group together. This might be shared interests, goals, experiences or values. Community is strengthened through interaction between people in the group, as well as support and encouragement from within for its members. It is this sharing in a supportive environment that enables community to thrive, as well as serving to validate and strengthen individual identities.

## ***4.2 Communities of Practice (CoPs)***

Communities have been around for a long time, but acknowledging the benefits of communities is becoming more important, particularly as knowledge is now seen to be the key to competitiveness in the information age. How often have we heard it said that people are an organisation's most valuable resource? But what exactly does this mean? Within any organisation there will tend to be a formal organisational structure. Yet studies indicate that the way that people actually work usually differs from the way that the organisation describes this work in manuals, training programmes and organisational charts (Brown & Duguid, 1991). Something else is going on – communities within – and it is often within these communities that significant learning and innovation takes place. Lave and Wenger (1991) first introduced the concept of Communities of Practice to describe these informal groups. This model distinguishes between the 'knowledge' that the organisational structure generates, and the 'dynamic knowing' that comes about as people communicate, share ideas and find new ways of doing things.

## ***4.3 How are the Members bound together in CoPs?***

While CoPs are informal, they generate a great deal of learning, learning that reflects the members' understanding of what is important. Learning is seen as a social process. Wenger (1998) defines the model along three dimensions

- Joint enterprise – a sense of what the community is about
- Mutual Engagement – the way in which the community functions so that the members are bound together into a social unit
- A Shared Repertoire – the communal resources that the members have developed over time

While this model of learning has often been applied to the learning that occurs within organisations, it has also been successfully applied to formal education (Wegerif, 1998). Indeed constructivist learning requires community in order for learners to get the most out of their learning experience.

## ***4.4 The Virtual Classroom – Online Community Building***

When students enter a college classroom for the first time, they may have little knowledge of the subjects they are about to study. However ultimately their academic success will be a measure in part of how well they become integrated into the academic community. An important part of this integration relies on the extent to which the students' social needs are met. According to Bauman (1997) "social factors can be as powerfully motivating as can be intellectual ones in keeping students in school". In a physical setting the process of community building is largely ignored, as the physical presence of teachers, students and other staff, makes community development quite easy. Students may mingle in corridors, have informal discussions about course issues in the cafeteria, make friends with other like minded people, offer support, validation, respect and acceptance. According to Kok and Brown (1998) "a healthy community is built on open interaction, interdependence, commitment from the members, shared interests and respect".

However, online, things are very different. Devoid of the visual, auditory and other non verbal cues that are present in the classroom, students are denied a great deal of affective information which forms an important part of the exchange between them. They cannot mingle in the corridors or have prolonged 'synchronous' chats in the café. Their entire communication is based on written text. This is the only means by which students can get to know each other. Yet it is important that students develop a sense of community that will encourage them to work collaboratively and learn in a constructivist way. Special attention must therefore be paid to incorporating social factors into the learning environment so that the development of communities is promoted, and quality learning achieved. In what ways can this be achieved online?

## ***4.5 Social Factors – The Development of Successful Learning Communities Online***

As already mentioned the nature of many traditional distance learning programmes has meant that many students work in isolation, maybe meeting their tutor and fellow students only a few times for the duration of the course, or maybe not having the opportunity to meet up with anyone at all. Online learning

provides a unique opportunity for the student to become part of a learning community. According to Kok & Brown (1998) "Isolation may cause an individual's research or learning to be less productive, less informed, or myopic. Community helps to motivate students as well as inform and broaden their learning". So the development of community online is an important factor in helping the student to optimise his/her learning experience.

But how can this be achieved when the online environment is so very different to that of the classroom?

First of all students must feel comfortable with the idea of using computer technology for communication, to the extent that the technology itself becomes transparent. It is also important that students recognise the benefits of becoming members of an online community, as opposed to the benefits derived from learning in more traditional forms of distance education.

To compensate for the lack of face to face contact, it is important that regular contact, between tutor and students and between students themselves, be maintained. Bauman (1997) suggests that one way of doing this is by setting up facilities online to enable everyone to interact on an ongoing basis. As well as allowing students to 'voice' their opinions, this type of facility also enables students to see what others are thinking and to either learn from it, or build on it, by making their own contributions to the conferences.

It is also important to create space where students can interact in a more informal way, a place where discussion can take place about day to day happenings in their lives. This can quite easily be achieved by having a virtual café where people can communicate in a more casual and relaxed manner. An e-mail facility is also useful for this purpose.

Students should also be able to avail of additional support services online. For example, in the case of the NTDI's distance learning students, a special study support and advice conference could be available, as well as a technical support area.

Discussion opportunities should also be made available to enable students to meet with visiting lecturers and guest speakers. Again this is particularly important for students with disability, enabling them to make contact with others outside of their immediate learning environment – people within the wider community who may be able to help them in achieving their educational and vocational goals.

## 5. Conclusion

While appreciating the enormous task of developing and implementing study supports online, it is nonetheless important to ensure that any online implementation, while striving for quality through innovative use of media and design, would also be such that would foster the development of community between students. The result for people with disability - reduced isolation, increased motivation and self-esteem, and in turn a greater sense of belonging.

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# XMATH: A MATHEMATICAL E-LEARNING PROJECT

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## Abstract

The Xmath project [1] will develop mathematical courses on the Internet using an innovative process where new technologies are important. We are trying to connect mathematical pedagogies and Information and Communication Technologies (ICT). We describe the pilot course and the technologies to be used to design it. We also pay attention to the future pedagogical evaluation of our project.

## 1. Introduction

The use of the web in the education of mathematics and science has up to now suffered from lack of standards to represent the special “**characters**” used in these fields.

Mathematics and ICT is in its very birth. Mathematics on the web has not been mathematics but images. The symbols, operators, etc. used in Mathematics have been either GIF images on page or they have to be viewed/evaluated by using special software packages installed locally. The mathematical content of symbols, operators, etc. is often absent.

MathML, a recommendation of W3C (World Wide Web Consortium) [2], is the new standard for describing mathematical and scientific documents on Internet. MathML is an application of XML with tags specialized for mathematics. Then we can convert mathematics from "frozen images" to "live materials". Therefore these **real mathematics** may be understood by mathematical software packages for evaluation.

Xmath project is an European project under the umbrella of Minerva action. The possibility of using brand new technologies, specially MathML, and on-line calculations in web, WebMathematica, is the starting point and also the core of the Xmath project.

We describe the main items of the project. When the course will be ready some conclusions about the design and evaluation will be drawn.

## 2. Objectives and participants

The main objective of Xmath is to design a course to profit from the brand new technologies to learn **real mathematics** by internet, including on-line calculations. We have to remark the use of **interactive and event-driven** documents will enhance understanding and allow an explorative and personal way of working.

We hope this design will make Mathematics very **attractive** to the students in the Colleges and Universities. Then we can convert the tedious mathematical contents in interesting topics. We are convinced this kind of courses can help the study of mathematics, generally speaking. Then we can enhance, via Xmath, mathematical pedagogies and Information and Communication Technologies.

The Xmath team is the following: Buskerud University College in Kongsberg (Norway), coordinating institution, Sogn og Fjordane University College in Sogndal (Norway), Slovak Technical University in Bratislava (Slovakia), Universidad Pontificia Comillas in Madrid (Spain) and the consultant Enrique Canessa from the International centre for Theoretical Physics. All the institutions have for many years

been using mathematical software and multimedia documents in their teaching of mathematics. The consultant is an expert in ICT.

### **3. Pedagogical aspects**

Let us remark important facts about the study of mathematical contents. The mathematical topics mainly allow:

- The “organization of the brain”, doing mental reasoning, understanding theorems, etc.
- The development of mathematical theories to be applied in the professional life.

The mental process to understand mathematics is indispensable. The students have to think about mathematical contents if they are able to understand it.

But it is also true that mathematics are “heavy topics” in every step of learning (primary and secondary schools, colleges and universities). Then we can profit from the technological age (the use of computers and internet resources is normal for today’s students) so as to change the students’ psychological perception about mathematics.

Important differences between net based pedagogies and traditionally pedagogies lies in the communication process and in the ability to monitor the students' work. Also the learning process has to be changed. Probably the students have to learn the same or similar topics by using different ways than the traditional ones.

Then what it is needed is a balance between the mental process of learning and the purpose of using technologies to learn mathematics. The use of technologies allows exploration and discovering. Instructor’s help will do these trials very successful.

Following the above ideas we have developed a pilot course to be carried out in the future for different targets.

### **4. The pilot course**

The designed pilot course [3] includes different topics concerning Calculus of one variable.

#### ***4.1 The contents***

The contents, roughly speaking, are the following:

- Basic number theory: Natural numbers, integer numbers, rational numbers, irrational numbers and the properties of real numbers. Complex numbers.
- Real functions: The definition and basic properties of real functions. Polynomial functions, rational functions, trigonometric functions, exponential functions and logarithmic functions and their properties.
- Limits and continuity: Definition, properties, geometric interpretation, the main theorems.
- Differentiation: Definition of derivative, properties, differential, mean value theorems, Taylor’s polynomials. Applications.
- Integration: Basic methods of integration: The definite integral. Geometric interpretation. Properties. The fundamental theorem of calculus. Barrow’s rule. Applications.

#### ***4.2 The design***

We have divided each module: Basic number theory, real functions, limits and continuity, differentiation and integration in several sub modules: theory, exercises, applications and test. Each sub module can have different levels according the depth of the mathematical contents.



We use the technologies to get on line calculations, some animations, mainly to enhance geometric facts and the possibility of use of external links.

The design allows a very high flexibility to personalize the study of this course using an adequate framework. The module database, placed in a remote server, can be used with freedom and only the instructor's advice can be taken into account for the good use of such database and the better understanding of mathematical topics.

### ***4.3 The software***

The software used to develop the pilot course or necessary to carry out it is:

#### *4.3.1 Editors, browsers and plug-in*

We have mainly used Amaya like MathML editor/viewer. It is recommended by W3C [2].

The browsers Mozilla, Netscape 7.0 or Internet Explorer Browsers are required to follow some parts of the pilot course. Also the plug-in MathPlayer [4] is needed.

#### *4.3.2 Software on line*

WebMathematica : This Wolfram research [5] product allows interactive calculations and visualizations in a web site by integrating Mathematica with the latest web server technology. It uses familiar web interface elements such as buttons, drop-down lists and text fields.

Scientific Talk [6]: This software, designed by Enrique Canessa, one of the participants of the project, allows users to enter interactively letters and numbers in a web chat by writing shared text. It also allows to select Mathematics signs/symbols from an Equation Editor to write down, display and share equations, formulas, etc and to plot some functions.

#### *4.3.3 The "traditional" software*

Mathematica: This Wolfram research [5] product is the calculating engine in connection with the calculations on line.

Software for animations: Several animations have been designed using the software Flash [7].

#### *4.3.4 A management software*

We use the software Blackboard [8], a portal education, as management system to support the course.

The main components of the blackboard are:

- Announcements, Course information and Staff information.
- Course documents and Assignments.
- Communication with Send E-mail, Discussion board, Virtual classroom, Roster and Group pages. In the virtual classroom the user have options for on-line chat with session archives, questions and answers panel, participant information panel, slides panel, incoming questions panel, whiteboard for drawing and access to external URL's.
- External links. In our pilot course these links are: Web-Mathematica, Xmath educational calculator a Scientific Talk.
- Tools, including resources, course map and control panel.

### ***4.4 The implementation***

A remote server, placed in the coordinating Institution, will support all the files and the management system of pilot course.

We will help the management system structure to exploit their possibilities for improving the pilot course, taking into account that one of the keys of web-based pedagogies generally is the student-student and student-teacher communication process.

## 5. The targets

In Norway ODL is a fast growing activity. Especially in the districts, people do not want to move to the cities to get their education. Sogn og Fjordane University College is at present involved in a project which offers teacher training and preschool teacher training as ODL programmes. This includes pre-service as well as in-service programmes. The pilot course developed in the X-math project, will be used in this programme.

In Spain, like in the majority of European countries the students reach the University with a low mathematical level. Then, in the first year studies, their difficulty in Mathematical topics is remarkable. In the Universidad Pontificia Comillas we will run this pilot course in the academic year 2003-2004 to reinforce the topics on Calculus I. We will consider this course like a virtual tutor. The students will use the pilot course with total freedom. In every topic the professor will guide the students for a better understanding, using the pilot course, to enhance the traditional topics studied in the classroom.

In Slovakia, the traditionally good mathematical knowledge of secondary school students has come down to an unsatisfactory level in the last years. This lack of understanding higher mathematics, on technical universities particularly led to ideas on introducing different brand new technologies to enhance interest in learning Mathematics. Virtual classroom and electronic course of Mathematics could be one of the first attempts to allow students to adopt their own learning strategies, individual speed and frequency and level of reached knowledge. The Pilot course is aimed to support creativity, self-involvement and deeper understanding using different ways of representing the study material to be more clear and interesting. Students at the Mechanical Engineering Faculty of Slovak University of Technology in Bratislava will be encouraged to use the Pilot course free, as an additional approach in their compulsory courses of Mathematics in the first and the second semester of their study programmes in the academic year 2003-2004.

## 6. Evaluation

We have to evaluate the following items, focussing the attention in some of them according the different targets:

- To enhance mathematical topics, using the brand new technologies.
- The ability to use **real mathematics** on the web, because the students may then "play" with the expressions, formulas, etc. rather than only looking at them.
- To encourage process-oriented teaching and learning by exploration and discovering.

The evaluation of the pilot course for different targets have been designed as follows:

Norwegian target: There are 19 students following the course. 8 of them are students in the teacher training education. The others are external students. They are trained teachers who are partly students and partly working. The students will have 5 lectures during the term.

Because of the few lectures the students get, they have to study a lot on their own, and we cannot teach all the content that they are expected to learn. We have therefore decided to teach the heavy concepts, and work problem based. We will therefore focus on differentiation and integration, Taylor series and differential equations. We then talk about the other concepts when they come up naturally in these lessons.

The students are organized in groups of 2 - 5 students, but one student is on his own. Some of them have physical meetings, others communicate by mail, phone and a communication platform.

The pilot course is a supplement for these students. But they will have a group paper connected to the course. In this they are told to evaluate both the content of the course, and how it functions pedagogically.

They have to use the web-calculator, and give an evaluation of it. They are told to try Scientific Talk, give comments on its functionality and suggest improvements. Each group will hand in a report.

Spanish target: There are several courses on Calculus I in the Engineering School of the Universidad Pontificia Comillas. We will divide then in two different groups. In the first one only lectures will be imparted. In the second one we will use the traditional lectures and the pilot course. We will value the understanding of the concepts and we will compare the marks of the exams in both groups. For students running pilot course on-line questionnaires will be proposed after each module.

Slovakian target: At the Mechanical Engineering Faculty of Slovak University of Technology in Bratislava, within 6 main subgroups of students that entry the university study every year, one group (approximately 100 students) will be chosen to evaluate the Pilot course learning outcomes. Within this large group, students are divided into 5 smaller working groups (20 students), while for each of these subgroups a different approach will be chosen. There will be one traditional group with traditionally read lectures and guided tutorials with no information on the existence of the interactive Pilot course on Internet. Another group with the same study approach will be encouraged to use the free access to the Pilot course on Internet in the free time during the self-study, their access will be without a teacher as a guide, but registered to get the frequency of inputs. One of the groups will have traditional lectures, obligatory Pilot course with a teacher guidance and a supportive tutorial, and one selected group will underwent their course on Mathematics with lectures and guided Pilot course only. A special group of volunteers could have an individual study programme with the Pilot course and teacher assistance only. We are interested to get information on students' evaluations, on their interest in the Internet electronic courses, on their ideas how to adopt the pedagogical process to get the best possible learning outcomes. All students will give their remarks in an anonymous questionnaire.

## **7. The dissemination**

The dissemination of the projects using brand new technologies is very important to widen the mathematic e-learning.

We have chosen the following ways for the dissemination of Xmath:

- To create and maintain a web site. The Xmath web-site includes a description of the project as such, links to sites in connection with the framework and important tools, on-line demo tools, news groups and a restricted area for project participants.
- To present the project and their future results at conferences, meetings, workshops, etc. The project has been presented in 11th SEFI-MWG European Seminar on Mathematics in Engineering Education held in Chalmers, Gothenburg, Sweden [9] and several papers have been sent to international meetings.
- To give seminars on project subjects. Odd Bringslid, coordinator of the project, and Enrique Canessa has been the organisers of The first MathML symposium [10], hosted by the Abdus-Salam International Center for theoretical Physics in Trieste (Italy). The second Symposium will be hosted by IPAK, Velenje, Slovenia in 2003. We hope these symposiums will be the germ for the "European MathML community"

## **8. Some future tasks**

Several possibilities of work are quoted bellow:

- To follow the dissemination of the project. It will allows the "extension" of the MathML community.
- Additional modules to widen the pilot course can be prepared. The number of modules to be designed can cover the majority of mathematical topics to be learned in Universities and Colleges. The "Building a European Database of Mathematical e-Learning Modules" project, a Leonardo da Vinci II pre-proposal involving Xmath participants and institutions of other countries, claims to work in several of such modules.

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# PRINCIPLES, QUALITY REQUIREMENTS AND SOLUTIONS FOR ON-THE-JOB E-TRAINING IN SME<sup>1</sup>

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## Introduction

The urgent need for innovation and continuous training and competence development of the personnel of Small and Medium-size Enterprises /SMEs/ is widely recognised. These have to be developed systematically around sound training structures, ensuring that working and learning are matched effectively. SMEs in any sector cannot respond effectively to this vital need. The reason is their small size, which usually means shortage of resources.

The SMEs specific training and consulting needs would be covered by the development of Internet-based environment. The building of a network for e-Learning would provide the integration, customisation, deployment and dissemination of the training platforms, methodologies, services developed under various successful projects, and best-practice results. E-learning also acts as support to the process of change within the organisation, offering a new approach towards learning, teaching, working, interacting and thinking, which is necessary today.

The aim of this paper is to present the basic implementation phases of e-Learning network for on-the-job training /OJT/. The current paper addresses also the requirements, principles and criteria providing an effective and qualitative development.

## Basic Phases of e-Learning Network Architecture Implementation

The e-Learning network has to be established on a sound technological baseline. Technology has to be considered as “a critical element of the learning process itself by allowing substantial methodological and cognitive innovations” [3]. The adoption of effective learning methodology is another critical point. The special requirements of adult training as well as the support of the in-classroom, in-company, distant learning, self-paced and group-work learning have to be considered during the methodology tailoring. The standards regarding re-usable learning objects fostering the creation of specialised courses by intermixing and exchanging material with other learning environments supporting these standards have to be considered too.

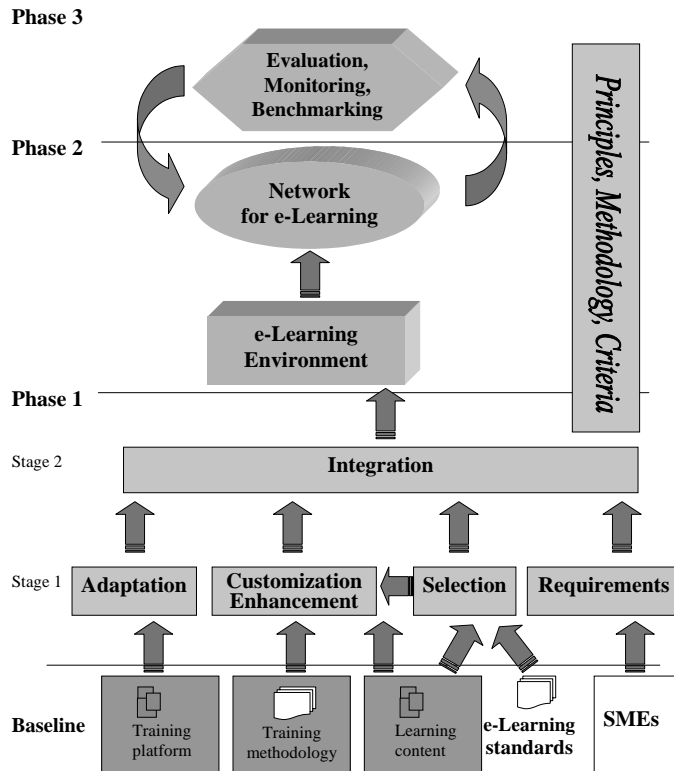
The figure below depicts the overall work to be done starting from its baseline and advancing gradually until the network is fully operational. In particular, the work is organised in three distinct phases. The first phase takes as input available generic technological platform along with international e-Learning standards and builds the training network. This phase has two stages.

Stage 1 refers to the necessary adaptations on the training platform, customising a relevant training content and training methodologies, and selecting appropriate e-learning standards to follow. In parallel there is a user requirements analysis running to specify the specific features of the training network in order to meet the needs of the concrete SMEs sector.

Stage 2 of this phase integrates the customised material into the adapted learning platform following the selected e-Learning standards.

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During the second phase, the network is operational and the monitoring of its performance starts. In parallel a detailed evaluation framework has to be elaborated based on concrete criteria about the functionality of the learning environment, specific objectives in terms of building and using user competencies, and methodological aspects for adult training. The extensive monitoring along with evaluation and refinements are high-priority tasks in order to have a self-sustainable and fully functional environment. The detailed specifications of the benchmarks for measuring the impact of the used approach to the concrete SME sector are mandatory.

The final phase includes extensive testing and refinements on the basis of the evaluation framework specified in phase 2. In addition, during this phase the deployment of extensive marketing and dissemination activities contribute for the expansion of the network.

The next part of the paper illustrates the building up of dedicated e-Learning network on the example of the OJT e-Learning network, developed under the “Leonardo da Vinci” project ADONIS: “Advanced On-the-job e-Training Solutions in E-Business for SMEs” (2002 – 2004).

### Training platform

The ADONIS architecture is an enhancement of the generic training platform developed under project ARCHIMED: “Advanced Multimedia-System Architectures and Applications for Educational Telematics” [3, 9] (1998-2000). The ARCHIMED platform was aimed to build an environment adaptable to the learner needs, by offering her/him tools that facilitate learning and collaboration. It supported a number of facilities that proved efficient in supporting the virtual university paradigm:

- Organisation of training material in Web-based presentations.
- Provision of registration and “virtual desk” tools to learners, such as annotations on the training material.
- Development of the training material on-line, in a set of web-based presentations.
- Development of on-line and automatically corrected exercises.
- Digital Library, providing a common pool of information in different file formats (documents, presentations, spreadsheets, multimedia content etc.).
- Discussion Forum, facilitating the communication and exchange of knowledge and information between the network members.

The functional characteristics of the ADONIS learning environment, build up as adaptation and enhancement of the ARCHIMED platform, consider the specifics of:

- the form of learning processes - on-the-job training;
- the target group – personnel of tourist-oriented SME’s;
- the learning content – IT and other knowledge and skills, allowing and stimulating successful e-business activities.

The analysis of these specific topics allows to formulate three groups of functional characteristics, necessary or desirable for the ADONIS environment:

- Operation in Internet mode by DL delivery of OJT courses/modules
- Support of learning-by-doing practice
- Operation in working conditions (with real software systems)

The necessity of these functional characteristics corresponds to the aim to have OJT (taking place on a working place and oriented to regular working products and services) for IT and connected knowledge and skills.

- Execution of assessment tests and projects
- Support for the teachers/trainers acting in their specific roles and activities in OJT.
- Registration of the learner's history for tracking his/her progress.

This set of functional characteristics corresponds mainly to the features of structured OJT, though the facilities for self-evaluation are important also for the self-directed learning.

- Asynchronous connection with the teacher/tutor.
- Sufficiently intuitive interface for the end-user.
- Work with standard/not excessive computer resources.
- Considering moderate data exchange rate.
- Avoiding the need to download programs/files on the learner's computer (lesser requirements to the learner's computer resources, increased learner's trust in the security of his company confident information).
- Allowing the learner to work and practise with real software system on a remote computer without the need to purchase the system for his exercises.

This third set of functional characteristics concerns mainly ADONIS implementation, taking into account some pragmatic considerations about the learners community.

### ***Design principles***

The design of the ARCHIMED training environment and its enhancement in the ADONIS architecture consider a set of common design principles [6]:

- Content Eligibility - the learning material has to be tailored to the needs of target group, revealed by requirement analysis.
- Sound instructional design - proper learning objects assembly to support effectiveness in terms of learners' performance.
- Engagement/Interactivity support - the aim is to keep the attention of the learner with the right amount of interactivity and support for interaction between the learners and the users in general.
- Navigation Support - the learner should be able to control navigation and not get disoriented during a course. Users' navigation could be aided by means of course maps, availability of options, user profiles, and usability of visual components.
- Motivations - use of appropriate means of motivating the learner to forward with the course, including case studies, involvement of experts in the training process, practical exercises, group work, multimedia content and dynamic adaptation of courses.
- Sequencing. The course structure enables learners to build on existing knowledge. The courses are built on lessons organised from simple to more and more complex ones.
- Feedback and Evaluation Support. The learners can get feedback and tests for progressive evaluation in all phases of the learning process.

- Esthetical Quality - the design of the courses and the training platform environment has to consider esthetical quality of the presentations in order to raise user attention and satisfaction.
- Record Keeping - suitable recording of user performance and preservation.
- Language & Tone Suitability of the used language, support for dictionaries and domain specific thesauri. Support of local languages.
- Personalisation - support for different learning styles, customisation of the course material and the presentation based on the special needs of each learner.
- Scalability in terms of content aggregation and delivery to the learner.

These principles have to be reflected also to specify suitable metrics for the evaluation framework testing the effectiveness of the training environment.

### **Methodological aspects of training**

The modern learning technologies apply constructivist pedagogy principles. The models of learning are based on the following main ideas [3, 5]:

- Learning should be context based and acquired through making links with existing knowledge.
- Conceptual learning is through active involvement.
- Learning is through collaboration with others.
- Learner should have personal autonomy and control over learning.
- Teacher mediation depends on needs and skills of the learners.
- Multiple perspectives of the learning tasks and different approaches of understanding.

The ADONIS environment is oriented towards adaptation of the constructivist pedagogy principles to the specific requirement of the on-the-job-training life cycle [1, 2]. Essential criteria for on-the-job training activities are the following:

- The location in which the learning takes place is a work place and the nature of the learning process is largely similar to the working environment.
- The trainees produce regular working products and services.
- The activities include “hands-on” experience.
- The training is highly similar to the current or future everyday tasks.

The ADONIS architecture is designed to reflect the specific quality requirements for OJT by supporting the following types of learning processes and activities in case of structured OJT:

- Learning by doing (practice-based OJT).

In this case the role of the ‘master’ may be supported by: 1) examples included in the course materials - e-demonstrations of master tasks execution; 2) in-classroom training in case of combined on-the-job-/off-the-job-training.

- Learning by practising partial skills (instruction-based OJT).

The ADONIS architecture concepts suppose that the courseware structure involves this kind of training by means of exercises offered for execution without direct supervision by the instructor. In case of acquiring IT knowledge and skills combinations of e-demonstrations and exercises – tasks to be executed with real software products – will simulate also the apprentice-like type of training.

- Learning by systematic feedback and reflection / self evaluation (study-based OJT).

In this case the feedback function of the ‘coach’ is provided in the e-Learning environment by development of communication functions, allowing the supervisor to follow the execution of exercises and development of projects by the trainees.



The ADONIS architecture consider also possibilities for unstructured OJT:

- Self directed learning with options for free access to the courseware units (access to selected units independently of the standard sequence, access to units of given type, e.g. exercises on given theme etc.).
- Coaching and group discussions by means of the communication functions of the environment.

### **Development and integration of training materials**

A traditional approach to training is based on the theme's features list - the course is developed on this features list baseline and the students are tested on their recall of the features. A performance-based approach, by contrast, is outcome based rather than content based. It focuses on what people want (or need) to do, rather than on what there is to know. This approach to the specification of learning goals of a training material seems more appropriate for OJT as OJT is oriented primarily to skills acquisition.

The user requirements analysis identifies the needs of knowledge and skills and necessary levels of competency for the user groups supported in the learning environment. The learning content of the courseware under development in the ADONIS environment covers the following topics:

- Training in tools and services for the SME in the role of an information supplier - templates for web site construction, electronic publishing tools for the publishing of internal documents, "business-to-business" documents, client oriented documents (catalogues, advertising), tools and services for SME web marketing within the regional context.
- Training in tools and services for the SME in the role of an information receiver within the regional context (databases for archiving information, user profiling tools, library of specialised information, search engines and agents).
- Training in tools and services for the SME in the role of an information exchanger (messaging tools, cooperation tools and services).
- Training in methods and tools, catalysing SME e-business activities (business plans, business models, introducing e-commerce).

The courseware is developed in the form of learning objects - mainly short courses/modules with explicit practical learning goals rather than as courses with complex structure, more typical for formal institutional training. The learning objects are built according to clear conceptual scheme and are kept in repository of training materials. Therefore they may be further reused, customised and intermixed. Standards for reusable Learning Objects (such as SCORM) [6, 7] will be supported so that the training material can be shared combined and mixed with Learning Objects from external sources.

### **e-Learning network set-up and evaluation**

The ADONIS e-Learning network is an open distributed environment, supporting distributed repository of training materials and a set of nodes - local centres of expertise for on-the-job training /OJT/ with their own networks of tourist-oriented SMEs. The distributed repository contains information resources as software solutions, training courseware, multimedia and documents, oriented towards successful e-Business activities. The local centres are built-up by the project partners and will organise testing in the real practice of ADONIS on-the-job training solutions. The integration of the local centres networks forms the network for virtual communities of users.

The approbation of the effectiveness of ADONIS operation and the applicability of its interactive training materials will be performed through flexible scheme for different groups of SMEs according their business goals, working organisation, staff background etc. It will apply set of benchmarks (quantitative and qualitative measures) to evaluate the suitability of learning methodology and the training materials and the usability of the training platform. The set of benchmarks is developed in close user-supplier co-operation. The local centres evaluation reports will be integrated in order to provide recommendations for refinements of the training environment, pedagogical methodologies, the training materials and the training platform services.

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# A COMBINED ASSESSMENT METHODOLOGY APPROACH

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## Overview

Diplo Foundation is in the process of introducing a new course based on the successful post-graduate diploma in I.T. and Diplomacy. The course is modular, whereby students are able to take up individual modules of study that may lead to either a Master of Arts or a Post Graduate Diploma.

The mind map below illustrates some of the issues that were taken into consideration.

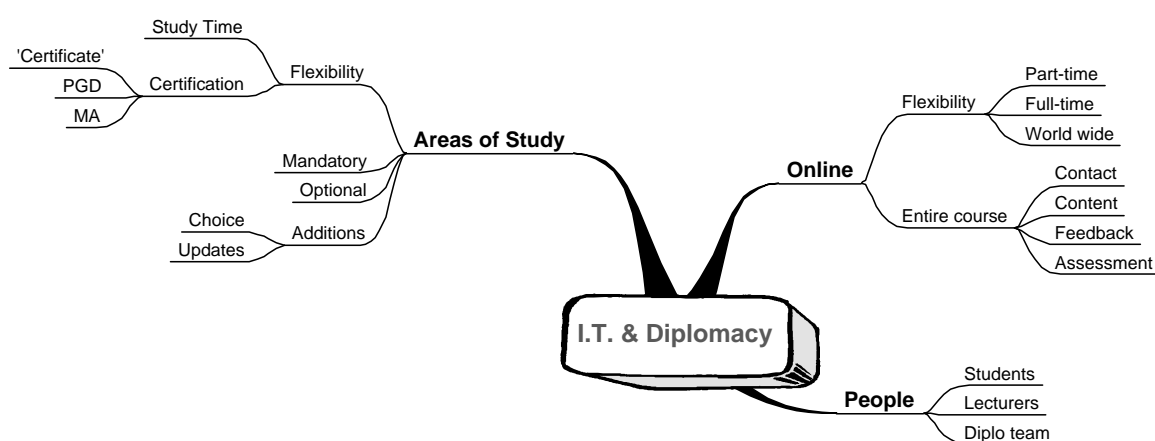


Figure 1. Exploratory Mind Map

From this departure point, a more 'classical' course structure was developed. At present, Diplo Foundation is in a position to offer the following Areas of Study that fall under the umbrella of Information Technology and Diplomacy:

- Bilateral Diplomacy
- Multilateral Diplomacy
- Information Security for Diplomats
- Trade Diplomacy
- Language and Diplomacy
- Internet and Diplomacy
- Human Rights and Diplomacy
- Organisation and Management in Diplomacy
- Knowledge Management and Diplomacy
- Science Diplomacy

Each Area of Study will be composed of 8 Study Units. A Study Unit will refer to a particular aspect, which is an integral part of the Area of Study. Each unit will be made up of the following:

- Online text + links to interesting references
- Online chat discussion sessions
- Question and Answer (Q & A) exercises

Completion of an Area of Study is formalised by:

1. Assignments

The format of which may vary from Area of Study to another depending on the content treated and the approach taken by the lecturer.

2. Online examinations

On completion of the Study Units and assignments, will be provided with a link to a website in order to log in and gain access to the examination questions. The examination may be considered to be of the 'open book' type whereby it is assumed that students have access to information whilst working on the examination questions.

## **Rationale**

The approach adopted by Diplo Foundation is based upon the necessity to provide students and lecturers with a means of continuous assessment for both cognitive and affective learning objectives.

### ***Instructional Text and Annotations***

On commencement of the first Study Unit, students are provided with a link in order to gain access to the various resources made available via the Diplo website. Students are given sufficient time to look up the main text made available online by the lecturer. They may also download it on their computer should they wish. They are also provided with other website links and more 'traditional' references in order to broaden the knowledge of the subject.

The next stage is that students go back online and critically analyse the original text provided. Students are encouraged and indeed requested to add their own hypertext annotations or comments by means of specially designed software. Students and lecturers are able to write comments and references directly via the hypertext annotations Annotation would automatically indicate the person who made it and the date when it was added on to the website, apart from the comment itself. Moreover, there is also the possibility to include URL links.

The use of these hypertext-based annotations is based upon the notion of organising knowledge in cognitive structures outlined by Ausubel (1963). Buzan and Buzan (1993) bring forward the notion of mind mapping. The main scope is to get students to identify the main ideas or root nodes and subsequently identify the subsidiary ideas. It must be noted that the students' background, perceptions and values may result in contrasting results.

All the comments and annotations are made available on the web-based text. Thus each participant can go through the hypertext notes added and add their own, either to the original text or in reply to other annotations. Thus an asynchronous discussion is created.

From the entity of the annotations incorporated, the lecturer is able to determine the level of research carried out by the student but also the degree of participation within this period of asynchronous discussion.

Associated with each study unit, there is a Question and Answer (Q&A) exercise. This normally consists of a set of questions that require somewhat short answers. The questions tend to be either of multiple-choice format or short, one-line answers. The objective of this type of exercise is to provide the student with a means of assessing his/her assimilation of the knowledge provided in the online text. Students are expected to complete these Q&A exercise prior to the online chat sessions. Moreover, it is possible for each individual student to obtain the results of his/her Q&A exercise.

### ***Online Chat Sessions***

These chat sessions are the only means of synchronous communication between students and lecturers. It is envisaged that chat sessions will be held twice a week for a total of three hours a week.

During the chat sessions, students and lecturers are able to discuss the text provided online and the annotations that were added the same text. The annotations together with the Q&A exercises serve to purpose to help start off the discussion as it provides both parties involved with a basis upon which they would base their arguments. Naturally, any unresolved difficulties may be clarified during these sessions.

Towards the end of the study period, the chat sessions will also serve to discuss issues pertinent to the final written assignment and online examination. While both will be made available online and relevant instructions provided, a chat session where the lecturer is available was deemed a necessity in order to clarify and queries coming from the course participants.

It must be pointed out that the chat rooms would be made available twenty four hours a day. While chat sessions with lecturers would be held at a stipulated time, students groups are free to agree on a particular time and set up their own chat session whereby they can discuss issues related to their course of study.

### **Assessment Related Issues**

#### ***Proposed Assessment Methodology***

For a single Area of Study it is being proposed that its assessment will be based upon the following:

- Use of hypertext annotations
- Attendance and participation in the online sessions
- Q&A exercises
- Assignment
- Online examination

The selection proposed above stems from the need to be able to address learning objectives that within the cognitive domain, but also the affective domain as identified by Krathwohl, Bloom and Masia (1964). Belanger and Jordan (2000) indicate that while it is relatively easy to achieve Bloom's cognitive learning objectives (1956) by means of distance learning technologies, it is somewhat more challenging when it comes to the affective learning objectives as the latter are affected by issues such as the learner's interests, emotions, perceptions, aspirations and whether the instructional content is accepted or rejected by the learner.

Belanger and Jordan (2000) go on to indicate that affective learning objectives may be met in two ways through the use of distance learning technologies.

1. The use of multimedia technologies raises the general level of interest and engagement of the student with the instructional content.
2. The learner is engaging in a multiple sensory learning environment. Distance learning courses require students to, for example, view images and read material. More senses are being employed unlike learners who just sit passively in a lecture based course environment. Learning is more interesting and the retention of cognitive material is enhanced.

#### ***Interactivity***

Interactivity is considered to be a determining factor for the success of this course. All the participants must be able to interact effectively with the Diplo Learning Management System (LMS). Belanger and Jordan (2000) indicate the following reasons why interactivity needs to be actively promoted:

- It decreases sense of isolation of individuals involved in distance learning
- It increases the flexibility of individuals to adapt to new conditions
- It increases the variety of experiences individuals are exposed to
- Interaction may be a requirement for some types of courses
- Allows more senses to be used in the learning process

Modern Learning Management Systems (LMS) such as the Diplo LMS provide both asynchronous and synchronous means of communication, including, electronic mail, electronic bulletin boards, chat rooms, personal web space, hypertext-based annotation tools, simulation exercises and others (Kurbalija, 2000).

It is imperative that students engaging in this form of distance learning do possess the right cocktail of skills in order to gain maximum benefit. Past research (Caruana, 2002) did indicate that student lacking the necessary skills were experiencing great difficulties and ultimately led to some elements to refrain from completing a similar course organized by Diplo Foundation.

#### *Interaction with Instructional Content*

Baker, Niem and Herl, (1994) contend that validity not efficiency must be the main focus towards the application of technology-based assessment methods. The purpose of the hypertext-based annotations is to be able to verify and assess the degree of interaction with the instructional content. The number of annotations provided by a student should serve as a quantitative element in terms of the degree of interaction with the content provided. Moreover, the quality of the annotations should provide an element of quality as to the level of understanding of the various interrelationships between the various values exposed in the content provided, evaluation of the instructional content and other learning objectives.

The degree of understanding of the instructional content provided is further corroborated by the Q&A exercises. Students are able to gain access to a particular Q&A exercise, answer the questions and obtain feedback. It is then the lecturer's role to assess the students' competence based on the annotations entered and the Q&A responses, provide feedback and set the outline to be discussed during online chat sessions.

#### *Interaction with Lecturer*

Lecturers will always play a fundamental role in that they will act as a point of reference for students. Students will always seek the advice of their lecturer in times of need. Lecturers will also be involved in the assessment of the student.

In the case of this course, the role of the lecturer has also incorporated that of an 'e-moderator' (Salmon, 2000). Lecturers will be presiding over the chat sessions, providing support and direction. Students must not be left on their own as some will feel isolated and cut off (Wegerif, 1998). While it is important to keep a discrete level of socialisation, it is important that the lecturer is capable of steering the chat session into a meaningful exercise that stimulates the participant's learning experience. Rossman (1999) provides a detailed list as to how to provide feedback to learners, and ways to facilitate the online chat discussion such that no one is left isolated. Salmon (2000) refers to 'lurkers' – students who would log on the chat session but tend to refrain from participating actively in the discussion. In the case of previous Diplo Foundation courses, there were instances of students who gained access to the content but provided very little feedback in terms of comments related to the instructional content itself.

By referring to the annotations made on the text and the participation in the online chat sessions, the lecturer is able to rate the level of participation of the student. Moreover, any 'lurker' may be addressed individually by e-mail. It is often the case that students refrain from participating out of embarrassment. The lecturer's job is to provide encouragement and support in order to induce the hesitant student to participate more actively.

### *Interaction with Students*

In a traditional classroom environment, student interaction may produce fairly positive outcomes resulting from the sharing and development of ideas in a non-linear way. It can also expose learners to other cultures and enhance their learning experience by allowing them to benefit from the strengths of each other. Studies by Taylor and Burnkrant (1998) in the United States indicated that American university students indicated the lack of student-student interaction as a major problem in online courses.

The combination of text and hypertext annotations and online chat sessions outlined previously attempts to tackle this problem within the proposed course framework. The objective is to initiate a form of peer reviewing process as advocated by Nulden (2000).

### **Discussion**

The Mind Map illustrated in the beginning provides a quick overview of the issues that are being tackled in order to move on to the final implementation stages. At Diplo Foundation, we take pride in the quality of academic courses provided but also in the level of interaction that has been achieved between students, lecturers and Diplo staff. The intention is to retain these qualities for this course, which unlike others will be entirely offered online. The project is currently in the final testing stages. During the year of 2002, the various tools incorporated in the LMS have been extensively tested *in situ*. At present, testing is taking place by means of a sample course made available over the web. It is envisaged that the formal launch of this programme initiates at the beginning of the next academic year.

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# **DANCE THERAPY AND DISTANCE LEARNING EXAMPLE OF ORGANIZATION AND APPLICATION OF GROUP CONSULTATIVE MEETING**

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## **Introduction**

The adaptation of people of art in the new conditions that were shaped the last decades of 20th century re-defined their relation with education giving them a new prospect. The particularity of their object of pastime, which at the period of creation requires active viable attendance in most forms of art, constitutes characteristic of increased difficulty for the distance education.

The last two decades of the foregoing century long distance learning developed by using all the potentials that new technologies offer. A wide range of discussions has started about education in arts, that focuses in the use of P/C and World Wide Web, for the needs of students and the desired aims in relation to the content of teaching (Eder, 2001). There been held trying for the alternation of the curriculum of traditional courses in long distance education. These modifications are about courses of art like drawing (Hudson, 1988). The combination of virtual reality technology with World Wide Web was used from Garland and Naugle (1997) for the creation of an on line dance course and in general, for the use of computer technology in dance education. Today more and more museums develop distance learning initiative based on videoconference that allow to make virtual tours in the museums collections or to attend their educational programs.

Dance therapy constitutes a special field of study. Organized postgraduate areas of study exist long enough in the traditional educational systems. However, a small number of educational organizations has adopted the method of distance learning in dance therapy. Dance therapist should allocates, the basic knowledge of psychologist and the faculties of dancer. He is not only dancer neither psychologist. For this reason his education combines the theoretical and practical dimension.

The aim of this project is, the presentation of the organization and the conduct of group consultative meeting (G.C.M.) about "dance therapy". The example could be applied and aims to the familiarization of persons of this area to the processes of distance education. The meeting could be a part of thematic unit "dance therapy" which constitutes unit of postgraduate program of distance learning about dance. It aims to offer, knowledge about the evolutionary course of dance therapy and the different visual angles that can be approached. Gives the opportunity to the student to comprehend the different and new "usefulness" of rhythm and rhythmical movement.

The aim of the meeting is to comprehend the way that we use dance in order to achieve a positive effect in the psychism of a person using it as the most suitable means of expression.

During the group advisory meeting will be analyzed the significance of dance therapy. The students will be aware of the traditional dance therapy mechanism, they will recognize it through examples that emanate from monotheistic and polytheistic societies, they will be aware of the theoretical base of modern dance therapy and they will be aware of at least one modern technique of dance therapy – multimodal approach (Levy, 1988).

## **Activities before the group-consulting meeting**

Professor should be willing to answer via the distance communication, using any means that is easier for the student to use, all the questions that he has about the curriculum and to encourage him (Kokos & Lionarakis, 1998).

A few days before the meeting he owes to send written letter to the students that will remind them the place and the time of the meeting, to report the books, or the texts that would be useful to bring with them e.g. France Schott-Billman (1997) and Fran Levy (1988), also to prompt them to send him their questions before the meeting and to announce them the daily provision. He tries via communication to diagnose the focal point of their reflection and to elicit their needs taking into consideration the difficulties that they face, the points that they are interested or that are obscured as well as their aspects about the curriculum.

The sought results of group advisory meeting are distinguished (Kokos & Lionarakis, 1998):

- *In level of knowledge:* determination of term dance therapy, determination of stages of traditional dance therapy mechanism, recognition of the dance therapy mechanism through examples that emanate from monotheistic and polytheistic societies, determination of the theoretical base of a modern dance therapy technique and knowledge of at least one modern dance therapy technique - multimodal approach.
- *In level of dexterities:* faculty of application of at least one modern dance therapy method and concretely the "multimodal approach".
- *In level of attitudes:* acquisition of a favorable attitude about the application of dance in the treatment of mental dysfunctions.

Taking into consideration the above objectives, the professor creates the methodology that follows (table 1) which includes the determination of stages of meeting, the actions and the duration of each stage, the educational techniques and the supervisory means that he will need.

In *stage A* at the level of knowledge will be determined with clarity the significance of dance therapy, what is included to that as well as who are the relative aspects of well known dance therapists. It is appreciated that this stage can be completed in 20 minutes. As suitable educational technique is selected the lecture with use of examples and as supervisory means a PC with headlight for presentations with Power Point as well as a table.

In *stage B* at the level of knowledge it is sought to be analyzed the traditional dance therapy psychological mechanism, to elaborate the five phases of the process and to be recognized through examples. In level of attitudes is sought the obliteration of reserves for the traditional dance therapy mechanism, supported in his comprehension through examples that emanate from the everyday routine. The time that is sold is 45 minutes. Enough time in order to be presented the theoretical curriculum and be presented the relative video. Initially in the first 15 minutes is selected the educational technique of lecture with a wide use of examples and then the technique of questions and answers. The supervisory means that will be used it are video, slides, PC with headlight for presentations with Power Point.

In *stage C* at the level of knowledge will be determined the theoretical base of modern dance therapy and will be presented at least a modern dance therapy technique and in this respect the "multimodal approach ". In level of attitudes is sought the positive confrontation of modern dance therapy techniques through the presentation of information that mainly come from the scientific psychology. In this stage the allocated time, the educational techniques and the supervisory means are the same as in stage B for the same reasons. It follows 10 minutes break.

In *stage D* at the level of dexterities, the objective is the acquisition of faculty of use of multimodal approach through practical exercise. In level of attitudes is sought the creative confrontation of modern dance therapy technique through the familiarization taught. This stage lasts 60 minutes because the professor wants to give emphasis to practical exercise. The practice of the students is selected in work groups with final presentation of their work, realization of composition and conduction of conclusions developing the opinions of students. At the course of this stage it will be used table and a cd player.

Table 1: Content and methodology of Group Consultative Meeting (G.C.M.)

OBJECTIVES	A STAGE	B STAGE	C STAGE		D STAGE	E STAGE
KNOWLEDGE	Definition of the term dance therapy.	Definition of the traditional dance therapy technique.	Definition of modern dance therapy techniques and their theoretical bases.	BREAK		Firming for further probing deeply. Prescriptions for further written work.
DEXTERITIES					Ability of using multimodal approach.	Firming for further probing deeply. Prescriptions for further written work.
ATTITUDES		Effacement circumspections about traditional dance therapy mechanism	Positive confrontation of modern dance therapy techniques		Creative confrontation of modern dance therapy techniques	Exploitation of dance therapy methods.
TIME	20 '	45 '	45 '	10'	60 '	35 '
TECHNIQUES	Lecture with examples.	Lecture with examples. Questions and answers	Lecture with examples. Questions and answers	BREAK	Practical exercise in work groups. Presentation of the work. Composition	Lecture & discussion with the plenary session of the students
MEANS	Power Point Table	Power Point Video Slides	Power Point Video Slides		Table Cd Player	Power Point Photocopies

In *stage E* are presented the specifications of written work through which is sought the further deepening in dance therapy. In levels of attitudes is sought the consolidation of disposal of exploitation of dance therapy methods from the students. The stage lasts 35 minutes appreciating that they are enough for the presentation of specifications of written work. Educational technique that is adopted, is the lecture with regard to the specifications of written work and then discussion with the session taught on her way of realization. The means that are required are a PC of headlight for presentation with Power Point and photocopies.

### The actions during group consultative meeting (G.C.M.)

Professor should clarify further the concerns that emanate from the lack of acquaintance, the doubt for the usefulness of G.C.M. and whether they will accomplish to attend with success the thematic unit. After first it exposes the educational objectives and practices of G.C.M. he develops with the student the curriculum that was studied up to the G.C.M.

Then follows the application of the five stages as they were formed during the design of the content and the methodology by the professor before the G.C.M. Whether was preceded the analytical presentation of the content of the stages, the techniques and the means that were used, however it is consider necessary a further clarification of the educational technique at stage D'. The students are separated in 5 work groups of mixed composition. Each one of the groups applies in action according to the multimodal approach the technique of moving dialogue in combination to music with the aim of facing feelings that have to do with problematic situations of everyday life. Every member participates vividly in the application of this method and tries to connect theory to action. After that, a representative from each group presents the results of their work, after follows the annotation and finally the professor condenses the results of the groups and conclusions are extracted.

### **The axes, the criteria and the technique of evaluation**

By the end of meeting will be given to all the students line of selected questions of closed type with five scales from positive to negative each one of them. The questionnaire will cover the 8 following axes and criteria. In their evaluation are concluded personal, pedagogical and organizational factors that can be examined in the frames of G.C.M. (Vergidis et al., 1998).

After that, the axes and identically two criteria of evaluation for each one, are presented (European Commission, 2000; N.C.E.S., 2000; Rogers, 1996).

*1st: The importance and the quality of content of studies during G.C.M.*

- The cognitive areas of dance therapy that were not covered.
- If exist thematic regions where they are not useful in professional and scientific level or should they are incorporated.

*2nd: The structure and the management of time.*

- If the content of G.C.M. was presented with a reasonable order.
- If the time that was dedicated for each object is satisfactory.

*3rd: The use of new technologies and the technical infrastructure.*

- If the classroom is comfortable, had lack of furniture, if it had easy access.
- If the presentation by the use of P/C was more pleasant, easy to understand, interesting.

*4th: Relationship of professor & student.*

- In what extent professor practiced criticism without explaining why.
- In what extent the communication with the professor was easy to succeed in.

*5th: The effectiveness of the educational techniques.*

If the way of learning:

- offered variety of experiences of earning.
- gave the chance to participate vividly to activities

*6<sup>th</sup>: Achievement of objectives in cognitive level.*

- If afterwards, G.C.M. they have increased their knowledge in concrete object. They better comprehended, significances or comprehended the difference of dance therapy techniques.
- If the G.C.M. them prompted for more study.

7<sup>th</sup>: *Achievement of objectives in level of dexterity.*

- How capable they feel in order to be able to apply modern dance therapy techniques
- If they developed their faculties with regard to the resolution of concrete psychological problems.

8<sup>th</sup>: *Achievement of objectives in level of attitudes.*

- In what extent their interest about dance therapy is increased.
- If the confrontation specific psychological problems is feasible through dance therapy or necessarily via dance therapy.

## Conclusions

The successful application of a distance educational program that concerns dance therapy, demands careful and in detail planning of all the details that can influence the final result. The actions before and after the G.C.M. should take into consideration the characteristics of the educated to seek for concrete objectives, to ensure the suitable conditions, and to be programmed with detail (Kokos & Lionarakis 1998). For the control of the effectiveness of the above actions there must be evaluated with concrete axis, criteria and techniques (Rogers, 1996). People that deal with dance therapy it will be supposed to utilize the advantages that offer distance education in order to update the personnel and the study in the particular field of knowledge.

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# TELEPRESENCE – THE MEETING PLACE ON THE BORDER BETWEEN THE PHYSICAL AND THE NON-PHYSICAL SPACE

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## Abstract

*How to create the feeling of presence using two-way video/audio in communication?*

*Is it possible to obtain the feeling of «reality» in the virtual space?*

In this paper, the author tries to answer these questions presenting experiences from a research-based course within the pedagogical use of videoconferencing – two-way video/audio. The results are based on 5 years of cooperation between Gjøvik University College and Royal Institute of Technology in Stockholm, Sweden. The course is called Netbased Multimedia and the idea of the content and implementation in the learning process, is to discover the parameters for making the technology transparent i.e. to create such an involvement and interaction during the communication processes as to forget cameras, monitors and cables – feeling real presence in our joint virtual space. In other words, we try to create what we call TELEPRESENCE. Our experiences are, that it IS possible to create TELEPRESENCE even with simple technology and low bandwidths. The results depend, not so much on the technology, as it does on the content, the pedagogic planning and the proper use of the technology.

## Introduction

In communicative processes, whether in a classroom, a meeting, on Internet, during two-way video/audio, humans always try to do as best as they can in order to achieve interaction and positive feelings on doing something together. Let us call this feeling PRESENCE. Many people talk about quality of the technology and/or being physically close to people as key issues for the feeling of presence. Heeter [5] state that «Perfectly mediated sensory stimuli do not automatically induce continuous presence». There is much more to it than that. The feeling of PRESENCE is, first of all, a mental process and depends on a number of factors and preconditions, such as:

- Cohesion and trust among co-present partners, Bradner and Mark [4]
- Ability for imagination may be different from individual to individual – easily be «carried away», to feel identification with fictional characters in a story Enlund [1]
- The emotional state at a specific moment [1]
- A conscious decision to temporarily accept something as real , often called the «willing suspension of disbelief» – e.g. «decide» to forget reality and become engaged in what's happening on the stage in the theatre or a film [1]
- A good storyteller
- Content
- And many other factors

A variety of special and outstanding happenings may also lead to the feeling of presence:

- The first telephone operators had a very strong feeling of presence when connecting telephone lines between people. Possibly the excitement on having the opportunity to speak with people at a distance was the most important factor.
- The author himself had that tremendous feeling of presence when TV entered our lives around the sixties.

- The author have experienced feelings of presence when implementing chat net-meetings on Internet with course groups, particular when participants start more social talk, talking about their own lives and activities. Once a participant said: “I never learned a teacher to know as well in any class-room as I did in this net-based course...”

On this background, we will have a look into and concentrate on the use of two-way video/audio and see how feelings of PRESENCE may turn up as a result of the combination of technology, pedagogy, psychology and content in a storey. This will be done, based on experiences from a course called Netbased MultiMedia (NMM) – a joint course between Gjøvik University College (GUC) and Royal Institute of Technology (KTH) in Stockholm, Sweden. The size of the course is 6 ECT credits.

Let us call a feeling of PRESENCE through the use of this technology, TELEPRESENCE.

### *Statements*

Through the years one has experienced a variety of statements from people, with or without experience in using videoconferencing, such as:

- The physical classroom is the best arena for learning!
- Technology creates distance between people!
- It is important to be able to touch one another in the same room!
- It is impossible to mediate body-language through cameras and monitors!
- For me it is important to feel closeness to my students. Therefore, I cannot use technology in communication!

Do we agree or not?

### *My statement*

- The feeling of distance is not dependant on the class-room or technology!
- We may have the greatest feeling of distance to a teacher in the class-room!
- We may have the greatest feeling of presence through cameras and monitors!
- All is dependant on the human and the pedagogy – not the technology or the class-room!

### *Two experiences*

1. An experienced pedagogue and psychologist was well prepared for giving lectures through videoconferencing within pedagogy for two classes of continuing education course groups – one local and one remote. After his first lecture he said: «This was the first and last time I use this technology – I want closeness to my students».
2. A young woman psychologist was trained for one our. Then she went home and prepared herself. Two days later she kept the same two classes in «high mood» through 5 hours.

So, it IS possible, but people are different. What do we learn from this? Well, in the following we will try to go deeper into the matter and look back on the different issues and experiences given above.

## **Background**

The author has been working with videoconferencing since the late eighties in research projects supported by the Norwegian government, in cooperation with Norwegian Telecom Research Department (the previous name of this research organisation) - and in European distance education projects (Pilot projects within the Leonardo Programme). To-day GUC is implementing decentralised education both in the form of continuing education courses and as complete undergraduate programmes nationally and internationally. Videoconferencing and e-learning platforms are tools used for implementation of the learning processes.



Fig. 1 GUC is implementing videoconferencing within a large national and international network – both as externally financed projects and as long term implementation of graduate programmes.

Through group projects, the students try to achieve a mutual feeling of TELEPRESENCE between two or more sites in space.

### **Objectives of the course**

This course was established in order to give students experience in using videoconferencing, utilising it's potential for their future employer for meetings, competence development, remote instruction and so on. Also, it has been of interest to make research into the matter in order to investigate new ways of using the technology. Traditionally, we talk about meetings and lectures. However, thanks to the students, a number of new ways of using the technology have been «discovered».

### **The course implementation**

After an initial period with theory within technology, camera- and lighting techniques and storytelling, the students are divided into groups for preparing an exam-project. The groups choose a topic for their project and work in the NMM-lab under guidance from the author and the colleagues in Stockholm – all the time communicating through videoconferencing between local studios and between Gjøvik and Stockholm. «We live as we learn...». All exam projects are being recorded on videotape in Stockholm and Gjøvik. It is therefore possible to demonstrate TELEPRESENCE in both places by replaying these. **During the paper presentation, live video clips will be played for the audience for demonstration.**

The exam is implemented as a communication project where the groups are evaluated at distance, taking into account quality elements, such as: *degree of achieved dynamic interaction, storytelling, proper and intelligent use of technology and excitement of content.*

Typical chosen topics for the exam projects are: *Role play* (Criminal cases, flirting, virtual wedding, psychological tests), *Remote instruction* (Build something, hand drawing, learn how to use a computer program, cooking, flower decorations), *competitions* («Do you want to become a millionaire?», music competitions, fantasy). Up to now, about 50 different topics have been «invented».

In the following, we will present some of the student project. After that we will discuss the results and the realities. All the pictures are grabbed from video recordings during exams.

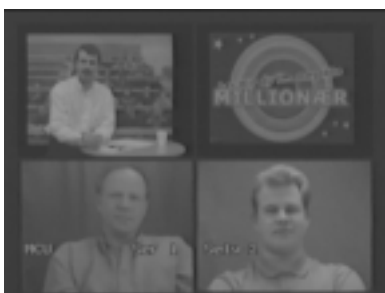


Fig. 2

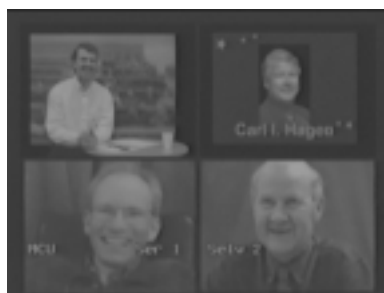


Fig. 3



Fig. 4



*A project - Competition: «Do you want to become a millionaire?». A multipoint videoconference between Stockholm (down to the left and three studios in Gjøvik. One studio is used for graphics, presenting the introduction of the program (fig.2), questions (fig. 3) and scores (fig. 4) – all three in upper right window. We can see there is engagement among the competitors, two in each team. (Stockholm down to the left and Gjøvik down to the right). The program leader, upper left window, is an illusion. He is sitting in front of a blue curtain. By color-keying and video-mixing, he is mixed on to a live video that illustrates an audience who «applauds» every time a team gives a correct answer. A good project that utilize the technology in an exiting way.*

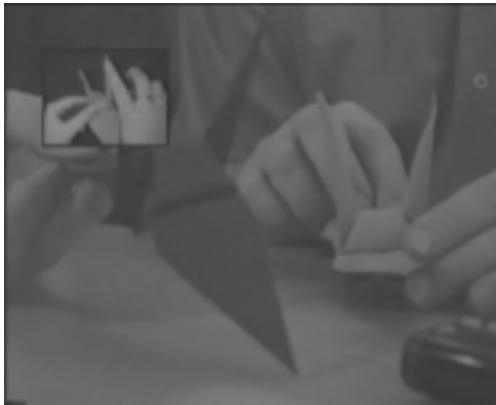


Fig. 5



Fig. 6

*A project on remote instruction. Making a paper bird. This is an extremely difficult task with many turns. In order to instruct this in a good way, it is important to use cameras with close-ups so as to see details on either side, both for the instructor and for the pupil. Fig. 5 as seen in Gjøvik. She can see details of the work in Stockholm (the large window) and they can see details of how she is bending (the small window). The small window in Gjøvik is what they see large in Stockholm. Fig. 6 as seen in Stockholm (the large window). The project created a lot of dedication and good fun. This will be demonstrated live during the presentation.*



Fig.7

*Interactive storytelling and presence production.*

*A variety of distance technologies are being used during communication between KTH and other studios in Gjøvik.*

## Discussions

As one will understand, the observations in Stockholm and Gjøvik are different, but still part of the same «play». It is important that we realise this difference so as to give optimum feeling of presence on either side. One of the most important issues is the creation of body language and eye contact. Sponberg, Knudsen, Handberg [2]. Without eye contact, no TELEPRESENCE. However, a number of other factors must be there, such as proper camera windows/frames, audio, camera back-ground, proper written presentation and controlled movements inside a camera frame, taking into account that we are working on relatively narrow band-widths. Even so, the latter is not as crucial as it used to be, since equipment and bandwidths (ISDN and/or Internet) is available at steadily increasing rate.

About 350 students have been through NMM and for the best projects, TELEPRESENCE has really been achieved. Statements, such as:

*This was fun. I forgot it was an exam...! - This is the best course I have attended since I was I primary school! - I never attended a course where I could really be creative on my own premises!*

The experiences from NMM, demonstrates that videoconferencing may be used in a great variety of new ways in the future.

- *Remote instruction.* The students have been implementing projects where complex and tiny operations could be executed by remote guidance. Many projects have proved this. Among the projects we also find remote training in using different types of software, varying from end-user software to active computer programming.
- *Interactive entertainment.* As available bandwidth is increasing, we believe interactive entertainment in the form of role play, competitions and music performances will come.
- *Interactive news.* Some projects created a choice of news in society, where the viewer not only is a viewer, but may communicate directly with the news production (This may be further into the future...)
- *Joint parties with friends and family.* Videoconferencing will be part of the multimedia infrastructure in any home in the future. It will become quite usual arranging parties at distance. Some day, one wall in the family's media-room will be a wide screen. People will appear in natural size on the screen from floor to ceiling.

I will end my paper with the beginning statement in Heeter [5]: «*We look for ways technology can more and more closely approximate human sensory experience, then examine the impact of those technologies on presence, extending understanding of human perception and technological capacities to create realistic sensory stimuli*».

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# A WEB ARCHITECTURE FOR REMOTE CONTROL OF PHYSICS EXPERIMENTS: RESEARCH ACTIVITIES OF LABNET2 PROJECT\*

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## 1. Introduction

Until a few years ago students, whose high-school had an experimental laboratory, spent almost all their laboratory time sharing just one physics experiment with other ten friends, and so they usually lived as simple spectators their laboratory experiences. Nowadays, new technologies have notably changed traditional learning models. The educational model was radically transformed, and we are moved from a model focused on the institution (*institution centred*) to a model focused on the student (*learner centred*). Now therefore students are able to interact autonomously with teachers and teaching resources. During the evolution of learner centred model, we have observed a notable increase in the availability of on-line didactic materials, forum, newsgroup, chat, e-mail. So that nowadays in traditional courses some lectures have been replaced by virtual modules. Above all web applications for simulation and prototypes of virtual laboratories are frequent. Indeed such prototypes allow the reproduction of resources usually available in an experimental laboratory. Nevertheless although the simulation resolves the demand of an initial experimentation, and it allows to handle the poor diffusion of the laboratories in the high schools, it doesn't usually allow the same available opportunities in a real experimentation environment. Moreover in many field applications, the evaluation of complex responses of physical apparatuses constitutes a fundamental necessary requisite to best understanding. Then, currently there is a strong necessity to find an alternative to the virtual environments for simulation, and to give to students real laboratories with available instrumentations, even of elevated complexity, that can be remotely controlled through web pages. How just observed because some experimental apparatuses are very expensive and their management needs very qualified staff. As last motivation of same importance, just a few high schools have a laboratory that allows effective practical learning.

## 2. Researches in progress in Labnet2 Project

The present paper will explain the progress of research activities and on-going experimentation within the project LABNET2 of the Italian Interuniversity Computer Science Consortium (CINI) in the National Laboratory for Multimedia and Telecommunication (ITEM) in Naples. Current research activities are concerned with the remote control of laboratories, accessible to students and moreover with the control of Physics laboratory "LAFIDIN" of the Engineering Faculty of University of Naples "Federico II". The present paper will also explain remarkable progress of the previous remote control system [7]. Through it students can perform experiments and they can control instruments via internet through usually known web pages.

## 3. The new applicative scenery: on line decentralized laboratories

Besides increasing primary laboratories, the new application allows the creation of secondary laboratories with the purpose of increase the number of shared experiences and resources. A primary laboratory has a

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high speed connection, a large number of instruments, very complex experimental equipment and highly qualified teachers. A secondary laboratory has an intermediate speed (IDSN or DSL) a moderate number of instruments, usual experimental equipment and usual qualified teachers. The fundamental constitutive element of the new application is the single shared experiment. A server machine will be used to connect the experiments. The server now can simultaneously manage experimental equipment and multimedia instruments. More remote connected experiments create a remote laboratory. A remote laboratory is then connected to an access server and with access server are connected both multimedia classrooms for group exercise and students for home work. The connection to the LAFIDIN lab is provided to schools by the ITEM infrastructure, which acts as Internet Service Provider and access server, routing data flows to LAFIDIN at high speed over a HDSL link. The following figure shows a scheme.

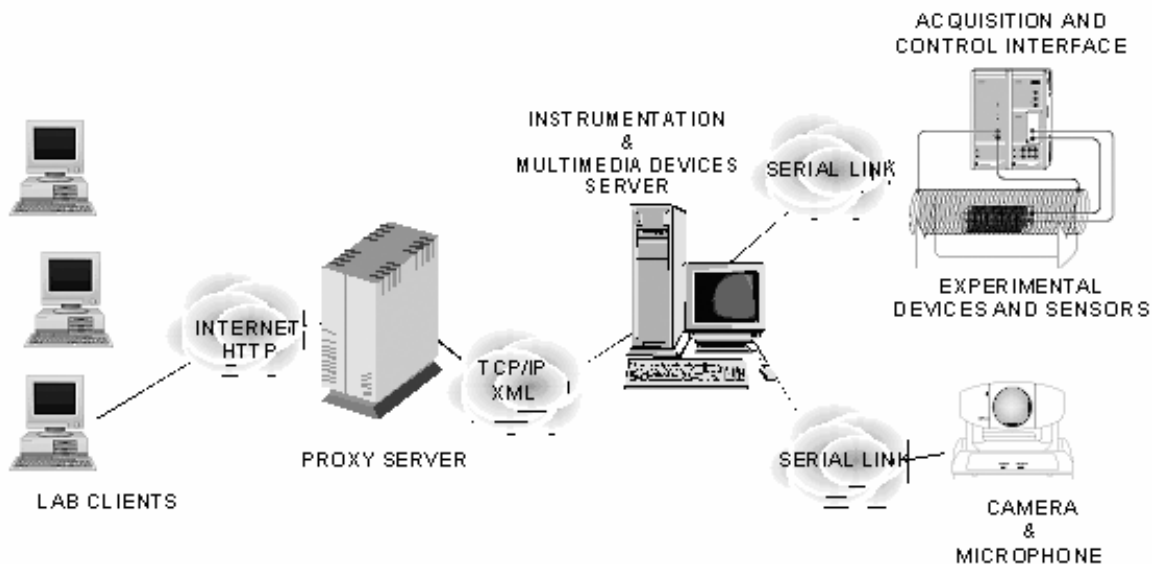


Figure 1. The outline of remote experiments.

#### 4. The Web architecture RELAX

In the first attempts to evaluate the remote laboratory didactic effectiveness, net-meeting software was used; this has allowed through the remote control of the server and the camera to perform the experiments. The previous solution enables an exclusive but sequential remote management of the experimental apparatus used by each student to perform his experiment.

Considerable progress in the previous methodology has resulted through the development of Relax (Remote LABORatory eXperience) architecture. RELAX is a web architecture which has been realized to enable the user, via internet, to have independent and parallel remote management of experimental laboratory apparatus. Users of RELAX have a highly intuitive interface at their disposal which is inserted into a series of web pages which constitute a real formative process. The PC used by students needs not to have particular characteristics and a broadband connection is not absolutely necessary.

##### 4.1 Technological solutions

RELAX uses an open architecture, developed using standard technology, quite platform independent and equipment independent. This architecture does not impose particular requirements on the computers on which it is installed, nor are there any particular requirements which may arise if the equipment is updated or substituted. This flexibility was possible by use of the Java language “platform independent”, which is strongly network oriented. As support technologies, XML (Extended Markup Language) has been used as a database and also as a means of information transfer between the various architectural modules. The JSP (Java Server Page) side server was used to create dynamic web pages, and the Java applet was used to obtain experimental results in graphic form.

## 4.2 The logic structure of RELAX

The architecture which was utilized is a classic “three-tier” web architecture, whose database is, however, rather atypical because it is live built from the measures provided from the laboratory apparatus. It can best be described as a “dynamic database”.

The elements which together comprise the RELAX architecture are, therefore:

- **Client:** this is the browser through which the user connects to the remote experiment.
- **Proxy Server (front end):** this enables the user to interact with the architecture, providing a user-friendly interface and making transparent the architecture and instrumentation. After the parameters have been set, it creates an XML document in which there are the instructions for the experiment and this document is then sent to the server. In reception mode the Proxy Server receives one or more XML web documents containing the result of the experiment that are visualised through web pages and applet.
- **Instrument server (back end):** this is a multithread module, written entirely in Java. The module is able to dialogue with the data acquisition instrumentation and controls the actuators, booking the resources and synchronising the experiment session. It receives an XML document which contains the instructions for the experiment and from these the parameters for issuing instrument-oriented commands that are sent to the apparatus. Successively it receives the results of the experiment which are encapsulated in one or more XML documents and sent to the Proxy Server.
- **The apparatus:** this is the dynamic database.

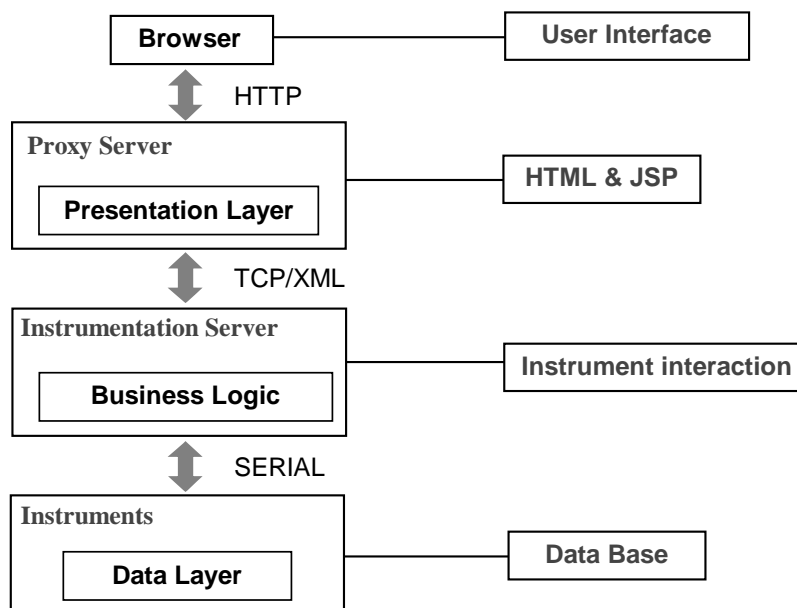


Figure 2. The RELAX web architecture.

## 4.3 The experimental session

It is important to emphasize the interaction among the components of the architecture which constitute the same phases as a typical experiment:

- **Choice of experiment and setting of the parameters:** the user connects to the web pages, he receives instructions concerning the phases which he will follow, he chooses an experiment and selects the parameters, and he concludes the first phase sending the request.
- **Sending the required experiment:** the parameters chosen by the user are sent to the equipment server in an XML document which will be translated in hardware commands to be sent to the equipment.

- **Execution of the experiment:** the equipment receive and carries out the commands sent by the server.
- **Reproduction of results:** when the experiment is finished the equipment sends the results to the equipment server. The equipment server elaborates them and sends them to the proxy server in one or more XML documents. The documents are sent back to the user as graphics, tables or in the form of a Csv file which can be downloaded for future elaboration.

## 5. The experiences in high schools

The opportunity to give to students an exclusive and independent control over the experiment has allowed to get an exercises level more advanced than previous experiences, that were directed to an impact valuation. Two vertical subjects were tested: the first one about linear and not linear electric conductivity phenomena, the second one about magnetism and Hall effect. Part of the classes, whose institute had no laboratory, experimented just on remote. Another part made experiments both in school laboratory, and on PC controlling on remote the physics laboratory of engineering faculty. Before making experiment it was made an entrance test. After the experiments it were made exit questions to value the learning gain. Following graphs show global results.

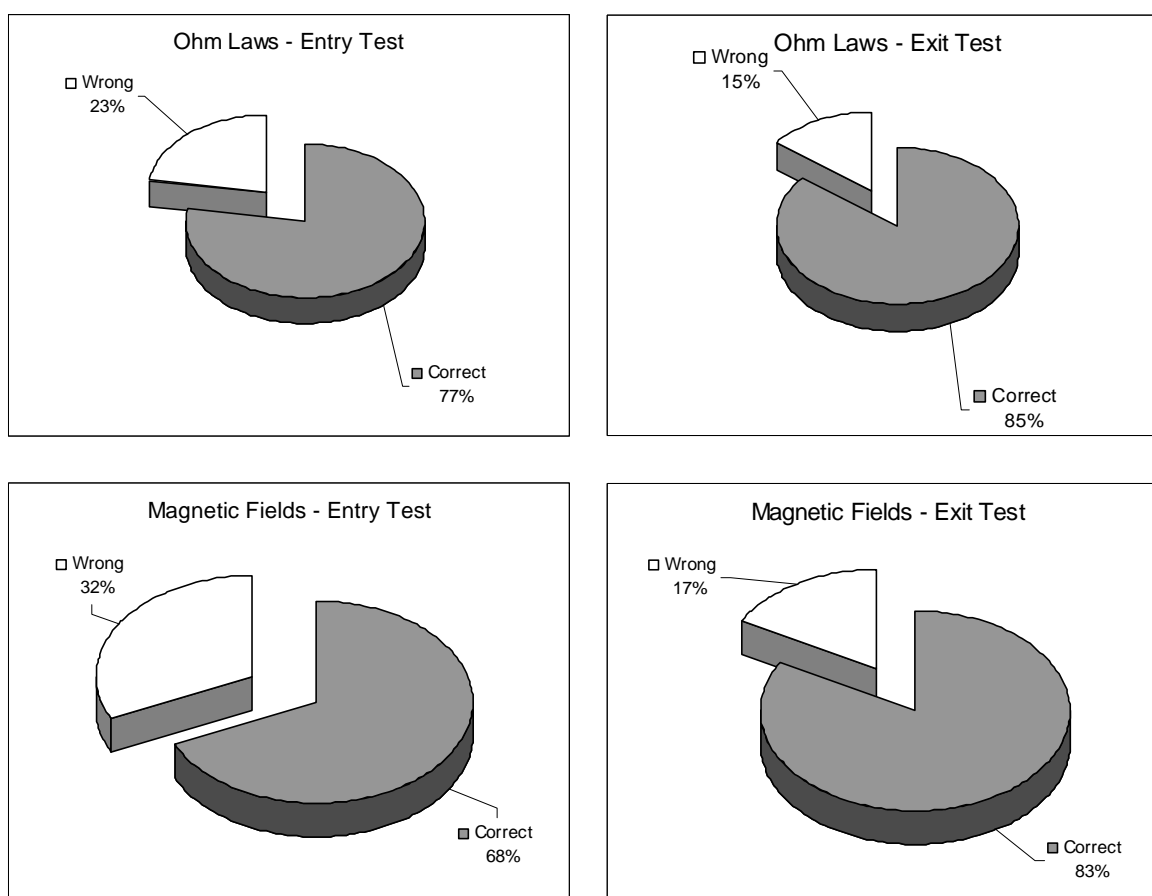


Figure 3. The global results of questionnaire.

As we can observe from results, students have shown a significant improve of their specific knowledge about the experienced subjects. They understood particularly the way how to control remote equipments. They understood the aims of the experiences too. At the end of any experimental session, there was a conclusive debate, where students did original comments, showing a remarkable interest in remote laboratory.

## 6. Conclusions and future developments

The results of this researches have shown that a basic laboratory, whose experiences are made in classroom, or in school laboratory, but with poor materials and simple equipment, joined to a remote laboratory, whose advanced experimental equipments are interfaced give remarkable contributes to the learning gain of the students, confirmed by quantitative results. The base knowledge level needed from students to work effectively with remote experiment was carefully valued. The spontaneity and the absence of any mediation in autonomous experimentation of students contributes to stimulate interest and curiosity of the students, stimulating the acquisition of new concepts.

In this way, during the remote laboratory activities, students didn't want anymore to reach quickly final result trough fixed steps.

Such behaviour exhibited by the students, as the answers to the questionnaires have illustrated, has guaranteed them the opportunity to valorize the concepts that have been learned during the experimentation. Besides in the remote laboratory has been given to the students the possibility to follow different runs. They has been able to furnish answers to questions of the type "*what happens if...*", because they has been put in condition to make attempts. The student under these conditions is surprisingly stimulated to produce original ideas and to try different approaches. According to an improvement of current remote laboratory, in next future will be improved the graphic interface and the amount of didactic equipment and data sets on website that students made in previous experiences.

It will be possible to improve the instruments to build a platform for cooperative learning in which it will be possible to make verification tests directly online. At last it will be possible to extend the network and the experimentation to other European schools.

The suggested solutions and the experimentation gave remarkable results which open the view to a net of decentralized laboratory. The network will allow the sharing of experimental equipments, knowledge, teachers, cross experiences between local and remote laboratory, and offers a new remarkable cooperative distance learning opportunity.

## 7. Acknowledgment

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# **ENTER – TEACHING AND LEARNING WITH MODERN EDUCATIONAL MEDIA A PROGRAMME EVALUATION EXPERIENCE**

*Susanne Kraft, German Institute for Adult Education (DIE), Germany*

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“ENTER – Teaching and Learning with Modern Educational Media in Further Education” is a joint project of the German Institute for Adult Education (DIE) in Bonn and the Centre for Distance Study and Higher Further Education at the University of Kaiserslautern.

The aim of this project is the development and trial of an internet-based further education programme on teaching and learning with modern educational media. The course is aimed at graduate staff and heads of departments working in adult and further education.

The development and the scientific attendance is sponsored by the German Ministry of Education and Research (Bundesministerium für Bildung und Forschung).

## **Teaching and learning with modern educational media**

Adult and further education is being faced with new challenges. Teaching and learning with modern educational media is changing traditional patterns of the organisation of learning and teaching in adult and further education. Being able to use and apply the new educational media professionally on the basis of information and communication technology makes new demands on educational decision-makers and teaching staff (organisers, syllabus planners, teachers). They have to be able to operate new technology and put it to good use. This requires comprehensive knowledge of the media, a certain degree of technical know-how as well as the ability to properly assess the potential of the new media against an educational and psychological background and, most importantly, to be able to put it to use.

This further educational programme which runs over 14 months will allow the participants to acquire wide-ranging skills in the use of modern media. This includes a solid grounding in current media technology, basic knowledge of pedagogical and psychological concepts and theories of teaching and learning with modern media, as well as a knowledge of the areas of application and use of the media in adult and further educational institutions. However, familiarity with the use of a computer and the internet is an entry requirement and cannot be included as a part of the programme.

ENTER not only provides theoretical knowledge of learning and teaching with modern media but also makes it possible for the participants, during the online phases of the course, to gain personal experience of learning online, of communicating online and of using an internet teaching/learning platform. The participants experience both theoretically and practically what it means to moderate learning and teaching processes in a learning environment. As well as this, they can make direct comparisons between different learning/teaching platforms (online seminars, web-based training).

ENTER consists of four online modules, four attendance phases and one practical project.

The online periods which extend over 12 months are the largest part. In four modules the participants acquire the necessary knowledge concerning teaching and learning with modern media and experience themselves what learning on-line is like for participants.

The attendance phases provide the participants with the opportunity of getting to know each other as well as a room for social and professional exchange with each other and with the trainers. Organisational issues as well as technical matters concerning communication can be clarified and ideas for projects developed and encouraged. During the project period the participants develop a media project relating to an institution. The aim of this is to ensure that the participants make the transfer from theory to practice.

## Online-learning seen from the point of view of the participants

ENTER has been performed twice with 50 participants per course. The participants have been asked regularly parallel to the course about their experiences with online-learning, about emerging problems and about their motivation.

The results can be summarized in seven theses:

- Experiences of learning with modern media do not often differ from learning during attendance phases.
  - Virtual (distance) learning is considerably more intensive than traditional distance learning.
  - Successful e-learning requires the active collaboration of the learner.
  - Without enough technical know-how online learning is difficult and frustrating for the learner.
  - Successful e-learning requires a good and qualified tutorial supervision.
  - The communicative and the social component is decisive for successful e-learning.
  - E-learning will not replace learning during attendance phases.
- Technology: In the field of technology some negative experiences and therefore central problems of online-learning have become evident: Online-learning is still unfamiliar to many learners, some had problems in the beginning to dial into the learning environment, some forgot their passwords, they had to orientate themselves in the learning environment. Positive experiences regarding technology- there were none, only when a problem had been solved and therefore an initiated effect of learning was positively mentioned. A participant formulated as follows “Wonderful, when technology just works.”
- Panels of discussion: The exchange of learning contents played a particular role in ENTER. The participation was encouraged by the tutors and a condition for getting a certificate at the end of each module. This has surely added to the fact that many contributions have been made and what caused the fact that (from the point of view of the participants) the number of contributions was hardly readable any more and hardly to master. The number of unread contributions caused a permanent guilty conscience as well. A great number of participants positively emphasized that the panels made possible an intensive specialist exchange and a critical reflection of learning contents, that many substantial and inspiring discussions took place, mutual recognition and cooperativeness became visible.
- Group work: the didactic concept of ENTER is associated with an intensive and complex group work as performed in module 3. Many participants made the experience that online-group work is very intensive and time consuming and that it has to be exercised (here the wish for tutorial guidance was obvious) in order to cope better and faster with computer-transmitted problems of understanding. One participant characterized the problems as follows: “What I can clarify during an attendance phase in a few seconds by taking a quick glance round would take me a few days online”. On the other hand online group work was seen positively though: For many it has been a new, stimulating and productive form of work, there was a good and constructive cooperation, everybody brought in his or her competencies ending in good results. Working in groups strengthened the sense for the group.
- Amount of time: One of the biggest illusions of e-learning has also been disclosed during the ENTER-project: E-learning is not in the least time-saving, especially when it is asynchronous, cooperative, virtual as usually in online-seminars. Many participants complained of not keeping the set task of time or that it could not be kept because of professional and familiar obligations. The amount of work was surprisingly high for many, the balance between job and further education was difficult. Time pressure arose for it was important for the sequence of the modules that the participants worked on common contents and the free division of time was therefore limited. One of the central perceptions is that e-learning is not time-saving, but the problem of time and time management is the most aggravating problem. However, other participants found

the deadlines and time limits given by the trainers as absolutely adequate and very important and helpful. As a result some said that a good time management is necessary to reduce stress.

- Online-learning in general: For many participants ENTER was the first experience with online-learning. Especially reading and learning on the monitor was described by some as strenuous and unfamiliar. Whereas others found especially this a new and interesting experience. Online learning texts are perceived as informative when the material is didactically prepared accordingly and annotated with e.g. links and further resources. But it is not decisive, that the learning texts are fully equipped with animated graphics and interactive elements, but that they offer a specific overvalue to the traditional text forms and are integrated sensibly. The highly praised “learning everywhere and every time” is a myth for the technical suppositions must always be given to participate successfully in e-learning.

Asked for a total valuation of their ENTER-participation it shows that participants value their experiences altogether as positive to very positive and as interesting and exciting. They got to know many diverse and new possibilities of learning and they also learned from problems and mistakes.

The participants also agreed on their total rating of e-learning: e-learning requires self discipline, self motivation, self organization and time management and a fundamental technical know-how.

What can be deduced from the experiences regarding E-learning for further education? E-learning must be formed – like any other learning-teaching process – in form and content, methodically and didactically.

E-learning is no entirely new learning – to form e-learning in form and content, methodically and didactically – that is a great challenge for the practice of further education. The use of modern media and the configuration of e-learning must be backed up methodically and didactically and be put to good use as well as to correspond to the contents of teaching, the aims of teaching and the receiver.

“Learning with new media is a different learning but the medium does in no way replace the critical analysis with the learning material. Learning stays closely related to the terms effort and endeavour” (quotation of an ENTER-participant).

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# POLE STAR – EUROPEAN STANDARDS AND TOOLS FOR ODL TRAINERS A LEONARDO DA VINCI PROJECT

*Franco Iannelli, SINFORM – Sinergie per la Formazione, Italy*

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## The POLE STAR project

In this brief introduction we present the POLE STAR project objectives and we outline the results obtained so far, five months from completion.

The objective of the project is to design a system tool in order to identify repertoires of skills for distance learning by moving from the analysis of the distance learning processes and adopting ISFOL's study "Standard formatori: per un modello di competenze verso l'accREDITAMENTO" as a methodological reference.

The said skill repertoires are the basic platform for the design of training plans for trainers' training that aim at developing a professional profile in the specialised field of distance learning.

The following approaches have been planned:

- The identification of processes and functions found in structures delivering ODL services;
- The development and subdivision of these processes/functions according to activity areas;
- The implementation of products and tools useful for the sharing, dissemination and analysis of standards at the European level.

These approaches have been followed by carrying out a field analysis of management, organisational and learning contexts for the European distance learning models, which have enabled us to classify ODL types and indicate characteristic elements, in order to subsequently move towards a draft mapping of professional profiles of ODL operators and the identification of related skill areas.

Along with this, a group of academic experts has been established. Their contribution to the project is an analysis of ODL processes and professional profiles from a theoretical perspective, in order to strengthen the results derived from empirical observations.

The description of the theoretical scenarios pertaining to the offer of distance learning is a sort of platform on which investigations and analyses have been developed, in order to identify and describe the types of deliverable ODL services, technologies being used, work procedures and processes.

With these objectives, POLE STAR aims at becoming not just a technical tool, but also a **system tool** in the ODL panorama, thus becoming the basis for implementing a real vocational training policy in the European Union.

## Italian partners

- SIN.FORM (Promoter and Co-ordinator)
- Associazione Smile
- S.C.S. Consulting
- ENAIP – Ente Nazionale ACLI Istruzione Professionale
- ENFAP – Ente Nazionale Formazione e Addestramento Professionale
- IAL – Istituto Addestramento Lavoratori

- IRFI – Istituto Romano per la Formazione Imprenditoriale
- ISRE – Istituto Superiore Internazionale Salesiano di Ricerca Educativa
- I.T.I.S. “Amedeo di Savoia Duca d’Aosta”

## **European partners**

Federation des Chambres Syndicales des Formateurs Consultants (France)

INOFOR - Instituto para a Inovação na Formação (Portugal)

People’s College (United Kingdom)

The POLE STAR project is structured along five phases

## **PHASE 1**

### *Analysis of ODL management, organisational and teaching European models*

The objectives of this phase are the identification and the description – within an ODL set-up – of the types of deliverable services, adopted technologies, pertaining work processes and procedures and co-ordination models, assessment and certification.

The activities carried out in this first phase of the project are mainly an analysis of the ODL realities in Italy and in the rest of Europe. The methodological backbone of this work is a research document where schemes and matrices have been designed in order to provide researchers with common instruments for a common reading of ODL phenomena.

In order to come up with the definition of a mapping for products-services, for organisational and technological models and for ODL roles and skills, individual and group interviews have been carried out, so as to detect the needed skill units for each "type figure" in an analytical way.

A large number of cases have been studied: 50 Italian cases and 38 European cases (in the United Kingdom, in France and in Portugal) chosen among the many ODL realities, on the basis of their relevance to the training tradition of each country.

From these, a limited number of particularly meaningful experiences - according to the criteria of the geographical dimension, production sector and transferability of results - have been focused upon. 22 ODL experiences (7 in Italy and 15 in the other partners’ countries) have been studied in detail, in order to have a more accurate description of the processes and of the professional profiles relating to those processes.

Then, in order to have a perception of possible future developments, a series of interviews have been carried out with ODL experts in Italy, in the United Kingdom, in France and in Portugal. 34 interviews (13 in Italy and 21 in the other partners’ countries) have been carried out. The aim of these interviews is to have a more detailed analysis of relevant aspects, such as the initial theoretical-methodological paradigms, the technical options and solutions, the professional skills and in general a description of what the future developments and scenarios of ODL might be, something not easy to detect by just analysing processes and profiles in existing realities.

Thus, via interviews and case studies, the types of deliverable services have been analysed, alongside technologies used and reference work processes and co-ordination, evaluation and certification models.

Among the results of this phase are a great quantity of collected data and a specific analysis of different professional profiles, areas and units of competence, development modalities and control.

## PHASE 2

### *Comparative research on skill repertoires for distance learning*

Objective: Describing minimum skills and professional profiles, which are shared and essential for the delivery of ODL services. In particular, the ordering and summarising of skill repertoires have been carried out.

During this phase, the partners of the project have produced matrices with an ordering and summarising of the skill repertoires on the profiles of ODL professionals.

Among the outputs, we have a mapping of a series of ODL professional profiles, of related skill areas and of units of competence.

As a partial result of this still on-going work, it is possible to outline the ODL processes, which have been identified:

- Diagnosis
- Designing
- Development of Materials
- Delivery
- Evaluation

The professional profiles that have been singled out as common to all ODL experiences in all the partner countries are the following:

- System Administrator;
- Project Manager;
- Curriculum content specialist;
- Designer;
- Tutor.

In this second phase, a very meaningful contribution has been given by the group of academic experts from the universities of Bologna and of Rome who have been invited to participate in the project.

Their contribution to the project is the surveying of reference texts selected from the most common ODL literature, the definition of matrices for pointing out ODL competences and the description of a general framework of the “observed actions”, by dividing all activities of the ODL profiles through a de-structuring of competences.

Empirical observations have been the basis of the whole project and on those observations the researchers have synthesized and defined the professional competences needed. But a mere phenomenological approach simply portrays the existing realities. In ODL, though, a field in which procedures and profiles have not been standardized yet, it is of strategic importance to provide any analysis with a strong theoretical background, in order to identify ideal procedures and patterns besides actual practices.

So the general structure of this second phase can be summarized as follows:

- Identifying different ODL learning, organizational and technological models;
- Strengthening the analysis of cases through the elaboration of a theoretical model necessary for the study in detail of an analysis of specific cases;
- Overcoming the limitations of the experimental value of research based only on the analysis of specific cases.

At the moment of writing, the group of experts is working on the completion of the two research documents (one which describes the empirical approach and one which describes the theoretical approach) and above all on the synthesis document, the real outcome of the POLE STAR project which will define the competences, the roles and the tasks of ODL professional profiles. The result of this work is, in addition to the research documents, the matrices with the maps of competences.

The matrices of these professional profiles will be as follows:

Professional profile \_\_\_\_\_

STANDARD FUNCTIONS \ ODL WORK PROCESSES	ACTION DESIGN	PRODUCTION OF TEACHING MATERIALS	DELIVERY
	ACTIVITY		
1. DIAGNOSIS			
2. DESIGN			
3. DEVELOPMENT OF MATERIALS			
4. DELIVERY			
5. EVALUATION			

	ODL MODEL: TELE TEACHING/TELE TUTORING/CO-OPERATIVE LEARNING		
STANDARD FUNCTIONS \ ODL WORK PROCESSES	ACTION DESIGN	PRODUCTION OF TEACHING MATERIALS AND SERVICES	DELIVERY
	PROFESSIONAL PROFILES		
1. DIAGNOSIS			
2. DESIGN			
3. DEVELOPMENT OF MATERIALS			
4. DELIVERY			
5. EVALUATION			

Professional profile \_\_\_\_\_

Standard functions	Tasks	Needed skills	Review modes	
			Documentary test	Direct tests
Diagnosis				
Design				
Development of materials				
Delivery				
Assessment				

After these documents have been completed, the TNet network will be involved in an overall assessment and validation of the outcomes of the project. In fact, the POLE STAR project, besides being expressed by a group of twelve European partners, stems from the involvement of TNet in the definition of paradigms for ODL.

### **PHASE 3**

#### ***Product designing and development***

Objective: Production of a package of materials, which may be useful in the sharing of repertoires of competence for ODL service delivery at European level.

The phase be characterised by the following products:

- Two online hypertexts on the two different approaches: the empirical approach and the theoretical approach;
- A multilingual online glossary, supporting ODL staff and vocational training systems;
- A European telematic network for actions, exchange and discussion among trainers as regards ODL management and skill areas.

The results of the project will take the form of on-line hypertexts, which will be published on the project web site.

Along with these, an on-line glossary with ODL terms is in progress. This glossary, in three languages (Italian, English and French) is not the mere translation of a series of terms, but a comprehensive portrait of ODL realities in Italy, in the United Kingdom and in France. The glossary has been designed with the specific contribution of partners, and therefore it will comprise the critical and comparative analysis of concepts, definitions, and keywords in the languages of the countries involved in the project.

### **PHASE 4**

#### ***Language adaptation of products***

In order to assure the comprehension of the products, each one of them will be made available in Italian and English, via the translation of storyboards and the subsequent adjustment of designed web pages, as regards texts and graphic and multimedia portions.

### **PHASE 5**

#### ***Dissemination of results***

Objective: Dissemination, as the work progresses and at the project completion, of activities and products envisaged by the Pole Star project; sharing Pole Star activities and products with TNET members at national and at European level.

In order to promote the project outcome at national and European level, different types of activities have been planned, with the following features and specific goals:

- A closing seminar to be carried out in Rome, for the presentation of activities and products designed and made in the various phases;
- A web site in Italian and English, comprising an information section concerning the activities carried out: research hypertexts, a multilingual glossary and the partners involved. In this web site <http://corsi.odl.net/polestar> it is possible to access a newsgroup where the results of the project will be debated. Any contribution is highly welcome.



The dissemination activities do not only concentrate on the end of the project. The POLE STAR project has also so far been presented both within the TTNNet network and in a number of initiatives, seminars and meetings.

Of course, the most meaningful occasions will be at the end of the project, when a seminar will be held in Rome to describe the project as a whole and, above all, its outcomes. We have also perceived interest from other European partners, who would like to repeat similar initiatives in their countries.

Moreover, on the project web site a newsgroup has been created where partners, TTNNet members, stakeholders and, in general, anyone interested in the project and in ODL can express their opinion and send their contribution. The POLE STAR web site aims at becoming the virtual forum for all those who are interested in ODL, its processes and its profiles. We aim at having the web site live well beyond the lifespan of the project, making it a real source of information for the whole ODL panorama.

These initiatives will be further promoted and enhanced at European level, thanks to synergies promoted by ISFOL within TTNNet.

The beneficiaries of the planned initiatives are the vocational training systems (public authorities, universities, schools, vocational training bodies, associations and consortia, trade unions organisations, etc.) at regional, national and European level, interested in:

- Defining quality standards (at methodological and organisational levels);
- Developing and disseminating ODL as a consolidated tool for the implementation of Community policies for vocational training;
- Promoting operators' growth and development, from an educational and management perspective, towards the application of new training technologies.

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# **E-GIS – EUROPEAN LEVEL DEVELOPMENTS OF FLEXIBLE LEARNING MODELS WITHIN GEOGRAPHICAL INFORMATION SCIENCE (GIS) FOR VOCATIONAL TRAINING**

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## **Abstract**

E-GIS is a Leonardo pilot project, within Geographical Information Science (GIS), to be implemented over a three year period, 2002-05. The main objectives of the project is to establish co-operation between European Universities and GIS user organisations and to develop modularised courses intended for Internet based learning, establish links of communications between the partners in the project in order to disseminate and share “best practises” in different teaching situations and for different types of students. The course modules to be developed, all together, will constitute a one-year programme within GIS. This project mainly targets full time students, private and civil service employees within the EU but also similar categories in non-EU countries. The course modules are supposed to be flexible both in time and in “tempo”. However, synchronous group models will also be considered.

The outcomes of the project will be high level content, new net-based pedagogic method suited for accessing target groups of great diversity as regards pedagogic traditions, access to computers and bandwidth. Cooperation between the institutions will, certainly, give higher level courses than the individual institutions could possibly themselves.

## **Objectives/aims for the E-GIS project**

### ***GIS as a tool for society***

Within Geographical Information Science (GIS) are handling geographical data, both in the form of “digital maps” and as “attribute data”. Attributes are e.g. tabular data connected to geometric features, like points, lines and surfaces, on a map, describing what type of feature an object represents and the characteristics of the object. A point could be a well, a line could be a road, a surface could be a cultivated field, etc. In most sectors of society, the use of GIS is currently increasing rapidly. The utility of being able to manage, analyse and visualise data using the graphic interface provided by the map has been recognised to improve efficiency for many organisations.

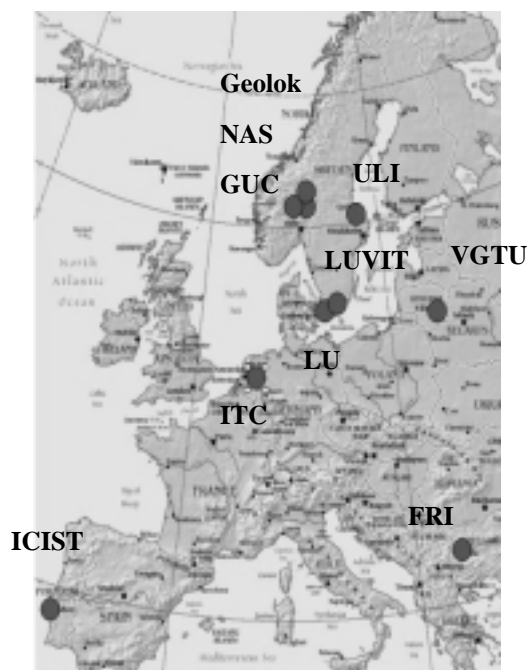
Informative data, linked on to geographical data, give society a unique tool for visualizing numerous situations in the geography, such as: a) *Physical planning*, b) *Tourist information (road information – choice of route for travel from one point to another and tourist site and hotel information)*, c) *Environmental issues and finally* d) *Natural resources*.

Data is found in GIS databases and may be picked up by accredited persons or by public in general. It all depends on type of information – and the level of security and necessary protection. In the following we will give some examples on information available for public.

Depending on the purpose of the GIS analysis, the data needed are either available or have to be captured. If we want to use GIS as a simple “map making system”, digital maps are often available and the user is able to create a layout that suits her/his demands. However, even if there are a lot of free data available over the Internet, it should be realised that one of the main obstacles connected to extended use of GIS is high costs. More specialised analysis, like modelling of environment effects in time and space relating to different sources of emission, require detailed, user-specific, data that have to be collected and entered by the individual user.

## Partners

The project partners are 10 institutions from 6 European (BG, LT, NL, N, P and S) countries, several are HEI, two partners one from Sweden and one from Norway are from the users side. For partner allocation, please see fig 1. Gjøvik University College is contractor and project coordinator.



**Bulgaria:** FRI (Forest Research Institute, Sofia)

**Lithuania:** VGTU (Vilnius Gedimino Technikos Universitetas)

**Netherlands:** ITC (International Institute for Geo-Information Science and Earth Observation)

**Norway:** GUC (Gjøvik University College), NAS (Nettskolen AS), Geolok

**Portugal:** ICIST (Instituto Engenharia de Estradas, Territorio e Construc ao)

**Sweden:** LU (Lund University), ULI (Swedish Development Council for Land Information), LUVIT AB

Fig. 1 Geography of project partners.

## Course content

The following eight course modules will be developed, all together constituting a one-year programme, 60 ECTS. **1. Basic GIS I** (Basics for understanding GIS and be able to identify operations for solving GIS concepts). **2. Basic GIS II** (Treats advanced GIS theory and discuss methods for advanced analysis). **3. Specification of GIS in an Organisation** (Learn to identify a user/organisation's needs for geographical information and the implementation of it). **4. Physical Planning** (Focus on the use of GIS in the process of establishing physical plans, and the public authorities' use of GIS as a decision support system) **5. Resource Planning** (Introduce to the student to GIS as a planning tool for resource management) **6. Environmental Planning** (The student will be used to handle environmental data in a GIS environment and discuss environmental data sources and data quality). **7. Geographical Data Modelling and Management** (The students will be able to use conceptual schema languages to describe (simple) information models and how to convert the models into databases suitable for geographical data, how to manage the database, including the user access to databases). **8. Internet GIS** (On completing the module the students have knowledge on how to visualise geographical data, both as traditional maps and as perspective views. The students will also have experience on how to distribute and use geographical data over Internet).

## Why Internet-based?

The main advantages of Internet-based learning, is increased accessibility, also for disadvantaged groups in society. Advantages are the possibility for attending courses at distant education institutions that may provide specific education not available at local institutions. Another obvious advantage by an intra-European co-operation is the sharing of best practise among the teaching institutions that will provide better quality for the students and constitute a basis for creative development of new course modules within special fields of competence not available everywhere.

The outcome of this project will be a network of co-operation between some of the most prominent GIS HEI in Europe. This network would be used to develop a set of modular courses adding up to a one year full time studies in the field of GIS. The concept of using short modules will have several advantages to traditional one term university courses. Those advantages are mainly: flexibility to choose only appropriate parts for students already professionally active, spreading the modules over longer time span for full time employees, full time student from different fields could top their exams with selected GIS competence and modules could easily be adapted to fit specific training environments, e.g. third world countries, district civil service, etc.

## **Practical use of GIS**

As indicated above, GIS can be used for many different purposes and by many different types of users. At a basic level, GIS is normally used for map making and data retrieval. Since the digital map data in the system are divided into different “layers”, it is possible for the user to construct maps at an appropriate scale and with desired data content. The data retrieval is twofold: either we can identify objects on the map and retrieve corresponding attribute data, or we can select specific attribute data (e.g. properties belonging to a specific user) and visualise where the corresponding map objects are situated by the use of the digital map. To make this data retrieval possible, the attribute data have to be linked to the map data. As a matter of fact, this link is the fundament of GIS, and a prerequisite for most analysis.

More advanced use of GIS, such as transport optimisation, environmental modelling and GIS-based marketing, can be very complex and complicated. Depending on application, the GIS analyst needs deep knowledge in e.g. mathematics, economy or archaeology. Only a few of the possible analyses have yet been performed. It can be stated that GIS is a multi-disciplinary tool with an enormous potential.

In the appendix a number of GIS applications are presented available through Internet. Most of the examples include data from eastern Norway, and all presented information is open for public.

## **Why E-GIS?**

Unfortunately the current level of understanding and skill is not very high in most European countries regarding implementation of GIS. A system for promoting education and training within the field for undergraduate students as well as for people already active in a professional career is considered high priority in many countries. In Sweden, as an example, the government has implemented a project over the past three years in order to pilot implementation of GIS in the public domain - promoting networking, sharing of experiences and education of civil service staff.

## **Pedagogic and technological challenges in the project**

The implementation of the E-GIS modules are planned to be as flexible as possible for the user groups concerning pedagogic and technological solutions. Some of the users start and finish when they want (*Individual learning path*). Others will be working in synchronous groups starting and finishing simultaneously (*Joint learning path*). These two different approaches require different pedagogic and technological planning. Both has advantages and disadvantages regarding necessary resources and communication models. At the moment, we are in the project process of finding pedagogic solutions for the implementation of ‘full freedom’ - and synchronous group solutions.

Individual learning paths give possibilities for greater flexibility. This will, possibly be an advantage with target groups spread over the continent. Individualization will require numerous resources for implementation, in case each student should be supported individually. Most possibly, a kind of ‘self-correction’ type of tasks could be basis for evaluation.

Joint learning path gives possibilities for the students to interact and exchange experiences through the course. One may establish student groups, net-discussions and student-to-student evaluation.

The 'transport' of GIS information requires Internet connection with high capacity (broad-band). Besides unequal access to broadband and even computers in some of the partner countries, there are technical challenges among the partners and target groups, how to access all these with the same information and the same goal for competence development. The modules developed in the E-GIS project, will be designed for many different user-groups implying that the demand on flexibility is extremely high. The partners will contribute with target groups comprising campus students and civil service employees. Some groups will be spread over Europe and some being concentrated in closer regions.

Students with a higher level of technical facilities will be able to use sophisticated e-learning tools, video streaming and on-line chatting while other students have to rely on written material and audio streaming. However, it has to be stressed that, independently of technical facilities, all students should be given learning material that are equal in terms of theoretical and practical contents.

Luvit is chosen as the tool for developing the course modules in the E-GIS project.

### **Experiences so far in the project**

Even if the E-GIS project has just started, the value of the project is obvious. Different partners have brought in different aspects of e-learning and GIS methodology into the project, which already have given effect. The idea to intensify the cooperation between experienced GIS teachers interested in pedagogic development and skilled pedagogues has proved to be successful. Different experiences from different parts of the world have been integrated in this new learning concept, with focus on high theoretical and practical standard as well as on flexibility, both in terms of student groups, transfer of knowledge, starting data and tempo.

### **Expectations**

The specific results of the project can be divided into three parts; 1) Development of GIS course material adapted to flexible learning methods based on ICT, 2) New methods of building up course modules for the adaptation to specific target groups, and 3) A strengthened international network concerning GIS, resulting in future close cooperation. The main target groups for the courses will be ordinary students in higher education as well as professionals. The course material will be adjustable according to educational level, technical support and area of interest of the target group. Continuous evaluation of theoretical as well as pedagogic content of the courses will assure broad applicability. All course material will be developed in printed form, on CD ROM and available in interactive form on Internet connected to e-learning systems. The cooperation between the universities will also provide possibilities to "share" experts and strengthen multidisciplinary international research and education within the European society.

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(For Scandinavian speaking people. The GIS examples are picked up from here)

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# Appendix



Fig. 1 Map information. A regional map. Little information



Fig. 2 Map information. A certain area of the municipality have been marked for enlargement. We can now view roads and names of places.

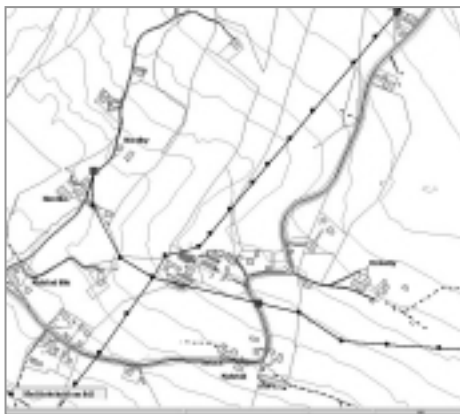


Fig. 3 Map information. Further enlargement and we can view houses and other geographical details.



Fig. 4, 5 and 6 Map information. Displaying a municipality map. From the map, we may access the area by vertical aerial photographs. This may further be enlarged to give extreme details, down to individual houses in the area.

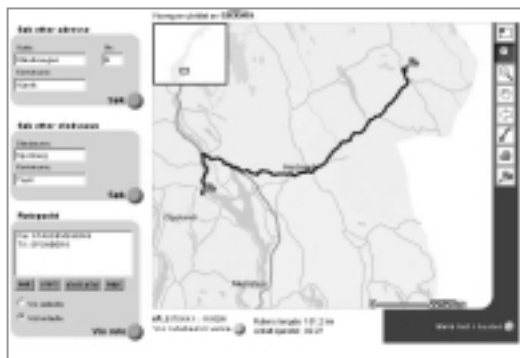


Fig. 7 Tourist information. A start and destination address has been given to the GIS system. The shortest route has been calculated and marked on the map.



Fig. 8 Tourist information. Further enlargement – and you can't miss your destination...

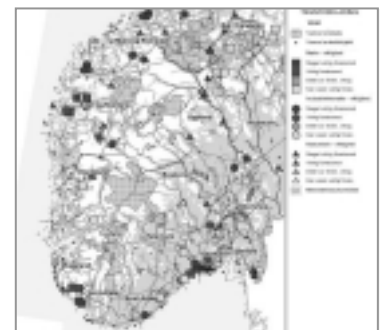


Fig. 9 Recourse management. Protected areas in South of Norway- also displaying places with mineral resources

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# INTEGRATED ENVIRONMENT FOR DISTANCE LEARNING - IEL

Cosmin Porumb, Bogdan Orza, Sergiu Gordea, Mircea Romantan, Sorin Cristea, Constantin Hutanu, Aurel Vlaicu, Technical University of Cluj Napoca, Romania

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## Abstract

As the convergence of education and technology continues to evolve at break-neck speed, institutions will find an unprecedented array of effective solutions to enrich their educational offerings, and build deeper relationships with current and prospective students, tutors, administrators, and other key stakeholders in education.

## Introduction

IeL – Integrated Environment Learning for Distance Education tries to cover the needs stated above. At the beginning of the development cycle of this application some design guides this kind of learning environment have to comply to were followed, such as the modular architecture, for superior scalability and performance, enabling single-site implementations, in order to support tens of thousands of users and thousands of courses, an open architecture that supports third-party learning applications interfaces and the easiness of use by all the users, through a familiar and consistent graphical user interface.

## Architecture description

The application is structured into three modules: a *communication environment*, a *course maker* and an *evaluation and assessment module*. These three modules represent layers of the same application and since they are encoded in Java and in Java compliant technologies, the platform independence is achieved. The architecture used to develop the application is a *two-tier* one based on Java, Java Server Pages, and Java Servlet technologies.

The first module implements a communication environment built on top of the ICE communication platform (*Integrated Communication Environment* – a software package that contains several critical communication facilities: whiteboard, chat, message interchange).

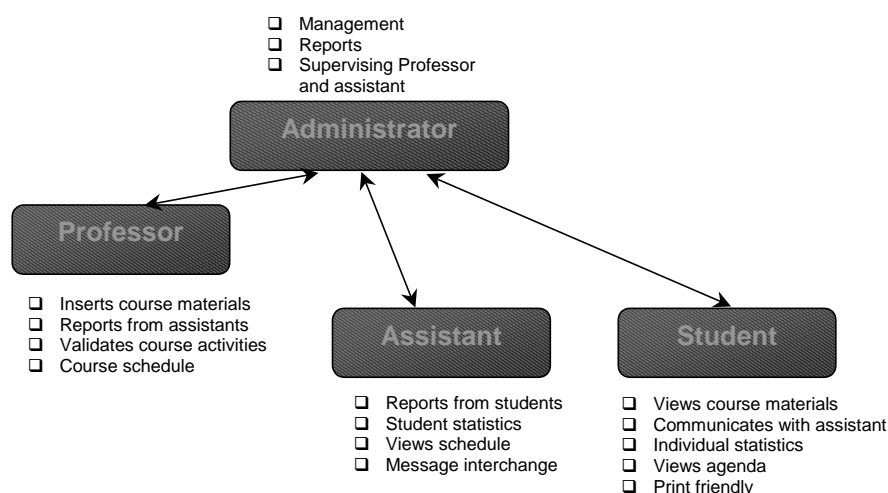


Figure 1. Course Builder block diagram

The second module implements a *Course Builder* that has four access levels: **administrator**, **professor**, **tutor** and **student**. Each of these levels has specific features as shown in Figure 1 below. In fact, this module is the most important because it manages all educational activities.



The third module, for the evaluation and assessment of the students, is structured into two levels: *evaluator* and *student*, each having characteristic features: the evaluator can insert tests (activated on demand), questions and can view different statistics offered by the software; the student can only view or take regular course and demo tests.

### **Architecture of the application**

The application inherits the capabilities of a two-tier distributed model. The first tier is *the Presentation Layer* which is represented by the database system with the logic contained into the stored procedures. It uses as server-side components Java Server Pages and JavaBeans.

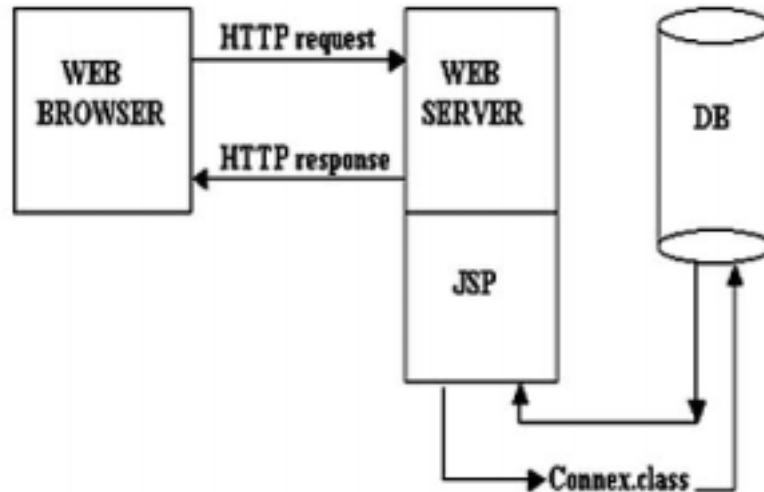


Figure 2. The architecture of the application

*The Data Layer* consists of both a database system and a set of DataProvider objects. The database system is a Microsoft SQL 2000 Server, chosen for its advantages: good performance for OLTP (large-scale online transactional processing), data warehousing, powerful and flexible Web-based analysis, highly scalability and reliability, and for its support for stored procedures (when the procedure is modified, all clients automatically use the new version).

The database has been divided into several functional blocks: *the user section*, which stores the information about user's accounts (professor, tutor, student, administrator), the *course section*, containing information about the course structure and about the links with other physical educational resource locations, the *schedule section*, containing the schedule for all course activities, the *testing section*, with questions and answers for a particular examination module and the *communication section*, containing all the received messages (off-line messages, e.g.).

The DataProvider objects ensure the links between application layers. They are responsible with the data flow to and from the database.

The Presentation Layer consists of a set of JSP and JavaBeans components. The data retrieved by the DataProvider objects will be used by the JSP engine and transformed into dynamic HTML.

### **The course builder**

#### *The Administrator Use Case*

This case is responsible with the all management task for users, courses, and tests and provides the features: **Login/Logout**, **Personal profile visualization**, **Master view of course features**, **Detailed view of course features**, **the Management of the user accounts and course features**, and **the Schedule**.

### *The Student Use Case*

The Student Use Case is responsible with the interaction between the educational process and the student itself. The following design goals were set for this module: the user interface must be consistent with the rest of the application (modules) and the functionality must be presented in a user-friendly, easy to use manner.

It must implement the following functionalities: *Login / Logout, Personal Profile Visualization, Management of the Educational Material, Communication and Reporting, Testing and Examination and, finally, Scheduling*. There are two types of tests available to the student; **the Auto-Test** that is presented to the student after the completion of each module, and the CourseTest, which comprises questions related to the entire documentation set. *The Auto-Test* comprises several questions and is, in fact, a self-evaluation procedure. The questions are related to the documentation set of a single module. *The Course Test* represents the classical evaluation procedure. The question themselves can be of two types: classical question that implies text entering into a box in the HTML page and multiple-choice questions. A test can contain an arbitrary percentage of classical/multiple-choice questions. The *Schedule* application implies that the student is able to see the schedule for a particular course, clearly specifying the date and location of seminars, workshops, laboratory hours, etc.

The application allows the student to view the courses to which the student is enrolled. Chapters compose each course and each chapter contains several modules. Each module is subsequently composed of: module information, documentation, module projects, module objectives, and supplementary links.

Online material is also provided per module basis. This material can include simple text files, MHT archives / PDF files, video and sound. An important degree of interactivity is achieved by using optimized server-side components. It will be, though, limited, by the use of dynamic HTML.

### *The Professor Use Case*

*The Professor Scenario* is a useful tool that allows the course tenant to perform his tasks in the educational process. The module features must be presented in a user-friendly, easy to use manner. Some of them are enumerated below:

- Statistics Visualization - containing *group statistics* (the system browses the database searching for the student groups and displays this information into a table format), *student statistics*, *examination statistics* and *graduation statistics*.
- Management of the Educational Material - the system allows the management of the educational material that will be published on the Internet. The courses and supplementary documentation (in electronic format) are uploaded to the web server in a restricted access directory.
- Courses Visualization - the tenant can overview the proposed course guide, objectives and a general statistic of his courses (the name of the course, the identifier of the course, the number of projects, labs etc.).
- Insert Course Materials - the system provides the facilities for uploading the documentation files, assigning projects, workshops and practice activities to the chapters.
- Insert Course Guide - the system allows the tenant to set the general information about the chapters, guide and objectives of the courses.
- Schedule - the system must provide the schedule facilities for a tenant. He can insert the schedule task, setting all the information requested and checking the complete schedule assigned to the respective course.

### *The evaluation module*

The goal of this module is the implementation of an integrated assessment environment for distance education, over the Internet, offering the possibility to create and manage evaluation tests for DE students. The module was realized using Java Server Pages (JSP), a modern and easy to use web-programming technology.

After a brief view, a teacher should be interested of this evaluation module because of two facilities, one of them is the usage of the pictures for completing textual questions, and the second one is the offering of interesting combinations for creating the tests. This module offers a relative good method of evaluation, which can be used in any Institution, having any domain of activity.

The module has two levels: *evaluators* and *students*.

### The Evaluator level

In order to be compatible with IeL, the evaluator level was developed under Professor use case. The professor's job, for this module, is to introduce questions and tests in the database. Professors can modify or delete this information anytime. They also can list the marks and if the students contest the results of some test, the professor can list a page with all the questions from test including student's answer and correct answer.



Figure 3. The insert questions page



Figure 4. The view questions page

There are two kinds of questions (see Figure 3); one type has up to five fix answers (that we will call grill questions), and another type with classical answer. All of these questions can have attached up to five pictures (any format supported by web browsers), all the questions must have a discipline and a module to which are attached to, a degree of priority and a time for answer. For grill questions professor must introduce up to five answers, must select the correct ones and can modify the importance of answers, by providing an importance percent. The professor can visualize all question related to a specific course and modify them as you can see in Figure 4.



Figure 5. The insert tests page



Figure 6. Allocating questions to a test

The tests have an active period, a discipline, a degree of difficulty and the number of questions to answer, that will be chosen by module (Figure 5 and Figure 6). The questions from tests are randomly generated; two students sustaining the same test will not have the same set of questions. This issue was introduced for having access to all questions for every test, and for reducing the possibility of trick. (i.e. in this case the students cannot learn questions for a particular test).

For non-grill tests the answers of students are save into the database and the professor will revise them after the test will be finished.

### *The Student level*

All the efforts that were done before have the final goal the automatic evaluation of student's knowledge. From their interface the students can sustain any active test. This task is performed in a new browser window that does not have menu bar and toolbar; there is no possibility to go backward after the start of test. There are presented a number of questions per page (depending by professor options) and a timer that show remaining time for answering this set of questions. If they are quitting the test, in the database is stored the mark that is calculated identical like in the case that they obtain 0 point for the unanswered questions. Another task of the Student Interface is to show their catalogue in HTML format.

## **Conclusions**

IeL comes to compensate the lack of face-to face contact between students and tutor, or between professor, tutor and supervisor, being a very useful tool for Distance Learning. It provides the tutor with an extremely useful additional information for the correct evaluation of the students, by consulting the data related to the students' activities, stored in a database.

The architecture of IeL is very flexible and, additionally, the *visitors* are able to access a demo part of the Distance Learning environment, having the possibility to fill in an enrolling form. By using the IeL, the students can ask questions and send comments to the tutor or to the professor and can receive the feedback via e-mail.

A possible development of IEL could be focused on creating a *Virtual University*, based on a three-tier architecture, thus covering all the tasks specified in the Open and Distance Learning Programme. The payment system (both student taxes and personal income) could become a problem due to the eBanking system of our country.

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# QUALITY IMPROVEMENT OF MECHANICAL ENGINEERING EDUCATION AT THE UNIVERSITY OF DORTMUND

*Sami Chatti, Meni Syrou, Matthias Kleiner, University of Dortmund, Germany*

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## 1. Introduction

Over the last decade, engineering education not only in Germany but all over the world has begun to undergo a number of reforms. These reforms are largely based on the rapidly changing demands of industry and on the competition in the global market place. The impact of information technologies on engineering science has resulted in a paradigm shift that calls for new and innovative working methods, in order for industry to be able to gain and maintain competitive power on national as well as international dimensions. Engineers in general need to be able to take lead in these developments, making new technologies work through synthesising multidisciplinary knowledge into practical solutions [1]. The future calls for engineers with interdisciplinary skills not only in the field of engineering sciences but also in the areas of business, communication, teamwork and leadership.

The status quo, however, proves that industry is in fact confronted with a shortage of well-trained engineers with a university degree. Beyond that, engineering graduates enter the work force with significant competency gaps, a major gap being the inability of integrating skills and knowledge and putting them into praxis.

In its development of new study programs and curricula, the faculty of mechanical engineering at the University of Dortmund has responded to criticism from the industrial community that calls for a more integrated, holistic and practice-based education. Rather than compartmentalizing knowledge and skills and expecting that students will somehow be able to self-integrate the concepts, the faculty of mechanical engineering has designed integrated curricula where courses are transparently linked to each other. The development of these programs also responds to a second major educational reform objective which is the call for international competitiveness and compatibility, both of which are to be achieved by the introduction of bachelor and master degrees as well as by subsequent doctoral programs.

This paper discusses two international engineering programs at the University of Dortmund, one being a binational master-program in industrial design and manufacturing, the other one being a three-year doctoral program in the area of production engineering and logistics. The development, goals and curriculum of the master-program “Industrial Design and Manufacturing” (IDM) as well as of the “Graduate School of Production Engineering and Logistics” are described in more detail in order to demonstrate the ways in which the quality of both graduate and postgraduate education in mechanical engineering is being improved.

## 2. European Master Program “Industrial Design and Manufacturing”

### 2.1 Beginnings

IDM is a binational program that involves the collaborative efforts of the mechanical engineering faculties of the University of Dortmund and the University of Twente (The Netherlands). It has evolved out of a longstanding tradition of cooperation regarding research and teaching, as well as student mobility between these two universities. Before the start of IDM, this cooperation had been partially institutionalized with both universities belonging to the network of the European Consortium of Innovative Universities as well as partaking in the Sokrates program. With the funding of the German Academic Exchange Foundation (DAAD) on the German side as well as the with grants of the Dutch Ministry of Education on the partner’s side, the IDM program was developed in 1998. In order to secure the program’s quality in terms of innovation, competitiveness and marketability, the involved educators

felt the need of a thorough preparation that ended up taking several years. After a successful testing phase since 1999, the program started with a pilot trial year in September 2001 and presently has entered its second round successfully.

It combines the strengths of both faculties in a complementary fashion with the expertise of the University of Dortmund resting in production engineering, logistics and work science, and the University of Twente being strong in product design, product planning and management.

## ***2.2 Profile***

The design of new products as well as the development of manufacturing plants that produce them require a new, specialist type of engineer. Engineers have to be able to focus on the entire product realization process in a life-cycle oriented way. In larger companies, design and manufacturing engineers are in particular involved with or responsible for product design, process planning, scheduling, part manufacturing, assembly, inventory control, and customer service. They need an integrated approach, using high-tech knowledge of design and manufacturing engineering along with skills in production management, marketing, logistics, work and environmental science.

Based on these above mentioned demands by industry the IDM master program aims at offering a graduate level education focusing on the entire process of product realization. Unique about this program is the integration of high-tech knowledge and skills in manufacturing at an advanced level on the one hand, and the synthesis of key industrial engineering fields such as quality management, marketing, production management and cost engineering on the other. In the center of the program is the life-cycle approach ranging from the design of the product, its manufacturing as well as its market distribution up to its recycling.

## ***2.3 Requirements***

The program is intended for students from all over the world holding a bachelors degree in mechanical or industrial engineering or its equivalent. Program duration is four semesters. Since the program is entirely conducted in the English language, proof of good English skills is necessary. Based on international standards, the TOEFL-test with a paper-based score of 550 points or a computer based score of 250 points is mandatory.

## ***2.4 Structure***

Courses in the program are taught by members of both faculties, requiring students to spend time at both universities. The first two semesters of the program consist of lectures and a large hands-on project that accompanies and complements the coursework, whereas the second two semesters involve the completion of an industry internship as well as the master thesis.

## ***2.5 Curriculum***

According to European standards set out in the Bologna declaration, the program is based on the European Credit Transfer System (ECTS) to make it internationally compatible. The course curriculum for the first two semesters consists of a number of different modules that each contain strongly related subject areas. The integration of the subject areas is not only emphasized in the courses within the modules as well as across the modules, but also in the structure and organization of the hands-on project that accompanies the coursework.

### ***2.5.1 Program of the first year***

Module 1: Life-Cycle Strategy (4.5 credits)

This module aims to give insight into life-cycle analysis, life-cycle oriented design and maintenance aspects. It consists of two lectures, "Introduction to Life-Cycle Strategy" and "Product and Material Recycling".

#### Module 2: Industrial Marketing (2.0 credits)

In this module an introductory course in industrial marketing is taught, specifically designed for engineers. While the basic principles of marketing are explained, the attention rests on the buying behaviour of consumers and industrial purchase, marketing planning, market segmentation, marketing mix and marketing research. In view of the character of the IDM program, the focus lies on the development of new products from a strategic marketing perspective.

#### Module 3: Product Design (8.5 credits)

The three lectures in this module are “Design Principles”, “Design Process and Context” and “Design Tools”. A design assignment is part of this module.

#### Module 4: Manufacturing Facility Design (5.5 credits)

This module contains a number of different lectures dealing with the logical design of a process plan based on the geometric interpretation of technical drawings. Manufacturing planning and control as well as production capacity are being discussed. The influence of auxiliary functions, such as tool management, quality control, information management are explained within these lectures. Related to material handling attention is paid to the principles, equipment, flow lines, grouping and packaging. Beyond that, layout planning and the use of simulation for manufacturing facility design purposes are on the agenda.

#### Module 5: Enterprise Design (3.5 credits)

Consisting of two lectures, “Enterprise Strategy” and “Business and Management of Transportation” this module presents a systematic approach to specifying, planning, realization and maintenance of industrial systems, based on system modelling and quantitative methods.

#### Module 6: Manufacturing Technology (9.0 credits)

This module represents one of the strengths of the mechanical engineering faculty of the University of Dortmund focussing on new trends and developments in forming technology, cutting technology, surface treatment and welding, as well as automation and robotics. The integration of high-tech knowledge in this module on the one hand and the use of highly developed machines and tools for the experimental work accompanying the lectures on the other hand lead to a manufacturing technology education at an advanced level.

#### Module 7: Production Management (4.5 credits)

The first part or lecture of this module deals with production and inventory control, line balancing, inplant transportation, design for logistics and simulation. The second part of the course focuses on operations planning and industrial engineering aspects. Beyond that, basic processes and concepts of Supply Chain Management are also subject of this module.

#### Module 8: Cost and Investment (3.0 credits)

In this module basic economical documents (balance sheet income statement and cash flow statement) are introduced and the working of them in practical solutions are explained. Besides, the differences in management (cost) accounting and other fields of business economics are discussed. The control cycle is introduced. During a case study all these aspects of the module are being integrated.

#### Module 9: Quality (3.0 credits)

This module consists of a single lecture entitled “Quality Assurance during Product-Life-Cycle”. It presents a systematic approach of quality assurance during the entire product life-cycle, including quality management and measuring techniques.

#### Module 10: Work Science (2.0 credits)

Consisting of two lectures, one on work science and organization, the other one on industrial psychology, the module focuses on job design, scientific work organization, working time design and wage payment systems on the one hand and on psychological factors of human behaviour in the industry on the other.

#### Module 11: Strategic Planning (1.0 credits)

This module basically consists of presentations on aspects related to strategy, organization, quality,

information structuring, and management by executives from industry. For that purpose guest speakers from the industry are invited. Also, a number of excursions to different companies are part of this module.

#### Module 12: Project (13.0 credits)

The project gives the students the experience of working in a team and applying the theoretical knowledge gained from coursework to real-life business situations. In this project, which covers the first two semesters, students grouped in teams have to design, build and test a prototype of a complex product. Every year a new product is proposed, so as for the students to keep an innovative attitude. In the pilot year the project assignment was to produce a “cable cat” (*Fig. 1*), a device for a more accurate and extended inspection of high voltage transmission lines to transport electricity from producer to consumer. The device being produced in the current year is a stairclimber for a wheel chair or a white line device.



Fig. 1: Cable Cat

#### 2.5.2 Program of the second year

The second year consists of two individual projects, one being a project in the industry and the other being the master thesis project in a university laboratory involved in the European IDM program. Given the international character of the program, one of the projects is to be carried out in a country outside Germany and the Netherlands.

#### 2.6 Management and Quality Assurance

To ensure the quality and constant improvement of the curriculum, the steering committee, the module coordinators, the project supervisors as well as the program coordinators monitor and evaluate the program on a regular basis, of course constantly taking into account student evaluation. Weekly talks with the students, often combined with social activities, are an essential part of the agenda.

The assurance of quality is also an essential point of focus with regard to student recruitment. In terms of marketing strategies the emphasis is being laid on launching co-operations with partner-universities abroad where a reliable pre-selection of well-qualified candidates is conducted. Based on experience with somewhat weaker students from non-European countries during the pilot year the steering committee has convened that pre-entry testing, language training courses as well as deficiency programs will have to be developed for the future.

#### 2.7 Future Development

In order for IDM to expand into a real European masters program, the steering committee currently works to involve a third European university, preferably of the ECIU network, into the program. With more partners more optional courses would be offered to the students.



### 3. Graduate School of Production Engineering and Logistics

#### 3.1 Beginnings and Profile

The Graduate School of Production Engineering and Logistics is one of six graduate schools in the German state of Nordrhein-Westfalen that were established by the Ministry for Education, Science and Research in the summer of 2001. These graduate schools are conceptually based on the Anglo-American doctoral education system, with the explicit aim of improving the quality of doctoral education and hence establishing Germany's universities as attractive centers for postgraduate education and research in the global market.

The explicit goal of the Graduate School of Production Engineering and Logistics is to establish centers of excellence by attracting highly talented graduates in the natural and engineering sciences from all over the world with a masters degree or its equivalent. Such talent is needed in particular to improve the international competitiveness of German universities as well as to secure the future development and advance of science and industry in NRW. The doctoral program is based on a well-structured curriculum designed to guide the young researchers toward completion of their PhD topics within three years.

#### 3.2 Research

Research and PhD topics in the program emphasize the essential interdisciplinary nature of production engineering and logistics. They represent the collaborative efforts of professors from a number of different university departments which are illustrated in the chart (*Fig. 2*) below:

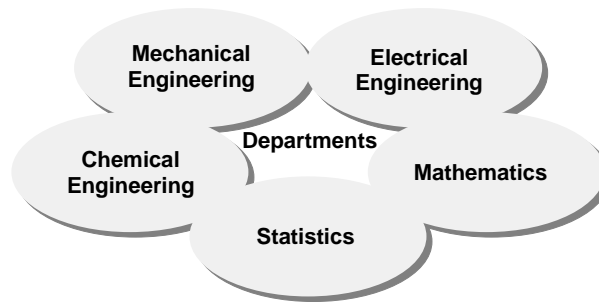


Fig. 2: Participating Departments

The research program of the graduate school focuses on the entire lifecycle of industrial products, including everything from (production-oriented) product design and development to their manufacture, their marketing and sales, as well as their recycling. Thesis topics offered by the graduate school are grouped into the broad areas of (1) production engineering processes and (2) process networks and chains. The first area involves research into such topics as the modelling and simulation of production processes, the material behaviour of engineering materials, new manufacturing methods, and process engineering. The second is concerned with the design, control and operation of process networks, as well as with the analysis, modelling and optimization of logistic systems, including in particular network-building in e-business. In keeping with the interdisciplinary nature of these areas, the graduate school represents a combined effort of the departments of mechanical engineering, chemical engineering, electrical engineering, mathematics and statistics at the university, with mechanical engineering taking the charge of the program.

#### 3.3 Structure

The work of the doctoral students takes largely place in the respective research group of the advising professor, where they can make use of the infrastructure and know-how of the chair staff and departments. At the same time the doctoral student in this program is embedded within the interdisciplinary scientific framework of the graduate school, participating in lectures, seminars, as well as in scientific colloquia in which professors, guests and PhD students regularly report on and discuss their work. The following chart (*Fig. 3*) demonstrates the program's structural and temporal framework:

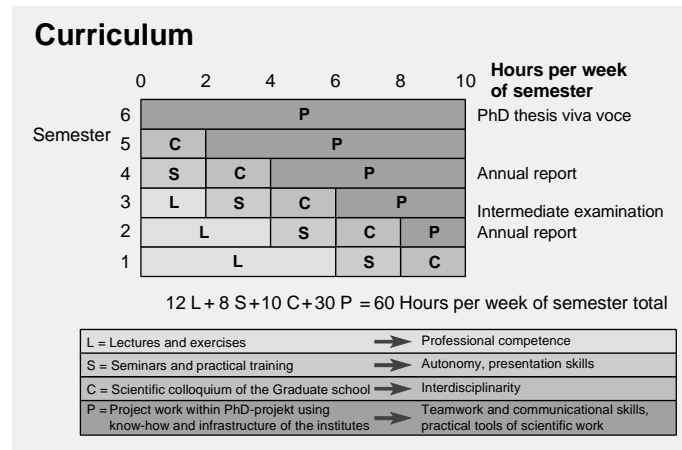


Fig. 3: Curriculum

Classes clearly form the emphasis of the first year of studies so that doctoral students gain a solid theoretical foundation of knowledge for their dissertation. In the course of the program, the amount of coursework is reduced in favour of work in projects and leaves sufficient time to finish research on the dissertation project and to complete the dissertation within the designated three years.

#### 4. Conclusions

Both programs described in this paper have been designed to improve the quality of engineering education and make it responsive to industrial demands as well as to meet the needs of international marketability and compatibility. The IDM-program provides an integrated, holistic and internationally oriented graduate education in mechanical engineering that keeps the balance between theory and practice. The postgraduate program of the Graduate School of Production Engineering and Logistics aims at the improvement of the doctoral education by devising a structural and temporal framework that enables PhD candidates to finish their dissertation within three years. Beyond that, it fosters interdisciplinary research in teams, thus also providing an integrated, holistic approach to research.

#### 5. Outlook

In addition to the establishment of the IDM master program and the Graduate School of Production Engineering and Logistics, the improvement and standardization of the European Bachelor of Science education will be the next aim at the University of Dortmund. This aim can be achieved within the scope of a joint project (EPRODE) of the Chair of Forming Technology, the Royal Institute of Technology (Sweden), the Warsaw University of Technology (Poland), the Tekniker Foundation (Spain), and other industrial partners in Europe. The main goal of EPRODE, which will be financed by Leonardo Da Vinci funds, is to deliver the necessary characteristics and requirements for a common European education in production engineering. In this project, needed knowledge and skills up to the BSc level will be specified. This will substantially ease flexibility and mobility among European production engineers and will also be a basis for higher standards in many European companies, especially SME. The ultimate aim of EPRODE is to initiate actions towards a European production engineering education certificate. The main target groups are employees within manufacturing engineering companies and students leaving school.

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# AN EFFECTIVE FACULTY APPROACH TO A WEB ENHANCED LEARNING PROJECT: CAMPUS MEDICO ONLINE – A CASE STUDY<sup>1</sup>

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## Abstract

Campus Medico Online has the ambitious aim of using new methods and technologies to improve the quality of teaching: the goal of the project is to promote and manage the development of online teaching and learning environments for the Faculty of Medicine and Surgery at Milan University. Campus Medico Online includes various activities which have been programmed over this year and the following years. The aim of this paper is to illustrate the methodology of the project and our findings to date.

## 1. Introduction

The academic year 2001-2002 saw a considerable increase in the number of e-Learning initiatives at Milan University. In previous years, e-Learning projects had been the result of the work of individual teachers, but this meant that the projects were of an experimental nature, often linked to that particular course. It became clear that for an accurate assessment of the effectiveness and efficiency of Web technologies applied to learning, it was necessary to involve more teachers in a co-ordinated manner. In 2001-2002 four faculties (Agriculture, Arts, Medicine and Surgery, Veterinary Medicine) of the nine faculties at Milan University decided to embark on e-Learning projects. Each faculty designed its own e-Learning project on the basis of its plan for developing the teaching and learning processes, according to its needs and objectives. The Medical School was the first to develop its own e-Learning project, called Campus Medico Online; this is therefore considered the “pilot project”.

The special feature of Campus Medico Online is the high level of institutional, that is, Faculty involvement. The project follows specific guidelines that are periodically reviewed and assessed by a commission made up of faculty members and staff from the CTU (Centre of Learning Technologies, Milan University). The Faculty has established its needs and priorities, has given the e-Learning initiative an institutional character and has funded an instructional designer to work full-time for the Campus Medico Online project.

The CTU supports the project with the backup of its specific competencies in learning technologies. Its team of content experts, instructional designers and technical experts offers faculty members methodological and technical support. Building and maintaining the e-Learning infrastructure is addressed by *Ariel*<sup>1,2</sup>, the platform built and run by the CTU.

It was of utmost importance to establish the main aims of the project right from the beginning and to articulate them in the context of yearly teaching programmes and lines of action. There is a step-by-step evolution in the yearly teaching programmes. The first year of the project consists of a phase which “mimics” the traditional approach to teaching in which both teachers and students become familiar with the technology, the learning environment and above all with the new possibilities for teaching and learning processes. In subsequent years, priorities move on from the identification and definition of teaching and learning processes which best exploit the characteristics of the new technologies to the

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<sup>1</sup> <http://ariel.ctu.unimi.it/corsi/CampusMedOnline/home/>

<sup>2</sup> Ariel is a software environment built on the concept of the virtual classroom; it is an integrated system of tools to facilitate publication of contents, communication and self-assessment.

definition and creation of a virtual classroom which effectively integrates the traditional classroom and reformulates and reorganises the aims and activities of the course. The three lines of action are:

- training and support for faculty
- training and support for students
- design, creation and evaluation of virtual classrooms associated with traditional lectures, with special attention to experimentation with specific multimedia learning modules

During the first year of this project we concentrated on *training and support for faculty*.

## **2. The first year of the project**

The plan for the first year of the Campus Medico Online project was composed of seven phases:

1. project launch
2. technical and methodological training for teachers
3. design of virtual classrooms
4. creation and monitoring of virtual classrooms
5. evaluation of the first phase of the pilot project (courses in the first semester)
6. repetition of the previous phases of the project in the second semester
7. overall evaluation of the first year

To date (February 28<sup>th</sup> 2003), we are still working on phase 5 *evaluation of the first phase of the pilot project (courses in the first semester)*; our observations and conclusions are therefore still only partially formulated and are provisional.

### **2.1 Launch of the Faculty project**

The project has formally been in place since the conference held on January 17<sup>th</sup> 2002 by the Medical School: "*e-Learning and communications technologies in teaching and learning projects at the Medical School*". The Faculty had been contemplating the use of new learning technologies as it was aware that e-Learning projects were already in place in other faculties and saw that this could provide a solution to the enormous pedagogic and organisational problems it was facing after the university reform. Campus Medico Online is the result of the exchange of experiences and ideas that has taken place within the Faculty.

At the time of the conference all members of the medical faculty received a questionnaire titled "Survey of the use of Web technologies for teaching and learning". Faculty of Medicine and Surgery, Milan University. The aim of the survey was to draft an outline of the technologies that had been used in teaching, and, above all to glean an idea of what faculty members of the Medical School actually felt about using Web technologies in the teaching and learning process. Our findings were in line with similar experiences reported in the literature (7;8). Despite the fact that the Dean of the Faculty had sent out an official invitation (both by email and by letter) to all members of the faculty to complete the questionnaire and to attend the conference, only 118 of the 600 faculty members returned the questionnaire. Although most of the respondents stated they used the Internet and email on a daily basis, the most significant finding was that teaching today at the Medical School is mainly based on traditional technologies, such as overheads or photocopies (Figs. 1 and 2).

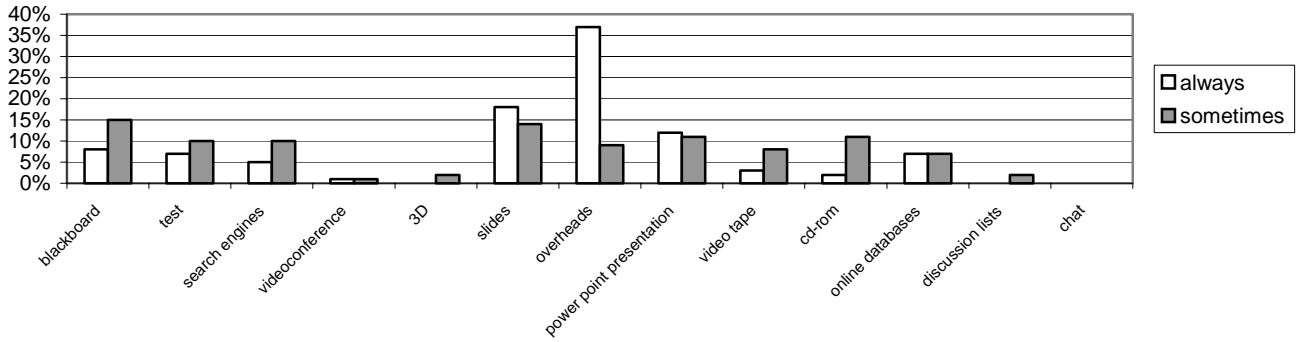


Fig. 1: Tools used in teaching (from the findings of the "Survey of the use of Web technologies for teaching and learning". Faculty of Medicine and Surgery, Milan University).

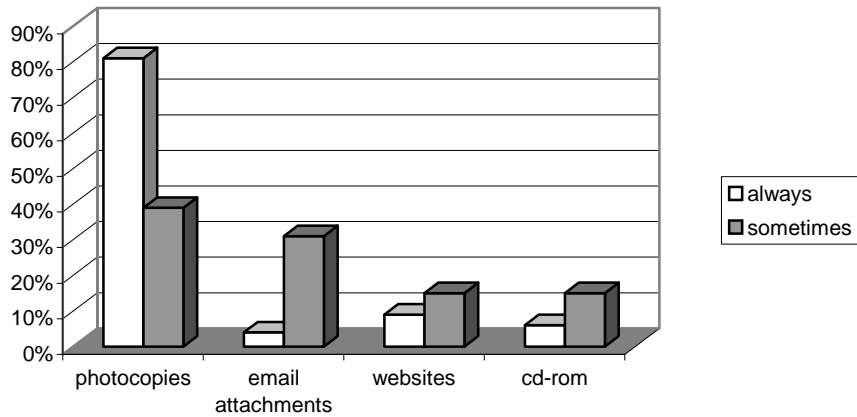


Fig. 2: Means used to deliver teaching material for faculty member's own course (from the findings of the "Survey of the use of Web technologies for teaching and learning". Faculty of Medicine and Surgery, Milan University).

Web technologies are seen as a positive means of publishing information and news and documents. With the exception of self-assessment tests (which were already in use in a printed form), Web technologies are not generally considered as a way of updating the teaching process, but rather are seen as a quicker, independent and efficient means of performing routine tasks (Fig. 3).

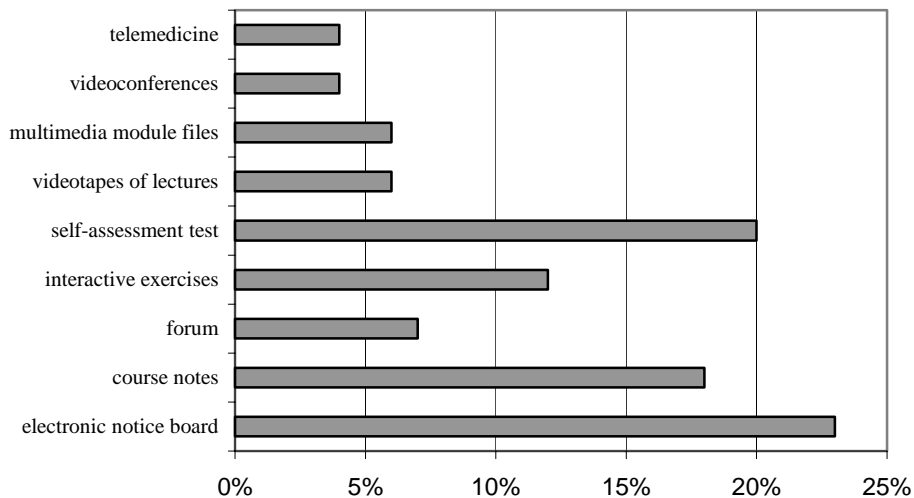


Fig. 3: Tools and activities considered effective as support for faculty member's course (from the findings of the "Survey of the use of Web technologies for teaching and learning". Faculty of Medicine and Surgery, Milan University).

From the survey we found that e-Learning is seen as a way of delivering courses and not as a potentially new way of organising teaching and evaluating resources (social and technological) with the aim of developing new learning processes and forms of knowledge (2).

## 2.2 Technical and methodological training for teachers and design of virtual classrooms

In response to the findings we gleaned from the questionnaire, the conference and literature on the subject (5; 1), we planned the development of *faculty training in eLearning*. Special emphasis was placed on both technical and methodological "training and support", which were found to be fundamental elements of support for faculty members, especially in the transition phase from a traditional teaching practice to more innovative teaching. For faculty training the emphasis was on the gradualness of the process.

- Aim in Year 1: independent management of the virtual classroom at the first level
  - outline of project development
  - basic technological competencies for independent use of platforms tools
  - introduction to active use of website
  - outline of involvement required: time for creating material, animation of virtual classroom, close collaboration with "experts" for the design of the virtual classroom
- Aims in following years: integration of teaching practices in the virtual and real classrooms
  - creativity in the use of platform tools
  - creation of teaching modules which integrate the potentials of the virtual classroom (communication and learning processes) with those of the real classroom.

We endeavoured to structure the learning process by balancing theory and practice: we alternated face-to-face teaching with small group workshops. We used the tutorial model for faculty training: a learning process which involved examples, practical problems to solve and theoretical contextualization (3). We evaluated the acquisition of competencies by introducing a "individual task" that each faculty member had to develop and discuss with the instructional designer (see Table 1).

Table 1: Phases of "Faculty training" in the first year of the Campus Medico Online project

Phases	Methods
1. Training courses	<ul style="list-style-type: none"> <li>– face-to-face teaching: theory and examples</li> <li>– small group workshops: practical work</li> </ul>
2. Individual workshops	<ul style="list-style-type: none"> <li>– definition of prototype: support site for teacher's course</li> </ul>
3. Discussion with course design expert	<ul style="list-style-type: none"> <li>– definition of teaching goals</li> <li>– content and teaching structure</li> <li>– design of site to support real classroom course</li> </ul>

In the faculty training sessions members are given a general introduction to e-Learning: theory and presentation of examples applicable to certain disciplines, practical workshops on the use of platform tools, practice at building online courses. It is only when the phase of the discussion with the instructional designer about the "individual task" is reached that work begins on the building of the virtual classroom for the teacher's specific subject. This includes the definition of teaching goals, structure of content and forms of collaboration and development of means of evaluation. To extend the initiative to the whole Faculty, models which the CTU has already designed and implemented are used to define the structure of the site, especially of the first level virtual classrooms. Faculty members are enabled to manage their support site independently; the instructional designer is essentially called upon to help in jointly creating learning activities and models with the teachers.

### 2.3 Creation and monitoring of virtual classrooms and evaluation of courses in semester 1

In the first semester 13 sites to supplement traditional teaching processes were published.

We now believe it is important to concentrate on the evaluation of the pilot phase of the project to have a clear understanding of the impact Web technologies have on teaching practice and to define, therefore, how to proceed in this project. We are currently designing a questionnaire for faculty members and students involved in the first semester of the project. However, we are already able to outline our first impressions of the project so far on the basis of the sites which have already been published.

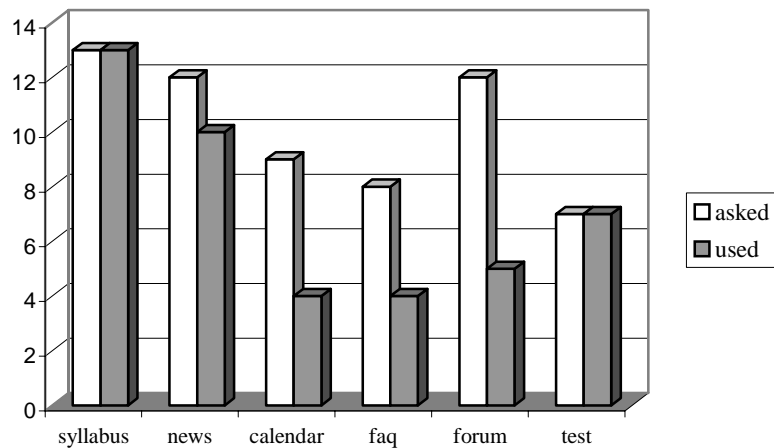


Fig. 4: Tools used independently for online courses in Semester 1 (excluding contents)

It is interesting to note that the tools actually used are the syllabus (the web pages providing details of the learning process) and the self-assessment tests, which were already in use in the printed version. All the other tools, including the forum, were under-used. One interesting observation was that the courses in their second or third edition used all the tools. This finding illustrates that the use of certain tools does not occur at the first level, not so much because of technical incompetence as because of an increasing methodological awareness that is acquired by practitioners when they design virtual classrooms at a higher level.

As far as teaching and learning contents are concerned, teachers may publish slides, texts, images, lecture notes, articles, more advanced material or create multimedia modules and personalised tutorials. Again, teaching and learning material may vary enormously from course to course, according to the time invested by the teacher, to the teaching goals and to the organisation of face-to-face course contents. Fig. 5 shows the various ways used to publish contents: those requested at October 24<sup>th</sup> 2002 and those actually used.

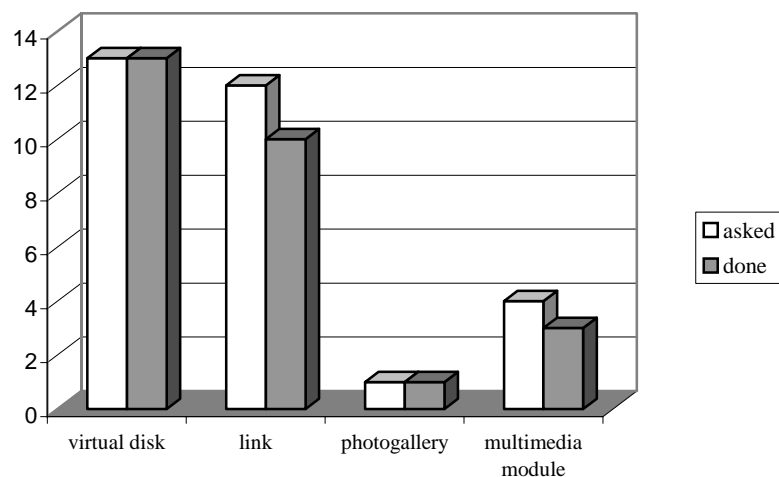


Fig. 5: Type of content publication for online courses

Generally the type of content publication requested is the one actually used: only those courses in their second or third edition attempt to a higher level content type publication.

In contrast with previous years, the Ariel platform allows teachers to publish documents independently (virtual disk), but in this way the quality of the material published is not at all uniform. Some of the material has been very carefully prepared and designed for the learning of specific skills, other material consists of an online publication of students' course notes. Teachers tend to use the virtual classroom as a back-up to the traditional lecture room and have difficulty in understanding the added value of the virtual classroom and in using it in their teaching practice. Sites are often used as if they were for publishing lecture notes and not as an active learning environment. In addition, teachers are often demoralised by what they deem as an excessive workload, given the lack of recognition on behalf of the university of the teacher's time and commitment. If the aim of this first year, which we feel has been achieved, was to acquire competencies to use e-Learning tools independently and understand their technological and methodological potential, the goal for the following years is to insist on the quality of material published and the potential of learning technologies to help teachers understand, with hands-on experience, that e-Learning is not just a means of delivering teaching and learning material, but that it is above all a way of organising education and of enhancing social and technological resources to facilitate new ways of learning and new forms of knowledge (2). However, renewing teaching and learning processes so that they are effective, involves time, energy and co-ordination at an institutional level (4; 5; 1).

### **3. Conclusions: some guidelines for the development of the project**

On the basis of previous experience reported in the literature and of what we experience in year after year of close collaboration with faculty members, four fundamental lines of action have been identified to proceed with the development of the Campus Medico Online project:

1. the continuous and constant involvement of the Faculty, which must be the driving force behind its own renewal, because it is only with consistent and co-ordinated help and support at an institutional level that the individual experience may become routine procedure;
2. faculty training must be structured on the basis of goals which are well-defined and measurable both to motivate them, and to render the process feasible;
3. the usefulness of the new technologies applied to the learning process must be made explicit in concrete and measurable goals: methodologically, organisationally, strategically and economically;
4. the instructional designer must be seen not as an "intruder", but as a methodological support in the transition from the traditional lecture room to the "virtual classroom"; human resources are required for joint technical and pedagogic support, both to ensure exploitation of the total potential of the tools and to make good use of them in education in relation to training goals: these are competencies that are not necessarily found in the same instructor, but may emerge and interpenetrate in a work team (6).

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# CREATING E-LEARNING OPPORTUNITIES AT THE FACULTY OF ECONOMICS, UNIVERSITY OF LJUBLJANA

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## Introduction

The Faculty of Economics (FELU) began to build its information in about ten years ago. The concept was based on our own knowledge, experiences, and above all on the needs as they have appeared through the years. In previous years, the FELU made a considerable investment in building the web infrastructure, since we are aware that our students' future career depends not only on a good understanding of economics and business, but also their capacity of coping with new communication technologies.

Today, the FELU's web site is officially recognised as the best web site among the Slovene educational organisations and institutions. It offers to users (students, teachers and visitors) rapid access to a large spectrum of information, e-learning solutions and supports the faculty's vision of being a flexible and e-learning institution.

In the past, the creation of e-learning solutions was carried out especially by an individual initiative from particular teachers and their teams. Some of these initiatives were financed by PHARE or EU programmes, and some even by the teachers' own means. Therefore, the priorities of the Teacher Development Centre is to evaluate the existing e-learning materials and solutions, to present the examples of good practice to others, and to encourage them to create their own study materials on the basis of existing experiences.

This paper aims at presenting four of FELU's e-learning solutions:

- FELU Course web-pages
- CD-ROM study guide for the course on Human Resources Management (author: Bogdan Lipičnik)
- On-line Course Module on the European Economic Statistics (authors: Lea Bregar, Irena Ograjenšek, Mojca Bavdaž)

In addition: to evaluate what was the purpose and intentions of the author(s); who uses the solution and who is the beneficiary; what are the positive and/or negative experiences; and what is the possible continuation or upgrading.

## 1. Course web pages

Course web pages were designed with the purpose of providing complete information about the FELU's study programme on the undergraduate and postgraduate levels. Course web pages contain information about course objectives and contents, about course director and teachers who are responsible for the course, and about students' obligations and weekly plans on the course topics. All relevant information about the course are put on the web before the beginning of the course.

Besides this general information about the course which addresses all potential visitors of the faculty's web-pages, course web pages include some specific options-links tailored for the needs of the students involved in the course. These options offer to teachers the possibility of adding some particular announcements (about the course realisation, about eventual changes in the weekly plan or consultation schedule), and to deliver study materials or to open the discussion forum.

Since October 2002, course web pages have existed for all courses on undergraduate and postgraduate levels and appear in the FELU's study programme. General information (objectives, contents, literature) is permanently available and is updated every year in September. Other options/links (announcements, course materials, discussion forum) are active when the course is in progress. The teacher is free to decide whether he/she would use any of these options or not, and which one. We find it is important that the infrastructure exists and that teachers have the possibility to use it. Some teachers use all these options in a very advanced way, some do not use them at all. However, by communicating with students through web pages, teachers considerably contribute to the students' ability to use web facilities, and additionally give a good example to their colleagues.

The course web pages are uniform, flexible, user friendly and enable further additional options and links. We consider them an excellent starting point for teachers and students to become familiar with web facilities and the platform for further implementation of e-learning solutions.

### ***Discussion forum***

The FELU's course web pages provide not only information about course objectives and contents but also enable the teaching staff to deliver study materials and encourage students to participate in discussions concerning course content. The latter is achieved by providing the students with the possibility to join a discussion forum.

Considering the flexibility in terms of course content, this tool can be used to enrich courses in the field of economic theory and methodology. In addition, it can also enrich courses that instruct students on practical and intuitive use of their knowledge, therefore, they can become more closely connected to the problems of business practice. According to the structure of the course, professors and/or teaching assistants create topics that will be discussed at the forum. Each individual topic opens for discussion after the course content regarding the topic is explained at lectures.

When a topic is opened, the discussion is initiated by the professor or teaching assistants who prepare a list of questions that are relevant to a specific topic. The feedback concerning students' answers is given in two ways. Firstly, by marking answers with stars. Each answer can be graded with up to three stars according to the suitability of the answer. Secondly, feedback is provided in the form of teacher's comments, additional questions and remarks. Students' answers and teacher's comments are shown in different colour. When a satisfactory answer is given, a teacher summarises the main conclusions and closes the topic discussed. Students' participation at the discussion forum is evaluated at the end of the semester. The course web pages offer an analysis of the frequency of students' registration for the forum and a total number of stars given to all answers.

At the discussion forum participation has proven beneficial for students as they actively participate in discussions, which help them gain a more in-depth understanding of microeconomic theory. This enhances the flexibility of the study process, complements face-to-face tutorials and stimulates student-to-student communication.

## **2. CD-ROM study guide for the course on Human Resources Management**

Professor Bogdan Lipičnik created the CD-study guide especially for the DE students with the purpose of providing them with complete information about the way they should study and progress through the textbook. The CD-ROM is designed in web format and contains the instructions necessary to start working with the CD-ROM, the literature recommended for the course, a weekly plan, an index of subjects and interesting links on the web.

The weekly plan is devised into 8 units. Each unit contains references to the textbook chapters which need to be studied first, with the base of students' seminar works (recommended for further reading), video clips for the illustration of the specific topics treated in the textbook, some audio clips for the relaxation, etc.

As a supplement to the basic textbook this study-guide provides very complex and accurate information about the course objectives and aims, about students obligations and it also provides a visualisation of particular topics. It is easy to use and the author can update it for every generation. In this particular case, the costs are very low since professor Lipičnik created the whole CD-ROM himself without outside help.

The author admits that his initial intention was not really to create an e-learning solution. The course contents (Human Resources Management) need to be demonstrated by the concrete examples from the reality of business. In the past, professor Lipičnik took his students to Slovene companies. In time these visits and excursions became both a strain and expensive, therefore, he began to look for other solutions. He decided to make video spots and to present them at his lectures. The next step was to put these materials on the CD-ROM for the needs of the DE students.

At the moment, this is the only officially published CD-study guide at the faculty. Its advantages (easy to use, no on-line protocols or expenses, easy to update, and low production costs) convince us to apply the same example to other DE courses.

### **3. The On-Line Course on European Economic Statistics (CEES)**

The on-line Course on European Economic Statistics (CEES) links modern information and communications technology (ICT) with the goal of increasing the quality and efficiency of the learning process. The CEES provides an overview of the theoretical aspects, international and EU statistical standards, and gives information on the national (Slovene) practice in the field of economic statistics.

The course development phase was finalised in the beginning of 1999. It is now an integral university degree course covering 15 topics that is available on different media (in print, on a CD-ROM and on-line) and in three languages (Slovene, English and Bulgarian). The course is considered very useful for both undergraduate and postgraduate students at Economics and Statistics Faculties. As it provides background information about the main fields of economic statistics, it can also be considered as an introductory course for statisticians wishing to obtain training in this field.

The use of ICT can contribute to the quality and efficiency of the course in three strategical areas. These include: (1) an extension and deepening of students' access to information, (2) an increase in the flexibility of access, exploration and use of official statistics, and (3) the integration of students' learning experiences and knowledge (Bregar et.al, 1999).

In order to achieve effective integration of ICT and CEES course contents, a course modularisation approach combining linear and non-linear study paths was applied and supported by a range of navigational and functional tools.

Through the course modularisation approach the hierarchically built structure of a traditional course is decomposed into homogeneous topics. Each topic contains several blocks that embody course contents (e.g. Overview, European Standards, National Application) or pedagogic support with guidance to additional sources of information (e.g. Objectives, Activities, Resources, Links).

In order to facilitate the students' access to relevant information and assure efficiency of the learning process, CEES offers the user three basic navigation tools. The first is the suggested study path. Through the pages the course developer or tutor suggests a certain study path that students should follow in order to gain relevant knowledge and achieve course objectives. By clicking the navigation buttons + (plus) and – (minus) they move onward or backward on the suggested study path. If students select any of the existing internal or external hyper links on the path the option 'back to the path' brings them back to the course page that is currently on the path. This is a very user-friendly and effective way of navigation. It combines the advantages of a traditional way of navigation (e.g. it has the successive reading of pages) and advantages of hyper space, such as random access to external information.

The second navigation tool is a multilevel table of contents that is based on the matrix presentation of the course structure. The multilevel table of contents can be combined with the tool called the study profile

that allows students to choose the topics and/or blocks they would like to study, therefore, select the preferred course contents.

The third navigation tool is the study map. It is based on the graphical presentation of the hierarchical course structure. This tool enables the students to directly access the selected course page.

Functional tools help to increase the delivery process flexibility in terms of place, time and pace of study. They include communication tools (tutor's e-mail, notice board, etc.), the link to the library's catalogues, a database of self-assessment questions, notes editor, a search engine, a help engine, calculator, glossary, etc. An overview of the students' progress through the on-line course (number of pages already visited, percentage of the course still to be completed, etc.) can be displayed and analysed with a functional tool 'progress'.

Compared to traditional educational programmes, an on-line course is much more complex and demanding in terms of its development procedures. An appropriately designed on-line course enhances the complexity and diversity of study materials and makes the study process more flexible in terms of contents, time, pace and place.

## **The Main Findings and Conclusions**

Embarking on new and diversified ways of study certainly provides several benefits to students, although due to their insufficient skills in independent self-study and use of modern information technology, pedagogical support is crucial.

Enriching traditional learning formats with new approaches and elements of e-learning is a possibility to improve the quality of learning in a mass study environment. As teachers encourage active student participation in the study process, teacher-student interaction improves by various means of communication. However, the teachers' workload also increases.

Integrating e-learning elements in the study process at the FELU is an ongoing process of increasing importance. However, as e-learning components require continuous upgrading and updating the rigidity of a traditional university as well as increased teaching loads (especially in mass study environments) constrain newly emerged tendencies and needs for flexibility. Considering the large number of e-learning solutions it is crucial to select and implement those options that meet the needs of the FELU study process and are not constrained by the mass study environment.

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# MANAGING ICT APPROPRIATION IN A FRENCH GRANDE ECOLE: THE BOTTOM-UP WAY – A CASE STUDY

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## Introduction

In the French two-tier system of higher education, "Normale Sup.", as it is often called, ranks among the famous "Grandes Ecoles", the elite and prestigious Graduate Schools in the country, thus bearing a certain likeness to Oxbridge in the UK or the Ivy League in the US. In order to become Normaliens, students have to take a highly competitive entrance examination. After obtaining their General Certificate of Education (the Baccalaureat) students must then spend two or three years in highly selective Preparatory Schools, but each year the ENS-LSH accepts only around 100 Normaliens for the whole of France, which means that the majority of students will enroll in the standard university system. The Eleves then specialize in a field of their choice (litterature, linguistics, philosophy, history, geography, european or middle-eastern and asian languages, economy and sociology, art and cultural studies), but they benefit from the ENS's commitment to the development of cross-cultural and interdisciplinary study, in a vibrant environment of teachers and researchers of international standing.

Recently, however, ENS-LSH was given an even more original stance: the Ecole is no longer characterised by a general interest purpose concerning all the subjects likely to be studied for the 'agregation' (the French competitive examination for admission to posts on the teaching staff of 'lycees' and universities), but has been broadened to encompass Research and Development, higher education as well as professions linked with the civil and territorial services, to which this type of education is likely to give access. The ambition of the ENS consists in forming intellectuals able not only to transmit knowledge as they obtain it, but also to react in context and to manage complex human situations. It intends to build an appropriate formation for Humanities abilities and careers in the XXIst century.

This challenge requires from students, teachers and staff a real involvement in the use of information and communication technologies. The School moving from Paris to Lyon in September 2000 offered a radical opportunity to change and adapt teaching, researching and working habits to the world communication era. The stakes were clear, but the practices were hardly emerging. This paper tries to explain how the ICT appropriation strategy was implemented.

## First stage (1998-2000): the anticipation of change

Moving from Fontenay-Saint Cloud (close to Paris) to Lyon (500 kms far) meant a large range of upheaval: from an old patrimonial site to a modern high-tech building, from the parisian wealth in libraries, museums, cultural events and intellectual density to a province town to be discovered, from a high intellectual tradition, combined with a poor level of computer equipment and abilities, to a strategical renewal of Humanities teaching and researching through the use of information technologies. In addition, in order to plan the technical infrastructure of the future School building site, we were required to identify the users' needs and expectations: it would be more imagination than investigation outcomes... Nevertheless we began to conduct interviews, organize several working groups, schedule some pre-developments of our future ICT architecture and processes. The environment was not really adequate! As it is usual in the techno-sociological innovations, a small team (a few scholars very close to the Director, and a few specialists appointed by the building project managers and funders) gave and received continuous information, looked for exemples (in France and abroad) and for supports - the best friends of the change scarcely were those expected for, both among the teachers or the technical staff. The institution however gradually incorporated the concept, not as a whole, but for some specific purposes that we had to aggregate and give life to.

## **Second stage (2000-2001): discovering a new place and new tools, developing new habits and new capacities**

In September 2000, the most preminent actors on the Lyon site still where the various professionals of painting, glazing, carpenters and so on – with an armada of housekeepers. But the transfer had been effective and no time was to be lost for the beginning of the school year.

For several months, everybody tried to do «the same (as best) as usual» - except for the new students and teachers, and the technical staff struggling with the unfolding new infrastructure. These technicians were far more numerous than ever, with various experiences and capacity levels; they had to be convincing by fastly implementing the modern tools in the plurisecular intellectual background – and make them easily usable. It worked, because of their implication and openness, of the attractiveness of the technologies for various purposes, and by the mean of a constant «propaganda» attitude from the Direction, who frankly developed Intranet communication tools and publicized the «ICT & Humanities» project. But scattered initiatives do not make tactics. They are difficult to manage. And a few innovation leaders are not enough to transform a community practice. So that, it was decided to create a dedicated working group, called GRAIN (Groupe d'Appui aux Initiatives Numériques – Supporting group for digital initiatives): the initiative came from a communication science teacher (a former member of the «anticipation» team) and the Direction agreed at once.

GRAIN is an open entity, where everyone motivated by the change can bring his/her questions and try to find solutions in a collaborative way. It gathers technical, administrative and teaching/researching participants, with one meeting a week – or more, in a broad or limited participation, if there is a pressure on an issue or the other. It is dealing with multimedia courses, electronical printing and data, distance learning, virtual library, webcasting, and so on. The communication science teacher is in charge of the group's animation and outcomes, with a specific mandate from the Director and regularly reports or asks for decisions about GRAIN's requests and proposals.

The first advantage of GRAIN has been to make information flowing: for instance, while the Computing staff is implementing a new server or developing a new software – with immediate consequences on all people's job, GRAIN members are able to broadly explain why «the system doesn't work» and till when it be; when a scientific meeting is shot and webcasted, everyone is concerned by the following «are all the legal requirements effective about intellectual propriety and privacy matters?»; when a new officer enters the staff, he can immediatly be informed of and take in account the previous experiences; when a new technology-based teaching or documentary project is conceived, every stakeholder of the production line is able to give advices and make proposals.

These comments, and the following prescriptions, could have been delivered on a top managerial base. In a higher education institution, where academic freedom is a crucial value, as much as self-initiative and knowledge-oriented improvement, and where the technological competence is more or less shared, we preferred a collaborative formation and a bottom-up communicative process.

## **Third stage (till now): towards a stabilization and dissemination of best practices**

Two years after GRAIN inception, ICT Uses are more and more embedded in the daily work. A strong effort has been made for awareness, training and testing the ICT promises. Time has come to focus on quality more than quantity. To make choices in the teachers', researchers' and students' digital initiatives proposals and the best way they can be answered. And also to make our output available to others. Although ICT are not stabilized, nor the economic pattern of internet communication and services delivery, we must go on with a technological strategy according to our various and own purposes. Open and free access, for instance, is a strong commitment in the delivering of pedagogical and scientific contents as a common good. Harmonizing ENS-LSH specificity or notoriety and its relationship with the local, national and international higher education environment (it claims some common tools and projects) is another one. Above all, we meet the challenge of carrying on with inside global awareness and capacitation, answering to growing requests, and at the same time setting up top quality protocols and outcomes.

In January 2003 it was thus decided to gather electronic-multimedia production and webcast concerns in a new structure we called CEDILLE (*cellule d'édition et de diffusion des initiatives numériques sur l'École et sur l'extérieur*). It's working in parallel with GRAIN, with a single coordinator, but its mission is output-oriented: the main goal is to develop a ENS-LSH free content multimedia portal. A tight team is devoted to that task, under the supervision of a restricted teachers committee who ensures both the respect of quality standards and the ICT Uses involvement of the ENS-LSH academic community as a whole. The first results are expected on July.

### **Conclusion: conditions for success**

The success of ICT Uses integration and appropriation, in a higher education context or elsewhere, is bound to several conditions. First, it requires a tactical approach, beside a strategical one.

Once the equipments and technical staff are set to work, we must care not to believe in the unique technological power of tools and specialists to automatically create new projects and working habits. We must keep from ordering the change, in the name of modernity. We have to convince, to encourage, to reensure, to communicate, to coordinate. To mix voluntarism and pragmatism, clear guidelines and self-emerging willingness, individual and collective interests. It takes time, but it's the only way for a true appropriation.

In addition, reaching the goal needs coherence and cohesion. And both are to be built:

- between the different specialities (especially the technical ones, because the media convergence era gathers computing and audio-visual professionals),
- between the «ancients» and the «moderns» (teachers and students have to rely on books, lectures and face to face exchanges, as well as on digital and distance technologies for teaching and research),
- between technical or financial capacities and high-value academical projects (the technological infrastructure must be maintained and updated, the digital knowledge construction and e-learning processes have a heavy cost),
- between prescription and preferences (though general working patterns have been set, every project requires a singular adequation of supports to uses).

It obviously keeps alive the questioning of ICT impact on knowledge creation and transmission, teaching situations, scientific communication – and everyday working attitudes. And more precisely on the cost/benefit ratio of the operation – in larger terms than economics. «Technical object is but a medium, it does not exempt from thinking about the messages and their transmission conditions. Information–communication technologies don't validate contents, they are but tools. They don't offer a «miracle solution» because efficacy closely depends on objects, moments and publics. And, last but not least, ICT don't disrupt the profession: they «just» compel to do one's job under new conditions – and with wider possibilities»<sup>1</sup>.

In a further stage, we'll have to find, develop, and implement instruments to evaluate the change. Our criteria and indicators certainly will not deal exclusively with quantitative issues. They will share some features with the instruments all the universities are trying to set up; they will also take in account and express the specificity of our School in the french and european higher education system.

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<sup>1</sup> «L'appropriation problématique des nouvelles technologies éducatives à l'université», José Rose, GREE-CNRS-Université Nancy 2, Communication to the International francophone Congress «Apprendre et enseigner dans l'enseignement supérieur», Université Paris X Nanterre, 10-13 avril 2000 (*our translation*).



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## QUALITY DIALOGUE IN THE DANISH IN-SERVICE ICT-COURSE “SEMINARIE-IT”

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### **Dialogue as a necessity in Danish education**

The theme of the conference is “The Quality Dialogue”. That particular subject: “The dialogue” is often considered as part of quality education. At least in Denmark we always consider the dialogue as a very important ingredient of good learning. That doesn’t change of course just because the teaching takes place on the Net.

Therefore dialogue has always been an important item in all discussions of distance teaching in Denmark. Although I must admit that it was very difficult to find common Nordic pedagogic features at the EDEN conference in Copenhagen 2002, I dare insist that most Danes in the traditional educational scene put much importance in the dialogue. You will find other attitudes when looking at the commercial course providers offering very specific courses though, and we also heard at the EDEN conference that many people and institutions in other parts of the World believe in the same principles. But possibly there is the difference that in Denmark we think that a learning style based on dialogue is one of the elements constituting Danish culture as opposed to other cultures. It apparently proved itself false in Copenhagen 2002, but that doesn’t affect our belief in it in Denmark.

Collaborative learning is a generally accepted pedagogical principle to day and the dialogue is an integrated part of that. It is assumed that learning is more effective through acting, creating, discussing and doing rather than just receiving information from a teacher. At least it is a fact that in Denmark we have used the dialogue as a positive learning-style in the f2f education during several decades. That has led to the consequence that we very often let our pupils, also in the gradeschool, sit in groups and discuss common problems proposed by the teacher. Most people consider the words Grundtvig and Socrates as having very positive value, because both persons are symbols of dialogue as a tool for learning. Often that standpoint can look even as an obsession, and some people might think that all this group work is the reason for the poor results of Danish children in some international testing.

### **Netbased dialogue**

As a consequence of the above mentioned attitudes many others and I have tried for years to make the dialogue an integrated and valuable part of distance teaching courses. But it has turned out to be much more difficult than expected.

Spontaneously one could expect a dialogue to start by itself, and continue if just the technical possibilities were present. Many veterans in ICT have had good experiences with newsgroups. The dialogue here went on vividly. Most of those that have been active in ICT for many years have learned a lot reading contributions in newsgroups and writing articles themselves. Unfortunately it has not been possible to transfer these experiences to more formal structured distance teaching courses delivered with the Internet as mediator. It was often very disappointing when we tried.

We experienced very little dialogue. The reason is obvious of course. Those early Internet users were different from a normal student/participant in a course of today. They were involved in Internet activities with much motivation to learn about the Internet structure and its rules itself. On top of that newsgroups often had hundreds of lurkers that mostly read, but were ready to contribute when a familiar topic popped up. So the newsgroups were kept alive in spite of the fact that only few came with utterances. Last but not least you only participated in groups which had your absolute high interest.

When you offer a distance course on the Internet these conditions are rarely present. You can not assume that all the participants are qualified netconference users. And you cannot have 10 times as many listeners as active writers because normally the purpose is that all participants learn, so all participants must be active. For each lurker we have on a course we have failed as a teacher and it might result in dropouts and it would have enormous economical consequences if 90% dropped out of a course. Finally you can have students that are poorly motivated. They might have been forced to take that course by some external conditions. A dull course can be a compulsory part of an otherwise interesting entity. The employee might ask you to participate in the course in order for you to keep your position etc.

Therefore it is necessary to use different kinds of pedagogical tricks, a special methodology, to initiate and preserve a quality dialogue in netbased learning. Of course it is only similar to the fact that we also have developed a special methodology for effective groupwork when working f2f.

### **Different measures to obtain quality dialogue on the net**

Actually I have a vision of a dialogue based net-education that is even better than our usual f2f classroom teaching. I still have the hope because I know how much time can be wasted for pupils being passive listeners in the f2f classroom. It should be possible to minimise that. During the last 10 years I have tried several different methods to obtain good dialogue. None of them were really so successful that I would use it as the only method in future settings.

I once produced an in-service training course for college teachers where I wrote a basic course text jammed with questions integrated in the text. B. Holmberg and his “guided didactic conversation” (Holmberg, B. (1983)) inspired me. The idea is that the student should think of the questions in the text and his/her answers as a kind of discussion between him/her and the person writing the questions. One problem is of course that the questions proposed are fixed and cannot be changed as a result of the answers. It is therefore difficult for me as a course writer to foresee the different types of course participants and their varying interests. The answers were all written in a common conference for all 30 participants. The conference was divided into topics and everybody was supposed to read all answers and comment on them if they felt like. But that did not create very much dialogue, only few persons got involved (Dam, Erik 1998, p 66). It created a minor discussion “with the text” but not among the participants, they did not have the energy to comment on all the different answers. There were too many answers and they were not particular relevant as the questions did not originate from needs of the students, but from an idea within the teacher (me), that all students should understand all the statements and even take an active decision to them all. That was simply too much and overwhelming. It also felt kind of stupid that each student should answer a question that another student had just answered, if they had the same opinion.

The first thing I changed in the course design was to reduce the number of questions and to demand either an answer to the original question or a comment to one of the other answers of that question. That would create more energy to the course but still it was build on external motivation mainly, and it was only relevant for control of the students, not very much for learning purposes.

In another course for teacher-students they should end the course having passed or failed. Here we tried to set only few general themes to discussion and demand only a certain limited amount of contributions (original or objections) to pass (and thereby avoid an alternative written paper) (Bendsen Palle 1999 p35). It worked, but we felt that it was much due to the extrinsic motivation, and we feared that the long-range effect was too small. But we never made a proper evaluation of the effect.

In all our different settings we have also discussed the best group size for optimum dialogue. Most experiences has shown that with rather big groups of 20 or 30 we will get discussion but often with only 2-3 active participants and the rest delivering just one or two answers during the whole course. Often those 2-3 persons discussing are so experienced either as conference participants or in the topic discussed or both, so they scare the rest to silence unintentionally. It did turn out though that although this design did not develop many dialogs, it often provided interesting reading for the lurking participants because the writing persons were so qualified in their subjects. Those silent course members probably learned some from the reading, but according to my thesis here, the learning would have been more effective if

they had been actively writing too, having the possibility to test some of their hypothesis against others. Therefore we still wanted to work for more dialogue.

### **Pedagogical ICT driver's license**

I have not been very keen on group sizes of 2-3 persons, in a closed conference, without any contact to other students. I agree that those 2-3 persons often feel secure in their group, especially if they have chosen each other. I have been afraid that there would be too little energy in such a group. But in the last part of this paper I will describe a project initiated by the Danish governmental organisation for ICT in all educational institutions: UNI-C, where I was editor in 2002, and where we design with groups of 2-4 with possibility to discuss with the other groups in a total formation of around 30 participants. It looks as if it will become a success. I will not describe the total design but focus on the dialogue. The design can be studied in more details on <http://www.school-ict.org/>. (Information page for Pedagogical ICT licence)

### **The pedagogical basis of Seminarie-it**

I will describe the development of this distance learning project where I was one of 8 editors collaboratively developing a course for UNI-C. For several years now, UNI-C has developed an ICT-driver's license for teachers in the gradeschool, the high-school and 6 other parts of the educational system: "Pedagogical ICT licence". This driver's licence is very different from the European Computer Driving Licence (ECDL). Instead of testing skills in different basic programs in the office suite, UNI-C has developed a concept where the different skills are being used in different pedagogical situations. They took the spreadsheet or the word-processor or some other ICT-tool and found relevant uses for that type of program in the school and then they made a course and offered it to all teachers in specific types of school. They stressed the process of learning more than the evaluation of skills in the end. These driver's licences already had proven to be a success and they were the basis for our development (Study of the impact of skole-it 202).

We should develop a driver's licence "Seminarie-it" for a group of teachers at our colleges of education. That group is rather small, only about 1000 persons. We were not forced to produce a complete replica of the other licenses. A survey showed that most teachers in the 18 colleges were familiar with word processing, e-mail and use of Internet and they wished very strongly a course where they could learn how to integrate ICT in their subjects. The focus should be even more on pedagogic than the earlier driver's licenses. It should not be theoretic pedagogic but the course should be very close to praxis, the ideas should be implemented in practical proposals and even better tried out in praxis.

That was one starting point. Our assumption was: **You learn best if there is a connection between the content of the course and your daily work.**

The other main assumption was: **You learn best together with others.**

That meant that we based learning in our course design on the ground of **collaborative learning, project based learning** and **learning situated in the actual praxis**. We knew from research in Ålborg University Denmark (Dirckinck-Holmfeld L. 2002) that it is possible to implement netbased learning based on those principles but it would probably be more difficult to establish an ICT driver's license after such guidelines. When you talk about driver's license you expect a certain well-defined quality and unfortunately there are some contradictions in that and in the three above-mentioned principles. It is difficult at the same time to achieve a genuine quality dialogue with starting point in the participant's preferences and at the same time be able to guarantee that the course is a fixed and well-defined entity with well-defined results.

### **Seminarie-it, the course design briefly**

- It is a distance education course, you only meet physically with your tutor 4 lessons at the beginning of the course.

- All dialogue between groups and the tutor take place in a first-class conference.
- You get an introductory portfolio with practical information and an overview of the course material in order to give you the possibility to chose 5 modules from 8.
- The main articles are placed on the Web with a few links to external sites.
- On the Web you have material for self-tuition to learn the basic skills in word-processing, spreadsheet, picture processing etc. if you need it during the course.

To show you the difference from the other pedagogical driver's licenses that have their starting point in a type of program, I will list all 8 possible module headlines to show that this license takes its origin in pedagogical situations and the participant decides which ICT-tools are appropriate for his/her work in each module.

The 8 modules are:

- ICT in education and subject
- ICT in the gradeschool
- Production of teaching aid
- Flexible education
- Digital resources in education
- Collaboration and communication on the net
- Children and media
- Free project

The ICT-tools have to be integrated according to need. There is no fixed agenda, in Seminarie-it you can start from a need in your daily teaching. The course starts with a f2f meeting with the tutor (4 lessons). 20-30 persons normally start together as a main group and during this first day they form into groups of 2-4 persons according to interests that can be subject interests or pedagogical interests. The main group only meets later virtually in a net-conference but the small working groups normally meet physically many times as they often come from the same institution.

The work with each module follows a set schedule: The group of 2-4 students read the provided material, and make a proposal for at mini-project incorporating the theme into a small teaching item chosen from there daily teaching. That proposal is mailed to the tutor. He/she comments on it giving ideas to possible changes and draws attention to resources that could be helpful. After the group has received the response they finalise their project and return it to the tutor whom normally accepts it if all the formal requirements are fulfilled. This design is true to the pedagogical principles: collaborative learning, project based learning and situated learning.

We are convinced that there will be much dialogue of the themes in the smaller groups. Unfortunately there will probably only be little interaction between the groups in the main group. We have considered forcing that, but at the moment we only demand that the finished projects are placed in the conference so they can be exposed to the other groups, but we might change that design later, to make more pressure for exchange of ideas.

## **Quality control**

An important issue is quality control. How can we be sure that each single participant has reached a certain level of ICT-skills? The answer is that we cannot be 100 % sure. But researches on the other pedagogical ICT-licenses has shown that nearly everybody completes the course and have more knowledge after than before the start, and normally begin using ICT in the classroom. The level of the assignments vary from team to team – there is no absolute level. Focus is on the process and it is expected that each individual move from his/her level of skill to a higher one, but their will be no control of that effect.

The quality control is build into the design:

- The text material is very thoroughly scrutinised and developed for the target group to get maximum motivation.
- The possibility to do projects related to the daily work.
- The possibilities to discuss with partners in the small group and to a certain extend with the tutor.
- Certain formalistic demands. Each group must make at least 5 projects of 5-7 pages each.
- Each group must prove that they are able to use the ICT tools necessary for their particular chosen theme.
- There are examples in the material showing problems to solve and it is indicated which types of questions have to be answered. So there is a certain structure that the participants must comply with.
- To ensure a certain variation in the products it is a demand that the groups use several different types of reports: analysis/assessment, description of a sequence, product of a process.

But you cannot be sure if a certain specific area of ICT-tools has been learned during the course, it will vary from person to person. Theoretically a person can cheat. A person can hide behind two other persons in a group, but it will rarely happen because the course gives much needed knowledge, and the blend of inspiration and freedom to experiment gives commitment to the learning process.

- In the ECDL you control the test of some skills.
- In the other pedagogical driver's licenses you control that you have used some specific ICT in a pedagogical manner.
- In Seminarie-it you control that you have been able to integrate ICT in you classroom teaching.

Control never tells everything, you will always have to choose the best solution for you.

Of course you can never avoid the contradiction between the wish to know the outcome for each single participant and the wish to have people collaborate.

In this setting you will probably have a guarantee that most participants learn something that is really useful in the daily work, but you have no guarantee of what it is and no guarantee concerning each single person.

## Evaluation

There has not been any evaluation of the course yet. The first teams started January 2003 and will finish around June 2003. But the first reports tell about very engaged teachers.

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# EVALUATION OF E-LEARNING COURSES AT THE UNIVERSITY OF HRADEC KRÁLOVÉ

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## **Introduction**

The Faculty of Informatics and Management, University of Hradec Králové, has been dealing with e-learning for more than five years. Thanks to both foreign and Czech research projects several fully distance e-learning courses have been prepared for lifelong public education – Internet in Education, Modern presentation and education, ECDL (European Computer Driving Licence).

In 2001 intensive activities on adapting selected subjects taught in the combined form of studies started and new e-learning courses (called e-subjects) emerged in the virtual learning space WebCT. In the winter term 2001 two subjects (Database systems 2, Computer Nets) as pilot projects were taught.

Further preparation of at least other five e-subjects was planned for 2002. The target group was enlarged and another important decision was made – e-subjects would support face-to-face teaching to streamline the present form of studies.

In 2002 twenty-eight e-subjects were approved by the commission of experts and applied in lessons.

In 2003 the five subjects mentioned above have been finished, put to use and will be introduced to the commission in the next round. Other thirty e-subjects are being prepared. In total 32 teachers use and create e-subject courses and more than 2000 positions are occupied (1 student may participate in more courses).

Eight e-learning courses are used in lifelong public education and more than 1700 people take part in them.

## **Students' evaluation of teaching via e-learning**

During 2002 a continuous evaluation of VLE WebCT and e-subjects proceeded, teachers prepared their own evaluation sheets. In December 2002 an extensive study via questionnaire started. It was aimed at all 700 students who worked the virtual learning space, 360 of them made replies to the following questions:

- Does the placement of the virtual learning space on the Internet meet your requirements?
- Did the placement of studying materials in the Content Module meet your requirements?
- Did the use of communication tools in the virtual learning space meet your requirements?
- Did you use Assignments, Quizzes, Selftests to check the quality of your studies?
- How often did you enter single parts of the virtual learning space?
- How did the virtual learning space meet your requirements?
- Are you interested in other e-learning courses?

### ***Does the placement of the VLE on the Internet meet your requirements?***

Students were offered the following options and they could add their opinion verbally. Fig 1 demonstrates their responses:

- Yes, I am fully satisfied.
- Yes, I am satisfied.

- Yes, without any comments.
- Yes, but with problems.
- No, in no way.

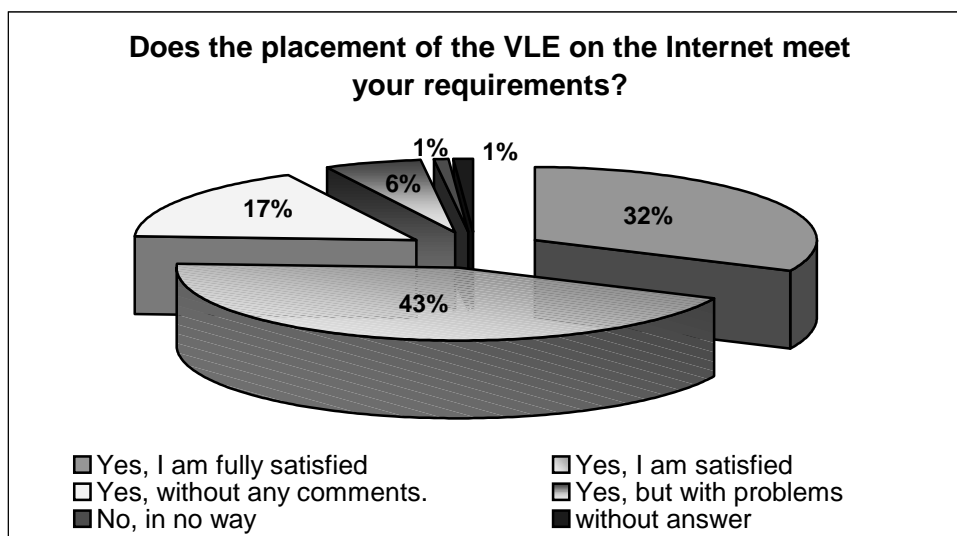


Fig. 1

In additional comments students often appreciated the possibility to study at any time, any place or to revise the topic. Higher costs of the Internet connection were found a disadvantage.

***Did the placement of studying materials in the Content Module meet your requirements?***

More than 54% of the respondents were satisfied with the placement of studying materials in VLE, only 1% did not suit this way of presentation and 10% had problems when using the materials. The files were too capacious which caused problems with downloading.

***Did the use of communication tools in VLE meet your requirements?***

Respondents clearly distinguished various types of communication tools. Asynchronous e-mail messages suited more than 56% of students, while 20% refused them. The other students did not use e-mail at all. Discussions were employed in a similar way. Synchronous chatting was preferred by 12% of students, it did not suit 16% and the others did not use it at all.

***Did you use Assignments, Quizzes, Selftests to check the quality of your studies?***

Students could choose their response and add verbal comments. Assignments were highly appreciated. 70% of students were satisfied, 19% did not have any comments. This tool did not suit to 1% of all students, the others had problems when using it. Quizzes were well-rated too. 37% of students were satisfied, 10% did not consider it useful, the others did not use them. Selftests were the least-used .32% of students found them helpful, 6% did not, more than 60% did not use them at all.

***How often did you enter single parts of the VLE?***

Students chose their responses from the following options for Content Module, Communication Tools and Evaluation Tools:

- Not once
- Only once
- Several times

- Several times a week
- Every day

Results are presented in Fig 2.

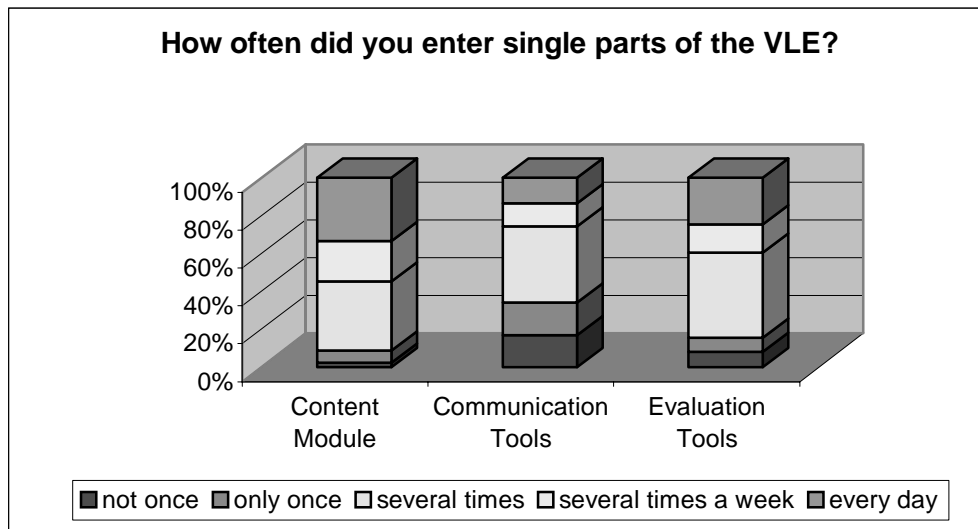


Fig. 2

Content Module was entered most frequently, Communication Tools were least-used.

***Are you interested in other e-learning courses?***

This was a Yes/No question. As the Fig 3 shows, 90% of all respondents are interested in other e-learning courses, 6% are not, 4% did not answer this question.

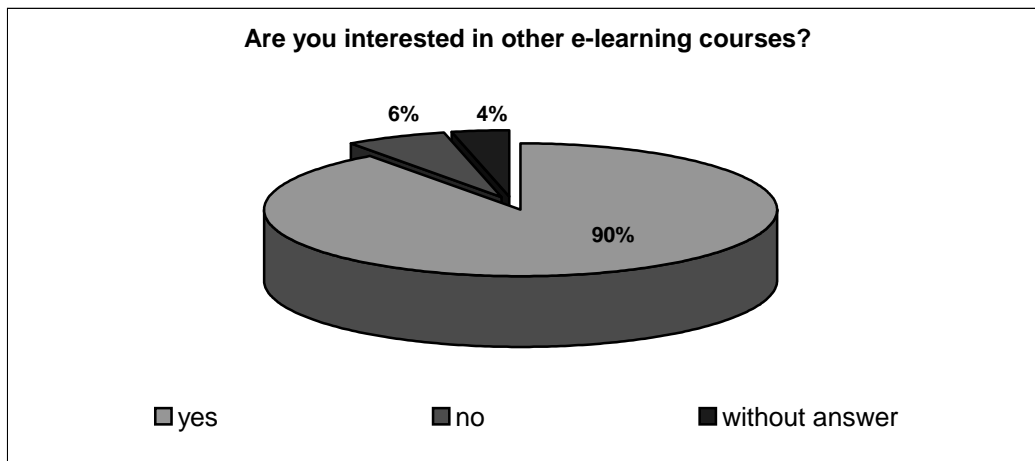


Fig. 3

**The efficiency of e-learning in comparison to face-to-face teaching**

As both e-learning and face-to-face courses are provided by the faculty, a comparison of the efficiency of present and distance learning can be made. Courses which prepare participants for ECDL testing will serve as an example. Five terms of e-learning courses and three terms of present courses have been organized. The efficiency rate was deduced from passing a single test.



Table 1. Participants of ECDL testing-distance courses

	Number of participants	Number of modules	Tests planned	Tests passed	Efficiency in %
<b>course 1</b>	66	3	198	150	75,8
<b>course 2</b>	11	7	77	71	92,2
<b>course 3</b>	7	7	49	27	55,1
<b>course 4</b>	28	7	196	118	60,2
<b>course 5</b>	10	6	60	44	73,3
<b>Total</b>	122		580	410	<b>70,7</b>

Table 2. Participants of ECDL testing-present courses

	Number of participants	Number of modules	Tests planned	Tests passed	Efficiency in %
<b>course 1</b>	5	7	35	26	74,3
<b>course 2</b>	15	5	75	53	70,7
<b>course 3</b>	15	5	75	56	74,7
<b>Total</b>	35		185	135	<b>73,0</b>

73% in present courses: 71% in distance courses. See Fig. 4.

Efficiency rate in distance courses and present courses (in %):

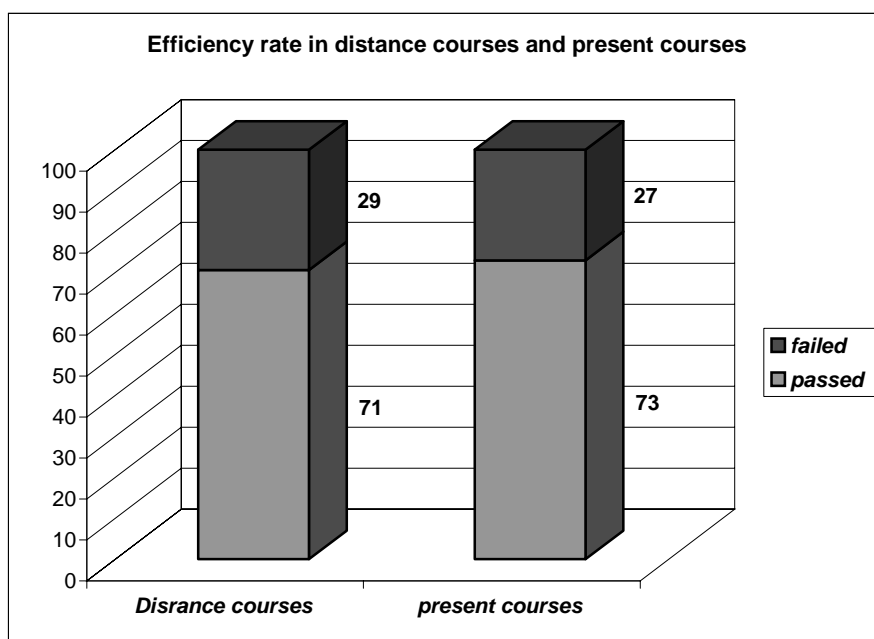


Fig. 4

In spite of the fact that the results differ slightly, the present form of preparation appears more efficient. Having analysed the group of participants we came to the conclusion that the present courses were more suitable for students with lower motivation and vice versa. The less successful participants had lower entrance knowledge, worse access to technical aids and above all – their motivation was not too high.

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# **SOCRATES PROGRAMME CONTRIBUTION TO THE CREATING OF AN OPEN LEARNING AND DIGITAL ENVIRONMENT IN POLAND**

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## **Abstract**

The article presents the results of the implementation of the Socrates – Minerva Programme in Poland in the context of creating of an open and digital environment which is one of the strategic objectives of education and training systems in Europe for 2010.

Survey results presented below clearly show that the implementation of the ODL/Minerva action has significantly contributed to the promotion of European educational policy of ICT application and to the gradual introduction of innovative solutions into educational practice on various levels as well as to the improvement of the quality of education by generating the „European added value”.

## **1. Strategic goals of education and training systems in Europe for 2010 ICT implementation**

Creating a successful knowledge – based economy and society in Europe demands the universal acquisition of new basic skills and attitudes, much broader access to education and lifelong learning opportunities to accompany rapid and generalised change.

The main implications of these new requirements were set out in the Detailed work programme on the objectives of education and training systems.

The detailed work programme on future objectives of education and training systems “...for the benefit of citizens and the European Union as a whole” was adopted on February 14, 2002. It set out the following three strategic goals:

- improving the quality and effectiveness of education and training systems in the EU;
- facilitating the access of all to education and training systems;
- opening up education and training systems to the wider world.

In the detailed work programme these three strategic objectives are broken down into 13 objectives, at least 3 of which are directly addressed to the best use of innovative teaching and learning techniques based on ICT. Two future objectives:

- developing skills for the knowledge society;
- ensuring access to ICT for everyone

involve the best use of ICT. The key issues that need to be addressed in order to achieve these objectives are as follows:

- providing adequate equipment and educational software so that ICT and e-learning can be applied effectively in teaching and training practices.
- encouraging the best use of innovative teaching and learning techniques based on ICT.

From this point of view the objective 2.1 – Creating an open learning environment is the most important one.

The transition to a knowledge society requires the more simplified and genuinely open access to education and training.

Creating an open learning environment is based on the following key activities:

- broadening access to lifelong learning by providing information, advice and guidance, on the full range of learning opportunities available;

- delivering education and training so that adults can effectively participate and combine their participation in learning with other responsibilities and activities;
- ensuring that learning is accessible for all, in order to better respond to the challenges of the knowledge society;
- promoting flexible learning paths for all;
- promoting networks of education and training institutions at various levels in the context of lifelong learning.

Distance education with flexible learning paths could be seen in this context as a vehicle to foster the progress in achieving the openness and accessibility in education and training systems. It helps in the difficult process of breaking traditions and designing something new, with more relevance to the post – industrial knowledge society.

## **2. Socrates Programme support for creating of an open learning and digital environment**

The concept of the learning environment was created on the basis of the educational paradigm change from empirically founded, target – reaching instructions to constructive learning. Learners are seen as subjects of the learning process. Their learning no longer consists of receiving and processing offered knowledge, but an active dispute with a learning object they have selected themselves in a defined context with simultaneous interaction from other learners in which they themselves develop or alter individual cognitive structures. Teachers concentrate on “discovering and shaping stimulating learning environments which enable students to create their own constructions”.

If this learning environment is digitalised and networked it may open new dimensions in education and create new opportunities and chances for innovative forms of learning in the context of broadening access to lifelong learning and promoting flexible learning paths for all.

The Socrates Programme is one of the European Union initiatives which supports these possibilities. Its main objective is to create a Europe of knowledge, providing a better response to the major challenges of the new century: to promote lifelong learning, to encourage access to education for all and to help people acquire recognised qualifications and skills.

Socrates advocates European co-operation in all areas of education. This co-operation takes different forms: mobility (moving around Europe), organising joint projects, setting up European networks (disseminating ideas and good practice), and conducting studies and analyses.

Whatever the target group and whatever the type of project, Socrates promotes the multicultural aspect of Europe as one of the cornerstones of active citizenship. It supports the education of the least advantaged groups of people. It promotes equal opportunities for men and women and targets under-achievement at school. By the implementation of new information and communication technologies and encouraging the learning of different European languages it promotes innovation in education to create a wider learning space. Socrates comprises eight separate actions: Comenius: school education; Erasmus: higher education; Grundtvig: adult education and other learning pathways; Lingua: learning European languages; Minerva: information and communication technologies in education; Observation and innovation of education systems and policies; Joint actions with other European programmes; Supplementary measures.

Nearly all of the Socrates actions make use of ICT as a pedagogical tool and for the purpose of supporting international communication as well as promoting virtual mobility. One of the Socrates actions – Minerva is directly addressed to promote European co-operation in the use of information and communication technologies in education and to promote open and distance learning (ODL). It covers all areas of education from pre-primary to adult.

All of the activities envisaged under Minerva serve the objectives of the eLearning initiative. They are as follows:

- Prospective study, analysis and pooling of the results of observing uses, and identification and dissemination of the best practices.
- Organisational and socio-economic aspects of innovation linked to new learning technologies.
- The pedagogical dimension of integrating new technologies into teaching and learning practices.

- Creation of a network linking people responsible for training teachers, managers and decision-makers in the integration and appropriate use of new technologies.
- Enhancement of expertise and promotion of European know-how in the area, and comparison with other models.
- European-level development of Internet portals linking learning communities and of quality multimedia education services.

The Minerva Projects are financed on the basis of an annual call for proposals in line with the general framework of the Socrates Programme and implemented in 30 European countries.

### **3. Results of the implementation of the Minerva action<sup>1</sup> in Poland achieved so far – survey data**

In 1998-2001 Polish educational institutions have participated in the implementation of 20 International Co-operation Projects promoting the use of modern information and communication technologies (ICT) and open and distance learning.

In order to collect information on the hitherto achieved results of projects implemented by Polish institutions within the ODL / Minerva action a 9-question survey was prepared.

The survey was then sent to all institutions participating in ODL / Minerva projects.

Filled in surveys containing information about 19 projects (95%) were sent back.

The obtained data show that the amount of funding received by Polish institutions from the Socrates programme for the implementation of 19 centralised projects of the ODL/Minerva action was 650 518 euro. International Co-operation Projects implemented within the ODL/Minerva action were mainly two-year projects (84.2%).

Polish educational institutions implemented these project jointly with their partners from 24 European countries including: the United Kingdom, Belgium, Germany, Finland, Spain, Italy, Lithuania, Hungary and Romania. The average number of countries working on one project was 7.

Projects implemented concerned mostly:

- the promotion of open and distance learning and the use of modern technologies (ICT) in broadening the access to education (38.5%);
- the preparation of innovative methods of implementing ICT in education (14.45%);
- the preparation of innovative curricula, methodology courses, teaching aids enhancing the quality of teacher in-service training (13.25%).

The main project results included:

- educational materials (24.56%), great majority of which (73.68%) in multimedia form;
- new educational methodologies (22.8%);
- innovative curricula (15.78%);
- courses addressed to specific target groups (10.25%).

A significant majority of the respondents identified certain advantages gained by the institution which implemented the given project (94.73%).

The following advantages were mentioned most frequently:

- an opportunity to get acquainted with new possibilities and implementation of innovative methods of electronic education;
- a possibility to equip the institution with modern facilities (equipping computer classrooms, purchasing video conference sets, equipping and starting tele-laboratories);

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<sup>1</sup> In the first edition of the Socrates Programme (1995 – 2000) the action was referred to as ODL (Open & Distance Learning), the name „Minerva” has been in use since 2001.

- creation and opening of data bases concerning courses delivered in a “distance” manner across Europe;
- broadening of knowledge on the methods of open and distance learning and modern human resources management;
- including distance learning methods into the institution’s research procedures;
- enhancing teachers’ skills in ICT application and preparation of multimedia teaching aids.

A small number of respondents (5.27%) has not identified any advantages and complained that during the project implementation contract conditions had been changed, the planned financial resources had been significantly reduced, the amount of work done was more impressive than the project results.

Answering the question whether the project implementation has initiated any changes in the institution (environment) which participated in the programme, majority of respondents said yes (73.68%).

The following changes were the most frequent:

- bigger interest in open and distance learning, understanding the necessity to modernise standard curricula in universities;
- organising pilot courses through computer networks;
- expanding and modernising teaching materials;
- more favourable atmosphere for innovative activities;
- more intense efforts to engage in international co-operation.

Some respondents admitted that the project had not initiated any changes in the institution (environment) which has participated in the programme (21.32%) because:

- the course delivered in a “distance” manner was addressed to a limited group of specialists;
- it was difficult to break certain inhibitions towards the introduction of e-learning and distance learning;
- in the institution there was intellectual indolence and no chances for prospective thinking.

More than a half of the respondents (57.89%) admitted that there were certain problems during the project implementation. The following were the most frequent:

- prolongation of contract signing procedure and delays in fund transferring;
- problems with partner withdrawals during the project implementation;
- lack of co-operation with university administration teams;
- technical problems – no possibility of quick access to servers used in project implementation;
- no own means for pre-financing activities caused by the delays in fund transferring;
- difficulties in making grant settlements.

Despite all these problems the great majority of respondents (89.47%) expressed the opinion that the project results are worth disseminating. The most frequently mentioned ideas for disseminating activities included:

- organisation of conferences, seminars, workshops – some of them in a “distance” manner;
- making the project educational materials available through the Internet, elaboration of web pages, promotion and opening of an educational portal;
- organisation of summer ICT application schools within Polish universities, offering modern distance educational possibilities;
- organisation of e-learning courses for teachers.

All of the respondents (100% of opinions) would encourage other educational institutions to participate in Socrates – ODL/Minerva projects because:

- it is a good opportunity to get acquainted with innovative educational solutions used by other countries and to transfer the so called good practice to Polish conditions;
- international co-operation enhances one's career path – an exchange of thoughts, ideas and knowledge stimulates progress and development;
- joint implementation of projects in an international environment stimulates co-operation in many areas, i.e. scientific, cultural and linguistic;
- international contacts popularise European educational standards in Poland, stimulate foreign language learning, promote innovative educational solutions;
- through the participation in the Socrates programme it is possible to obtain co-funding for interesting initiatives aimed to enhance the quality of and the access to education.

The obtained survey results clearly show that the implementation of the ODL/Minerva action has significantly contributed to the promotion of European educational policy of ICT application in Poland and to the gradual introduction of innovative solutions into educational practice on various levels as well as to the improvement of the quality of education by generating the “European added value”.

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# **ARCHIVES, MUSEUMS AND LIBRARIES: DYNAMIC SYSTEMS FOR CO-OPERATION IN DISTANCE EDUCATION, THROUGH COLLECTION AND DISSEMINATION OF QUALITATIVE INFORMATION**

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## **1. Introduction**

The term education is possible to be regarded as the total of instructive frameworks and actions from family, state, individuals or social organisations aiming at the harmonious physique of the body and the growth of intellectual dexterities, the moral education and professional preparation of the members of the society. The term at the same time denotes the institution that aims in the knowledge according the systematic teaching of all educational level students, the intellectual growth, bodily and moral faculties and dexterities with regard to positively defined subjects through special institutions (schools) and established and accepted methods. It is the frame of theoretical approach of relation of instructive subjects with their equivalent scientific fields [1].

The knowledge is mainly recorded in paper (in manuscript, books, scientific magazines, newspapers) but there are also new magnetic and optical records. Its management promotes research and educational process [14]. The management of this information is performed by in "external" institutions – other than the teaching institutions, which create new knowledge and culture. These institutions extend communication and promote learning and culture of present and future. The "external" institutions are interacting with educational programs and participate in social life.

The mass media and the electronic environment possess an important dynamic required to analyse and organize thought and communication. The application of Information and Communication Technology (ICT) in education [7] intervenes and involves changes of existing structures and models of teaching and learning. For example history and geography are determined as eminently studies of information. The historical knowledge remains the key for the comprehension of present and schools [5] are the institutions of service of social harmony, according to the philosophical reflection of Dewey.

Therefore school is not the only institution to offer education. Given the above and having in mind the technologies, techniques and methodologies of distance education; one could argue that these external institutions namely Archives, Museums and Libraries have an important role to play in education in its broader sense. The purpose of this paper is to study the way Archives, Museums and Libraries are involved in the educational process mainly by their sites and electronic material together with the rest of their infrastructure. The fact that not all of the Archives, Museums and Libraries have their material in electronic form yet is not considered for this discussion, since it is believed that is a situation that will last limited time period.

## **2. Archives, Museums and Libraries as contact points of information**

Archives, Museums, Libraries are rich sources of information and provide learning opportunities for people of every age and profession. The definition of terms as Archives, Museums and Libraries can bring better understanding and management of their contents for the educational activity. Their missions, legal, administrative, historical, cultural, coincide as they have common activities in organizational, functional and administrative fields. Reports have shown that Archives, Museums, and Libraries have a great social impact. Although there are differences in the way they operate, the information that they collect and contain can be used as tool of management by public administration, scientists, researchers, teachers and students. The traces of their activities justify their function and define their uses.



The first term, “Museum” determines its conceptual content as collection of objects of art or science, which have their origin in collections found in the country or in the region. This land-planning provision, which declares the place of study, at the same time includes a report of information, therefore the results of scientific research that allow for the representation of past and the better comprehension of social data.

The second term “Archive”, including the significance of the first, is a document’ s museum. It implies the total of documents, independent of date of issue, matter and form, which are produced by an institution or organisation or an individual, within the framework of its function, that is maintained in perpetuity. It denotes the organisation, the constitution, the filing cabinet, the building and the space that is intended for the storage, maintenance and use of files as well as the special software for the use data. The archivists are charged with the organization and the disposal of the material, to cover the informative, research and educational user’s needs.

The third term “Library” means the simultaneous functional regulation and administration of organized collections of printed books, magazines and reading material including the audiovisual form of the above. It means also the organization and the services of personnel, aiming at the regulation and disposal of material for informative, researching and educational needs of users. The interaction between the producers and the users of information is indicated in Fig 1.

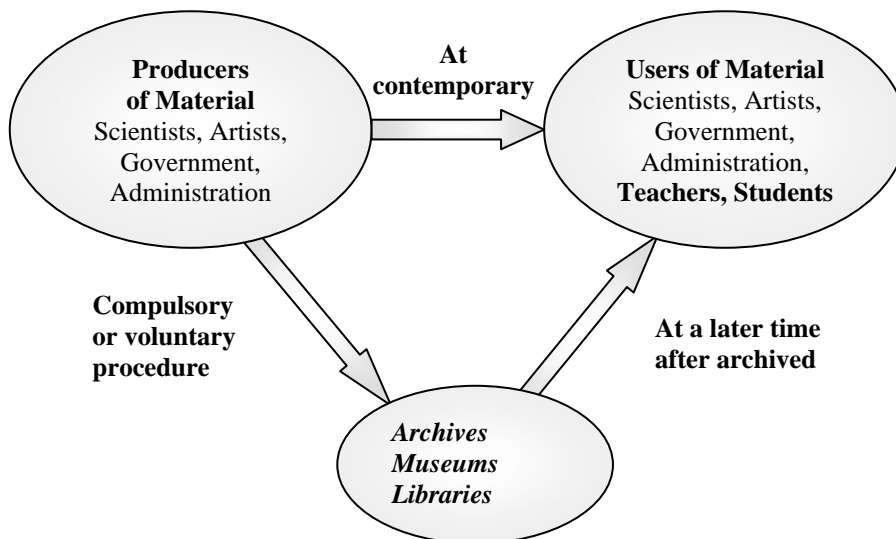


Fig 1. The Circulation of Information from and to Archives, Museums and Libraries

### 3. ICT and Distance Education in Archives, Museums and Libraries

The application of ICT techniques in Archives, Museums and Libraries have broadened the framework of cultural heritage and they have created new forms of contents (exhibits) for the dissemination and storage of the information that is administered by them in (electronic texts, multimedia, audiovisual etc).

The traditional contents-document does not have only natural presence but arises from computational applications (multimedia etc) and is transmitted in diverse forms as microfilm, e-mail, web pages, CDs etc. These techniques, consequently, of ICT is not only an option of the administrative work. It is registered as the standard of the operation of systems of information and it aims at the better management of the contents.

Fig 2. is an indicator of the modes of information flow from Archives, Museums and Libraries and users.

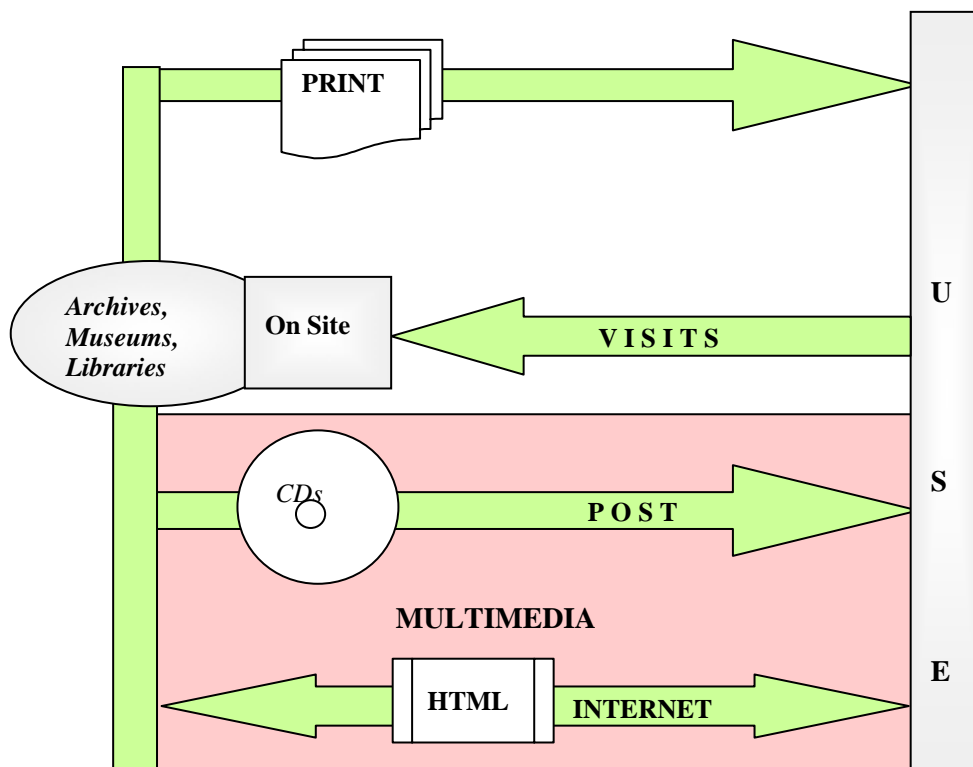


Fig 2. Information Exchange between Archives, Museums, Libraries and Users

It is obvious that the application of ICT systems in Archives, Museums, Libraries have minimized the time of access in the archival material. For example in an Archive, our first task is to sort out and categorise the different types of archival material. We check and approve our facilities with regard to a number of potential hazards, and explained about safe storage in acid-free cardboard and folders. We then have to index all the items on a database. The information that is entered on the various computer data base files enables us to build up annotated indexes of what we have in our Archives, that will also indicate where they are to be found.

The advent of the personal computer, the Internet [12] and the electronic delivery of information have transformed the world from a manufacturing, physically based economy to an electronic, knowledge-based economy. The computer has powered the need for learning to new heights as well as provided the vehicle to deliver that learning [14]. Technology has enabled educators to create, enable, deliver and/or facilitate learning electronically (e-Learning).

So learners can attend a training program "at their own pace and at their own place". They can also access training at any time, and only as much as they need; known as "Just in time and just enough" [2]. The use of Internet and the access to information has provoked a radical change of existing structures [9] and models of teaching and learning [17]. It broadens the scope of the subject object, other than the traditional forms of knowledge, i.e. teacher and book. The unification of communication, the speed and simultaneous utilization of sound, picture, text and data, have contribute to the educational process with the transmission of messages in big distance.

It is possible therefore that the teaching content, is enriched by material and bibliography from institutions other than schools as Archives, Museums and Libraries before or after the actual lesson. The navigation in descriptive and bibliographic data through the network, offers access to the users, by distance education techniques [11]. It gives the opportunity to all students with the use of a personal computer to access in educational sources. It facilitates the education of those students who live in distance regions, where there is limited access to libraries and gives the opportunity of attendance in the educational process of those who are already in the job market.

The tools of information system through internet navigation, helps the users of all three educational levels to select the studying material from archival and museum's collections, bibliography, magazines, to be connected with databases from Universities' libraries, educational organisations and to communicate with each other using electronic mail. Consequently, the use and application, of the modern technology in the educational process has influenced the role of schoolteacher as not the only institution of knowledge that monopolizes it, but also the person who undertakes roles of functional and social extent. The teacher communicates with the student, comes in contact with him immediately or indirectly and promotes the educational process with the submission of questions with traditional way or electronic, the recording of answers and treatment with modern methods. The teacher promotes the use of Archives, Museums and Libraries, guides the students to the methodology of their use, teaches the coordination of pieces of information and reveals the message and its meaning.

#### **4. Archives, Museums and Libraries Educational Process**

Archives, Museums and Libraries retrieve nation's conscience and memory [10]. It is there information is collected, processed, classified and archived. The electronic networks' connection offers access to the data that are put at the disposal of teachers, students and members of social community [18]. Educational process uses communication to express relationship, affinity, and agreement and to exchange of information between students or school teams and people in general. Modern educational process uses not only speech and writing to achieve its goals, but also images, sounds, video, etc. All these forms of expression and art are available from the web pages of Archives, Museums and Libraries in an effort to offer the available material to everybody interested [15]. Therefore nowadays, the above institutions offer a lot of educational material and a new additional skill of the teacher is required to guide students to search for it, to choose it, to collect it, to process it, to present it and to transform it into effective knowledge and culture.

The educational process enriches the new educational theories. It helps the user of information to approach new spaces and provide him with supervisory material from distance (archival, photographic, museum and bibliographic). These theories determine, moreover, dimensions of change in one's way think. The individual get wise in choice, converts the new coming informative elements, shapes affairs, comprehends the structure and is led to his intellectual maturation and handles general educational programs. But it requires a lot attention and collaboration between teachers and students.

It is important to recommend acceptable codes of moral behaviour upper cultural, religious and racial particularities. The individual follows common code either economic or social member. It follows moral standards as honesty, candidness, austerity, simplicity of style, it resources for preparation, and the future's planning and is checked by the society.

#### **5. Some Case Studies**

- a) Many schools and teachers can have access to Archives, Museums and Libraries from the Internet and retrieve the information they need. It is important to mention here the effectiveness of school programs in kindergartens in Preveza, Greece where preschool teachers used the Internet to show to young children the museums. The Internet address for the museum was taken from the book of J. Pange [12], [13]. According to this study all children were very happy using the Internet to explore the museums in various sites.

In these sites children discussed with their teacher about the museums, how often we can visit them, what they exhibit, the prehistorically animals, dinosaurs etc. The gains from such visit on-line are many. Preschool teachers admitted that the information that children get is valuable, and also the children collaborated in common projects for drawing animals, which appeared in this site.

- b) It is quite difficult to find information of doctors who worked in small places, but they have done an enormous amount of work to medicine. As an example of this category one can mention the work of Doctor Noulis, whose work was found explicitly in the archives of Ioannina Greece. The description of the pathological movements of the knee (forward and backwards) when the cruciates ligaments

were broken offers changes in the traditional scientific perceptions and is considered today that G. Noulis is the “father” of the “Lachman” test of the knee. He worked on the manoeuvre of flexing the knee and describes in details the rupture of the knee in his thesis, published in Paris in 1875. All this was discovered by an extensive search in the documents of Archives in Ioannina and other towns that he worked [14].

- c) It is proved that Archives, Museums and Libraries constitute a target site for communication and research for all the educational-levels. The Museum of History of Medicine at the University Campus of Ioannina is a good example of a good point of obtaining information for the Students of Medicine of the University of Ioannina, as well for special educational medicine related training programmes.

## 6. Conclusions

In the new era of Internet and communication, Archives, Museums and Libraries have a lot to offer to education. They are reaching out using modern technology and their contents can be available to students and educators as authorised and organised information.

They can they help the user to learn to approach new spaces and get material from distance (archival, photographic, museum and bibliographic). The students get wise in choice, convert the new coming informative elements, comprehend the structure, handle general educational programs and are led to their intellectual maturation. This requires also a lot of attention and collaboration between teachers and students and promotes new ways if educational attitudes and methodologies.

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# LOCALIZATION OF DIGITAL CONTENT IN OPEN DISTANCE LEARNING

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## **Introduction**

The objective of the paper is the presentation of cultural customization connected with e-learning. The efficiency and proper understanding of the message is a crucial factor of communication between people. One of the hindrance that unables the efficient communication is lack of knowledge about language, culture, customs and way of thinking of the recipients. For thousands years mankind have learnt to tackle that problem – there always have been highly specialized individuals performing as translators and interpreters of different cultures, traditions and customs.

Fast information flow and easier access to information are distinctive features of globalisation era. Fast and efficient global data access eliminates the intermediaries, as the message is to be international and on the other hand, from the initial stage of preparation, the message should be customized to the diversive culture, in other words – localized.

## **Localisation in e-learning**

The localization is the process of adaptation of information, products and/or services to the requirements of specific community, its tradition, experiences and way of thinking. Some localizers define localization as the effort to “adapt products so that they look and feel as if they were developed in the country, the language and the culture that they are localized for”. So, localization is the translation but not limited to words only or at least the meaning but also linguistic and cultural adaptation. The concept of localization is based on the idea of transcultural communication, passing of information from one culture to another. This involves the localization of the search, retrieval and personalization of interfaces and tools.

Unfortunately, there is still a low level of awareness of the need and nature of localization in Europe. While there is an established tradition of translation, there is a little experience with the processes and requirements of digital content localization. The consequences of this state influence also distance education. There is still lack of understanding of the fact, that the localization attitude is necessary in developing of the ODL programs and courses.

Distance Education Study Centre at University of Mining and Metallurgy (AGH) in Krakow has encountered most of the problems with content localization. The University of Mining and Metallurgy is one of the largest Polish technical universities. It has over 3900 staff members and about 30 000 students at 15 Faculties. The Distance Education Study Centre is the unit of UMM co-operating with all Faculties of the University.

The Centre belongs to the European network of distance education study centres established within the framework of “Multi-Country Programme in Distant Education” implemented in 1998-1999. Since 1998 DESC has been involved in several projects supported by European Commision (PHARE Multi-country Programme in Distance Education, Socrates and Leonardo da Vinci projects).

Between 1998 and 1999 DESC received to exploit and disseminate 28 distance education course packages created under PHARE Multi-country Programme in Distance Education. They were prepared by different centres in Central Europe according to the presumption, that they will be disseminated in all countries where such centres, created under Multi-Country Programme in Distance Education, exist.

Several distance education organisations from European Union member states have contributed to the development and implementation of this programme. These organizations have participated in an advisory capacity, as providers of training programmes in the area of distance education methods, and/or as providers of distance education course packages. The programme was aiming at support of the development and pilot implementation of high quality distance education course modules. The main objectives of the programme were:

- Development of distance education course modules in priority subject areas, including management and business, environmental sciences, information technology, medical sciences, modernization of public administration services.
- Promotion of sustainable distance education course development by supporting courses, which will be capable of running on a self financing basis after the lifetime of the Phare programme.
- Stimulating the multi-country co-operation in distance education and the establishment and strengthening of sustainable consortia among Phare countries and between Phare countries and European Union member states, for the purpose of exchanging skills and experience on matters relating to distance education.

The courses were created in English using DE method, by panel of experts from different countries, which was to prove their universality. The authors adjusted the curricula to the local needs and habits. It was assumed that the English translation of the curricula fulfill the required level of universality. However, after pilot groups had been trained and dissemination had begun, it appeared that implementation of the courses at different universities encountered unexpected difficulties. Besides the problems with the lack of trained tutors, purchase of licenses and intellectual property rights other difficulties with customization of content to the local needs and expectations arose.

Although the projects chosen for implementation were universal e.g. European law and institution, business planning for open markets, energy and environment, agricultural pollution, etc., it appeared that universities were not interested in implementing the courses. It was due to the structure, curricula content and timing of implementation which were not complementary to the national standards and customs. For instance, the course concerning protection of environment developed by foreign research centers was completely out of scope in other countries as it contained examples and data that did not correspond with local problems. Most frequently the chosen showcases were not appropriate for students of different countries as they dealt with the problems unfamiliar to them. The main reason of unsuccessful implementation of the courses was the lack of content localization, in other words, its adjustment to local requirements.

DESC is also involved in another project - „MISSION Multi-country Integrated System Support for Improved ODL Networking”. Also within this project the lack of understanding for the need of localization of educational content and distance education was clearly visible. Mission project aims at strengthening the cohesion between the CEE Phare ODL Centers established by the support of the Phare Multi-Country Programme in Distance Education and EuroStudy Centres coordinated by European Association of Distance Teaching Universities (EADTU). Establishing a central, multi-lingual (13 languages) WEB portal and electronic networking based on ICT (e-newsletter, discussion groups, course catalogue, counseling services) are the core activities of the project.

Several centers were established to work out the content that would be implemented in a web portal in future. In that case, centers were working separately on their own parts of the project taking into account the local needs and requirements. It is the factor that hampers application of such programme in other countries. If the localization is not included in the initial stage of content creation it will cause some difficulties in implementation and exploitation of the later results.

The examples above clearly show, that proper methodology of curricula created with the view to global disseminating should be based on international panels of authors and experts on digital content localization.

It is difficult to implement the project that was created by different partners in different centres dispersed in Europe. Such puzzle does not pay off. The authors who do not communicate constantly but meet incidentally on workshops tend to create the content suitable for needs of their own centres. Meanwhile, as we already know, simple translation is not sufficient to reach certain level of universality.

## Localisation of digital content – EU action

The problem with localisation that seems to overwhelm the industry, is a subject of interest of European Commission. One of the initiative tackling the issue is eContent EU Programme. However, the main objective of the Programme is stimulation of development and use of European digital content, localization plays a crucial role.

European market is estimated to have over 370 millions of customers, with additional 80 millions of Associated Countries. The numbers speak for themselves. No European enterprise has an access to such a variety of customers. An effective multilingual and multicultural strategy can make the difference between global success or failure for many products. Additionally, Internet as culturally and linguistically diverse tool will provide broader access to the Information Society for those citizens, who might otherwise be excluded.

eContent Programme emphasizes that in case of digital content localization is essential to adapt products and services to the local needs and requirements. It should be stressed here, that the lack of interest about nature of localization in Europe and the level of awareness about the importance of cultural customization of content is observed. Localisation makes a challenge to the publishing cycle of web sites, to the design and management.

The European Commission supports several projects that tackle the localization issue with accordance to e-learning process. Three examples of those most successfully addressing localization and e-learning will be presented:

- One of the most interesting initiative is the eTelestia Project which focuses on the development of a global multilingual online network for the provision of localised eLearning in fashion and clothing in six languages (Greek, English, German, French, Spanish, Norwegian). The objective of the project is to create the off-line tools localized in several languages, web enabled and delivered via an appropriately customised collaborative. At the same time, business scenarios will be explored in order to arrive at a sustainable business model for the immediate commercial exploitation of the final eTelestia prototype through new partnerships and business agreements at a global level. This project will create a multilingual e-learning platform on fashion with on-line training for creative design and skills development in clothing. The content will be localized in such a way that it will be understood not only linguistically, but will be customized to the local cultural context. Thus, the content will be familiar to the recipients and at the same time will provide an interesting base for learning process.
- Another project co-financed by eContent Programme is OSCAR. In frame of this project, four SMEs will set up a platform for the creation, localisation and commercialisation of multilingual on-line content for children. In order to obtain concrete results, the project will focus on content of one specific subject: Nature. The content will be centred around one character (Oscar the Balloonist). The content will be localised for different European regions and languages which means that children will be able to learn about tools familiar and understandable for them. Once again, it is not only the pure translation of text that makes this project successful, but the deep contextual adjustment of content to local needs placed in the global Internet network.
- The third project is ETHNOCLIC project which is based on an existing web site ([www.ethnokids.net](http://www.ethnokids.net)) allowing a worldwide network of children (7-14 years old) to produce and exchange original documents on their daily lives. It will design and develop a set of online tools and procedures for multilingual exchange by common interest communities. ETHNOCLIC, with an original educational concept based on social anthropology, is currently operating on an International level with French as the working language. ETHNOCLIC is to extend to English and Spanish speaking members, allowing them to communicate in their own languages while at the same time the learning about the other languages and cultures. The project's aim is to design a method and a set of tools based upon social anthropology (analysis of multicultural content), ethnolinguistics (analysis of languages in their cultural contexts) and customised automatic translation. These methods, tools and know-how will help to organize and to build structures of



various local resources existing on specific fields of interest and make them available to multilingual audiences in their original languages and contexts. Children will be able to communicate, exchange ideas and work together (i.e. building web pages with documents about their school, neighborhood, houses, meals, original customs, arts, etc.) in their language, and yet understand of each other thanks to a procedure and a set of tools encouraging the initiation and learning of foreign languages as well as cultural understanding.

## **Conclusion**

As it was seen, there is a strong need for localization of products and services on the global market. As e-learning is a part of this market, the problem of adjusting of content to cultural context is especially important in terms of education. Cultural differences cannot hamper the efforts of student, on the contrary, they should enrich the traditional way of teaching/learning and broaden the scope for creativity.

The success of the project described above lies in cooperation between partners from very beginning to the final stage of the project realization. Partners should meet in order to understand each other cultural context and thus gain wider perspective for the project preparation.

## **Acknowledgments**

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# HOW VIRTUAL LABORATORIES CAN IMPROVE THE QUALITY OF CONTROL ENGINEERING EDUCATION

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## Introduction

The popularity of online education is permanently growing. It can be denoted also as virtual education, Internet based education, web based education, and education via computer-mediated communication. In engineering education providing hardware and software components of existing laboratories via the Internet creates a base for establishment of virtual laboratories. A virtual laboratory would allow learners in a number of different physical locations to share expensive laboratory equipment without the necessity of losing time by travelling.

Virtual laboratories are virtual environments that facilitate learning by enabling interactive exploration in multi-dimensional data. These data may be produced by modelling or simulation (for example, numerical simulation used to model the response of dynamic systems), or may be empirical data (for example, from on-line experiments feeding observations to the learner in real time), or both. This interactive exploration capability will enhance significantly the interest of the learner to study problems more deeply and thus higher the quality of learning.

Virtual environments promise to foster faster and more effective learning. By tailoring virtual worlds to specific educational or training tasks (for example flight simulators), people can be trained to use complex and costly equipment without acquiring that equipment or putting equipment and trainee at risk. Virtual laboratory infrastructures are suitable for educational purposes.

Virtual laboratories for engineering education often take on the form of a traditional laboratory apparatus that is accessed remotely over the Internet. This approach fits the traditional model of a laboratory as a controlled environment for conducting experiments. Virtual laboratories of this kind are frequently used to extend the reach and availability of test equipment, which is usually a limited resource because it is too expensive to replicate or because access must be restricted for security or safety reasons. Providing a web interface to existing laboratory infrastructure was in fact the primary motivation behind the Telematics laboratory developed on our department.

The necessity of learner experimental work in laboratories represents one important aspect of engineering education. Students solve practical problems and gain experience and practice needed for their future career. Introduction of real systems increased transparency of the solved examples and improved quality of provided education.

The main motivation for using of plants in the educational process is clear physical “visibility” of the controlled dynamics, and also the necessity to exercise all design steps starting with the plant identification and ending with the evaluation of the control results achieved with the particular model. In fact, the model by itself can be presented as a virtual device whose dynamics is described by differential equations or as a real plant. With the development of new computer technologies, an interactive multimedia programming language JAVA, and the World Wide Web, it is now possible to simulate the virtual model on a computer and with Internet access to offer it as an animation to students in frame of “virtual laboratory” via the WWW or CD-ROM. However, using the animation models cannot substitute the work with real physical plants that always demonstrate some unmodelled dynamics, parasitic noise, friction, etc. Unfortunately, the number of students is high in comparison with the number of available real plants. A possible solution of this problem is building virtual laboratories that give learners access to laboratories via Internet (Fig. 1).

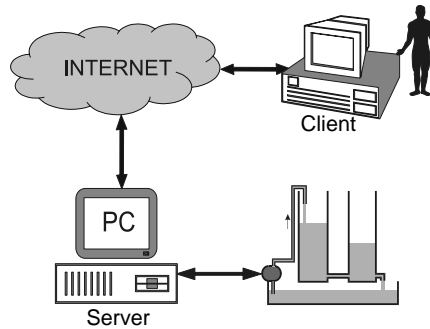


Fig. 1 Experiment control with the real plant through Internet

## Concept of the system

The concept is based on the existence of classical control engineering laboratories with experiments carried out in the presence form. The already built infrastructure is going to be exploited. In education of control engineers we usually use Matlab software for implementing various control strategies. Due to different toolboxes (like Real Time Control, Windows Target and xPC Target) Matlab with Simulink is not only simulation tool but nowadays it enables to control real plants. There exist many experiments using this platform. Our aim was to open laboratory equipment to more students, especially students who can not be present. This extension requires only small changes in laboratory hardware equipment and a little bit more programming work in software equipment [1].

To allow remote users to run experiments we have chosen the Internet connection, as this type of connection is widely accessible. Then it has been necessary to program a client-server application that handles the data flow between the real plant placed in the laboratory and the remote user. The client-server application is Web-based application so the remote user can reach experiments within the familiar environment of his/her Web browser. The client-server application communicates through TCP/IP protocol. (Fig. 2)

On the server side the application has to communicate with the Matlab application that directly controls the real plant. There can be different type of communication but it is advantage when the server part of the application resides on the same PC that controls the real plant. Then within one operating system the data are exchanged more easily.

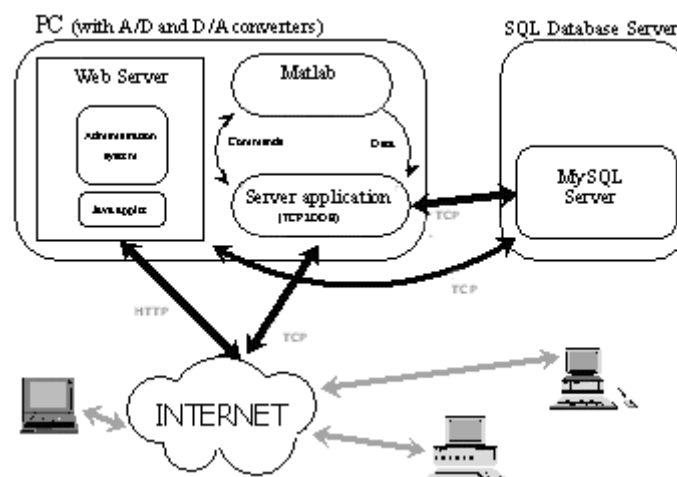


Fig. 2 Overview of the concept

The transfer channel is complicated and moreover the Internet connection is not very reliable one. Therefore it is advisable to divide the whole program application for tele-experiments into following parts:

- Local control (verified control strategies implemented locally with the use of the Matlab application)
- Server application (this serves for handling data flow between the remote client and the real plant, it transfers user's commands and transmits responses)
- Client application (remote user interface that enables to control a specific real plant usually in the form of JAVA applet running within Web browser)
- Administration (the application that covers administrative issues in the case of many users for several real plants)

In the following parts we will concentrate on the last two above mentioned points as they are directly connected with the user.

### Client applications

The client is an application that enables to connect the user to a server and exchanges data either as a stream or text. It is installed on a web server that can be approached by a student via Internet. It is usually realized as JAVA applet that enables to modify controller or simulation parameters and visualize simulation results. In Fig. 3 the applet for an inverted pendulum control is shown. An user is informed about the time of connection and the connection status through short information note in the first part of the applet window ("client is connected"). In this moment, everything for real-time simulation is prepared.

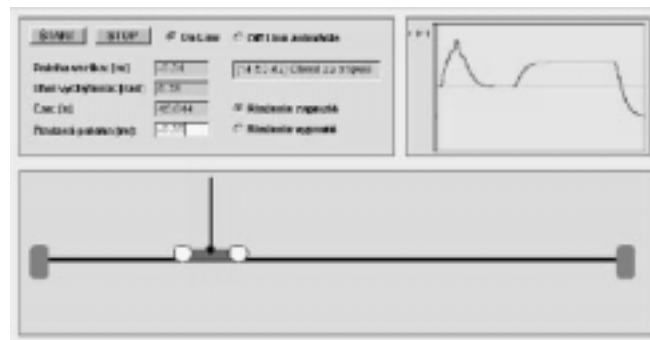


Fig. 3 JAVA client for inverted pendulum experiment

The user can enter a required position of the pendulum. The buttons "Start" and "Stop" serve for the control of simulation running. During the simulation user can follow numerical values of the carriage position, deviation angle of the pendulum, time of simulation and the graphical dependence of the carriage position. The simulation results can also be visualized through model animation. It is necessary to realize that the animation serves only for visualization of results and that the real experiment runs in the university laboratory.

The animation can run in two modes: on-line and off-line mode. In the on-line mode the animation starts immediately after the beginning of simulation and in each moment user can see the actual state of the pendulum in the animated model. The time between the real time experiment and the animation is synchronized. However, the velocity of this animation depends on the velocity of data transfer via Internet. If the transfer is not sufficiently fast, the animation is not capable to visualize the samples from the experiment on line because of big delays. Then, the off-line animation can be used. In that case the real time simulation is realized only numerically without the contemporaneous animation. After the simulation ends, measured data are sent to the client and the animation can be accomplished.

There is another example of the client application shown in Fig. 4. This client serves for control of the two-tank system. The remote user can receive the measured data numerically and at the same time to see them in the form of graphs or simple animation.

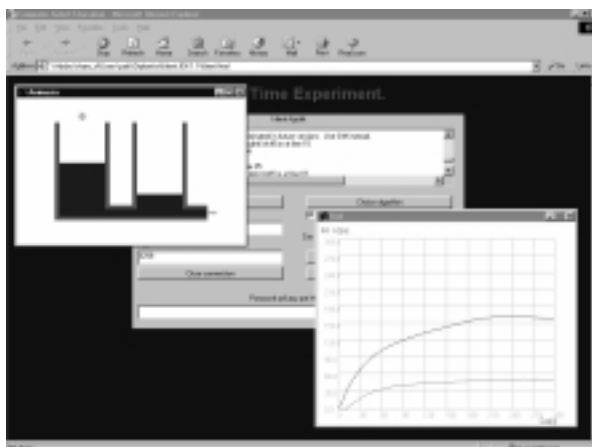


Fig. 4 JAVA client for the two-tank system

Similar client applications have been created for the helicopter model and the magnetic levitation system.

As it can be seen, the JAVA client has to enable user to control a real process and to collect and visualize data from the process. However, the Java applet can also be used without a connection to the real plant. In that case the process dynamics is described by means of differential equations those numerical realisation is included in the applet. Such virtual system (e.g. Fig. 5) can be accessible through Internet and can serve for simulation of some problems. Students are not restricted to install simulation software at home, they can perform a part of their work through Internet by means of specially developed web pages.

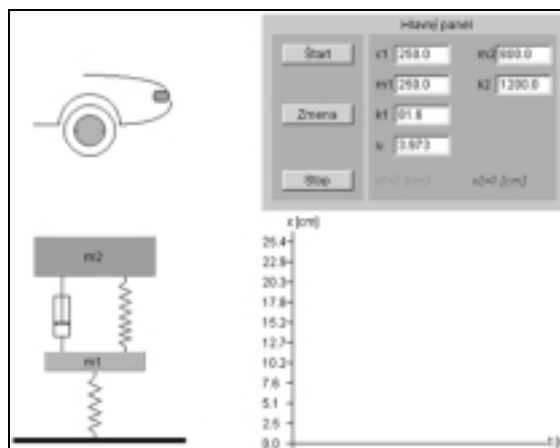


Fig. 5 JAVA client with the animated virtual model

Another way how to represent the behaviour of real devices on the distance learner's site is to use the Virtual Reality Modelling Language (VRML). VRML enables to build multi-dimensional models so that the user's view of the environment changes in real time in response to user control. This control allows to user to perceive and interactively change a virtual world through direct manipulation of virtual objects in the environment. High-quality sensory information – that derived from sight, sound, and touch – is generated by computing systems and delivered to users by special interface devices. These devices provide the feeling that a user is interacting with an environment just as that person would interact with the real world, and in addition employ "intelligence amplification" to expand decision-making capabilities. Objects in VRML world can move and perform animation with dynamics corresponding to the physical model.

## Administration

Since the client applications are placed on the public accessible web server, they are available not only to students in the selected course but also to the public community via Internet. In the case of tele-experiments (remote control of real plants) it is necessary to ensure their sharing by several users and synchronization of the access (Fig. 6). It means the administration of the experiment has to be done. The main aim is to guarantee, that in one time instant only one user can work on the real equipment. For this purpose the script language PHP can be used. One of its properties is that it allows to access relational databases (SQL databases). The administration of tele-experiment should ensure the access to the experiment only for defined group of users whose access rights and time scheduling are specified in the SQL server database. After entering the system by means of login name and password and correct authentication of the user, the user is redirected to the web pages with the client applet that enables the real time experiment.

Student	Day	From	To	Duration	Action
Mofin Jaskovic Dusan Antal Peter Molnar Giovanni Supak	Monday			1 week	Save
	Tuesday			1 week	Save
	Wednesday			1 week	Save
	Thursday			1 week	Save
	Friday			1 week	Save

Monday (18:00 - 20:00) [Delete]

Mon [Black Bar]

Tue [Black Bar]

Wed

Thu

Fri

■ time table of the selected student    □ time table of other students

Fig. 6 Time table allocation

Administrator of the system has rights to create new accounts for users and to cancel old accounts. He can specify time intervals when the user can access the real experiments and accomplish the simulation. In this way the work of several users can be coordinated.

From the pedagogical point of view it is advantageous when more users can follow the experiment. In this case, the user with the allocated timetable has rights to control the plant. All other users that are logged in can follow the real time simulation on experiment. This mode enables to the tutor or to the supervisor to explain a typical behaviour of the presented control algorithms. This form of learning can be supplemented by an online discussion in a chat session or by a discussion forum. In a team work the role of tutor can be substituted by any selected student from the study group.

## Safety conditions and recommendations

To ensure quality of education basic requirements for the virtual laboratory operation should be fulfilled. It is necessary to ensure

- remote control of the experiment and the possibility to switch on/off device from far-out user
- stable beginning position
- security for personnel and laboratory devices

The security should be guaranteed through

- hardware check (to protect a device from its destruction or a person from injury)
- software check
- network security that includes
  - assurance against unauthorized access
  - time limited (scheduled) access – only one person can work on device
  - user access transparency

After verifying these let say obligatory conditions it is good to provide the tele-experiment with next additional features such as

- presentation of the experiment output to remote user
- compatibility with Matlab/Simulink simulation and experimental interface
- experiment administration
- wizard (interactive study guide)

Except of this it would be very convenient to ensure also a visualization of the system behavior by the output data (graph, picture), or even by an additional video and sound transfer.

## Conclusions

Our attention was dedicated to the development of a virtual laboratory. In order to higher quality of distance education for local control purposes the widespread Matlab application with its real time toolboxes have been used. The different plant models have been tested for the remote control and are now being made accessible to students and colleagues via Internet. Introduction of the virtual laboratories in the control education reasonably increases the student motivation and also develops various other skills in the signal measurement and processing. Virtual laboratories enable to increase the quality of distance learning in engineering education to the level comparable with the face-to-face study.

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# EVALUATION OF DISTANCE EDUCATION IN THE DEVELOPING WORLD

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## Abstract

There is the growing need for inbuilt evaluation procedures into all distance and open learning initiatives in the developing world. Granted that the positive response to open learning in the developing world has attracted global acceptability, its implementation should concern the developed world where the open learning experiment had worked over the decades. The paper examined the inequalities created by the digital divide and consequently examined some evaluation techniques that are appropriate for monitoring distance learning in the areas of concept, context, curriculum, content, conduct, costs, coverage and compliance.

## Introduction

The spread of distance education, according to Ramanujam (1999) is a sure indicator of its present status as well as the future educational possibilities. Some factors appear to enhance this spread in the developing world, ranging from the factor of access to that of cheapness. Carty (1999) argued that government funding of conventional education has become scarce and conventional university more expensive. Formal education, particularly at the tertiary level, became inaccessible to the common citizen in the developing world. This lack of access led to the previous practice in the developing nations where citizens were sent abroad for university training. Distant education has therefore become more desirable and imperative in the developing world where their economy has become comatose.

The economics of distance and open learning puts time on the side of the developing world, for with each passing month, it becomes cheaper and more practical to reach geographical wider audience (Carty, 1999; Bandele and Ojo, 2003). The combination of disproportionately poor countries coupled with increasing investment on basic education by governments promises a virtual explosion of demand for post secondary academic and on-the-job training. According to Bandele (2002), the Central Government in Nigeria (as in other developing nations) could no longer shoulder the huge amount of money needed to run the higher institution, particularly the universities. There is hence, a growing, positive response to distance and open learning in the developing world, as an alternate route to the most cherished formal education.

## International acceptability?

Ramanujam (1999) reported that there are about 1117 institutions of distance education of different types located in about 110 countries of the 9 geographical regions of the world that offer more than 38,000 courses in different disciplines, to 40 million students! The situation would have progressively improved, over time, increasing the figures above by certain percentages. Corroborating the above, Asmal (2002), in his address to the 2<sup>nd</sup> Pan-Commonwealth Forum on Open learning in Durban, South Africa, stated that the first conference in Brunei involved a large participants, from the developing countries as a whole, but, outside of South Africa, very few from Africa. He however expressed his delight that nearly 200 African delegates, as well as 225 South African delegates, participated at the 2<sup>nd</sup> Pan Commonwealth Conference.

That distance education is flourishing in the developing world is assumed. The question is whether such initiatives worth global acceptability. According to Bandele (2002), the government of Nigeria, through the Federal Ministry of Education expressed her reservation on the continued existence of the



mushrooming distance education programmes in Nigeria tertiary institutions. These programmes, were privately owned, haphazard, uncoordinated with little interest to provide qualitative education and are characterized by large scale examination malpractices. Carty (1999) asked the question - that with pressures on nations to 'join the global information economy or perish', does distance education present an unprecedented opportunity to train more people, better and at lower cost? A survey of the distance education programme in the developing countries, he opined, illustrates the rich diversity of University distance education – within single countries, across regions, and between continents. The interest, and also the emphasis of the developed world should not be on mere acceptability of the distance education programmes of the developing world but on global monitoring of its implementation. After all, Tsui, Zhag, Jegede, Ng, and Kwok (2000) quoting OECD (1995) argued that the world now operates in a content which calls for international efforts to facilitate a global approach to learning.

## **Inequalities**

The disparity between the developed and the developing world in the distance learning delivery system is lamentable. Carty (1999) elaborated on this disparity between the distance education practices in the developed and the developing world, which according to him, constitute the pitfalls and the dilemmas of the developing countries on distance education. He identified disparities in the following areas:

- Infrastructure, as dramatic; with 90% of all information technology production concentrated in the industrialized world.
- Teaching styles, that emphasis rote learning and memorization, which clash with distance education's more learner- centred, autonomous and investigative practices.
- Computer literacy, with students in the developing world lacking basic computer skills.
- Policy issues, with traditional universities viewing distance education with suspicion.
- Weak start, with accreditation and central control problems.

The inequalities between the developed and the developing world in Information Technology (IT) world has brought in the problem of digital divide. Digital divide is explained to mean the gap between the information-rich and the information-poor countries. And according to Ramanujam (1999), globalisation and use of technology are too important to be ignored by institution practicing distance education in the developing world. In poor countries, he submitted, it takes at least a decade to have access to any type of technology and by the time they acquire it, that technology itself becomes outdated.

## **Inbuilt evaluation**

Technically, evaluation is judgmental. It makes judgment based on acceptable criteria. According to Carty (1999) as quoted by Bandele and Ojo (2003), in all countries, rich or poor, the issue of how to accredit, regulate, and evaluate distance education is currently unresolved. It appears as if, each country, particularly the developing countries do not consider acceptability based on rigorous evaluation activities as the priority of distance education. If any evaluation project is done at all, it has been the summative type, which waits till the output stage of a programme. There is hence the growing need for inbuilt formative evaluation procedures into the distance education programmes in the developing nations. Ash (2000) stated that evaluation should be done against course aims as outlined in the business (programme) plan. He remarked that - it is worth noting that evaluation as a phase has often been omitted even by distance evaluators. There is hence the need for reaching beyond traditional assessment of students' academic achievement, in evaluating distance education programmes to increase achievement in distance education.

Some evaluation procedures are examined in this paper as appropriate for monitoring distance education in the areas of concept, context, curriculum, content, conduct, costs, coverage and compliance.

### ***Concept***

Distance education – contrary to what you might hear – does not fit neatly into one single, universal definition to be followed by all countries and their culture and institutions (Carty, 1999). Its genesis according to Ramanujam (1999) dated back to 1982 when the term ‘correspondence’ was replaced by ‘distance’ in the International conference of Distance Education (ICDE) at Vancouver, Canada. In Nigeria, to be specific, distance education came under different shades and concepts: correspondence, satellite, sandwich, week-end, and part-time programmes (Bandeled, 2002). An inbuilt formative evaluation for appraising and monitoring, conceptually, the distance education programmes in the developing world is necessary for acceptable ‘start-off’ status.

### ***Context***

The feasibility of distance education in a developing country depends on the context under which such programme will operate. There is the need to evaluate existing environmental factors and assess facilities on ground. The context under which the distance education operates will correspond to one of the four generation classifications of Taylor (1998) as reported by Ramanujam (1999). They are classified on the basis of the number of communication media used by distance education at the different stages.

### ***Curriculum***

Distance education should be subjected to rapid curriculum evaluation using established models of curriculum evaluation. Whatever procedure adopted should be inbuilt into the distance education programme.

### ***Content***

This is the subject matter covered in each course under presentation in the distance education programme. The syllabi should be appraised and enriched from time to time based on evaluation activities and feedbacks.

### ***Conduct***

The distance education delivery system in the areas of teaching-learning and examinations require frequent objective appraisal. There is the need for performance evaluation in the areas of cognitive domains of the distance learners for feedback and remediation for quality learning and interactions.

### ***Costs***

Ash (2000) explained that there is a long tradition of costing in open and distance learning, mainly encouraged by the desire to reach more learners at a time. Bandeled and Ojo (2003) proposed a linear model for evaluating and monitoring the cost of open and distance learning in Nigeria and in the developing world. For cost-effective distance education, they proposed the minimizing of variable costs through objective evaluation procedures.

### ***Coverage***

Distance education lays emphasis on geographical coverage, and, within a nation or region, people. ‘Access’ in distance education explains the extent to which a large prospective learners are given opportunity for participation. The extent to which this is achieved require object appraisal via evaluation activities.

### ***Compliance***

The developing world cannot operate in isolation. The need to employ internationally acceptable standards to evaluate the implementation of distance education in the developing world is indispensable. Discrepancies and disparities should be catalogued as feedback for corrective actions and for updating the status of the distance education programmes in the developing world.

## Conclusion

The emphasis in this paper is the need to incorporate inbuilt evaluation procedures into the several aspects of distance learning programme in the developing world, to raise their status to internationally acceptable level. The need to apply appraisal techniques based on objective evaluation activities is considered imperative for monitoring distance education in the developing world for global acceptability.

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## **E-LEARNING, MAPPING MIGRATION AND SIMULATING RELIEF**

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The Mapping Migration project aims to construct a Geographical Information System (GIS) and web-site on Migration in South East Europe, as well as an eLearning environment. The partners are The Refugee Studies Centre, University of Oxford and The Centre for Computing in the Humanities, King's College London, while the site could be hosted by any of the partners. The project is tested as a distance learning tool, together with the Humanitarian Relief Simulation, a project undertaken by Refugee Studies Centre, Queen Elizabeth House, University of Oxford, and the Centre for New Media Teaching and Learning, Columbia University. This is a joint pilot project to investigate the use of computer simulations for training humanitarian workers in the management of the processes involved in providing assistance in complex emergencies. During the elaboration of these projects questions of quality frameworks and quality procedures became a priority, as all sides involved, policy makers, educational providers, learners, students and trainees contributed in ensuring consistent approaches, consolidating knowledge and adding value.

### **Mapping Migration in the Kastoria Region**

The GIS offers the opportunity to provide the vast store of written material, ranging from the popular to the academic, as well as a considerable amount of historical data and archive material consisting of population census data and surveys, contemporary maps, writings, memoirs, records, photographic archives and bibliographies, covering the last hundred years of the 20th century in South East Europe, in an accessible and effective way for a broad spectrum of users, ranging from those with a popular interest, to policy makers and those conducting serious scholarly research.

Population migrations were among the decisive factors contributing to the dynamism of Balkan history. As the Ottoman Empire collapsed, an increasing awareness of national identity clashed with severe border changes. Since 1989, forced migration, crisis interventions, economic instability, ethnic tensions and the torn social fabric, pose challenges for sustainable development policies, both human and economic. As well as illustrating how states have attempted to shape and control migration, this project will consider how migration is challenging traditional concepts of citizenship, sovereignty, national security and existing international humanitarian law. The purpose of the project is to present certain sub-themes, i.e. International Law and Relations, History, Economic and Human development, Complex emergencies and interventions, Foreign Policy of states, Migration issues, Religion, in order to study the political, economic, demographic, planning, social and cultural asymmetries shaping migration policies and practices. It also aims to understand the causes and consequences of the kinds of social, economic and political breakdown involved in complex emergencies and forced migration, the political and practical aspects of crisis intervention; and of the processes of rehabilitation and reconstruction, in order to provide policy makers with the tools to analyse the causes and consequences of civil conflicts, as well as the ability to consider better alternatives of external interventions.

Once the cartographic information is in electronic form, it is dynamic and can be displayed and analysed in many different ways. Basic topographical data can be overlaid with the specific sets of features of interest for a particular purpose. The specific sets of features are termed themes. The underlying topographical data would be the same but the features of interest, the themes, would form data sets, which are spatial as a result of their relationship with the underlying topographical data. Modern GIS technology thus provides the means of overcoming the limitations of more traditional forms of information processing such as relational databases, which were not designed for spatial or temporal modelling, and are limited in the representation and handling of non-western scripts (for example the Greek and Cyrillic alphabets). Place names, political boundaries and population data, suitably themed, would form spatial and temporal data sets which could be then subject to analysis.

The building of a GIS on South Eastern Europe is supposed to draw from all the above mentioned sub-themes. Once in a GIS, the relationships between individual name spaces can be studied, using formal queries to create new maps of spatial relationship, interaction and change. Specific patterns of political dominance, social and ethnic tensions and development strategies may be shown by particular patterns of name space relationship. Since the end of the 19<sup>th</sup> century, place names have been changed many times and entirely new names have been introduced, often associated with new patterns of settlement and land use, which have not been adequately mapped. The “rationalisation” and “nationalisation” of Balkan place names in the newly created independent states has been a standard practice, and there are many linguistic cross-representations of particular place-names in different “minority” languages and scripts, which has led to much confusion. Any future project aims to examine contemporary migration as a dynamic process, where different subjects leave their traces in space to be explored through time, using identity issues categories.

Mapping Migration starts at the present day and is organised in layers defined by a timeline showing significant events and migrations in the period 1880 to 2000. The backbone of the presentation is a series of about thirty maps (geographical, ethnological, religious, transport infrastructure, administrative and political). Many of these maps are being generated during the analysis of data by an off-line Geographical Information System (GIS). Interactive access to content is via location hot spots on specially produced image maps; these assist the users to navigate their way through the site. The hot spots will also have search options that will allow access to the different categories of information within the site.

The content is drawn from a collection of material consisting of historical documents, photographs (both contemporary and historical), postcards, short explanatory texts, demographic metadata in databases concerning about ninety communities, multimedia presentations of places, historical events and cultural phenomena and newspapers contemporary to the period. Links to Forced Migration Online, Oxford and the Macedonian Heritage web sites are available. Access to an on-line bibliography on the subject is available.

The GIS provides a visualisation tool to allow academics from a number of disciplines to explore, analyse, compare and summarise migration throughout the period. The project presents information that has both geographic and temporal elements, the time aspect being of particular importance. Its importance as a distance learning tool, both for academic institutions, as well as for organisations taking decisions, is significant. Much of the material recorded is unpublished and its availability online provides an invaluable resource. It preserves data that was formerly only available in databases that use legacy software, this is now available to a much wider audience.

The project also plays a significant role in raising awareness of the fragility of forced migrants, the risks and potential existing in reconstructing broken lives as well as encourage states and international organisations to develop strategies and legislation to deal with the phenomenon.

The Mapping Migration Pilot Project is one of a new style of digital projects in the humanities that make use of image, database and text based technologies. The research methodology and the research issues that arise from the use of these technologies, the technical design, the integration of different technologies, and the associated issues of access to and preservation of the digital materials provide invaluable assets for the development of a far wider project on mapping migration in south east Europe and possibly worldwide.

The project aims:

- To create a distance learning tool to be used by postgraduate students, ngo activists and policy makers.
- A central aim of this study is to reject the reductionist attitude to place names and spaces brought about by politically inspired pressures and attempts by international bodies to standardise place names on maps following international law agreements and/or military and development interventions.
- To provide a theoretical and historical grounding in the principal concepts involved in the study of territory and international boundaries, as well as forced migration.
- To examine the creation and maintenance of international boundaries on land and sea, and to illustrate the issues raised by the presence of trans-boundary natural resources, including human beings.

- To study the processes involved in boundary and territorial dispute resolution.
- To understand the causes and consequences of the kinds of social, economic and political breakdown involved in complex emergencies and forced migration, the political and practical aspects of crisis intervention at different levels; and of the processes of rehabilitation and reconstruction.
- To provide policy makers with the ability to analyse the consequences and the causes of civil conflicts as well as the ability to consider what kinds of external interventions might best ameliorate these consequences and address these causes.

The project has already started being implemented as a pilot study, Mapping migration in the Kastoria region, currently constructing a Geographical Information System (GIS) and web-site, hosted by King's College London Centre for Computing in the Humanities. The partners are The Refugee Studies Centre, University of Oxford and The Centre for Computing in the Humanities, King's College London. Material for the particular pilot study has been taken from the Research Centre for Macedonian History and Documentation, Thessaloniki. The study focuses on a section of the geographical region of Macedonia, more precisely the region of Kastoria, part of the Monastir Vilayet during the Ottoman empire, named prefecture of Kastoria and Florina when incorporated within the Greek state (1913), then becoming district of Kastoria following the end of the II world war and the Greek Civil war (1948).

### **Humanitarian Relief Simulation**

The training of aid workers who will be deployed in humanitarian crises is an area of intense activity for the plethora of agencies that operate in such environments. The turnover of staff is huge, and the training is costly and time-consuming. The ultimate goal of the ReliefSim project is to tackle these challenges by developing and implementing computer-based learning environments which incorporate simulations alongside a multimedia resource base of documents, images, time-based media and structured data. These environments will be designed to be used in a variety of different e-teaching and learning scenarios, in order that organizations and individuals can deploy them as best fits the training and user needs.

The prototype simulation that has been developed by CNMTL. This is a limited program, aimed only at modelling a small number of the factors operating in complex emergencies. For the purposes of the pilot we looked only at health, sanitation and nutrition. However, this prototype does show how the factors interrelate, and it offers some interesting discussion points on a) the nature of complex emergencies and b) the possibilities of simulating them in the training situation.

In order that the humanitarian community feels some sense of ownership of what is being developed, they need to be closely involved in the project from the beginning. The first task of the project team is to confirm who the key organizations and individuals are, and work with them to define the goals, needs and working methods. The following questions will be asked, and tasks carried out, building on the work already done in the pilot:

- Investigate evaluations of emergencies: What went wrong? Were there training needs that were not met? How could preparatory and field training have helped?
- Assess current training provisions:
  - Work with organizations to evaluate current training methods and resources.
  - Acquire course materials and resources.
  - Assess training needs.
  - Research user profiles and training contexts.
  - Research use scenarios.
  - Evaluate underlying educational theories.

- Extrapolate generalizable training models that would be a) amenable to delivery via a multimedia learning environment; b) would be sufficiently broad as to represent some consensus in the community; c) would be of appeal to the aid organizations.
- Work with organizations to discuss, evaluate and improve these training models.

From this work with the communities, we will confirm what technical developments best fit the needs, and will be able to refine the designs of the simulations and learning environments so that they most effectively address these needs. This is no small task, but it is vital to the success of the project. The work carried out during the pilot has proved the concept that simulation tools can be used to enhance the critical thinking and problem-solving faculties of aid workers. However, the development of a full simulation, embedded in realistic field scenarios and with rich data and content will need much technical effort. For the tools we build to be most effective, they need to create a realistic immersive experience for the users.

For the purposes of the prototype, the focus was upon health issues. In the second phase of the project, all other aspects of humanitarian relief will need to be considered. Included here will be shelter and site planning; health; sanitation; nutrition; protection; food security; logistics; political, social and cultural issues; etc. In order to create the immersive experience, realistic scenarios must be built. We are not proposing to create a full game-like simulation with virtual reality as we do not believe this is necessary for committed adult learners. Rather we will use mapping techniques, images, sound, video, narratives etc in an economical way that creates the best simulacrum of reality appropriate to our audience.

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