



eLearning

Project No: **2002-4075/001-001 EDU-ELEARN**

Project Title: **DELPHI: European Observatory of e-Learning Practice**

Deliverable Type: **Public/Internal/Restricted**

Deliverable No: **1**

Work Package: **1**

Deliverable Title: **E-learning – The State of the Art**

Version **Final**

Date of report: **28/03/2003**

Authors: Morten Flate Paulsen

Inputs
Mario Barajas
Katerina Kikis
Barbara Jones
Friedrich Scheuermann
Peter Mirski

Coordinator: Dr Mario Barajas, on behalf of the University of Barcelona (ES)

Partners:
- NKI Nettskolen (NO)
- Foundation for Research & Technology Hellas (FORTH)
- Manchester School of Management-University of Manchester,
Institute of Science & Technology (UMIST)
- Universität des Saarlandes, Institut für Rechtsinformatik (USaar),
- Management Center Innsbruck, MCI

Contact: mbarajas@ub.edu

Content

E-learning – The State of the Art	0
Content	2
Introduction	3
Definitions of online education and e-learning	3
The template	4
Pedagogical issues	5
Teaching and learning theories and philosophies	5
Independence and autonomy	5
The industrialization of teaching and distance teaching in the post-industrial society	6
Guided didactic conversation – teaching-learning conversation	7
Immediate and individualised communication – educational transaction and control	8
Constructivism and cooperative learning	9
Techniques methods, techniques, and devices	11
Assessment	12
Teacher workload	14
Teacher training	16
Teacher collaboration	16
Bandwidth and rich media	16
Administrative, organizational, and institutional issues	16
Large scale operations	17
Cost effectiveness	17
Teaching Incentives and Barriers	18
Flexibility	19
Accessibility	20
Socio-economical issues	20
E-learning standards	21
LMS-systems	21
Systems integration	22
Globalization and competitiveness	23
Funding and commercialization	24
Mobile learning	25
References	26
Appendix 1: Template for Delphi Analyses	29
Context Related Project Information	29
Input Related	30
Research Question 1: Key innovations in Pedagogical issues	31
Research Question 2: Key Issues in Organizational and institutional issues	32
Research Question 3: Key Issues in Socio-economical issues	33

Introduction

This work package intends to identify and discuss the areas of key-innovations that are important in describing the state of the art in e-learning. The issues discussed in the work package will be used as a foundation for further analyses in the European Delphi project. The outline and the issues in the work packages was first presented and discussed at the Delphi kick off meeting in Barcelona in January 2003. Then, the content of the work package was drafted by the author, and developed further through online collaboration among the project partners who contributed with input from their research, knowledge, experiences, networks, and resources. This process resulted in the definitions and template presented in this work package, which will be used for the Delphi analyses of areas of key innovations in European e-learning projects.

Definitions of online education and e-learning

Online Education: There are many terms for online education. Some of them are: virtual education, Internet-based education, web-based education, and education via computer-mediated communication. The Delphi project uses a definition of online education that is based on Desmond Keegan's (1988) definition of distance education. Hence, online education is characterized by:

- the separation of teachers and learners which distinguishes it from face-to-face education
- the influence of an educational organization which distinguishes it from self-study and private tutoring
- the use of a computer network to present or distribute some educational content
- the provision of two-way communication via a computer network so that students may benefit from communication with each other, teachers, and staff

E-learning is here defined as interactive learning in which the learning content is available online and provides automatic feedback to the student's learning activities. Online communication with real people may or may not be included, but the focus of e-learning is usually more on the learning content than on communication between learners and tutors.

Unfortunately, the term e-learning is often used as a more generic term and as a synonym for online education. Kaplan-Leiserson has for example developed an online e-learning glossary, which provides this definition:

E-learning covers a wide set of applications and processes, such as Web-based learning, computer-based learning, virtual classrooms, and digital collaboration. It includes the delivery of content via Internet, intranet/extranet (LAN/WAN), audio- and videotape, satellite broadcast, interactive TV, and CD-ROM.

In the glossary of *elearningeuropa.info*, e-Learning is defined as:

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.

Many examples of e-learning programmes seem to be extremely costly to develop and often cover only low-level knowledge and facts based on a simplistic view of what learning is (see e.g. Dichanz 2001 “*E-learning, a linguistic, psychological and pedagogical analysis of a misleading term*”).

As the previous discussion shows, the term e-learning is not very precise, and it should be pointed out that learning is just one element of education. So, the term online education should cover a much broader range of services than the term e-learning. One may also claim that e-learning companies often focus on course content, while online education institutions cover the whole range of educational services.

Hence, the Delphi project will analyze the broader issues included in the term online education and not only focus on the issues covered by the more narrow term e-learning.

The template

The areas of key innovations presented in this paper are organized according to the structure presented in Table 1. The columns in the table present the three main research areas and the issues in each of them that the Delphi project will focus on.

Table 1. Template for areas of key innovations in e-learning

Pedagogical issues	Organizational and institutional issues	Socio-economical issues
Teaching and learning philosophy	Large scale operations	E-learning standards
Teaching techniques, methods, and devices	Cost effectiveness	LMS systems
Assessment	Incentives	Systems integration
Teacher workload	Flexibility	Globalization and competitiveness
Teacher training	Accessibility	Funding and commercialization
Teacher collaboration		Mobile learning
Bandwidth and rich media		
Other issues	Other issues	Other issues

The main structure used in the template is derived from the MERLIN project (<http://www.ub.es/euelearning/merlin>) in which it was successfully applied by several of the Delphi project partners. Additional knowledge of the field is especially derived from the following EU-projects that the partners have been involved in:

- Ivette: Implementation of Virtual Enviroments in Training and Education (<http://www.ub.es/euelearning/ivette/>)
- Web-edu: A Study of Learning Management Systems for Online Education (2001-2002) (http://www.nettskolen.com/in_english/webedusite/index.html)
- M-learning: From e-learning to m-learning (2001-2002) (<http://learning.ericsson.net/leonardo/index.html>)
- CISAER: Courses on the Internet - Survey, Analysis, Evaluation and Recommendation (2000-2001) (http://www.nettskolen.com/in_english/cisaer/index.html)

In addition to the resources already mentioned, the project partners will search leading resources on e-learning during the Delphi project period. Among these resources are:

- <http://elearningeuropa.info/>
- E-journals
- Books and printed journals
- Standardization initiatives
- LMS Providers
- Portals
- EU-projects

Pedagogical issues

Teaching and learning theories and philosophies

Online teaching and learning philosophy is often based on traditional learning theories and theoretical perspectives on distance and adult education. Literature on traditional pedagogy often refers to basic learning theories such as behaviorism, cognitivism, and constructivism. Until now, online education has primarily been used by adult students. So adult education theories have been very relevant for online education.

Many theoretical perspectives on distance education have been presented during the last decades. Keegan (1988b) identifies these three theoretical positions:

- Theories of autonomy and independence,
- Theories of industrialization, and
- Theories of interaction and communication.

It should be noted that until the 90'ies the theories of interaction and communication mainly treated communication between the tutor/helping organisation and the individual student, while recently theories involving collaborative learning, group interaction and social constructivism emphasising learning as a process and result of a collective experience of the learning group have received much attention.

Independence and autonomy

Michael Moore is specifically known for his development and refinement of the theory of distance education as independent learning. His work was clearly based in a tradition of autonomy and independence of adult learners advocated by scholars such as R. Manfred Delling in Thübingen, Germany and Charles A. Wedemeyer in Wisconsin, USA. Moore's theory was developed over more than 10 years. The main dimensions are 'transactional distance' and 'learner autonomy'. It is clear that in his earlier writings Moore put more emphasis on autonomy – as distance teaching programmes by their nature require more autonomous behaviour by the learner. To succeed in such programmes, the learner must be able to act independently and autonomously. (In this connection it can be questioned whether this is a necessary condition for enrolment, or that the institution must take responsibility for preparing their students and train them to become autonomous learners, which again would be one important aspect of student support in e-learning.)

According to Moore (1991, p. 2-3):

It is the physical separation that leads to a psychological and communication gap, a space of potential misunderstanding between the inputs of instructor and those of the learner and this is transactional distance.

Transactional distance is not the same as physical distance but built up of the two qualitative and continuous variables labelled 'dialogue' and 'structure'. The dialogue describes the transactions between teacher and learner, but is not used synonymously with interactions, as dialogue is described as interactions having positive qualities (Moore 1993). The structure of a programme is determined by the nature of the media being applied and by the teaching philosophies of designers and constraints imposed by the educational institutions. Structure describes to which degree the programme is able to be responsive to individual student's needs. According to Moore the transactional distance of a programme increases when level and quality of dialogue decrease and structure increases. Programmes with low transactional distance have high dialogue and low structure.

For an overview of the theory of 'transactional distance', see <http://tecfa.unige.ch/staf/staf9698/mullerc/3/transact.html>
ERIC document annotations on 'transactional distance':
<http://www.asu.edu/lib/webdev/trans.html>

The industrialization of teaching and distance teaching in the post-industrial society

Otto Peters (1965), was one of the first theorists within the field of distance education. His theory of distance education as a new form of industrialized technology based education has received considerable attention. His viewpoint have often been misunderstood and often criticised (see Peters 1989). Critics have perceived Peters to look at industrialization of teaching through distance education as a positive development and thus being critical to traditional forms of education. This is not at all the case; his concepts were applied for the purpose of analysing the didactical structure and did not imply any kind of value judgements. Since Peters' early writings large societal changes have taken place, and modern online education takes place in a societal context often referred to as 'post-industrial'. In analysing distance education in light of the post-industrial society, Peters draw the following conclusions:

Distance education is, indeed, a typical product of industrial society. This not only applies to its inherent industrial principles and trends but also to the fact that distance education has been capable of meeting educational needs typical of an industrialized economy and that it could attract and keep highly motivated students who wish to improve their vocational or professional status as well as their income, sacrificing their leisure time for gratifications often delayed for many years.

In a postindustrial society the traditional industrial model of distance teaching will no longer satisfy the new needs of new types of students with their particular expectations and values which, seemingly, not only differ from those of the students in the industrial society but are in many cases even the exact opposites of them.

This situation calls for the design of new models of distance education. They will probably be combinations of intensified and sustained group work – highly sophisticated ways of acquiring the necessary information of self-study and increased telecommunications

between participants. They will have different sets of goals and objectives. And they will have to rely on self-directing and self-controlling – that is, on students becoming autonomous.

This means that the shift from industrial to postindustrial distance education will be a Copernican. Slight and superficial alterations will certainly not do. (Peters 1993, p. 57.)

There seems to be no doubt that when theorists of distance teaching and learning revisit their own writings when relating to the new developments of online teaching and learning, they agree that new technology changes the concepts, but that the main ideas still apply.

Guided didactic conversation – teaching-learning conversation

Long before the term distance education had been established and the terms for this concept were correspondence education, home study and independent learning Börje Holmberg argued in favour of a conversational approach to course development (Holmberg 1960 pp. 15-16) and later followed this up by attempts to formulate what can be called a theory of distance education in which empathy between the learner and the teaching organisation was assumed to favour learning. In his earlier writings Holmberg used to denote his theory of distance education as ‘guided didactic conversation’. Now he prefers the term ‘teaching-learning conversation’ (Holmberg 2001).

In recent writings Holmberg summarises his basic theory, concerning learning, teaching and organisation/administration, as follows:

Distance education mainly serves individual learners who cannot or do not want to make use of face-to-face teaching, i.e. usually working adults who wish to learn for career purposes or for personal development.

Distance learning is guided and supported by non-contiguous means, primarily pre-produced course materials and mediated communication between students and a supporting organization (university, school etc.) responsible for course development, instructional student-tutor interaction, counseling and administration of the teaching/learning process inclusive of arrangements for student-student interaction. Distance education is open to behaviourist, cognitive, constructivist and other modes of learning. It may inspire meta-cognitive approaches.

Central to learning and teaching in distance education are personal relations between the parties concerned, study pleasure and empathy between students and those representing the supporting organization. Feelings of empathy and belonging promote students’ motivation to learn and influence the learning favourably. Such feelings are conveyed by lucid, problem-oriented, conversation-like presentations of learning matter expounding and supplementing course literature, by friendly mediated interaction between students, tutors, counsellors and other staff in the supporting organisation as well as by liberal organisational-administrative structures and processes. These include short turn-round times for assignments and other communications between students and the supporting organisation, suitable frequency of assignment submissions and the constant availability of tutors and advisers (Holmberg 2001).

When analysing the teacher-learner conversation, Holmberg stresses that the conversation includes both non-contiguous conversation between the live teacher and student and also learning activities, such as thinking, processing information and other cognitive processes

taking place when the student interacts with the pre-prepared learning materials included its 'built-in tutor'. He specifically refers to the educational institution as the supporting organisation.

Holmberg agrees with Keegan that modern developments, included online learning, have not changed the content of the theory, although he clearly values that the use of new computer technology, provides the basis for great improvements of teaching-learning effectiveness. Communication on the net with its great possibilities for spontaneous interaction underlines the importance of the empathy approach and the conversational style. Holmberg in 2001 finds that the relevance of the theory is now greater than when it was first developed.

Immediate and individualised communication – educational transaction and control

D. Randy Garrison published his book 'Understanding Distance Education' in 1989. (See also Garrison 1993.) Garrison argues that technology and distance education are inseparable and that theory and practice in distance education have evolved based on increasing sophistication of instructional technology. He argues that distance education has developed through three generations of technology, correspondence education, teleconferencing and computer-based learning.

The new developments in technology make a paradigm shift in the theory of distance education not only possible, but also necessary. Garrison holds the position that previous theories of distance education were based upon the ideal of increasing access and looking at student independence as the ultimate educational goal. He argues that if distance education is to continue to develop as a field of study, one has to develop a theoretical framework that recognizes the differences between the old paradigm and the new and emerging paradigm. The old paradigm was, according to Garrison, based on looking at pre-produced and pre-packaged materials as the primary source of information and learning for the independent and autonomous student, and two-way communication between teacher and student as 'add-ons'. When learning materials are pre-packaged with prescribed objectives with the purpose of stimulating independent self-instruction, the approach reflects a behavioural perspective. Further, according to Garrison the new paradigm represents a cognitive/constructionist approach, which encourages the construction of new knowledge structures. This type of learning must take place in a highly interactive environment with feedback from teacher and fellow learners. The theory emphasises that education is a process, which is characterized as an interaction between a teacher and a learner. This educational transaction includes a mutually respectful relationship. It is a complex transaction for the purpose of transmitting and transforming societal knowledge.

Instead of, what Garrison sees as, an excessive emphasis on independence and freedom to study when and where the student wishes, the concept of 'control' is proposed as more inclusive to account for the complexity of the educational transaction. Control is defined as 'the opportunity to influence educational decisions'. Control is achieved in a complex and dynamic interaction between teacher, student and content/curricula at the macro level and between proficiency, support and independence on the micro level. According to Garrison, control cannot be possessed only by the teacher or the student, but should be shared in an inherently collaborative process. Control is seen as an inclusive concept where both teacher and student roles and responsibilities are considered within a context of continuous communication. If any of the parties of the educational transaction possesses an inordinate or inappropriate amount of control, the communication and possibilities for meaningful learning

and personal construction of understanding is seriously diminished. It is assumed in the theory that interaction is necessary for higher order cognitive learning.

The emerging paradigm is seen as reflecting a convergence between distance education and the general field of education and brings distance education into the educational mainstream. With the new technologies distance education can to a large degree simulate or approach conventional face-to-face education. It seems to be inherent in Garrison's view that high quality distance education is best organised within a traditional university or teaching institution.

In our view, Garrison's concept of distance education is far from most conceptions of e-learning. Courses and programmes based on 'third generation' distance education put less emphasis on pre-produced electronic learning materials and high emphasis on student-student and student-teacher interaction. In Moore's terminology the courses would be high on dialogue and low on structure, and probably student support will depend to a large degree on the teacher and fellow students, as it will in Thorpe's (2001) 'Online ODL – Learner Support Model – Web-based'.

Constructivism and cooperative learning

Constructivism is a theory of learning that has roots in both philosophy and psychology. The essential core of constructivism is that learners actively construct their own knowledge and meaning from their experiences. Constructivism acknowledges the learner's active role in the personal creation of knowledge, the importance of experience (both individual and social) in this knowledge creation process, and the realization that the knowledge created will vary in its degree of validity as an accurate representation of reality.

In his article *Constructivism and Online Education*, Doolittle (1999) presented a list of eight principles of constructive pedagogy:

1. Learning should take place in authentic and real-world environments.
 2. Learning should involve social negotiation and mediation.
 3. Content and skills should be made relevant to the learner.
 4. Content and skills should be understood within the framework of the learner's prior knowledge.
 5. Students should be assessed formatively, serving to inform future learning experiences.
 6. Students should be encouraged to become self-regulatory, self-mediated, and self-aware.
 7. Teachers serve primarily as guides and facilitators of learning, not instructors.
 8. Teachers should provide for and encourage multiple perspectives and representations of content.
- (<http://edpsychserver.ed.vt.edu/workshops/tohe1999/pedagogy.html>)

Doolittle discussed each of the eight principles and concluded that online education provides the resources necessary for students to engage in rich and effective construction of knowledge. He further claimed that the key to online education and constructivism is not whether or not the potential exists, but rather, whether or not the potential will be actualized.

David McConnell gives an introduction to computer supported cooperative learning in his book 'Implementing Computer Supporting Cooperative Learning (2000).

Cooperation in learning is not new. Students have formally and informally cooperated in learning processes, however as a way of thinking about and conducting learning processes, 'cooperative learning' is a fairly new concept. Planning and conducting cooperative learning means formalising what happens informally in many settings. According to Argyle (1991) there are three possible reasons for cooperating:

1. For external rewards – in education, e. g. achieve better grades, diplomas and degrees
2. To share activities
3. To form and further relationships

Often the educational system can be seen as one, which encourage competition and not cooperation. Often students are required to do the same work, and results are compared and often also a limited number of high grades are granted. The students compete on a zero-sum basis. Whatever one person wins, others loose.

In cooperative learning the theory is that everyone wins no one loses. The learning process is not seen as an individual pursuit concerned with accumulating knowledge, but as part of a social process where students helps each other to develop understanding in an enjoyable and stimulating context. The learning is process driven and learners must be involved in the social process and pay attention to this process to achieve their desired goals. The outcomes are not only academic, but involve increased competence in working with others, self understanding and self confidence. The learning activities may end up in group products which would not be achievable if learners worked individually, or the process may consist of learners helping and supporting each other in achieving individual learning goals.

The developments of online learning have spurred interest for computer-supported cooperative learning. Computer supported cooperative learning is based in socially oriented learning theories, such as 'constructivism' or 'social constructivism'. Emerging from the work of Piaget and followers the role of peer interaction in cognitive development has been influential for our concept of learning. Learning is seen as a construction of meaning in interaction with others (teacher and fellow students). Knowledge is constructed in social groups.

A meta-study by Johnson & Johnson (1990) (from McConnell 2000) concludes that cooperative methods lead to higher achievement than competitive or individualistic methods:

1. Students in cooperative learning environments perform better
2. Students in cooperative groups solve problem faster
3. Students in cooperative work use elaboration techniques and meta-cognitive strategies more often than those working in competitive and individualistic situations
4. Higher level reasoning is promoted by cooperative learning
5. Students in cooperative groups discover and use more higher-level strategy methods
6. New ideas and solutions are generated in cooperative learning groups that are not generated when people are working on their own
7. When individuals have worked in cooperative groups, their learning is transferred to situations where they have to work on their own.

Techniques methods, techniques, and devices

There are several distinct features that characterize online teaching techniques:

- They can conveniently utilize an overwhelming amount of online resources.
- They can facilitate collaborative learning independent of time and space.
- They can provide time to prepare and reflect on comments and contributions.
- They can facilitate on-demand access to learning activities that continue for an extended time period.
- They can provide unique opportunities to utilize discourse transcripts for analytical and reflective assignments.
- They can conveniently utilize computer-aided instruction.
- They can offer multimedia elements in presentations and demonstrations. However for interaction among people, they still primarily rely on written communication with the inherent keyboard limitations.

These features provide teaching opportunities that can rarely be achieved in other educational environments. They could probably add a new dimension to familiar teaching techniques and also contribute to the development of a number of new, innovative teaching techniques.

Teaching Methods: Verner (1964, 36) distinguished between individual and group methods of teaching. Applied to online education, you will encounter a more detailed classification of methods. Harasim (1989) distinguished between one-to-one, one-to-many, and many-to-many learning approaches. Here, Harasim's classification is supplemented with the one-online learning approach to support the four communication paradigms often used in CMC. The paradigms are information retrieval, e-mail, bulletin boards, and computer conferencing. The classification is derived from Rapaport (1991) who used it in his book; *Computer Mediated Communications: Bulletin Boards, Computer Conferencing, Electronic Mail, and Information Retrieval*. According to the discussion above, we will here distinguish between the four methods: one-online, one-to-one, one-to-many, and many-to-many.

Teaching Devices: Verner (1964, 37) referred to "various mechanical instruments, audiovisual aids, physical arrangements, and materials" as devices that can enhance the effectiveness of an adult education process. Verner also stated that television could be regarded as a device when used in a classroom and as a method when it is the primary medium used in a distance education setting. From this, one may argue that CMC could be regarded as both device and method. Here, CMC is viewed from the device perspective.

Let us use the CMC-classification derived from Rapaport (1991). There are four major CMC-devices: information retrieval systems, e-mail systems, bulletin board systems, and computer conferencing systems. These devices correspond to the four methods: one-online, one-to-one, one-to-many, and many-to-many.

Teaching Techniques: We use teaching techniques to accomplish teaching objectives. The techniques introduced here are organized according to the four communication paradigms used in CMC. The techniques are discussed in detail in *The Online Report on Pedagogical Techniques for Computer-Mediated Communication*.

The foregoing considerations result in a framework of four methods, four devices, and a number of techniques as shown in Table 2. First, the techniques classified as one-online are

characterized by information retrieval from online resources, and the fact that a student can perform the learning task without communication with the teacher or other students (e.g. search of online databases). Second, the techniques classified as one-to-one can be conducted via e-mail applications (e.g. e-mail based correspondence studies). Third, the techniques discussed as one-to-many will typically be conducted via the WWW, bulletin boards, or distribution lists for e-mail (e.g. publication of a lecture). Finally, the techniques presented as many-to-many can be organized within computer conferencing systems, bulletin board systems, or distribution lists for e-mail (e.g. debates).

Table 2. Teaching methods, devices, and techniques

Teaching Methods	Teaching Techniques	Teaching Devices
One-online	Online Databases Online Publications Online Software Applications Online Interest Groups Interviews	Information Retrieval Systems
One-to-one	Learning Contracts Apprenticeships Internships Correspondence Studies	E-mail Systems
One-to-many	Lectures Symposiums Skits	Bulletin Board Systems
Many-to-many	Debates Simulations or Games Role Plays Case Studies Discussions Transcript-based Assignments Brainstorming Delphi Techniques Nominal Group Techniques Forums Projects Student Presentations	Computer Conferencing Systems

Assessment

Assessment is the general term used for measuring students' performance on a course against the aims and objectives of that course. Assessment may be formative or summative.

Formative Assessment is assessment as part of teaching: questions and assignments set to help the student learn effectively, but not used to determine the student's course results.

Summative Assessment is assessment to determine a student's overall level of performance on the course: questions and assignments, the grades or scores of which are used in determining the student's course result.

There are four categories of online assessment:

- Computer-based assessment
- Self-assessment

- Peer-assessment
- Tutor-assessment

Assessment systems are strong indicators of how seriously course providers value their aims. One could argue that summative assessment is such an important issue for students, teachers, and course providers that experimentation with online assessment functions is risky and hard to find support for. Two obvious challenges for online assessment are authentication of student identification and detection of plagiarized digital material. Other barriers are public and institutional regulations, traditions for physical attendance, and technical limitations. These barriers to online assessment counteract the development of online education since they support face-to-face attendance and preserve traditional education.

While summative assessment of online courses seems to be very traditional and often has a face-to-face component, formative assessment is more experimental and based on online activities. However, there are some strategies that could improve online assessment. This author (Paulsen, 1998) has previously suggested that course providers should consider the following five strategies to organize and improve online assessment:

1. Consider testing the learners' ability to find and apply information, rather than to memorize and reproduce it. One possible approach to online assessment could be to focus more on the students' knowledge management abilities and less on their knowledge of the course content as Mason discussed in her book on global education:

...content-based methods of assessment are still being applied to conditions which demand a skills-based approach. This is undoubtedly because it is easier to design reliable assessment systems which test content rather than process. We have much less experience in assessing students' knowledge management abilities, the ways in which the course has transformed their thinking, and developed their skills in communicating and working with colleagues in the domain of the course content (Mason 1998, 42).

2. Consider applying assessment that does not require face-to-face sessions. It is noteworthy to observe that online assessment is not necessarily viewed as an important part of courses. But, if online courses rely on assessment in face-to-face sessions, flexibility for the students is substantially limited. For example, centralized, face-to-face examinations are not convenient for students who live far from the examination site. In comparison, assessment based on project reports and term papers are much more flexible with regard to time and space.

3. Consider including computer assessment. Computer assessment would suit online courses very well since course providers and learners have computers at their disposal. Such assessment could include simple multiple-choice assignments or more complex tutorials that monitor the students' progress. Further, computer assessment could provide immediate feedback and reduce teacher workload.

4. Consider including peer assessment. CMC could be very well suited for peer assessment because students easily can share and comment on contributions. After all, most CMC systems are developed to facilitate such collaboration. Further, by requiring peer students to take part in the process, assessment could become an integral part of their learning experience.

5. *Consider using group assignments.* Assessment of group assignments is likely to require less teacher workload than assessment of similar assignments prepared by individual students. Further, collaboration among online students could increase learning and result in a product of higher quality.

The CISAER project (Paulsen 2000) recommended that one should oppose regulations and attitudes that inhibit online assessment. Most of the institutions studied in the CISAER project apply several assessments methods in a course or program. Tutor assessment is the most common form of assessment found in the interviews. The interviews reveal many examples of self-assessment, but they imply that computer assessment is relatively scarce. However there are several examples of online quizzes, multiple-choice tests, and some examples of interactive exercises. The interview analysis implies that peer assessment is relatively scarce. The interviews indicate that some courses have no assessment simply because they are self-study courses with no tutors.

The web-edu analysis indicates that several LMS systems should improve their test and assignment tools. They could also be improved with regard to evaluation, e-portfolio, commenting on student presentations, management of competencies, assessment tools, and reports.

Teacher workload

Online education offers students excellent opportunities to individual communication with their tutors. They can be contacted via e-mail 24 hours a day, 365 days a year. Few learning environments provide equal opportunities for individual access to teachers. It is obvious that online students appreciate to always have a personal tutor available. It is the students' dream, but it could soon become a nightmare for the tutors.

Online education will never become a real success until we are able to limit the teacher workload. Therefore it is extremely important to consider teacher workload, especially during development of course assignments.

The CISAER project recommended that one should develop and implement strategies to reduce teacher workload. Further, the major concern arising from this author's thesis research (Paulsen 1998, 186) was how to keep teacher workload at an acceptable level. Hence, I suggested the following eight strategies to reduce the workload per student associated with large-scale enrollment.

1. *Form a group of experienced and well-trained teachers.* The survey shows that the teachers have relatively little experience in CMC teaching, and one may assume that the workload may be reduced as teachers are trained and gain more experience. Courses about CMC teaching and teacher training programs should be developed and made available for the teachers. The survey revealed that a number of such courses exist, but as additional research and experience on CMC teaching become available, more and better courses should be developed. Further, the literature review and the interviews indicate that the workload is especially high the first time one teaches a CMC course, and that material developed for one course could be used again in other courses. A group of teachers could possibly also benefit from collaboration and exchange of experience and course material. To facilitate teacher collaboration, the organization could organize face-to-face seminars and online faculty lounges for their teachers.

2. *Establish a system for technical and administrative support.* Some of the teachers suggested that support staff or the supporting organization should handle some functions for the teachers. For example, technical questions could probably be handled better by the technical support staff, and administrative requests could probably be answered better and more efficiently by the administrative staff. Even senior students could be engaged to support new students in order to relieve teachers from trivial support work.

3. *Shift attention from spontaneous interactive teaching to deliberate course design.* Moore (1990, 348) argued that "...preactive teaching is deliberative, a highly rationale process, interactive teaching is more spontaneous and to some extent controlled by students' questions, requests, and reactions." Moore's argument entails that the interactive workload depends more on the number of enrolled students than the preactive workload does. Similarly, the interviewees' advice on how teachers could handle more than 100 students indicates that the interactive workload could be decreased through careful preactive design and preparation. The course designers should also carefully consider which teaching techniques are suitable for the course. So, one possible way to handle high enrollment is to adapt the large-scale model with more emphasis on course design.

4. *Pay special attention to the assessment workload per student when you design course assignments.* The number and form of course assignments are especially important for the teacher workload. So, the course designers should pay especial attention to the teacher workload generated by the assignments. The teachers' assessment workload could be reduced considerably by substituting teacher assessment with peer-, computer-, or self-assessment. Further, group assignments could entail less teacher assessment than individual assignments do.

5. *Restrict teacher interaction with individual students and small groups of students.* Since the interactive workloads seem to be high in one-to-one techniques and in many-to-many techniques with high teacher involvement, high enrollment courses may have to use less of these interactive techniques even though they are perceived to have high learner outcome. These results support Bates (1991, 13) when he stated that the technology does not bring economies of scale unless the opportunities for interaction for individual students are dramatically curtailed.

6. *Encourage and facilitate interaction among students.* Students should be regarded as a resource for mutual learning. Services, teaching techniques, and assignments could be designed to encourage and facilitate interaction among students. Former students could become active alumni and be encouraged to participate in some interaction.

7. *Automate responses.* The teacher could develop a response library of often-used comments and even present this on a bulletin board for Frequently Asked Questions (FAQ). Further, automatic responses could be designed into a course, for example as automatic e-mail responses or self-correcting quizzes.

8. *Develop a scheme to handle the demand for expedient responses.* Several teachers comment that the time flexibility and the expected response time influence the nature of their workload. Therefore, one may argue that relaxing the requirements for expedient responses and allowing more flexible working hours could ease some teachers' perception of workload. However, students want expedient feedback, so co-teaching, shift work, and the use of teaching assistants may be considered as schemes to share a continuous and increasing

workload among several individual teachers. All teachers should also inform the students about their online work schedule, so that the students know which days of the week and what time of the day responses from the teachers could be expected.

Teacher training

The CISAER project (Paulsen 2000) recommended that one should support initiatives for training of online teachers, administrators, and instructional designers:

Online education is a new field with little research and practical experience. Practitioners need more knowledge and experience. Initiatives to disseminate existing research, examples of good practice, and training should be supported.

Teacher collaboration

The web-edu analysis shows that project teams often develop online courses. IT specialists and expert developers are often involved in the course development. Maybe this is because the course development systems are too difficult to handle by many individual teachers, or that the systems support collaboration among teachers. In any case, one may assume that collaborative course design result in higher quality courses.

Bandwidth and rich media

The bandwidth capacity has increased steadily and significantly ever since online education was introduced. This development will continue in the foreseeable future and provide online education with opportunities for more rich media content.

The web-edu project (Paulsen 2002a) showed that there is an obvious request for more bandwidth and more multimedia abilities. Several interviewees wanted to include video services such as streaming video, videoconferences, web-cameras, and moving pictures. Audio services such as voice communication and audio files were also requested. Some of the interviewees especially focused on multimedia tools such as videoconferencing and voice chat for better synchronous communication.

Administrative, organizational, and institutional issues

The CISAER project showed that institutions that plan to offer large scale and professional online education need an administrative system that is integrated with the web. A discouraging, but important observation is that a number of institutions do not use the web for administrative purposes. Many of the administrative solutions are primitive, and much could be done to improve most of the existing systems. The standard, commercial systems are continuously being improved, but they may still need much local adaptation. They may only meet some of the administrative needs, and they could place some pedagogical limitations on the courses.

The web-edu analyses shows that there is a general need for better administrative systems and tools. The analysis show that many systems could have better tools for administration of students, tutors, and content. The interviewees asked for better group management tools, student record systems, improved course management, and better password management facilities. Some interviewees more specifically want better services for student tracking and reporting functions.

Large scale operations

Online education has increased considerably during the last years. Five years ago, a typical educational institution piloted a few online courses for a limited number of students. Today, many institutions are implementing online education services to all their students.

Evidence of the world wide spread of e-Learning in recent years is easy to obtain. No fewer than 60.000 courses are listed on the TeleCampus portal from TeleEducation, New Brunswick, Canada (<http://courses.telecampus.edu>)

The current online education megatrend shows clearly a development from small-scale experiments to large-scale operation. This megatrend was pointed out in the CISAER-project two years ago (Paulsen 2000), and confirmed in the current web-edu project (Paulsen and Keegan 2002):

The interest in online education is high, and it seems to proliferate rapidly and globally. A Canadian competitive analysis (www.telelearn.ca/g_access/news/comp_analysis.pdf) shows that the primary expansion strategies are more and diverse programs, international students, and new and nice markets such as corporate training. The CISAER interviewees foresaw a future with more web-courses, additional online services, better quality of the courses, enhanced focus on teacher training, further collaborations with other institutions, and additional organizational consequences. (Paulsen 2000)

The analyses indicate that there is a clear trend that institutions offer more online courses today than they did three years ago. One may say that the trend is to go from small-scale to large-scale online education. If one characterizes institutions that offer at least 50 online courses as large-scale providers of online education, 30 of the 89 institutions (34%) we have data from could be characterized as large-scale providers. The analyses indicate that the trend towards large-scale online education has come further in the Nordic countries (60%) than in the other regions. (Paulsen and Keegan 2002)

Cost effectiveness

The CISAER project concluded that the financial barriers for online education are important. The analysis indicates that there are few institutions that can claim that provision of web-based courses has been an economic success, if they disregard external research and development grants. At the same time, most of the web-courses have relatively low enrolment. The cost of development and maintenance could be high, and there are many examples of expensive pilot projects that experiment with high-cost, state-of-the art technology. All this implies that it is necessary to focus much more on how online education could become more cost effective. This includes a focus on how online courses could handle larger enrolment and prioritizing cost effective technology and development schemes.

The current development towards large-scale operation entails that it is increasingly important that the institutions establish an *efficient and cost-effective infrastructure* that supports online education. This includes systems and routines for course development, customer relation management, course enrolment, student support, technical support, teacher training and support, examinations, payments, and logistics.

The web-edu project also concludes (Paulsen and Keegan, 2002) that cost effectiveness becomes more important as the institutions become large-scale providers of online education. The interviewees have, however, vague knowledge about the system's maintenance and operation costs. The cost and pricing structure for the commercial systems vary from system to system. This could make it difficult to compare real costs. Some interviewees were considered about high and increasing prices for the commercial LMS systems.

Teaching Incentives and Barriers

In this section we shall be discussing what motivates online teachers and the problems they encounter when they teach online. It focuses on the teachers' pre-active and interactive workload, their perception of the workload, and alternative strategies to reduce the workload. The available literature on the perspectives of distance education faculty is also relevant to online teachers. Michael G. Moore and Greg Kearsley (1996) have summarized some reviews on faculty perspectives and evaluation about distance education in general. In the article they present the following findings from Dillon and Walsh (1992):

- Faculty indicates that distance teaching requires a personalized and empathic rapport with students.
- Communication skills (voice quality, eye contact, body language, clarity) are critical for distance teachers.
- Faculty who teach at a distance are generally positive toward distance education, and their attitudes tend to become more positive with experience.
- Faculty motivation for teaching at a distance comes from intrinsic (e.g., challenge) rather than extrinsic (e.g., financial rewards) motivation.
- Faculty believes that distance teaching experience improves their traditional teaching as well. (<http://wbweb4.worldbank.org/DistEd/Teaching/Instruction/tut-01.html>)

Moore and Kearsley (1996) also refer to Blanch (1994) who analyzed the barriers to faculty adoption of distance education approaches at California State Polytechnic University. They stated that the greatest obstacles were:

- a lack of awareness on the part of the university community of the general benefits of distance education;
- lack of incentives for faculty to be involved in distance education;
- the unreasonableness of expecting faculty to commit themselves to a very different teaching approach without any trial period; and
- the faculty's sense that distance education was not integrated within the university's programs and plans. This last obstacle emphasizes the importance of an institution-wide policy regarding distance education. (<http://wbweb4.worldbank.org/DistEd/Teaching/Instruction/tut-01.html>)

Finally, Moore and Kearsley (1996) included the following recommendations to administrators who wish to support good distance teaching. The recommendations are based on Baker and Dickson's (1993) experiences at Western Illinois University:

- Hire support personnel to provide assistance with instructional design and the installation, operation, or maintenance of equipment.

- Establish a faculty development laboratory to provide a place to try out and practice with technology.
- Provide administrative support for distance education efforts.
- Be sensitive to faculty's needs for incentives and recognition for distance teaching efforts.
- Provide faculty training, not only in the use of the technology involved but also in presentation and participation skills.
(<http://wbweb4.worldbank.org/DistEd/Teaching/Instruction/tut-01.html>)

The three studies presented above focus on distance education, not on online education. They indicate, however, that a number of changes must be made both institutionally and individually to ensure successful online teaching. In particular, administrators of online programs must develop strategies to reduce barriers toward online teaching and provide sufficient incentives to recruit and keep competent online teachers.

Flexibility

In online education there is a conflict of interest between many students who prefer individual flexibility and educators who promote collaborative learning. Many students choose to study online because they want or need individual flexibility. They have full-time jobs and family responsibilities, and many are reluctant to participate if it means relinquishing high-quality family life and job achievements. They need flexible education: education that allows them to combine job, family, and education in a manageable way.

Figure 1 illustrates six dimensions of flexibility that many individual students want. The challenge is to develop online learning environments that support this individual freedom as well as collaborative learning. This challenge is discussed in the theory of cooperative freedom (Paulsen 1993).

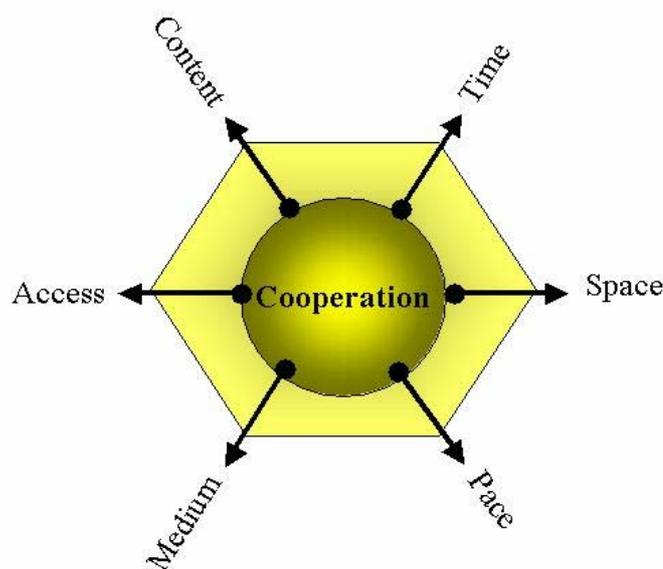


Figure 1. The hexagon of cooperative freedom

The CISAER project (Paulsen 2000) concluded that Both enrollment and progress can be more or less flexible. However, the two main models found in the interviews are group enrollment and progress and individual enrollment and progress. These models represent two different strategies that have important consequences for marketing strategies, administrative systems, and pedagogical approaches.

The interviews testify that group based enrollment and progression is far more used than individual enrollment and progression. The analysis identified 46 institutions that used the group model and 12 that followed the individual model. In addition, 11 institutions offered both models.

The preponderance of the group model could come from conventional thinking that sustain the semester and term system in traditional educational systems. Another possible reason is that the institutions have a well-considered perception that teamwork and collaborative learning is hard to achieve with individual enrollment and progress. One can however argue that many students will prefer individual flexibility and that many institutions lack systems, structures, and competence on individual enrollment and progression. If so, one may hypothesize that open universities and distance teaching institutions should be more disposed of individual flexibility than traditional universities and colleges. However, the analysis has not found evidence to support this hypothesis.

A few of the web-edu interviewees especially pointed out that they wanted more flexible solutions because that they felt too dependent on the systems intrinsic structure and design. One especially wanted better control of graphical design, logos, etc. Another would like to have access to the systems source code.

Accessibility

There is a growing interest of accessibility to web content, which focuses on how to make web content more accessible to people with disabilities. Two good resources for more information about this are:

- W3C's Web Accessibility Initiative (WAI) (<http://www.w3.org/WAI/>)
- Introduction to Web Accessibility (<http://www.webaim.org/intro/intro2>)

One may expect that more e-learning providers will utilize the result from the accessibility initiatives in the future.

Socio-economical issues

The CISAER project concluded that the interest in online education is high, and it seems to proliferate rapidly and globally. A Canadian analysis shows that the primary expansions strategies are more and diverse programs, international students, and new and nice markets such as corporate training. The CISAER interviewees foresaw a future with more web-courses, additional online services, better quality of the courses, enhanced focus on teacher training, further collaborations with other institutions, and additional organizational consequences.

E-learning standards

The most prominent organizations dealing with e-learning standards are:

- Advanced Distributed Learning Network (ADLNet)
- Sharable Course Object Reference Model (SCORM)
- Aviation Industry CBT Committee (AICC)
- Instructional Management Systems Project (IMS)
- Extensible Markup Language (XML)
- Microsoft's Learning Resource Interchange (LRN)
- IEEE Learning Technology Standards Committee (LTSC)

The web-edu project (Paulsen and Keegan, 2002) concludes that the institutions in North Western Europe are sensitive to the e-learning standards and they are considered almost as a norm. The Nordic interviewees are aware of the standards, and several claim to follow them. But few state that the standards are important to their institution, and e-learning standards do not seem to have had much impact on online education in the Nordic countries. The German analysis states that standardization will play an important role in the future. In Southern Europe it seems to be a considerable ambivalence with regard to e-learning standards.

The web-edu analysis (Paulsen 2002a) also indicates that there is an interest for standards and standardizations that can make it easier to exchange content and data between LMS systems and between LMS systems and other systems. Some of the interviewees spoke of the importance of on standardization in general terms. Many were concerned about the possibility to use, import, and export standardized course content and learning objects. Two German experts spoke about the importance of XML and meta-tagging. And many references were made to standards specifications and initiatives such as SCORM, IMS, AICC and IEEE.

LMS-systems

The Web-edu project analyses the satisfaction, or lack of satisfaction, of European institutions with the e-Learning Learning Management Systems (LMSs) that they have purchased or developed themselves. Data was collected from in-depth interviews with 113 European experts, usually the e-Learning systems managers in the institutions, in 17 countries. The analyses of the interviews revealed as many as 52 different commercial and 35 self-developed LMS systems. It is however important to observe that only a few systems are used by several institutions. The analyses indicate that the following systems are among the most used commercial LMS systems in Europe, since they were the only systems that five or more institutions had experiences with:

- BlackBoard (14 institutions)
- WebCT (20 institutions)
- FirstClass (7 institutions)
- TopClass (7 institutions)
- Lotus Learning Space (6 institutions)
- ClassFronter (16 institutions)
- LUVIT (5 institutions)
- Tutor2000 (5 institutions)

A striking conclusion of this study is that the generally accepted position that the market is dominated by the American LMS systems, is not the norm throughout Europe. In the

countries that not use English as their first language, locally developed LMS systems have successfully repelled the American products. A remarkable large number of the LMS systems used in Europe are commercial systems developed locally or self-developed systems at the institutions.

The following conclusions were presented by Paulsen and Keegan (2002):

There are significant regional differences within Europe with regard to how far the institutions have come in their use of LMS systems. The differences seem to follow the regional statistics for Internet users, which means that the Southern Europe, the Czech Republic and Slovakia seems to be less mature with regard to use of LMS systems than the other regions.

The analyses indicates that the BlackBoard, ClassFronter, FirstClass, Lotus Learning Space, LUVIT, TopClass, Tutor2000, and WebCT are among the most used commercial LMS systems in Europe.

The analyses found four European LMS systems that seem to be significant competitors on the European market. TopClass originated as a European Commission project at the University College Dublin, in Ireland, before becoming an Irish campus company and then migrating to the United States. ClassFronter is a Norwegian developed system that has a very dominant position in Norwegian universities and colleges. The system is available in a number of languages and sold to institutions in several countries. LUVIT originated at the University of Lund in Sweden, before it became a Swedish commercial company with reasonable success in Scandinavia and some other countries. Tutor2000 seems to be a successful LMS provider in the Czech Republic.

A striking conclusion of this study is that the generally accepted position that the market is dominated by the American LMSs, is not the norm throughout Europe. In the countries that not use English as their first language, locally developed LMS systems have successfully repelled the American products. A remarkable large number of the LMS systems used in Europe are commercial systems developed locally or self-developed systems at the institutions. However, very few of these systems seem to have more than a few user institutions.

There are remarkably many institutions that use self-developed LMS systems, and there may be many covert and vicarious reasons for choosing self-developed LMS-systems. But the analyses indicate that these institutions perceive the commercial systems as expensive and complex. The self-developed systems surpass linguistic problems and are regarded as supportive of special needs and target groups.

Systems integration

With the introduction of large-scale online education, the need for integration between LMS systems and other online education systems as illustrated in Figure 2.

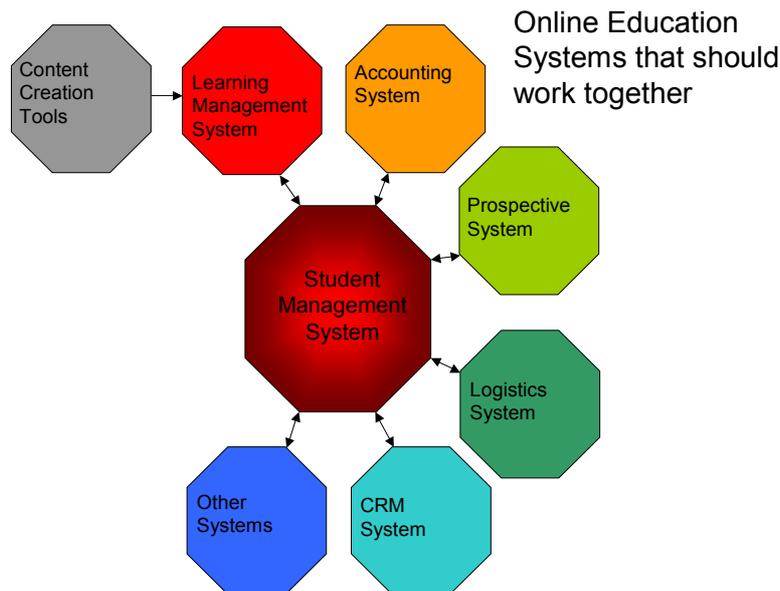


Figure 2. Online education systems that should work together.

The Web-edu analyses revealed a general lack of such integration. It is however interesting to see that the Nordic universities have standardized on a few national student management systems and that interesting integration efforts are in progress.

Many of the web-edu interviewees (Paulsen 2002a) wanted better integration between the LMS systems and various other systems and services. Some institutions claimed that there was a need for integration in general. Universities and colleges were concerned about integration with the student management systems that usually contains the central student databases with student records, examination results, fees etc. Some institutions also wanted integrated online payment systems. And the companies focused on integration with their human relation management systems and competency management systems. A Norwegian distance education institution also mentioned the need for better integration with the online catalogue that it use for course marketing and automatic tracking of shipment of textbooks. Finally, it seems that some of the services within the LMS systems could be better integrated.

Globalization and competitiveness

The CISAER-project recommended promoting national and international harmonization of degrees, certificates, credits, and grades to facilitate online mobility of students.

The CISAER catalogue includes entries from institutions in all continents. In addition to four transnational institutions, the catalogue includes entries from institutions in 26 countries. It is likely that there is an overrepresentation of institution from countries that have English as an official language since the primary research language was English. Still, it would be quite easy to include many more entries from North America, since the listing from this area is intentionally partial. Among the 130 catalogue entries, 45.4% were from the English language countries: USA, UK, Australia, Canada, and Ireland.

Most institutions or consortia have not identified international markets as an initial priority.

There is a steady growth of institutions that offer online courses to students in other countries, and the analysis presents many examples of international collaboration and thinking. However, most of the global initiatives seem to be experiments and ambitions rather than main priorities. One important barrier is the problems with acceptance of foreign degrees, certificates, credits, and grades as an integral part of education and professional development. International collaboration will benefit from an harmonization on these important issues. North American universities may have a competitive advantage compared with Europe since North American universities have a relatively long tradition of credit transfer.

Accreditation could be an important competitive advantage and several strategies could be followed to achieve the necessary accreditation. Collaboration with institutions in other countries could result in bilateral accreditation.

The survey indicates that institutions in Europe (60.8%), North America (21.5%), and Australia with New Zealand (7.7%) overwhelmingly outnumbers institutions in South America (3.1%), Asia (3.1%), and Africa (0.8%). Even though the researchers have a better knowledge of Europe, North America, and Australia than they have of the rest of the world, the survey testifies that these continents overwhelmingly dominate web-based education.

North America dominates the world of online education. Some of the reasons for this dominance are the well developed Internet infrastructure, the economic strength of the educational providers, the international dominance of the English language, the well developed university systems, and the famous brand-name universities.

The linguistic diversity in Europe is problematic for global competitiveness. Hence, UK providers seem to have a more international approach than providers in other European countries. Different national systems of degrees, certificates, and grades also make it more difficult to compete globally. A European harmonization of these systems will increase the competitiveness. Further, unlike North America, higher education in Europe is largely state funded, and this could resist change and become a barrier to competitiveness. The most obvious example is that national regulations in countries such as Sweden and Germany prevent institutions from charging tuition fees.

The Australian institutions are among the largest and most advanced in this analysis. Since the courses also are provided in English, Australian institutions should be very competitive in the emerging global market.

Funding and commercialization

The CISAER project (Paulsen 2000) recommended that one should oppose national regulations that inhibits institutions from charging tuition fees:

A country should allow its universities and colleges to charge tuition fees for web-based course. Countries that don't can hardly be competitive in the emerging global educational marketplace. Tuition fees can stimulate change, facilitate collaboration between institutions, and be an incentive for export of courses. Examples from both Germany and Sweden show that these countries restrictions are perceived as a barrier for online education.

In Australia, distance education is viewed as one of the country's most important export industries. The education and training action plan for the information economy from the

Commonwealth Government (DEST 2000) clearly states: “Education in Australia is a multi-billion dollar export industry of vital importance to our economy.” However, in Scandinavia, export of education does not even seem to be an issue for public discussion.

In Scandinavia, education is traditionally perceived as a public service that should be available free of charge. Although there is increasing acceptance for commercialization of education, Swedish universities, are not allowed to charge its students tuition fees. In comparison, Norwegian universities and colleges are now obliged to charge tuition fees for further and continuing education – educational initiatives that in recent years has become the most dynamic and innovative sector of education in Norway. Since Sweden lacks this economic incentive for change, the country will likely face future difficulties when competing with online education in other countries.

On balance, online education appears to be less developed in Sweden than it is in Australia and Norway. This may be partly due to the lack of economic incentives to offer online programs as a source of extra income. It may also be due to the fact that governmental online education initiatives tend to be imposed, and often without local institutional support. One such example is three Swedish distance education consortia, which have received considerable governmental funding since 1993-94 (Hillefors et al, p. 22; Ranebo, 2001). At its peak, these three consortia offered from 40 to 50 courses, to 5,000 to 6,000 students (Hillefors et al., p. 26). After nearly ten years of unimpressive results, funding is to be discontinued. To replace these consortia, the Swedish government has recently established Nätuniversitetet (<http://www.netuniversity.se>), a new national body to fund and coordinate Sweden’s distance education activities. In 2002, Nätuniversitetet will provide financial funding for the equivalent of 2,350 full-time students at 30 Swedish higher institutions.

Norwegian institutions typically charge students 3000 to 4000 euro for online courses, equivalent to one-year full-time study. In contrast, for the year 2002, Swedish universities will receive 12 000 euro in governmental funding from Nätuniversitetet for similar online courses of equivalent length. This is about three times more funding than Swedish universities receive for an on-campus student engaged in full time studies. Such lavish funding is probably intended to increase the development of online courses. However, it could also easily set a standard for future costs of online education courses. In the view of this author, the Swedish approach is unwise, as it not cost effective and could set an unhealthy precedent for future overspending.

Mobile learning

Mobile learning (m-learning) is here defined as learning that can take place anytime, anywhere with the help of a mobile computer device. The device must be compatible of presenting learning content and providing wireless two-way communication between teacher(s) and student(s).

Dye et al (2003) conclude that:

...wireless Internet is a must for m-learning to take off. To cater for huge chunks of data that is common in most educational websites, there is a need for high-speed wireless data transfer. However, this should be at affordable costs to the general public. The biggest impact m-learning will have on both students and teacher is increased flexibility. As a result, learning will be able to take place in other environments. Increased flexibility will place some demands on both teacher and student. It will require the student to have a high

level of discipline in order to achieve his or her academic goals, while the teacher might have no clear-cut- division between working hours and leisure time.

The key to making m-learning courses widely adapted is to target devices that have already penetrated the market and have good usability. There is no use creating courses for a device that is not widely adapted. The user will not buy a new device for m-learning, but might use an existing device for something new, such as education. Technology might help education by providing an easier way to communicate among peers as well as between students and teachers. The possibility of instant help from a peer or tutor creates an ideal environment for collaborative learning.

References

- Argyle, M. 1991: *Cooperation: The basis of sociability*. London: Routledge.
- Baker, B.O. and Dickson, M. W. 1993. Aspects of successful practice for working with college faculty in distance learning programs. *Ed Journal*, 8(2), J-6.
- Bates, T. 1991. Third generation distance education: The challenge of new technology. *Research in Distance Education* 3(2):10-15.
- Blanch, G. 1994. Don't all faculty want their own TV show? Barriers to faculty participation in distance education. *DEOS*, 4.(1).
- DEST (2000). Learning for the knowledge society. An education and training action plan for the information economy. [Online] Available at: www.dest.gov.au/schools/Publications/2000/learning.htm
- Dichanz, H. 2001: E-learning, a linguistic, psychological and pedagogical analysis of a misleading term. Paper presented at the 20th ICDE World Conference in Düsseldorf 2001.
- Dillon, C. L. And Walsh, S. J. 1992. Faculty: The neglected resource in distance education. *American Journal of Distance Education* 6(2), 64-69.
- Dye, A., K'Odingo, J. A. & Solstad, B. 2003. *Mobile Education - A Glance at The Future*
- Garrison, D. R. 1989: *Understanding Distance Education*. London/New York: Routledge.
- Garrison, D. R. 1993: Quality and access in distance education: theoretical considerations. In:
- Keegan, D. (ed.): *Theoretical Principles of Distance education*. London/New York: Routledge.
- Harasim, L. 1989. On-line education: A new domain. In *Mindweave: Communications, Computers, and Distance Education*, eds. R. Mason and A. Kaye, 50-62. Oxford: Pergamon Press.
- Hillefors, L., Myringer B., Svanteson B., Rathsman I., and Gisselberg M. (2001). Ett Nätuniversitet för livslångt lärande och kompetensutveckling. Rapport från en utredning utförd på uppdrag av styrelserna för Distanskonsortiet, Svenska Distanshögskolan och Västsvenska konsortiet för flexibelt lärande.

- Holmberg, B. 1960. *On the methods of teaching by correspondence*. Lunds universitets årsskrift. Lund: Gleerup
- Holmberg, B. 2001: A Theory of Distance Education Based on Empathy (unpublished paper).
- Johnson, D. V. & Johnson, R. T. 1990: Cooperative Learning and Achievement. In: Sharan, S. : Cooperative Learning. Theory and Research. New York: Praeger.
- Kaplan-Leiserson, E. E-Learning Glossary. <http://www.learningcircuits.org/glossary.html>
- Keegan, D. 1988. On defining distance education. In *Distance Education: International Perspectives*, eds. D. Sewart, D. Keegan, and B. Holmberg, 6-33. London/New York: Routledge.
- Keegan, D. 1988. Theories of distance education. In *Distance Education: International Perspectives*, eds. D. Sewart, D. Keegan, and B. Holmberg, 63-67. London: Routledge.
- Keegan, D. 1996. *Foundations of Distance Education*. 3rd Ed. London: Routledge.
- McConnell, D. 2000: *Implementing Computer Supported Cooperative Learning*. London/Sterling: KoganPage.
- Mason, R. 1998. *Globalising Education. Trends and applications*. New York, NY: Routledge.
- Moore, M. G. 1990. Correspondence study. In *Adult Learning Methods*, ed. M. W. Galbraith, 345-365. Malabar, Florida: Krieger Publishing Company.
- Moore, M. G. 1991: Editorial: Distance Education Theory. *Am. J. of dist. Ed.* 5, 3, pp. 1-6.
- Moore, M. G. 1993: Theory of transactional distance. In: Keegan, D. (ed.): *Theoretical Principles of Distance education*. London/New York: Routledge.
- Paulsen, M. F. 1993. The Hexagon Of Cooperative Freedom: A Distance Education Theory Attuned to Computer Conferencing. DEOSNEWS Vol. 3 No. 2.
- Paulsen, M. F. 1998. *Teaching Techniques for Computer-mediated Communication*, Ann Arbor, Mi, UMI Dissertation Services
- Paulsen, M. F. 2002a. *Potential Improvements in Learning Management Systems*
- Peters, O. 1965: *Die Didaktische Struktur des Fernunterrichts. Untersuchungen zu einer industrialisierten Form des Lehrens und Lernens*.
- Peters, O. 1983: Distance teaching and industrial production: a comparative interpretation in outline. In: Sewart, D., Keegan, D. & Holmberg, B. (eds.): *Distance Education. International Perspectives*. Croom Helm.
- Peters, O. 1989: The iceberg has not melted: further reflections on the concept of industrialisation and distance teaching. *Open Learning*, 4, 3, pp. 3-8.

- Ranebo, S. 2001. A Nordic Survey of National Initiatives for the Development of Virtual Universities. Nordiska ministerrådets IT-policygrupp. (http://www.norden.org/it-p/dok/NORDIC_VIRTUAL_UNIVERSITIES.pdf)
- Rapaport, M. 1991. Computer Mediated Communications: Bulletin Boards, Computer Conferencing, Electronic Mail, and Information Retrieval. New York: John Wiley & Sons.
- Thorpe, M. (2001): Learner support: A new model for online teaching and learning. Paper to the 20th ICDE World Conference, Düsseldorf.
- Verner, C. 1964. Definition of terms. In Adult Education: Outlines of an Emerging Field of University Study, eds. G. Jensen, A. A. Liveright and W. Hallenback, 27-39. Washington, D.C.: Adult Education Association.

Appendix 1: Template for Delphi Analyses

Name of analyser:	
How analysis was done:	

Context Related Project Information

The first step for the evaluation of the project is to define the operating context within which the project has been delivered. It determines the specific project's characteristics, specifically, those related to innovative approach to the use of ICT in learning.

Project Title and number	
Project web address	
Programme and Call	
Current Status	
Scope of the project - <i>Main goal</i> - <i>Envisaged outcomes</i>	
Main Contractor	
Other Project Partners	
Project Period	
Budget	
Focus area (Technology, Market, Pedagogy, Organizational change)	

Input Related

The objectives of this analysis are:

- To identify and assess the capabilities, strategies, and designs available in implementing the project as related to the Delphi objectives.
- To identify the implementation process and the solution strategies applied.

PROJECT INPUT

<i>Target population (academic level, sector, etc.)</i>	
<i>Statement of the problem</i>	
<i>Specific goal of the project</i>	
<i>Objectives of the project</i>	
<i>Research questions posed</i>	
<i>Methodology used</i>	
<i>Learning technologies applied</i>	
<i>ICT in the innovation studied (ICT arrangements)</i>	
<i>Learning scenario</i>	
<i>Main Learning issue(s) intended to study</i>	
<i>Community assessment</i> a. Sectoral b. Project	
<i>Exploitation Potential</i>	
<i>Implications for LLL</i>	
<i>Intercultural implications implied</i>	

Research Question 1: Key innovations in Pedagogical issues

<i>DIMENSIONS</i>		<i>Qualitative Indicators of change</i>
1.1 Teaching and learning philosophy		
1.2 Teaching techniques, methods, and devices		
1.3 Assessment		
1.4 Teacher workload		
1.5 Teacher training		
1.6 Teacher collaboration		
1.7 Bandwidth and rich media		
1.8 Other issues		

Research Question 2: Key Issues in Organizational and institutional issues

<i>DIMENSIONS</i>		<i>Qualitative Indicators of change</i>
2.1 Large scale operations		
2.2. Cost effectiveness		
2.3 Incentives		
2.4 Flexibility		
2.5 Accessibility		
2. 6 Other issues		

Research Question 3: Key Issues in Socio-economical issues

<i>DIMENSIONS</i>		<i>Qualitative Indicators of change</i>
3.1 E-learning standards		
3.2 LMS systems		
3.3 Systems integration		
3.4 Globalization and competitiveness		
3.5 Funding and commercialization		
3.6 Mobile learning		
3.7 Other issues		