Research into Online Distance Education and E-Learning
Making the Difference
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Theme 1. Research into institutional planning, management and quality development for online distance education and e-learning

Practical Research and Research in Practice
The Customization of a Research and Practice Based Quality Assessment Tool to a Particular e-learning Setting

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Abstract

The intention of this presentation is to give an overview of the process involved in researching and customizing existing best practices, criteria and standards to a particular e-learning environment and the criteria chosen for a particular work environment - continuing education at American community colleges. It will briefly elude to the starting point, the authors' positions, the selected criteria, where they originate, why they were selected as well as the intentions with the product that resulted from research and customization of existing models. The authors were both independently involved in quality assessment projects and had researched and worked in European as well as US based contexts before they joined forces for this particular project.

1. Starting Points

Both authors have a Masters in Distance Education from UMUC and have been involved in researching and working with quality assessment criteria, methods, and tools since 2004. In a trans-continental context a number of models and criteria were sampled (some tools were filtered using WICHE[1] standards). The most important examples include: Northern Ireland eLearning, Southern Regional Education Board (USA), the Sloan Consortium (Sloan-C), Canadian Recommended E-learning Guidelines (CanREGs)[2], Open eQuality Learning Standards (European-Pan American), AG-F – Arbeitskreis Qualität AKQ[3] (Germany). The authors both researched the "Inter-Institutional Quality Assurance Project, "Quality Matters" independently of one another.

[1] Western Interstate Commission on Higher Education
[2] FuturEd
[3] Working Committee Quality, Distance Education Section of the German Association for University Continuing and
Distance Education

2. Initial Position

The authors had individually and in their varying work contexts researched and applied different models of quality assessment tools (based on the prior research described above). Most recently Walti worked with UMUC and the University of Oldenburg on the EFMD-CEL Accreditation of the MDE Program and Templeton and Walti worked with the Inter-Institutional Quality Assurance Project, "Quality Matters" rubric reviewing credit courses from Maryland Community Colleges and vendor courses from Ed2Go, Gatlin Education Services and Success is Easy. As their work environments changed (to become more similar), the focus on the development and implementation of a tool that put the quality of distance course offerings in continuing education contexts (as opposed to credit contexts) of US American community colleges rose to the foreground. The goal was to work with (or if necessary adapt) objective and generally accepted criteria, which would allow fellow continuing education specialists to make choices based on Best Practice when offering courses to their learners that were not self developed.

3. Selection of a Model

Independently of one another and in different contexts Walti and Templeton researched quality assessment tools and models. Templeton's introduction to her (unpublished) master's thesis on Assessing Quality in Online Courses is:

> "Measures of learning and of quality are elusive and often controversial in higher education (Oblinger, Barone, Hawkins, 2001). Developers of faculty and student programs recognize that learning is both social and private, and experiential and that higher order learning requires reflection and knowledge construction, which are key elements for quality assurance in online learning (Alley & Jansak, 2001). The success of an online course is affected by its pedagogical richness, which is the degree to which a course addresses learning styles, use of media, and interactivity with content, testing, and feedback, and collaboration. Other success factors include content quality, delivery support functions for instructors, administrators, and students, including those with vision and hearing impairments; pedagogically driven instructional design with well defined objectives, web site usability factors, and technological factors (Sonwalkar, 2002). Alley and Jansak (2001) stress that internal course design elements such as student motivation and involvement and the art of instruction also affect course quality" (Templeton, 2004).

Literature and model review conducted by Walti[4] showed that assessment tools can be used for a variety of reasons e.g. to give a 'seal of approval', for certification, accreditation, an appraisal, a label or as in Canada an 'eQualityCheck'. In addition, quality assessment tools can be applied to a number of different levels: learning objects, courses, programs, organizations and product components. The levels of courses and programs were the most frequent areas of application (Walti, 2004).

When applying an assessment tool a number of questions must be considered:

1. What does the person/group applying the assessment tool deem as 'manageable'?
2. Is everyone clear on the difference between standards and criteria?
3. How do these relate to manageability?

[4] The blog with the researched literature can be found at: http://winproject.blogspot.com/

4. What makes sense in terms of applicability and sustainability of a quality assessment undertaking?
5. Who performs or carries out the assessment?
6. Is peer evaluation a possibility and if so how can it be constructed?
7. Should self assessment be a possibility? (Walti, 2004)

A variety of dimensions were found in the models described in the literature. Some of the most important and more manageable ones follow:

3.1. Group*:*

- Performance
- Features
- Reliability
- Conformance
- Durability
- Serviceability
- Aestetics
- Perceived quality

3.2. Group:

	Attitudinal	Practicability
Technological		
Pedagogical		
Organizational		

3.3. Group:

- Content creation and authoring
- Archiving and retrieval
- Delivery and distribution
- Learner support (tutoring, coaching, interaction) and communication
- Administrative support and student administration

3.4. Group:

- Institutional commitment and context
- Technology
- Student services
- Instructional design and course development
- Instruction and Instructors)
- Delivery
- Finances
- Regulatory and legal compliance
- Evaluation

3.5. Group

- Institutional commitment and context
- Curriculum and instruction

- Faculty support
- Student support
- Evaluation and assessment

3.6. Group

- Design and delivery
  - Instructional strategies
  - Communication strategies
  - Technology strategies
- Provision
  - Selection
  - Training and guidance
  - Teaching strategy
- Monitoring
  - Methods and tools
- Evaluation
  - Process results for students

4. QM Grant and Research

Based on the above described research, the authors' own work and application of assessment models and tools the Quality Matters Rubric based on the Inter-Institutional Quality Assurance Project[5], was selected as the tool that seemed to lend itself best to the continuing education environment to assess the quality of courses being offered by commercial products or ones developed by external partners in continuing education divisions at community colleges in Maryland (USA). The Quality Matters Rubric based on the Inter-Institutional Quality Assurance was extensively tested and applied at Maryland Colleges and beyond for credit courses. Both authors have had training and experience in applying the rubric and were strongly involved in offering products developed by commercial vendors or external partners. Together with the Distance Learning Affinity Group (DLAG)[6] the authors applied for and received a grant to test this assumption.

The objective of the grant research was to determine whether:

- The Quality Matters: Inter-Institutional Quality Assurance in Online Learning rubric, *which was developed primarily for reviewing online credit courses, to certify the quality of online courses and online components,* can be used for continuing education vendor/partner courses.
- If so, what value is there in using the rubric for these vendor courses?
- If not, to what extent and how can/should the rubric be adjusted?
- Raise awareness in the continuing education community of the necessity to apply best practices in this context.
- Share assessed courses with community college colleagues via MarylandOnline (MOL)

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[5] This annotated rubric can be found at http://www.qualitymatters.org/documents/Rubric%20Annotated%20FY0506.doc

[6] The DLAG is a group of continuing education professionals from all Maryland community colleges that deals with aspects, issues and opportunities that arise in distance education.

The quality of the vendor courses researched for this grant were based on the preliminary data collected by checking the alignment process with regard to the course objectives, interaction, activities, resources and materials, assessment and measurement and ADA compliance. The basis was the (credit) QM rubric and the scoring summary as developed by Quality Matters.

The rationale to conduct this research was to initiate the implementation of established and widely accepted quality standards, quality improvement of teaching and learning, and continuous development of a quality improvement tool. By using/adapting data from the QM rubric (i.e., course assessment, and program reviews) an evaluation framework for colleges to choose external products for a specific target segment would be available. The QM rubric as it exists is widely tested and used in Maryland colleges and beyond. Thus it would provide a tool to communicate standards to vendors, to make recommendations to Continuing Education Divisions on products and/or to strengthen existing courses and provide a tool to market their courses. As more and more commercial courses are reviewed, the statewide consortium of Maryland Community Colleges, MOL, could broaden its database of reviewed courses[7] and the scope in which the assessment tool, with possible adaptations, can be used.

The Data Collection consisted of:

- An extended project team (consisting of the authors and the DLAG) defining the differences between credit and noncredit structures within the context of this research and determining whether this has an influence on the criteria and standards developed for the rubric.
- Applying the rubric through the project team to 19 courses from three vendors and covering a number of different disciplines (Computer Applications, Healthcare, Writing, Business and Management, etc.).

The data collected reflecting structural differences between credit and continuing education, the application of the rubric, and the scoring summaries served as the research material on which recommendations to the various stakeholders were made.

5. Results

As mentioned earlier, the existing QM rubric was created primarily as a tool for faculty peer review. Our review of the differences between credit and continuing education divisions showed that learning outcomes in credit courses are more clearly defined, regulated and standardized. Continuing Education divisions must meet and satisfy more varied needs such as

a) certification and licensure;
b) personal enrichment;
c) professional development and CEU[8] demands;
d) varied course length, breath and depth.

Traditionally, continuing education (at community colleges) has spent fewer resources in developing their own online courses because this is a costly and time-consuming process in what is considered to be a very dynamic environment where quick responses are often of the essence.

[7] To date the existing database consists solely of credit courses.
[8] CEU stands for Continuing Education Unit. One CEU represents ten contact hours of participation in an organized continuing education experience under responsible, qualified direction and instruction.

These units have less experience, and at a different level and fewer resources than credit units when it comes to (developing) and assessing (and thus dealing with) web-based courses. The rubric was designed to accommodate a team approach where at least three persons, with the support of a team leader, assess a course using the rubric as their tool and in which the course instructor is available for clarification. In addition, reviewers receive a small stipend for their work, which is generally not available in continuing education units.

The numerical results of the rubric were tallied and the detailed comments by the reviewers were condensed.

The rubric in its existing form (for credit classes) proved to be too complex and too time consuming to be applied to non credit courses on a regular basis. These are in general much shorter than credit classes and target audiences that have other needs than those in their basic education. It also became clear that training was necessary to understand the concepts and help reviewers focus on design and not content. Upon review of this evidence and for the reasons outlined above (the differences in structure and resources between credit and continuing education divisions) it became clear that an adapted tool was needed in order to assess external products with the limited resources and interaction with the course designers/instructors that the continuing education units have with commercial suppliers. While the existing rubric is a valuable foundation, it did not meet the needs and/or circumstances of continuing education units

6. Recommendations

The authors then proceeded to develop a checklist (see table 1 below) that allows courses to be checked for a set of criteria and at the same time identified college and course producer responsibilities and divided these into a ‘vendor’ and a ‘college’ rubric that was based on best practices as described by Rosenberg (2001).

Recommendations for a required number of points to ‘pass’ the ‘**VENDRIC’** are not advocated. Rather, the research process clearly showed that depending on the department or content area of continuing education concerned, the number of necessary points can and should vary. The goal of this approach is to stress the need to go through the quality assessment process at all, and offer a mangeable and sustainable tool that works within the available resources.

6.1. VENDRIC (Course Checklist)

Vendor Rubric					
5 = to a very high degree; **4** = to a high degree; **3** = sufficiently; **2** = to a low degree; **1** = not at all					
	5	**4**	**3**	**2**	**1**
I. **Course Overview and Introduction**					
- Navigational Instructions make the course easy to understand - The course and learning structure are clearly introduced - Minimum technology requirements, learner skills and prerequisites are clearly stated - The instructor's introduction is appropriate and communication conventions and expectations are addressed					
II. Learning Objectives (Competencies)					
- Course learning objectives describe measurable outcomes - Learning objectives are articulated and specified on the unit/module level - Instructions how to meet objectives are stated					
III. Assessment of Successful Completion					
- Assessments are appropriate to the learning environment, goals and desired outcomes - Assessment and completion policies are transparent - Self-check or practice tests provide feedback - Variation in assessments, test, projects is sufficiently comprehensive					
IV. Resources and Materials					

- Materials support the learning objectives
- Resources and materials are:
  - Sufficient in breadth and depth and regularly updated
  - Appropriate for the online environment
  - Varied in terms of delivery and content
  - Appropriately cited and attributed					

V. Learner Interaction					
- Course design prompts the instructor to be present, active and engaged - Requirements for interaction are clearly stated - Standards for instructor response and availability are clear - Learning activities promote the achievement of objectives and outcomes					
VI. Technology					

- Tools and Media:
  - Support learning objectives
  - Compatible with existing standards of delivery
- Technologies are either provided or downloadable and instructions are provided					

College Rubric					
5 = to a very high degree; **4** = to a high degree; **3** = sufficiently; **2** = to a low degree; **1** = not at all					
	5	**4**	**3**	**2**	**1**

VII. Learner Support					
- Instructions on how to access the course, websites and resources are available to learners - Description of technical support responsibilities are clear and communicated to learners - Descriptions of colleges' academic support systems and use resources are available to learners - Course instruction for provider support are clearly articulated - Apply colleges' vendor/partner student survey					
VIII. Accessibility					
- Compliancy with ADA requirements and regulations is afforded by colleges - Web pages provide equivalent alternatives to auditory and visual content - Course demonstrates sensitivity to readability issues					
Total					

6.2. Process Checklist for Colleges

Furthermore, a checklist was developed to use when considering offering online courses to help manage the process before, during and after a course was offered. The two most important points here are that 1) a person or a group be determined that manage(s) online vendor/partner courses; 2) these persons should have training with regard to quality elements in the online environment e.g. using the VENDRIC[9].

1. Getting Started

Programming Staff	**Responsibility**
	Establish a person/group for vendor management
	Provide support and training to person/group who manage vendor courses
	Check the quantitative and qualitative ratings of vendors and products (publish on MOL)
	Establish insight into working relationships - responsiveness - modes of communication - hours of operation - turn around times
	College Resources: - Instructions on how to access the course - Technical responsibilities - Payment options

[9] This is also the case for all peer reviewers when applying the QM rubric to credit courses.

	- Standards for administering tests - Develop colleges' student vendor/partner survey and determine how to administer
	Knowledge of your own college's business practices in terms of online vendors
	Consistency of rules and policies of your institution
	Standards for Vendors to meet – consider MHEC rules, regulations and consequences Example: Areas like nursing and certifications have strict regulations
	Timeline for contract negotiations
	Reputation – vendor history and references
	Statement of warranties

2. *First Steps When Selecting a Vendor*

Programming Staff	**Responsibility**
	Establish a person of contact with the prospective vendor/partner – accessibility to key people
	Review/evaluate course outline, curriculum, including required textbooks and other materials (desk copy of textbook available from publish) (Applying the VENDRIC)
	Take a sample course
	Ask for numbers – enrollment, drop out rates and successful completion
	Discuss working relationships including administrative and student support - on the side of the college (operations) - on the side of the vendor
	Determine the committal of maintenance, update to courses, content and communication on these areas
	Determine required instructor/TA credentials - subject matter expertise - e-learning expertise
	Request instructor bios, resume and verification of credentials for each instructor/TA
	Establish roles of instructors/TA's in each course (who is actually teaching the course and responding to classroom discussions)
	Determine availability of instructor/student surveys and gain access to copies
	Consider the return on investment and cost range - FTE[10] eligibility - Pricing - Can a CC10[11] be completed based on information from vendor
	Determine criteria for 'successful student completion'
	Where applicable consider boards and associations
	Establish how to get roster signed by instructors

[10] FTE is Full Time Equivalency and is a formula to calculate state funding aid
[11] CC10s is the request form for Maryland state funding for a continuing education course

	Make the decision to offer the course
	Prepare the letter of agreement - payment options - timeline and dates (i.e., credential verification, surveys returned, tests dates, signed rosters returned, invoiced, etc.)

3. Implementation

Programming Staff	**Responsibility**
	Secure course outline, syllabus, curriculum and course materials for files
	File instructor/TA credentials for files
	Finalize 'successful student completion' criteria
	Administer student surveys
	Implement items in Letter of Agreement
	Secure verification of student completion
	Send appropriate materials to operations for: - Awards, CEUs or other contact hours where applicable
	Pay according to letter of agreement

While this checklist may be very particular to the authors' work environment, it was developed based on the experiences of the DLAG, the feedback and questions in the rubrics to the individual courses and everyday work experiences with vendors and partners, and should help meet organizational structuring needs. This guide seems particularly important because the community colleges in Maryland, while involved in a number of consortia with one another and others, do each have their own policies and the authority to direct implementation as they see fit. The authors also feel that raising awareness above and beyond the course level is of great importance when assessing quality (see also pt. 3.4 and 3.5).

7. Summary

The extensive research and work the authors had done in other contexts was highly applicable to a new environment. But, only through this research, their background and knowledge and the support of the grant were they able to apply and customize existing best practices to their work environment: continuing education at community colleges in the United States. The authors feel strongly that this applied research and the resulting tools can be duplicated at other institutions to ensure that quality assurance has a firm place in every course and unit that provides third party e-learning learning objects, courses or programs.

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Assuring and enhancing the quality of online courses: exploring internal mechanisms in higher education institutions in the UK

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Introduction

Over the last 30 years key changes have taken place in higher education institutions that have led to significant transformations in its practices and policies.

Looking at the UK, it is observed that the expansion and diversification of higher education systems brought a more diverse student body into universities. New entrants were from a wider range of backgrounds, ages and qualifications, and also from groups traditionally disadvantaged -ethnic minorities and people with disabilities (Ashwin, 2006). This growing demand for higher education placed institutions in a new scenario, in which they needed to respond creatively to the needs of the new student body, within the constraints of a limited funding, to be able succeed. Flexible learning became in this way the means by which institutions could address this change and started consequently offering more flexible courses, among which technology-based distance education has grown steadily along the past decade, becoming widely used by universities around the world nowadays. In the UK, for example, it has been estimated that in 1999 there were more than 70 dual mode higher education institutions (Weyers, 2000).

As a consequence, several challenges for higher education institutions have been raised. One aspect significantly affected by these new modes of delivery is the institutional processes set up to maintain and enhance the quality of their programmes of study, as governments called for more accountable institutions through the implementation of a set of quality assurance measures (Harvey and Knight, 1996).

Quality Assurance in Higher Education

Developments on quality assurance have taken place over the past decades at different levels: institutional, national and internationally, generating intense debate over the notions of quality embedded in the different arrangements, and the role and effectiveness of these mechanisms in improving the quality of courses (Massy, 1996; Middlehurst and Campbell, 2003).

At institutional level, quality assurance mechanisms have shown to be strongly affected by the notions of accountability and enhancement, which are particularly relevant in the UK context, where the roles of the Quality Assurance Agency (QAA) and higher education institutions internal quality management systems have evolved during the last decade in the search for more appropriate and effective mechanisms (Morley, 2003; Brown, 2004; Harvey, 2005)

A closer exploration of the internal quality assurance mechanisms in higher education institutions in the UK also show that the tension between accountability and enhancement is not easily resolved, putting greater strain in the capacity of institutions to manage their internal procedures effectively (Middlehurst, 1997; Biggs, 2001; Harvey, 2005; Inglis, 2005). This challenge becomes more demanding as new modes of provision are increasingly part of traditional campus based higher education institutions, and institutions are trying to use the same mechanisms to deal with a completely new form of courses.

Internal mechanisms for quality assurance and quality enhancement are part of the requirements that UK higher education institutions have in place as part of their responsibility for the quality of their programmes. These mechanisms should be in line with the Code of Practice established by the QAA, but each institution has the responsibility in setting up adequate internal procedures that assure the academic quality of their programmes according to their internal standards (QAA, 2002). Consequently, institutions have fairly similar internal quality assurance procedures in terms of their aims, although they may be set up differently and according to their own internal organization and structure.

The QAA recommends higher education institutions to use these mechanisms to assist them for the processes of assuring and enhancing the quality of their courses, all their courses. The question that emerges therefore is whether these internal quality assurance mechanisms are also effective for every type of courses institutions provide, and particularly whether they are effective to assure and enhance the quality of online learning courses. The QAA recognizes the relevance of this issue through the code of practice dedicated to collaborative and flexible provision that includes e-learning (QAA, 2004b); this code however is of a different nature to the ones referred to the internal management of quality that describe the procedures to assure and enhance quality. The code of practice that covers collaborative provision and e-learning good practice is defined solely as a guide for practitioners; the codes of practice related to internal management of quality are defined as a requirement, with which higher education institution should comply.

The literature analyses this question and agree in considering that quality assurance arrangements of e-learning should be different when compared with traditional distance learning and on campus delivery. It presents some differences in the level of detail with which they approach this analysis, yet combined it offers a clear overview of the e-learning aspects potentially impacting quality assurance arrangements (O'Shea, Bearman and Downes, 1996; CVCP, 2000; Hope, 2001; Middlehurst, 2001; Harvey, 2002; Roffe, 2002; Connolly, Jones and O'Shea, 2005).

The main argument supporting the revision of the quality assurance arrangements is based on the differences that are possible to identify between e-learning and campus based learning. Among the variety of elements that are suggested to be distinctive to online learning, there are four main aspects that seem relevant for the present analysis regarding quality assurance:

- disaggregated processes, as courses are no longer in charge of only one person who takes care of the whole process.
- organization of the teams, as academic staff no longer work in isolation, but courses require teams to work collaboratively, as academic staff need to interact with many other professionals who are involved in the different phases of course design and delivery.
- visibility or openness to review, that makes possible for the monitoring activities to be more in depth, continuous and unobtrusive than in face to face delivery and also than traditional distance learning; and
- limited access staff has to students.

Considering these elements, I have carried out a piece of research with the aim to further understand how dual mode universities could approach the application of the quality assurance procedures to their online courses that would allow them to assure and enhance their quality. The research strategy aimed to identify whether the quality assurance procedures already in place in these institutions are able to capture –and to what extent- the aspects that characterize an online courses. To carry out this analysis, a case study approach was selected as the most appropriate strategy that would allow a deep examination of the quality assurance procedures as well as the features of the courses under study, keeping their connection with their institutional context.

Exploring the effectiveness of quality assurance procedures

The study included four case studies. Each of them was an online or mixed mode course that had been under quality assurance procedures and it was part of the academic offer of a dual mode higher education institution in the UK.

The first set of data gathered of each case study consisted of the quality assurance documentation related to the particular courses selected. A total of 67 documents from all four case studies were coded using specific quality assurance categories devised for this project, which will be explained below. The documentation collected for each case study varied in size and contents, as the different institutions presented different ways in which they organised their records. The analysis of the quality assurance documentation gave a picture of what was actually being captured by the procedures in place in the courses under study. To identify the issues which were not being captured by these procedures a set of interviews were carried out with a group of participants of each of the courses.

The aim of the interviews was to get the participants' view on the quality and features of their courses, providing complementary data to the documentation already analysed. The selection of the interviewees was carried out based on their roles. The roles expected to cover were academic staff and tutors; administrator(s); students; employers; support staff - technical and other; and developers/designer(s). A total of 16 academic staff and 10 students were finally interviewed, and their transcripts coded. Supplementary data from students was gathered through an online survey.

The aim of the document analysis was to map out the aspects and quality issues that were actually being captured by the quality assurance procedures, and the extent to which they were effectively captured. Similarly, the analysis of the interviews aimed to identify the aspects and quality issues that were described by the participants as to represent their online course. The results obtained from the analysis of the interviews were then contrasted with the results of the documents in order to get a map of the aspects mentioned by the interviewees that were not present in the quality assurance documentation.

In order to carry out this comparison, the documents' texts and the interviews' transcriptions were coded following a predefined list of categories defined based on the theoretical aspects of quality assurance taken from the literature. The starting point for creating the list of codes, was the examination of the main quality assurance documents that higher education institutions require to use when applying their internal procedures: the Quality Assurance Agency's Handbook for Academic Review (QAA, 2000c) and the relevant sections of the Code of Practice for the assurance of academic quality and standards in higher education (QAA, 2000b; QAA, 2000a; QAA, 2004b; QAA, 2004a). This list of codes was piloted and its final version used in this study is presented in Table 1.

Table 1. List of codes

QA aspects	General Categories	Specific categories
Administrative issues		
OUTCOMES STANDARDS	Course definition	Intended learning outcomes
		Expectations
		Curriculum
		Assessment
LEARNING OPPORTUNITIES	Teaching and learning	Student capacity
		Staff capacity
		Teaching methods
		Student achievement
		Student expectations
	Student support	Before the start of the course
		During delivery
		Academic support
		Accessibility & Equal opportunities issues
	Learning resources	Staff
		Facilities
		Delivery system
QA PROCEDURES for ENHANCEMENT	QA procedures	External examiners
		Module evaluations
		Student representation, complaints and appeals
		Annual Review
		Other QA procedures

Preliminary Results

Comparing the four case studies in terms of the number and nature of the issues which were not covered by the quality assurance procedures, it is possible to observe that most of the issues that tended to be left out from the quality assurance documentation are mainly related to student participation and the support provided to the students. Also, issues related to assessment strategies and organisational issues (like the relationship with the college, equivalence with on campus version, staff coverage, and access to resources) were also missing in the documentation reviewed.

Analysing this issue from the point of view of its sources, it seems that the information missing in the quality assurance documentation is coming mostly from the students, indicating that although courses might have procedures in place to collect student feedback, these strategies may not be enough or fully effective.

Each of the cases studies presented some particular features that were affecting the implementation of the quality assurance procedures in place in each case, particularly those associated with the organisational context in which the courses were located. In some way it appears that online and mixed mode courses tended to become isolated from the rest of the institutional processes in place, unless there was a clear and strong leadership that would bring them in. This isolation was made evident in the way the institution-wide quality assurance mechanisms allowed these courses to do their business on their own, sometimes without major interference, as they had not set up any particular requirements for online courses.

The main features that characterise online courses within dual mode higher education institutions that appear to be affecting the quality assurance procedures in place in the courses under study were: the position that these courses had within their own institutions; the distributed configuration of the course teams and the distant location of students.

In terms of the specific quality assurance procedures studied across the four case studies, the preliminary analysis of the findings suggest that:

- External examiners were one of the few quality assurance procedures in place in all case studies with equal level of formalisation. The role of the external examiner was perceived as a positive one by all staff members, who considered that no particular distinction should be made on the role of the external examiner for an online course.
- Annual Reviews were also in place in all the cases under study, and it was perceived as a useful exercise as it helped to organise the paperwork, get the issues discussed and written down. The effectiveness of the annual reviews however seemed to be connected with the fact that the courses were online as staff perceived that senior management were not prepared or not understanding the relevance of them, hence not providing the necessary support or ways to solve the problems.
- Module evaluations, in contrast, were a problematic area in the courses studied. Module evaluations seemed to be one of the procedures that were heavily affected by the online modality. The most relevant issues here were related to response rates, the tool used to collect the feedback, the moment in which it was collected and the type of questionnaire used. Module evaluations seemed to be a procedure teams struggled to get it right in their courses.
- Student representative was only in operation in the course which had a combination of online and mixed mode modules, although presenting serious problems in its implementation. This situation raises the question whether student representative is an appropriate procedure for online and mixed mode courses. Surprisingly, students considered not to need student representatives as they would always contact their tutors directly. Considering this strong and close link that is established between students and tutors, student representation may not have a useful role to play in this context.
- Team meetings played a key role as a mechanism for coordinating, monitoring and dealing with the daily running of courses, particularly when teams are distributed. The way in which course teams organised themselves seemed to be affected by the number and location of the members of staff and also by the style of leadership of the course directors. These factors seemed to be affecting the levels of formalisation, the frequency, the mode of communication and ultimately the level of detail with which the course was dealt with. Overall, from the point of view of the quality assurance procedures and their specific effectiveness to assure and enhance quality, the preliminary results suggest that three of these mechanisms were the most strongly affected by the online modality of the courses: module evaluations, student representatives and team meetings.

Conclusions

From the preliminary findings it is possible to suggest that the quality assurance procedures in place in dual mode higher education institutions require adaptation to be effective when applied to online courses. This findings show that the online modality and also by the complex institutional environment in which they were located, were affecting the application of these mechanisms, obstructing their capacity to assure and enhance the quality.

It is possible to suggest that the quality assurance mechanisms in place in the cases studied were affected by the online modality of the courses in different degrees. From a general –and institutional- point of view, the results indicate that higher education institutions might need to approach the quality assurance and enhancement of their online courses from a different organisational perspective. Online courses seem to require a stronger definition of coordination, communication and planning strategies, as well as a clearly defined leadership, than face to face courses. The absence or limited clarity of any of these elements affected the effectiveness and enhancement roles of several of the procedures, such as team meetings and students surveys.

An additional aspect suggested by the results is that institutions and course teams may need to consider with particular care the strategies to improve the amount and quality of student opinions. Online courses were particularly affected by a restricted access to students, which had a direct effect on the quantity of the feedback gathered and the appropriate representation of their views. In this sense, it seems that student representation, in its present form is not a useful mechanism as a conduit to bring up student opinions. The data suggests however that the relationship established with tutors may be a route worth exploring for student representation.

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THE QUALITY OF QUALITY CRITERIA - REQUIREMENTS FOR THE DEVELOPMENT OF A THEORETICALLY SOUND CONCEPT AS APPLIED IN THE CERTIFIED ACCREDITATION OF TECHNOLOGY-ENHANCED LEARNING EFMD-CEL

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I. Introduction

After a period of testing and exploring the potential of e-Learning in different contexts, there is a broad consensus that much more effort should be put into the question of quality improvement. The quality of both the products and programs in the field of technology-enhanced learning varies widely, and although there are some proposals around, we still lack a concept of quality improvement which is theoretically sound and at the same time meeting the expectations of practice.

The quality management approach EFMD-CEL is designed as a quality accreditation scheme that focuses on technology-enhanced programs. A program is to be regarded as "technology-enhanced" if a minimum of 20 % of its overall duration is delivered by teaching and learning methods based on technology, i.e. either interactive multimedia (media types other than printed text or recorded lecture material) or network interaction (interactivity between a student and standalone content or to connect different students to an e-tutor / e-moderator or to each other).

A "program" is more than just an e-Learning-medium (e.g. CBT, simulation tool), an event of eCommunication (e.g. e-Lecture, discussion forum, virtual classroom session) or a learning sequence of short duration. It will correspond to the equivalent of at least 100 hours of candidate learning effort ending with an assessment, evaluation, examination or the like. It must be operated on a durable basis, i.e. the program must have at least been running once.

This paper aims at providing an insight into the methodological derivation of the quality criteria used in the quality management approach EFMD-CEL which was designed to assess and improve technology-enhanced programs. After briefly outlining how the quality dimensions and the quality perspectives form the basis of an integrated quality model, the derivation of a number of quality criteria is explained.

The CEL quality accreditation programme grounds its own quality on criteria which are theoretically sound and supported by empirical or theoretical evidence and/or argumentative reasoning. This research on the quality criteria will be the major focus of this paper.

II. Theoretical Foundation of the Quality Model

a) Quality Dimensions

One of the main tasks when looking at quality improvement is to define in which areas quality should be evaluated. In order to get an overview on the existing quality management approaches, a literature analysis concerning quality and technology-enhanced learning was conducted. A number of existing quality (management) approaches, e.g. the EFQM Excellence Model, the quality management system ISO 9000, accreditation and certification of business schools, e-learning, and distance learning, were analysed by Wirth (2005) with regard to the underlying understanding of quality, the primary target groups and the basic conditions (cf. Wirth, 2005). The plausibility, i.e. the consistency and transparency of the quality aims and criteria are very important for the credibility of a quality management approach. The literature analysis showed that different categorizations are possible. However, most quality approaches are oriented at generic educational processes or are of phenomenological nature. They do not document how they deduct their quality dimensions and criteria. It is mostly unclear what kind of quality perspectives and understandings build the basis for the quality management approaches (cf. Wirth, 2005). The quality dimensions according to Seufert & Euler (2003 and 2004) are based on interviews with 25 experts in the field of e-Learning from various disciplines (cf. Seufert & Euler, 2003) and on a delphi study with 38 experts to further validate the theoretical framework (cf. Seufert & Euler, 2004). They include the pedagogical, economic, technological, administrative, and socio-cultural dimensions which provide a consistent and evidence-based framework for the conceptualisation of a quality management approach. To complete the framework, a so-called program dimension integrating the specific conditions of a program was created (cf. Wirth, 2005).

- **Program strategy** focuses on the transparency of the main characteristics of the program and on the (added) value the programme provides especially by integrating technological components.
- **Pedagogy** covers all aspects of the learning and teaching process including the type of learning environments the program consist of and the (added) value of the learning processes supported by technology.
- **Economics** involving all facets related to efficiency in the use of resources. The main question is: Are the resources in terms of funds and competencies efficiently used?
- **Organisation** dealing with the question whether the organisational measures for running the program are adequate to meet the program's underlying objectives.
- **Technology** addressing the question of the functionality of the technology .
- **Culture** looking into the question if the cultural factors of change and innovation are considered adequately.

b) Quality Perspectives

The quality of a program can be evaluated with regard to the different quality dimensions. Quality is understood as a construct that expresses the characteristics of processes, products or services, evaluated against the specific demands of relevant stakeholders. The understanding of quality can be characterized by analysing different perspectives which are summarized in figure 1 (cf. Wirth, 2005):

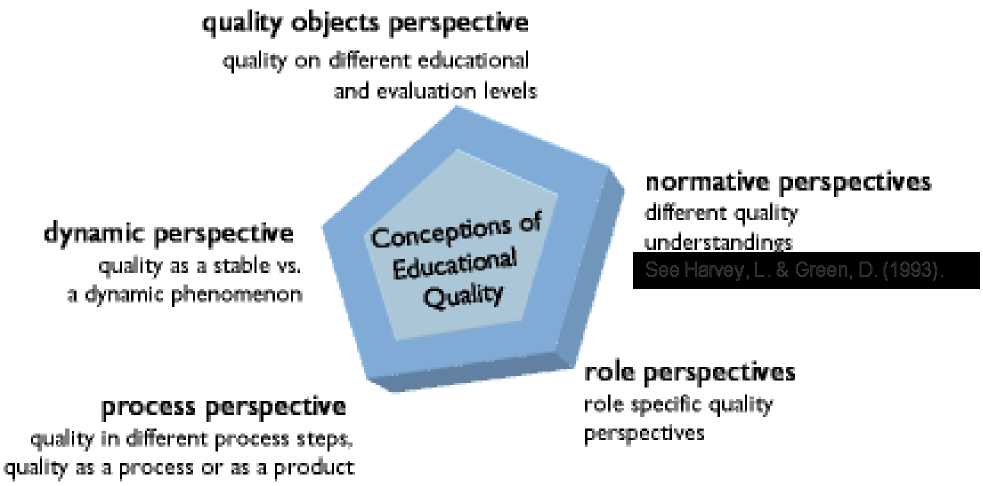


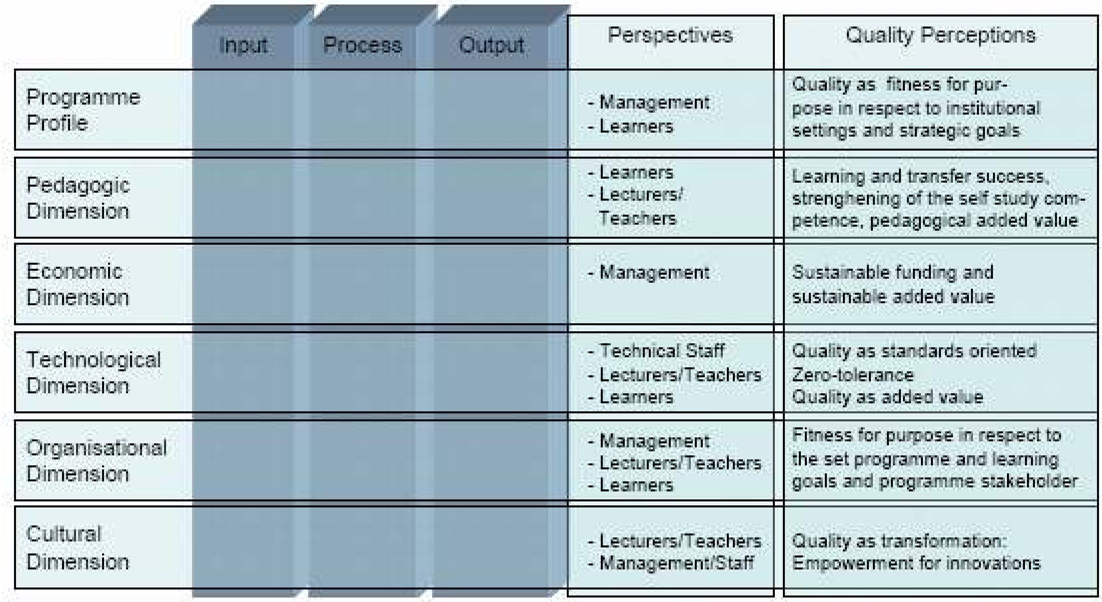
Fig. 1: Conceptions of Educational Quality

The question arises whether all "subqualities" and facets of a program are based on the same quality perspectives and understandings (cf. Harvey & Green, 2000). It has to be discussed if the understandings differ when evaluating and assessing e.g. the technological dimension or organisational issues. The above-mentioned quality management approaches do not offer a sufficient explanation concerning this question which is vital for the improvement of the comprehensibility of the quality criteria. Therefore, the relevant perspectives and understandings were identified for each quality dimension so that the user can decide whether or not he can accept the criteria as valid concepts.

For instance, the program dimension mainly addresses strategic issues like program aims, strategic anchorage within the institution as well as a sufficient market and target group analysis. In consequence, the program management will provide the relevant perspectives for this dimension. In terms of the quality understanding, the normative understanding of quality as fitness for purpose regarding institutional settings and strategic goals seems to be most appropriate (cf. Harvey & Green, 2000). In comparison, the pedagogical dimension can be mainly evaluated from the learners' and teachers' perspectives (cf. Ehlers, 2003). The corresponding quality understanding would be transformative in the sense of learning and transfer success as well as an enhancement of the self-organized learning competences and the self-responsibility of the learner (cf. Wirth, 2005, also Rogers, 2001). For the other four dimensions, the quality perspectives and understandings can be found in figure 2.

c) Quality Model

The above-mentioned literature analysis showed that numerous approaches exist in this field. This indicates that the different terms and concepts have to be used in a careful manner. The views of the relevant stake-holders should be included into an integrated quality management model. Thus, the criteria that stake-holders deem to be meaningful for the quality of a program should be integrated along with the corresponding quality understandings. Additionally to this focus on quality perspectives and understandings within the six identified dimensions, the quality model is completed by the inclusion of the process-oriented perspective including input, process and output. This adds a dynamic component to the model. This leads to the quality model shown in figure 2.



	Input	Process	Output	Perspectives	Quality Perceptions
Programme Profile				- Management - Learners	Quality as fitness for purpose in respect to institutional settings and strategic goals
Pedagogic Dimension				- Learners - Lecturers/ Teachers	Learning and transfer success, strenghening of the self study competence, pedagogical added value
Economic Dimension				- Management	Sustainable funding and sustainable added value
Technological Dimension				- Technical Staff - Lecturers/Teachers - Learners	Quality as standards oriented Zero-tolerance Quality as added value
Organisational Dimension				- Management - Lecturers/Teachers - Learners	Fitness for purpose in respect to the set programme and learning goals and programme stakeholder
Cultural Dimension				- Lecturers/Teachers - Management/Staff	Quality as transformation: Empowerment for innovations

Fig. 2: The quality model (Wirth, 2005)

Based on this quality model, the quality criteria have to be developed for each dimension.

III. Derivation of Quality Criteria, Indicators, and Standards

a) Different possibilities for the derivation of quality criteria

Not the truth makes good quality criteria, but a sound and comprehensible substantiation of them. There are different ways and different weights of reasoning (Wirth, 2005):

- **Comprehensibility**: evidence and self explicability of criteria that obviously support the quality of e-learning supported programmes (e.g., it is obvious, that the used technology should be stable).
- **Theoretical reasoning**: Arguments and reasoning that can be deduced from widely accepted (scientific) theories (e.g., psychological theories suggest that the learning environment must correspond to the learning pre-dispositions of the learners).
- **‚Best or Good Practice' Benchmarks**: Well prepared case studies may (often although only context specific) highlight success factors and pitfalls. Returning success factors may be used as crucial elements of a quality e-learning programme (e.g., self paced learning oft only works in combination of an adequate learner support).
- **Empirical evidence:** Results from qualitative or quantitative empirical research often provide specific answers to certain questions. In contrast to single-case based best practice literature, empirical results can often be considered to be more objective and externally valid (e.g., faculty support as such was identified to be very crucial for high quality e-Learning by several studies such as from IHEP[1]).

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[1] The Institute for Higher Education Policy (www.ihep.org) studied active distance learning programs at six institutions. They examined the question whether the benchmarks for all types of distance learning programs are applicable to internet-based distance education. The final outcome is a list of 24 criteria meant to be essential to ensure quality in internet-based distance education.

Putting CEL quality criteria in operational terms is regarded to be a crucial element and very much differentiates this approach from others (see figure 3).

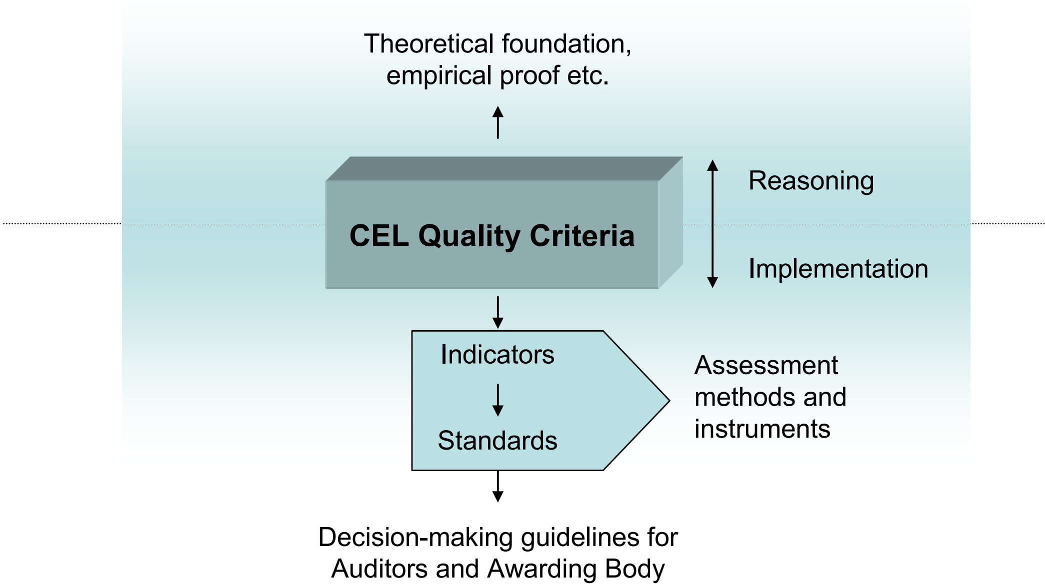

Fig. 3: The methodical derivation of the CEL Quality Criteria

b) Exemplary Derivation of the Quality Criteria in the Cultural Dimension

The process of the derivation of the quality criteria will be exemplarily shown regarding the cultural dimension since the elaboration of all criteria would go beyond the scope of this paper. The cultural dimension deals with the integration of technology-enhanced learning into traditional education and with the underlying change of habits and attitudes (cf. Euler, 2003) The analysis of the different quality (management) approaches showed two different quality areas within the cultural dimension, one consisting of the implementation and continuation of the innovation process and the other including the commitment of the teachers and other staff as well as adequate incentives (cf. Wirth, 2005).

It is difficult to forecast the success of innovation processes, however, research showed that the learning culture seems to be a significant factor in educational contexts (Barnett *et al.*, 2000) as it leads to an improvement of the teachers' attitude towards work, higher motivation and more cooperation among teachers. Thus, the first quality criterion (C1) in this dimension is formulated as "The understanding of the learning and teaching culture the programme strives for is stated" (Wirth, 2005) . The corresponding indicator would be a documentation showing that understanding which includes a reflection on the kind of teachers and learners the program seeks (e.g. self-regulated learners). In consequence, the standard would be a convincing and comprehensive documentation.

In order to overcome the resistance towards innovation among teachers and learners, the teachers have to develop the necessary competences for they are seen as the bottleneck of educational innovation (cf. Management, 2004). Therefore, it is not only necessary to install a systematic human resource development but also to implement a cooperative culture (cf. Seufert & Euler, 2004). This includes a frequent exchange among teachers. The second (C2) and third quality criteria (C3) are formulated as "The philosophy of change, innovation and co-operation within the institution (especially with regard to eLearning) is stated" respectively "There is a plan for the implementation of the programme, outlining the analysis of support and resistance within the institutions the main stakeholders and measures to be taken for enhancing the acceptance of the program and promoting a motivating and demanding environment for achieving the programme objectives" (Wirth, 2005). The corresponding indicators and standards for these and the following criteria can be found in figure 4.

Another factor influencing the success of innovation process in educational institutions is the commitment of the management. Even though the literature on leadership quality is not quite consistent (cf. Marcus, 2004), some characteristics of good leadership can be identified: it should establish common goals, initiate and implement change, support teachers and prioritize teaching and learning. With regard to technology-enhanced learning, the aspect of steering technological innovations as well as the belief in technology as enhancement of learning can be added (cf. Marcus, 2004). The criterion (C6), thus, covers the "commitment of the institution's leading management to support the objectives and implementation of the programme, especially concerning the eLearning components within it" (Wirth, 2005).

The last two criteria within the cultural dimension focus on the commitment of the teachers and staff as well as on the incentives. Since the satisfaction level, the motivation and enthusiasm of teachers are a prerequisite for the learning success, it is not sufficient to consider the educational background of the teachers when assessing educational quality (cf. Wirth, 2005). Additionally, the attitudes of teachers towards new media is of utmost importance for the success of the usage of technology (cf. May & Short, 2003). Other factors influencing the quality of teachers include the compensation and workload of teachers as well as the issue of intellectual ownership. Thus, the quality criterion C4 puts its focus on the question whether issues of "workload, compensation, ownership of intellectual property resulting from the programme and their impact on the commitment and participation of the staff have been considered" (Wirth, 2005). The last criterion deals with the incentives in the form of attractive salaries but also with regard to intrinsic factors, e.g. the implementation of common goals concerning the usage of technology in learning ("Incentives for the staff involved in the design and running of the courses are linked to innovative practices, commitment and performance in advancing the programme" (Wirth, 2005)).

The criteria, performance indicators and standards as well as the corresponding methods of data collection are summed up in figure 4.

Quality areas	#	Quality criteria (metatext)	Performance indicators	Standards	Method of data collection
Imple-mentation and conti-nuation of the innovation process	C1	Understanding of learning and teaching culture	Document including understanding and reflection on teachers and learners	Comprehensive and convincing documentation	Self-assessment, audit team review
	C2	Statement of the philosophy of change and innovation	Document addressing issues of change, innovation, and cooperation	Strong commitment and examples of faculty learning from each other	Self-assessment, audit team review
	C3	Implementation plan including an analysis of support and resistance	Documented plan on promotion of acceptance and dealing with resistance	Comprehensive and convincing description	Self-assessment, audit team review
	C6	Commitment of the management	Leading management's commitment	Strong and convincing commitment	audit team review
Commit-ment of staff and teachers; incentives	C4	Impact of workload, compensation and intellectual ownership on the commitment of staff	Facultay satisfaction with the teaching circumstances	High level of faculty satisfaction	audit team review
	C5	Incentives for the advancement of the program	Documentation of incentive structures and impacts of incentives	Comprehensible demonstration of impact on practices, commitment and advancements	Self-assessment, audit team review

Fig. 4: Overview of the cultural dimension (Wirth, 2005)

c) Validation of the Quality Criteria

For the purpose of validation, the quality criteria were applied in two pilot accreditations (case studies). In addition, experts and practitioners were interviewed with questionnaires and a workshop at an international conference was conducted.

The case studies showed some redundancies, e.g. with regard to the criteria C2 and C3 as well as concerning the criterion C1 and one of the pedagogical criteria (PE3) dealing with learning and teaching culture as well. The differentiation between quality criteria and performance indicators also posed some difficulties, especially within the other quality dimensions (cf. Wirth, 2005). The feedback of the experts and practitioners included a number of hints at possible misunderstandings of the quality criteria. It is also suggested that the transparency of the criteria could be improved with more operationalized wording as well as with examples. The workshop participants of the international conference found the programmatic and cultural dimensions extremely valuable and suggested more precise quality criteria for the cultural dimension.

In sum, 17 quality criteria across the different dimensions were discarded. According to the focus on the cultural dimension taken in the paragraph above, the process of aggregation of criteria will be elaborated concerning this dimension as well. Due to the closeness of the contents of C1 and PE3 (see above), the criterion C1 will be complemented by PE3, thus eliminating C1. The criterion C3 will be discarded since the differentiation between strategic and operative questions did not prove to be of added value. As parts of the criterion C5 are already integrated in C4, the remaining intrinsic incentives will be added to C4 so that C5 can be eliminated. Concerning C6 (commitment of the leading management), the performance indicators will be worded more precisely as to include concrete behavior, signals, and participation in the program (cf. Wirth, 2005).

d) Resulting CEL Quality Dimensions, Criteria and Standards

Bringing the results of the literature analysis, the derivation of the quality dimension, criteria and standards, as well as the validation through case studies and experts together, the following 30 quality criteria were identified (see figure 5):

	Input	Process	Output	Perspectives	Quality Perceptions
Programme Profile	PR1, PR2, PR3, PR4			- Management - Learners	Quality as fitness for pur-pose in respect to institutional settings and strategic goals
Pedagogic Dimension	PE1, PE6, PE7	PE2, PE3, PE4, PE5, PE8	PE9, PE10	- Learners - Lecturers/ Teachers	Learning and transfer success, strenghening of the self study com-petence, pedagogical added value
Economic Dimension	E1	E2		- Management	Sustainable funding and sustainable added value
Technological Dimension	T1, T2	T3, T4	T3, T5	- Technical Staff - Lecturers/Teachers - Learners	Quality as standards oriented Zero-tolerance Quality as added value
Organisational Dimension	O1, O3	O2, O4, O5		- Management - Lecturers/Teachers - Learners	Fitness for purpose in respect to the set programme and learning goals and programme stakeholder
Cultural Dimension		C1, C2, C3, C4		- Lecturers/Teachers - Management/Staff	Quality as transformation: Empowerment for innovations

A total of 30 quality criteria

Fig. 5: Overview of the CEL-Quality Dimensions and Criteria (Wirth, 2005)

In order to make the criteria evaluation more transparent to the relevant stakeholders, the standards for each criterion are defined and elaborated in the CEL manual[2]. Where criteria allow or imply that different levels of achievement are being evaluated (mainly where objective standards may be set), the standards are broadened by a more detailed set of indicators that allow the peers and auditors to evaluate the criteria more adequately and homogeneously. As opposed to many other criteria lists that are currently available, the CEL criteria explicitly reflect the major interdependencies between them.

By providing the substantiating background of the CEL quality criteria, the developed scheme raises a scientific dialogue on the quality criteria and standards used and thereby establishes and improves the comprehensiveness and acceptance of the CEL quality criteria.

IV. Application of the Criteria, Indicators, and Standards in CEL Case Studies and Concluding Remarks

The CEL-scheme provides an empirical and theoretical substantiation of the quality criteria which allows the end users to better understand the meaning and relevance of the specific quality criteria. Furthermore, it operationalises the quality criteria into indicators and CEL standards. Through this operationalisation, the gap is closed between the theoretical quality framework and the guidance notes used by those executing the quality evaluation

The quality scheme EFMD CEL has been in operation since 2004. Since then four accreditations have been executed, three of them successfully, resulting in a CEL quality award. James Fleck, Professor and Dean of the OUBS stated: “The scheme is particularly valuable because it recognises that e-learning is about more than just technology; the accreditation process looks very carefully at the effectiveness of the teaching and learning process.“ Dietmar Albrecht, Head of Knowledge and Learning Strategy, Volkswagen Coaching, emphasized that the EFMD CEL quality management approach now serves as a blueprint for the development of further programs. The experiences show that the CEL scheme can be used in Academia as well as in the corporate sector even though the terminology and concepts employed are different in the two areas.

Furthermore, it has become clear that every quality management approach is subject to economic conditions and limitations. Albeit it would be desirable to interview Alumni, employers and also students in order to evaluate a programme, the costs would be prohibitive. Therefore, efficiency and quality goals in certification are conflicting to some extent. In the context of given organisational and economic conditions, an pragmatic solution in terms of evaluation instruments, information sources and scale of quality criteria has to be achieved. This is to say that the quality management approach has to accept an economically justifiable compromise without neglecting quality standards of high priority. In consequence, a quality management scheme such as CEL can not be expected to provide a comprehensive representation or evaluation of training processes and outcomes (e.g., by examining the learner behaviour with comprehensive tracking data, participating the courses or by a detailed inspection of the technological infrastructure).

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[2] The manual on the CEL quality criteria as well as the guidelines for executing the quality evaluation are published on www.efmd.org.

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Abstract of the presentation "The Impact of the UOC Studies and Degrees in its Graduates: A Research Study from a Personal, Professional and Social Perspective"

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Synopsis

This article describes a part of a research study on the values and impact of the Universitat Oberta de Catalunya (UOC) in its graduate students' degrees from a personal, professional and social perspective, carried out in 2005.

Abstract

Introduction

After 10 years of activity, the UOC is offering more than 20 official degrees through distance education. Now, it is time to evaluate what is the impact of the acquired degrees in the graduates' lives, together with the perception by the employers and industry. We have developed a scientific study with the following research purposes: to get to know what the UOC has brought up to all those who have run a degree in our university; and to assess the value of the degree taking into account the stakeholders in the labour market and the different professional environments.

Beyond the quality indicators for methodology that might be identified in higher education (such us the students' academic performance, the levels of drop outs or their personal satisfaction), this study on the UOC graduates intends to become the basis for a permanent observatory of the personal, professional and social position of all those who have studied and got a degree at UOC. The study gathers relevant data on several issues, such as: skills acquired by studying through the UOC methodology, competencies put into practice, level of improvement in the job position as a consequence of getting a UOC degree, personal and social benefits obtained, perception of the value of the degree in society, tracks and careers followed after the university studies, or the level of compensation for dedication.

From this perspective, and considering the new framework of convergent higher education in Europe (EEES), the observatory would contribute in the long run to the definition of a renewed training offer in distance higher education. The study will contribute to enlarge the common understanding of e-learning from the perspective of its use, benefits and impact in some sectors of the society.

Objectives of the study

The aim of the study is to identify the impact of the UOC in its graduates, at a personal, professional and social level. We wanted to know about the profit got by graduate students and their assessment of their own educational process at UOC. Furthermore, we wanted to measure their employability index in relation with the acquired competencies and skills, together with the added value of the university degree from the point of view of the employees (job consultancy and human resources companies). The present study not only turns out to be the starting point of an observatory of UOC graduate students, but an steady contribution to the description of the professionals in the information society.

On the basis of these intentions, UOC has developed the study in the terms that follow, by means of both quantitative and qualitative analysis.

Specifically, the study aimed at:

- Getting to know the setting off factors of life-long learning and adult training: identifying the starting situation of the future students regarding their educational level, motivation, training needs, expectative and wishes.

- Identifying motivations and decision-making factors for the UOC as an alternative distance education university for adult training: considered players in the evaluation of alternatives, reasons for acceptance or refutation, attributed mental image to the mentioned alternatives.

- Valuing the experience at UOC in respect with other educational alternatives and level of satisfaction regarding tuition, pedagogical model, personal enhancement, professional development, skills developed.

- Getting to know the impact at a personal, professional and social level in graduate students, after some years they have graduated.

- Comparing the mentioned impact with market studies together with external references and indicators: improvement in job position and remuneration, change of professional sector, social acknowledgment, development of personal skills, and wished but non-covered needs.

Scope of the study

In the framework of this research, the impact of the UOC university degree refers to the effect that the diploma has at the social level and also to its significance at a personal and professional level, for all those students who have graduated at UOC.

At the professional level the following indicators have been measured:

- Change in job position and income as an effect of the achieve of the degree
- Better performance in job by the acquisition of e-competences
- Improvement in the career development
- Adjustment to new professional requirements

The impact at the personal level relates to those aspects that represent an added value to the graduate student by the fact of having studied at the UOC. His /her personal perceptions of three different aspects have been measured:

- Motivation towards learning: willingness to acquire new knowledge, cultural enrichment, the pleasure to better understand the world and the environment in which we live, development as individual …
- Significance and value of learning: capacity to comprehend the reality from wider perspectives, cultural background gained in adult education, e-skills acquired …
- Psychological aspects: increase of self-esteem, self-confidence, fulfilment of one's aims…

Methodology

As a first step in the design of the research study, a benchmarking report has been carried out. This report analyses the indicators used by 20 higher education institutions and universities in Spain, the rest of Europe and the US in their studies of impact of their graduate students. This information - about the measurement of the circumstances of graduate students after several years of their graduation - was very useful and was partially used as a base for the design of our research.

Some other sources of reference where taken into account, such as the currently published by the national quality assurance and accreditation agencies (ANECA, in Spain, and AQU in Catalunya), together with several well referred market studies which explore professional profiles from the human resources perspective and in industry.

By considering these external scopes of measures and indicators, we will be able to position the value of the UOC diploma in relation with others in higher education by allowing for, not only internal outcomes and activities, but also outside references.

The members of the ENS - Education and Network Society Research Group (professors of the Psychology and Education Studies at UOC and Martin Carnoy of the Stanford University in the US, have supported the research and reviewed the activities developed.

The methodology of the research has been both quantitative and qualitative. Data collection has been carried out by means of the following instruments:

- For the quantitative analysis: Telephonic questionnaire to a sample of graduate students
- For the qualitative analysis:
    - Interviews (focus groups) to a sample of graduate students
    - Interviews (focus groups) to a sample of employers and human resources specialists

Sample of graduate students

A representative sample of graduates of 8 programmes of study has been interviewed in small groups for the qualitative analysis: Business studies, Business Management and Administration, Law, Educational Psychology, Library Information Science,

Multimedia Graduate, Computer Management and Computer Systems (Technical Engineering).
Employers and representatives of professional sectors in the labour market have been also interviewed in focus groups.

In parallel, and for the quantitative analysis, another sample of graduates has been interviewed according to the following variables: gender, age, place of residence, previous studies or type of access and finalizing semester of the course.

The picture below shows the distribution of the sample together with the methodology:

Distribution of the sample

GRADUATE STUDENTS	Age of 25 to 35	Age of 36 to 50
Graduated at least 2 years ago	1 Focus Group (Humanities) 1 Focus Group (Business and Sciences)	1 Focus Group (Humanities) 1 Focus Group (Business and Sciences)
Graduated between 2 and 4 years ago	1 Focus Group (Humanities) 1 Focus Group (Business and Sciences)	1 Focus Group (Humanities) 1 Focus Group (Business and Sciences)
	4 Focus Groups	4 Focus Groups

EMPLOYERS	
Human Resources and Consultancy companies	4 Personal Interviews
Managers, head of Human Resources units	1 Focus Group

Research outcomes

Research results and outcomes have been structured as follows into the following categories:

- Students profile at entry stage (before studying at the UOC)

- Decision-making process for life-long learning and for the studying at the UOC
- Self-evaluation of the UOC experience and the acquired competencies
- Evolution after graduation: the personal and professional present situation

In the light of both the quantitative and qualitative analysis, the outcomes point out in the direction of:

- High motivation for life-long learning
- High personal satisfaction by following university studies in the adult period; that is: getting a degree or a second university qualification
- Very relevant fulfillment of expectative, with a well balanced efforts and investments versus reward for dedication
- Very significance assessment of the acquisition or improvement of key e-competences for the further application in the professional field
- Satisfaction by the recognition of the diploma at a social level

More in detail, some of the most relevant outcomes of the study of impact are the following:

Quantitative analysis:

The average age of the graduate students considered is 40, and a high percentage had a previous university degree before studying at the UOC. There is major significance in the results when considering study programs separately. For example:

- Graduate students in the Educational Psychology Program: mostly women, the qualification has allowed them to get a better job position, from private to state schools and colleges, in most cases.
- Graduate students in the Law Program: they are proud to be able to affirm that the online course has provided them with tools and resources in the law field, and they have learned to be autonomous in the searching online legal sources, databases and jurisprudence in their daily practice of the law profession. The online *Practicum* also allowed them to be able to solve problems and case-studies in a real context.
- Graduate students in Business and Administration Program: many of them make the first move in business in the family environment or in very small and medium enterprises, but without any specific training or degree. The degree obtained whilst working professionally has provided them an extremely useful conceptual base of applied knowledge.

(These results will be demonstrated with the correspondent numeric tables and detailed graphics during the presentation of this paper at the Conference).

Qualitative analysis:

Most of the graduate students show a high level of motivation for learning and elevated intellectual stimulus. Most of them have a job, familiar responsibilities and, in general, a lack of time to dedicate to learning. Having studied at the university despite of these circumstances has made them more “respected” by relatives and the family unit. Time and efforts invested are positively valued among friends and acquaintances, and that causes high satisfaction to graduate students, increase their self-esteem and self- self-confidence.

Employers confirm the idea that adult learning makes the candidate a dedicated person, highly motivate to improve him/herself and with lots of initiative. However, in the opinion of some of the specialists interviewed, a distance education university degree is still socially perceived as a "second level" diploma, and it is only professionally recognized or approved when it is the second qualification obtained in the higher education level.

Acknowledgements

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E-learning in Small and Medium Enterprises

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1. Assumptions around e-learning in SMEs

Policy discourses have seen the use of e-learning in SMEs as unproblematic, based on a series of assumptions. Assumption number one was that SMEs appreciated that in order to become and remain competitive they must train their staff. Assumption number two was that one of the major reasons SMEs do not train staff is due to the difficulties in releasing staff for training. Assumption number three was that e-learning could solve this problem by allowing just in time training, taking place on-line and at the workplace. As such, SMEs were a major target for extending the market for e-learning for both private e-learning providers and for pubic institutionally based providers.

Research undertaken through the seven country, EU funded, ICT and SME project, in line with other surveys and studies, has shown that none of these assumptions hold true. Many SME managers are unconvinced of the benefits of continuing (and in some cases, initial) training, either believing that their enterprise already possesses the required skills, and that if additional skills and knowledge are required the workers will gain these primarily through experience, or that it is cheaper and more efficient to buy in trained staff than to provide training themselves. Of course, this is a generalisation. The term SME covers a broad range of different enterprises, and the results of our research suggests that attitudes and involvement in training may vary by size and by sector. Furthermore, there is some evidence to suggest that involvement in training varies by country dependent on different cultures and systems.

Nevertheless, in the seven countries involved in the ICT SME study, there is little evidence of consistent involvement in formal e-learning on a geographical or sector basis. That is not to say that learning is not taking place in SMEs or that computers are not being used for learning. In the case studies we have undertaken in Wales we have found a surprisingly high use of ICT for learning. This learning is not taking place through organised classes, face to face or through computer mediation, but is predominantly informal and social and utilises business and social software applications rather than purpose designed e-learning software.

The Leonardo da Vinci ICT and SME project has undertaken an extended literature review, a series of policy interviews, a survey of more than 350 SMEs, focus group meetings and perhaps most importantly, around 90 case studies in the seven different countries. The case studies took place between 2002 and 2005 and were based on a semi-structured interview. The findings presented in this paper are based mainly on the case studies, whilst the analysis of the findings is based on a wider review of literature and research in pedagogy and learning. Enterprises were selected for the case studies on the basis of being representative of the target group. However, we would not wish to pretend in any way that the enterprises sampled are a representative of either the regions or the sectors as a whole. It was not the aim of the case study activities to undertake a representative study, even if it had been feasible. Instead the case studies were seen as a source of rich data, to be aggregated with the other research findings of the project. The findings are contradictory in that the patterns of use of ICT vary greatly between different enterprises. Nevertheless, we believe it is possible to advance some hypotheses about the use of ICT for learning in SMEs and to extrapolate some lessons for policy development and intervention.

2. The realities of e-learning practice in SMEs

Education and training policies

Few of the enterprises studied had a formal policy for education and training. Neither did they have a budget for training nor was there any individual with formal responsibility for training. This is not to say that managers were unaware of the importance of the skills and knowledge of their workforce. They saw those skills as being acquired through recruitment of skilled staff or from informal work based learning. Most SME managers saw their staff as having a personal responsibility to acquire new skills and knowledge as part of a collective responsibility for the company's profitability and growth.

Attitude to formal qualifications

Few of the enterprises were greatly concerned with formal qualifications, other than in those limited areas – such as in the restaurant and food industry – where formal qualifications were a regulatory requirement. Previous experience was seen as much more important. One enterprise said they did not even look at qualifications on an application form but relied totally on job interviews. All of the SMEs had strong involvement in informal sector and / or geographical networks and these networks were often the source of new recruits, rather than job advertisements and formal recruitment procedures.

Limited formal training and learning

As might be expected given the lack of formal training policies, there was very little formal training, either face to face or using ICT. Where formal training was seen as necessary, or where formal training was required for regulatory reason, enterprises tended towards buying in participation in face-to-face courses from public sector education and training providers. Where this was unavailable, private trainers were used and selection was on reputation obtained through word of mouth.

Little knowledge of e-Learning

Few managers or staff in the SMEs we studies were aware of the potential or possibilities of ICT for formal learning. None had received any information from public bodies in this area. Although some had received advertising material by post, these had been seen as junk mail circulars.

Much use of Information and Communication Technologies

Whilst obviously the use of ICT in the workplace varied according to sector and occupation, SMEs were using computers extensively in their day-to-day business operations.

Users of ICT included:

- For administration and accounting
- For business to business transactions (including trading through e-Bay)
- For customer communication
- For advertising and promotion
- For stock control and logistics

From our interviews it would appear that the use of ICT in SMEs is increasing, particularly for e-commerce and for business-to-business transactions. A number of the enterprises felt they were not exploiting the web as fully as they should and were planning further activities in this area. The particular areas of concern were that whilst the web was being used for business-to-business transactions with suppliers, few of the enterprises were themselves offering sales or services through e-commerce. A number of the enterprises also felt their web sites to be amateurish and offered little functionality.

Much informal learning

In contrast to the paucity of formal learning provision in the SMEs we studied, there was a great deal of informal learning taking place. From our study most informal learning appeared be learner driven, rather than planned in conjunction with others in the enterprise, and was problem motivated, although some learners were motivated by their own interest rather than in response to any specific problem. In many cases ICT was being used as part of this informal learning. The main means of ICT based learning was Google key word searches. Managers were often unaware of this learning, although they were frequently aware of the problem which inspired it.

There were considerable differences in the use of ICT for informal learning between different enterprises. It would be tempting to ascribe these differences to age, sector, size or occupation but it is hard to discern such causal factors from the case studies undertaken.

Work organisation a key factor

The major causal relationship in the study was the link between work organisation and the use of ICT for learning. ICT was most frequently used for learning in those enterprises with flatter hierarchies and more devolved decision making and in which employees had greater autonomy in the organisation of their own work. Interestingly, these enterprises also tended to have a more experienced workforce and lower turnover of employees.

Conversely, hierarchical work organisations tended to have the least use of ICT for learning. In some cases only managers and administrative staff in these enterprises had access to computers and the internet. There was no evidence of any organised support for informal learning – either face-to-face or on-line. However, in some enterprises the learning acquired was discussed with peers as part of everyday collaboration and teamwork.

No accreditation of learning

None of the employees in the enterprises we studied had attempted to claim recognition or accreditation for the skills and knowledge gained through informal learning. It is not clear if this is because they are not interested in pursuing further formal qualifications or if it is because they are unaware of any opportunities of claiming accreditation for informal learning.

No general shortage of ICT skills

In general, SME managers did not perceive of any shortage in ICT skills in the workplace. They appeared of the viewpoint that younger workers especially had sufficient ICT skills to meet enterprise needs. However, two enterprises referred to problems in updating their web sites due to lack of skills.

3. Learning and knowledge development in SMEs

The following section explores some of the findings of the study. Because of length limitation this paper focuses on implications for pedagogy and learning and for the future development of e-learning.

Information or knowledge and the nature of informal and non formal learning

Perhaps the most significant finding is that instead of involvement in formal e-learning programmes, ICT is being used for informal learning. Although much of the debate over informal learning is overly academic, there is a major issue in distinguishing between information seeking and learning. Assessment or testing has traditionally been seen as a means of assuring that learning has taken place. How effective assessment is as a measurement of learning may be contested. It may be more fruitful to examine the nature of activities resulting from informal learning as a means of validation. Activities identified through the project case studies were:

a) Purposeful

b) Heavily influenced by context

c) Often resulted in changes in behaviour

d) Were sequenced in terms of developing a personal knowledge base

e) Problem driven or driven by personal interest

f) Social – in that they often involved recourse to shared community knowledge bases through the internet and / or shared with others in the workplace

Such criteria clearly differentiate learning from the acquisition of information.

Pedagogic approaches – how are people using ICT to learn?

Pedagogy is usually taken to be the process of teaching or disseminating and facilitating knowledge development. This is a problem in the context of this paper, in that teachers and trainers were not present in any of the learning observed in the case studies. However, it is important to understand how people are learning through ICT, regardless of the lack of mediation through a teacher. There is of course a tradition of research in auto-didactic learning. Even this research tends to assume an external structuring of learning, through some form of guidance or through sequenced learning materials. The issue of sequencing learning and learning materials has been a major concern to e-learning researchers and developers. The project research suggests learners are primarily driven by the nature of the problem in how they sequence their learning. However, this begs the question of how that learning is structured and how the problem is approached.

The use of the Google search engine as the major tool for learning is interesting in this context. It raises the question of how people are framing their search terms, how they are refining search strings, how they are selecting from the results of search queries and how they are following hyperlinked texts. For a search result to be useful it needs to both produce materials, ideas and concepts which can connect with the learner's existing knowledge base of the one hand and approach the issue or problem being addressed on the other. The ideas of legitimate peripheral participation and proximinal development may be helpful for explaining this process and of understanding how people are making sense of knowledge.

Lave and Wenger propose that the initial participation in a culture of practice can be observation from the periphery or legitimate peripheral participation. The participant moves from the role of observer, as learning and observation in the culture increase, to a fully functioning member. The progressive movement towards full participation enables the learner to piece together the culture of the group and establish their identity.

"Knowing is inherent in the growth and transformation of identities and it is located in relations among practitioners, their practice, the artefacts of that practice, and the social organisation…of communities of practice."(Lave and Wenger, 1991, p 122).

Especially in micro enterprises, SME employees have tended to be isolated from communities of practice. This may be a greater barrier to learning than the much fabled lack of time to attend training courses, One of the most powerful uses of ICT for learning in SMEs is the ability to connect to distributed communities of practice. There has been much comment on the phenomenon of 'lurkers' on discussion sites, lists servers and bulletin board. Lurking is very much a process of legitimate peripheral participation. Watching, listening and trying to make sense of a series of posts and discussions without being forced to reveal oneself or to actively participate allows the development of knowledge 'about knowledge' within a community and about the practices of the on-line community.

Similar to the idea of legitimate peripheral participation is Vygotsky's (1962) "Zone of Proximinal Development". This theoretical construct states that learning occurs best when an expert guides a novice from the novice's current level of knowledge to the expert's level of knowledge. Bridging the zone of proximinal development construct with legitimate peripheral participation construct may be accomplished if one thinks of a zone in which the expert or mentor takes the learner from the peripheral status of knowing to a deeper status. This may be accomplished with or without intention as Lave and Wegner (1991) state:

"Legitimate peripheral participation is not itself an educational form, much less a pedagogical strategy or a teaching technique. It is an analytic viewpoint on learning, a way of understanding learning. We hope to make it clear that learning through legitimate peripheral participation takes place no matter which educational form provides a context for learning, or whether there is any intentional educational form at all. Indeed, this viewpoint makes a fundamental distinction between learning and intentional instruction (1991, p. 40)."

However the expert scaffolds the environment to the extent in which the learner is engaged with the discourse and participants within the zone and is drawn from a peripheral status to a more engaged status. The peripheral learner interacts with the mentor, expert learners and peers within this zone. More able learners (peers) or the mentor will work with the less able learner potentially allowing for socially constructed knowledge.

Within the SMEs studies there were few instances of mentoring or continuous contact with an expert. The use of ICT was allowing distributed access to expertise – albeit mediated through bulletin boards, forums and web pages. This leaves open the question as to the process of scaffolding which essentially becomes an internalised process. However the process of less able learners working with more able peers is a common process in seeking new knowledge through the use of ICT.

Essentially workers are using search engines to seek out potential forums and contexts for learning. Selection depends on closeness of interest and the level of discourse in the community. There is little point in following a discourse of too low a level, of knowledge already gained, neither is their an attraction to a discourse clearly on an level which cannot be understood. Learners will seek a community with knowledge at a higher level than their own but which can connect with their prior learning, learning and practice. Typically they will lurk in order to understand the workings of the community and to gain some basic knowledge. After a period of time they might contribute in the form of a question and later again might themselves contribute to the hared knowledge pool. In this ways they move from the periphery through lurking to full bound participants in a community. It should be noted that communities are frequently overlapping and that the use of hyperlinks and more recently standards like track back allow the communities to be dynamic with the emergence of new groups and discourses.

7. Using ICT to supporting informal learning in SMEs

Although there would appear limited potential f or developing formal e-learning in SMEs, the use of social software may hold much potential for learning. Social software lets people rendezvous, connect or collaborate by use of a computer network and is based on the idea of distributed networks of people, content and services that are adaptable and responsive to changing needs and goals. Social Software adapts to its environment, instead of requiring its environment to adapt to software. Applications include web logs, wikis and shared bookmarking. This form of software is ideally suited to supporting communities of practice in SMEs.

Aggregator applications allow advanced searching and the bringing together of materials from different sources. There are a number of interesting developments in personal learning environments based on social software. These could potentially be adapted to build on the informal learning which already takes place and at the same time allow the natural development of e-learning portfolios based on practice.

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Researching a model for learning in small and medium enterprises
A Model for E-Learning in SMEs Based on the Community of Practice

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Abstract

Previous research has indicated that formal learning approaches that have been successful in other contexts are, in many cases, not appropriate for small and medium enterprises (SMEs). The EU-funded Work and Learn Together project is an applied research project which is developing a model for learning in SMEs that is based on the concept of the community of practice.

This paper describes the participatory framework used to design this model and the initial research experience. The principles of the community of practice are used to derive the basic elements. The initial design is based on three clusters of fundamentals (basic elements, framework and presence). The initial experience describes the process of involvement of participants in the design process.

Introduction

Research in a recent EU-financed project led us to conclude that formal learning approaches are, in many cases inappropriate for small and medium enterprises (SME). Learning takes place, but it is more usually of an informal, situated nature, and formal learning approaches are often rejected by participants as irrelevant to their needs or insufficiently flexible. The characteristics of this kind of learning have much in common with the learning that takes place in communities of practice. The Work and Learn Together (WLT) project is therefore developing a model for learning in SMEs that is based on the concept of the community of practice.

This document initiates the process of creation of a provisional working model. The initial considerations and general structure set out will be refined and perhaps reorganised through discussion with the SMEs who participate, and is furthermore expected to evolve with time. The article begins with brief summary of the literature review that focussed on the concept of the community of practice and some characteristics of web-based communities identified by different authors as necessary conditions for the emergence of a community. We then derived from these principles a series of central ideas and a general structure before going on to identify the key questions that are informing the user-centred participatory process of development of an appropriate model for learning in the SME context.

Literature review: Communities of Practice

Our examination of the concept of the community of practice focussed on the work of Lave and Wenger[1] and Wenger's later work[2] , in which learning is understood principally as a social activity that is part of a wider process in which individuals participate actively in communities of practice. This is the key idea that leads us to propose a model for learning in the SME context that attempts to incorporate informal learning processes as an integral part of the learning approach. Our research indicates that much learning in SMEs is informal in the sense that it is not planned, and community-based in that it is based on learning through participation with others in processes that are based on situated activity within a context rather than learning in the abstract about that context from outside it. The concept of the community of practice illuminates these processes and points to ways in which they may be facilitated and supported.

In table 1 the basic characteristics of the community of practice as described by Lave and Wenger are summarised, as well as the contributions of Brown and Duguid[3], who working with ethnographic research done by Orr, focussed on how knowledge is created within the community rather than the nature of the community itself.

It is important to note that there is overlap between concepts and in which it is hard to isolate particular elements completely. These authors emphasise the complexity of interaction in this context and the ways in which the organisations in which these communities were identified depend on this complexity. We find a constellation of overlapping terms with boundaries that are not clearly delimited, and as Preece and Maloney-Kirchmar[4] point out, communities are intrinsically hard to define because they are not by nature clearly bounded. This is important to recognize, since the nature of the

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1 Lave, J. and Wenger, E. (1991) Situated learning :Legitimate Peripheral Participation Cambridge University Press; UK

2 Wenger, E. (1998) Communities of practice: Learning, meaning and identity. Cambridge University Press, UK

3 Brown, J.S. and Duguid, P (1991) Organizational learning and communities of practice: Towards a unified view of working learning and innovation, The Institute of Management Sciences, Maryland USA. Accessed 28/12 /2005 http://www2.parc.com/ops/members/brown/papers/orglearning.html

4 Preece, J. and Maloney-Kirchmar, D. (2005) Online communities: Design, theory and practice. Journal of Computer-Mediated Communication 10(4) article 1. Indiana, USA

concepts defined here, while they are useful for illuminating and indicating possible approaches, is unlikely to lead to clear blueprints for action and the complexity of this area means that loose definitions and guidelines which take shape in practice, in the community and its context are liable to be more useful than cut and dried definitions. Flexibility and open design that includes the contribution of the participants themselves are therefore vital aspects to bear in mind, in order to allow this self-definition to take place. The initial nature of the model therefore needs to be understood as framework in which each "community" of learners can emerge. Rather than design it is perhaps more appropriate to speak of cultivation, while communities may perhaps not be created, they may be cultivated or facilitated and this is the focus of our approach

The literature on communities throws up a range of principles for the cultivation of a community of practice, which we have summarised in table 1. We focussed on three different descriptions, the first of which is the work of Wenger, McDermott y Snyder[5]: (2002).. In it the authors propose a series of seven principles that in their view seem important. Daniel, McCalla and Schwier[6] propose a different though related series of guiding principles**.** These authors distinguish between distributed communities of practice[7]and virtual learning communities. They list Lave and Wenger's key aspects of distributed communities of practice, and then go on to describe fundamental elements for virtual learning communities. The key difference they mention is the informal nature of the learning that takes place in communities of practice, in learning communities it is pre-planned. In communities of practice goals are emergent and continually renegotiated, whereas in learning communities they are organised beforehand. These differences are of vital importance in this context, given the findings of our research. The objective is not to dress a course based approach as "community" based learning, but to support and facilitate the informal learning processes that already appear to take place in SMEs by providing a framework that will help to facilitate them.

These authors also emphasise two other key elements in the success of a community of practice, one is that collaboration, which permits the exchange of ideas and a sense of belonging, develops, and the other is the importance of trust among the members, and this is another important difference with respect to the virtual learning community, in which the bounded nature of the collaboration means that mutual trust is less necessary, though of course desirable.

The other work we examined in detail is Amy Jo Kim's[8], list of simple design principles ("social scaffolding") for rich online communities. Her principles refer to web-based communities rather than communities of practice; however they were included them in the review since they may be of use in the definition of an appropriate community of practice based model for SME learning. In particular it may be that Kimble and Hildreth's[9] reservations relating to communities of practice in business contexts may

5 Wenger McDermott and Snyder (2002) Cultivating communities of practice: a guide to managing knowledge, Harvard Business School Press, USA

6 Daniel, McCalla and Schwier (2003) Social capital in virtual learning communities and distributed communities of practice. Canadian Journal of Learning and Technology, Canada

7 Lave, J. and Wenger, E. (1991) Situated learning :Legitimate Peripheral Participation Cambridge University Press; UK

8 Kim, (2000) Community Building on the Web Peachpit Press: Berkeley, California USA

9 C.Kimble, P Hildreth (2004) Communities of Practice: Going one step too far? York, UK. Accessed 28/12/2005 http://www.knowledgeboard.com/cgi-bin/library.cgi?action=detail&id=3597

make it necessary to include more "directed" elements such as some of those in Kim's list, especially leadership, in the initial stages of implementation.

To summarise briefly three elements can be described as fundamental in the community of practice. The first element is *mutual engagement*. Communities of practice evolve around common actions and ideas. Members engage with each other and interact around these shared elements and the community is defined by these interactions. The second element is *joint enterprise.* Shared objectives presuppose a continuous renegotiation of objectives. The third is *shared repertoire*, which includes all the routines processes, understandings, symbols and so on, that the community has acquired throughout its existence, it can be understood as a common culture.

These different elements provided us with a conceptual base for the initial framework, which is described in the next section of this paper. The following stage involved the definition of a participatory process, involving the prospective participants in the communities (in our research these are tourism SMEs in a range of European countries). Using the different elements of the framework a series of questions to ask the participants was derived, the answers to these questions drive the specific design of the initial parameters for each community.

Initial framework for the model for learning in SMEs

The initial framework for the model is based on three clusters of issues:

Basic elements

The three **basic elements** (mutual engagement, shared repertoire and joint enterprise) that are shared in different descriptions of communities of practice, albeit using different vocabulary, can be viewed as central, in that without them it is unlikely that the benefits of a model based on the concept of a community of practice can be realized. In addition to these is an issue mentioned by Wenger, McDermott and Snyder [4] and Kimble and Hildreth [5], although from differing points of view. This is the question of motivation. In many communities participants can be described as self-motivated, but in the SME context it would be rash to assume this. It is therefore vital to ensure that participants are motivated. Wenger, McDermott and Snyder use the idea of value in this context. Participation in the community must be in some way of value to its members, this value may be of different kinds, though principal among these the learning that takes place, and the value participants may find in acting at times as experts for others. In addition to this and Daniel, Schwier and McCalla [6] identify a sense of belonging as important and this may also be viewed as a possible provider of value.

In the participatory design process the questions that need to be answered in order to identify the nature of these elements for a particular prospective community are:

- What are the common interests and shared objectives of this potential "community of practice"?
- How do members of this potential community view themselves? Is there a shared identity among the potential participants?
- How do the potential members of this community currently engage/interact with each other?
- How can the potential value be demonstrated? Both before the start and during the life of the community?

Framework

The second cluster of considerations can be denominated as the "**framework**": the configuration of the space in which the community exists, including aspects related to the tools used and the spaces and sub-spaces created and initial consensus-based norms that govern the way the community functions (though these may change). The idea of framework can however also be understood as an evolution over time. This includes not only the stages of emergence, but also the sense of history of the community, the rhythms of interaction, the interaction between familiar events and rites and spontaneous activity.

In relation to the framework different questions need to be answered, such as:

- What experience do potential participants have of online activity and interaction?
- Is there an identifiable set of norms and protocols that would be acceptable to potential members of the community?
- What kind of time commitment to the community is likely to be possible for participants? How often are they likely to connect to the community?
- Is there a history of similar face to face community activity, either in the workplace or outside it, among the participants?
- What kind of regular activities might be seen as valuable elements of the community by potential participants?

Presence

The third cluster of considerations can be termed "**presence**". This includes all the elements relating to interaction, dialogue and the interrelation of the participants and the different roles they adopt at different times. In a sense these are elements that cannot be defined beforehand as they are emergent, and conditioned by the way in which the participants behave and interact within the community. From the purpose of learning in SMEs they are key because they constitute the processes through which learning will take place through participation in the community.

The idea of presence can be divided into three areas along the lines of Garrison and Anderson[10] who make a distinction between social presence, cognitive presence and teaching presence. Teaching presence is similar in nature to the idea of framework, we prefer however the idea of framework as an organizing concept since the idea of the teacher (though participants may adopt this role more or less explicitly at times) sits uneasily with the nature of the community of practice and would seem to lead away from informal processes to more formal contexts.

Social presence is described as the ability of participants to project themselves within the community and appear as real people, in other words, the sense of self and others within the community, which is of particular importance in an online context, where this kind of presence requires careful attention. It cannot be taken for granted, especially in an SME context where many participants may be less than familiar with the technology used and even initially uncomfortable with it.

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[10] Garrison, D.R. and T. Anderson, E-learning in the 21st Century. A Framework for Research and Practice. RoutledgeFalmer, London/New York, 2003

Cognitive presence is described as the extent to which participants are able to construct meaning through sustained communication: this can be related to the idea of learning through participation (in this case in conversations) described in the context of communities of practice. It can be used as a term to aid thought about how learning is to take place in this community context.
Though as we have mentioned, the nature of presence within a community can not be pre-defined, as it emerges over time, questioning can give a series of indications as to the shape it might take in order to identify and prepare possible facilitation and support actions. These include:

- Are there natural leaders or champions within the potential community who could act as attractors for other participants?
- Are there identifiable peripheral experts who could be encouraged to participate sporadically in community activity?
- What interrelations exist between potential participants already?
- Are there cultural aspects or attitudes that may affect participation in the community?
- What kinds of interactive activity are likely to be most valued by potential members of the community?

Current status of research

The framework for the participatory design process is currently being applied. Using an initial telephone survey to identify possible participants the research partners are engaged in the process of defining the initial parameters of the communities, using the questions outlined in the framework above. Initial findings are that the model proposed provokes interest, and is perceived to be of potential value to the companies and individuals involved. It is also clear that the participatory approach is welcome; it gives a sense of ownership of the process, and is perceived by participants as ensuring relevance to their needs both in terms of content and methodology (something that we have identified in previous research as a key obstacle to the uptake in SMEs of other models, products and services, especially where e-learning is concerned) To give an example, in the Valencia region of Spain we are working with three groups, rural tourism SMEs, small travel agents, and a group of small hotels. In each case the characteristics are different, in terms of interests, background, experience of ICT and the extent to which the group is already identifiable (the travel agents are part of an association, the rural tourism SMEs have a nexus in the Local Development Agent in their zone, but do not know each other, and the hotels will come together for the first time in the project) It is anticipated that these differences will serve to demonstrate the adaptability of the approach to a range of contexts, as well as its viability.

As this research is ongoing, we expect to be able to provide a further update of the current status at the conference.

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Annex: Table 1

	W	BD	WSM	AJK	DMS (L+W)	DMS (VLC)
Basic	Shared repertoire	Narrative		Context	Shared interest	Shared purpose
Basic	Mutual engagement	Social constructivism		Context	Common identity	Individuals in the community
Basic	Joint enterprise	Collaboration			Shared objectives	Explicit learning goals
Motivation			Value		Sense of belonging	
Framework (temporal)		Narrative		History		
Framework (temporal)			Familiarity and Spontaneity	Events, rituals		
			Rhythm stages of development			
Framework			Open design		Autonomy in design and evolution	
Framework				Etiquette	Shared protocols and objectives	Social protocols
Framework			Open design	Meeting places varied spaces	Effective communication s media	Communica tions
Cognitive/so cial presence		Collaboration	Interaction		Collaborative exchange of ideas	
Cognitive/so cial presence		Social constructivism	Dialogue		Collaborative exchange of ideas	
Cognitive/so cial presence					Shared information and knowledge	
Social presence						Trust

Open Content Methodology: New Approach to Educational Research and Practice

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Introduction

The majority of modern researchers converge in opinion that global education experiences deep system crisis. In the modifying world with growing challenges of globalization and technological revolutions, global problems can not only be solved within the framework of existing approaches but also even be correctly posed. Claims to the education system concentrate around of concept “quality of education” which does not suit neither economy, nor a society, nor actors of education themselves.

In these conditions e-learning is perceived as a new word in pedagogical science and practice a way of overcoming of crisis of education in its all manifestations. However technological solutions influence basically the organizational moments of training, allowing making educational processes more flexible and focused on the user. But in a basis of system of e-learning still lay traditional pedagogies build on a paradigm of transmitting of knowledge and cultural samples, conceptually rooted in “Great didactics” by Jan Amos Komensky.

Last years amongst the customary (though not necessary profoundly interpreted) notions related to and describing education (e.g. distance learning, e-learning, online learning and teaching, online distance education, etc.), other notions appeared open and flexible learning, open sources, open courses, open resources, open art and open content. It is accepted that these open constructions offer new opportunities and challenges to educational systems, institutions, stakeholders, users and providers of education.

The authors consider that attempts to create the unique substantial theory of e-Learning, to generalize the techniques applied in e-learning, to overcome plurality of the methodical directions chosen as the basis for the construction of training processes are not always successful not for the reason of that some factors have not been considered, the insufficient data file is analyzed and specific features of e-learning are not examined, but because of more deep rational. We believe that it is necessary to reconsider basis of education as public (social) institute, namely the methodology of activity which should be Subject-focused.

Being absorbed in research on the most comprehensive notion of open content and conceiving new features of this phenomenon, the authors have come to a conclusion that the methodology corresponding to open content represents an example of a fundamentally new methodology which could be attributed to post-non-classical methodologies, and the main point of such methodologies is recognition of uneliminability of a Subject from any cognitive process (description, explanation and prediction). While comparing the characteristics of post-non-classical methodology and those of open content, the authors prove the propriety of such problem setting.

The readers are invited to draw their own conclusions which may follow the proposed judgment on relations between a Human being and World.

The Approaches to the Definition of Open Content

Our social institutions, economics and educational sphere were conceptually formed at the beginning of industrialization when information revolution, globalization, virtualization of real world, non-classical and post-non-classical picture of the universe were out of the discussion. Though a number of modernizations slightly adapted these institutions to the changing conditions, nothing was altered radically and completely.

But today, critically examining (through the prism of post-non-classical methodology) its own organization the global community ought to recognize that the Information Society and especially Knowledge Society with all their outlines and approaches sketched by the moment require cardinal revision of the fundamental nature of most social and economic “rules of game”.

The Information Society is a society where the main production, communication and other processes take place in the virtual environment. Such virtualization of the real world results in the fact that knowledge about “the ideas” occurs to be much more important than practical realization of the ideas that becomes a routine due to the progress in technologies.

Formerly, the ideas of objects could be transmitted from one generation to another only being implanted (“immured”) into the objects, but nowadays stocked information about an object allows to produce its material copies when and as may be needed. The extraction of meanings (denotations) from the objects of material culture makes the most of material values unnecessary and possession of them becomes senseless.

The accent has been shifted from possession of objects to possession of ideas, which are different from the material objects due to their virtual nature and present the processes resulting from creative communication.

The Information Society is not only a theoretical investigation of armchair scientists but it is phenomenal and today one may observe its existing shoots in some mass phenomena. First, we mean open projects and free (independent) communities developing in the Internet environment. These communities (still) take very modest practical aims but their activities comprise something common which, being extrapolated to wider community (up to whole society) makes it possible to perceive the other world, other interactions, other laws and other productiveness.

Along with the development of such projects and extend of the fields of their implementation principally new methodology has emerged. This methodology looks for and gradually detects the techniques and modes of co-organization of people in the communities based on creation and dissemination of knowledge, information and products of creative activities.

Two Definitions of Open Content

In the narrow sense, open content means digital content under the specific (open) regime of using, which is usually regulated by the special open license for dissemination of content. This empirically narrow operational definition of open content is widely used now and appeared due to the joining to the regime of production and dissemination of open software for other digital products such as texts, music, video, images and combined products united by the term "multimedia".

The term "open content" is (still) used in almost the same sense in the UNESCO documents, but here the word "open" has an additional nuance corresponding the Organization's spirit and means not only the open regime but also the principle of openness and availability of knowledge, information and works of art, which UNESCO advocates.

Nevertheless, it seems to us that the whole sense spectrum of open content could not be limited to the definitions mentioned above.

The "content" means not only content in proper sense but also essence, substance, meaning and sense. By the way, an English word "content" succeeds in its sense to two different Latin words: "contentum" that means "something existing inside" and "contentus" that means satisfaction and contentment (sic!).

The second part of the term, namely the word "open" comprises in its sense not only openness as availability and accessibility but also means something what was open, released, discovered as well as "open" in the sense analogues to those used for "open systems", namely open-ended, unaccomplished, unfinished and available for interactivity.

In the broader sense Open Content constitutes a holistic virtual milieu, which represents:

- *an environment of the virtual (third) culture,*
- *individuals as subjects of interaction with each other within this environment,*
- *individuals as subjects of interaction with this environment,*
- *processes and products of mentioned interactions.*

The ongoing process of building of the third, virtual culture (while the first culture is natural one and the second culture is culture of material objects) means extracting of senses from the material carriers and their locating in virtual digital milieu in which the senses visually demonstrate their indissoluble coherence. When one explain a notion using other notion and accentuate something, he hopes to be heard bearing in mind that his interlocutors possess the same space of senses (at least, compatible space). The senses insert into each other like in Russian matreshka. It becomes obvious that the senses are interdependent to the degree when they turn into a single and indivisible whole.

Everything embraced by the notion “open content” constitutes the substance of culture or cultural stratum and cultural environment. Taking into account the rate of digitalization of cultural information the last will turn in the near future into the virtual cultural environment and become “the third culture” which follows natural and material cultures.

The process of digitalization is extremely important as far as it comprises at least two revolutionary sides: first, the cultural values tear away and remove from their material carriers and, second, they transfer to another, namely open, scheme of access. Due to obtaining its networked dimension, the cultural environment turns out for the first time in history to be available for all, freely disseminated and complexly interconnected by the semantic reflections, associations and allusions. Moreover, it becomes reliably protected, unengaged and resistible to any ideological influence.

Open Content as a Methodology

In some works on gnoseology and science of science, the multifold correlation between the levels of social development and dominant methodologies has been realized. The transition to the next level of social development is accompanied by a paradigmatic transformation of methodology. Thus, the methodology corresponding to the industrial society is a classical methodology. Its formation was routed in methods and principles applied in natural science of those times, and so-call “classical picture of the universe” was shaped. The classical methodology originated from the methodology of natural science, representatives of which were convinced that immeasurable values do not exist and every measuring may have every degree of accuracy as well as when something is ignored it can be compensated. The picture of the universe was under “pure” construction, without God and Subject.

But later the necessity to study microcosm where the principles of classical methodology occurred to be inadequate, e.g. there is no possibility to measure with every required degree of accuracy and some measured values are interdependent. The perception of such results led to the formation of so-called non-classical paradigm of methodology evolution, and meanwhile the society entered a consumer phase of its development. Along with the syntax and semantic elements of analysis the pragmatic elements have emerged. It has become clear that an integrated picture of the universe could not be shaped when taking into account the existence only of the macrocosm and microcosm and not considering the presence of the world of information.

The mentioned world of information possesses amazing property, namely integrity. The sense extracted by a Subject from observed events and phenomenon has its value only in connection with other (earlier gained) senses. Moreover, this connection between senses is so significant that it could be affirmed as follows: *any sense constitutes only a fraction taken by consciousness from integral and indivisible space of senses, which may be exemplified through the virtual space of the third culture.* Examining previous ideas of connectedness of senses, one may notice that in classical methodologies, the senses were regarded as independent and in non-classical connected in some way (according to the principle of complementarity).

The integrity of the space of senses with which we interact as cognitive subjects leads us to the necessity to revise our conception of the human being's role in the world as well as the principles of organization of social and working environment.

The main attributes of uneliminability are:
- uneliminability of a Subject from any process, incl. description, explanation and prediction processes,
- uneliminability attributes to a Subject in all its manifestations: divine, human and spiritual.

Although the principles and methods of post-non-classical science has been accepted by the intellectual community and recognized as scientific thinking, our societies, economics, political systems, social and public institutions, including mass education, are still based on non-classical and even (and often) classical picture of the universe. No surprise that there are a number of failed attempts to inculcate, basing on previous fundamentals, modern methods into **mass** education, namely methods of personalized learning, structuring of personal learning environments and tracks using e-learning. Along with updated and relevant pedagogy, psychology and management required for e-learning, there is a necessity in a new relevant methodology for research and practice of the whole frame of e-learning and online learning and teaching.

Implicitly, the post-non-classical approach has always had its place in education for creative and free professions and "limited production" of artists, sportsmen, decision-makers, etc. The transition to the Knowledge Societies means the conversion of the main part of workers into the creative workers in the fields of science, information, social and artistic activities, and this is a challenge for education.

Other challenge for education constitutes a cognitive divide, a new type of inequality which impendent to become the major inequality as information technology expands. While the digital divide means segregation according to the access to digital facilities, the cognitive divide consists of inequality in formed basic competences and thinking skills, which allow or disallow an individual to participate on equal terms in information, scientific and creative activities. The eradication of the cognitive divide requires the cardinal reconstruction of mass education system, and the post-non-classical methodology should be laid at its basis.

We conceive that the forming of new methodology goes through the development of open content methodology, and it is quite credible that it will turn into the post-non-classical methodology or, in other words, methodology for Knowledge Societies.

The main characteristics of the post-non-classical methodology are:
- cognitive nature of notions of the reality types,
- free will,
- variant nature of correlation between a Subject and Environment oriented to a Subject,
- a unique result of a Subject's activities is the creature of senses,
- "anti-label law" towards two or more Subjects,
- impossibility to create an environment, which externally defines a self-identification of a Subject,

- the aim setting is indistinguishable from the holistic picture of the world and could be assessed only situationally.

And the main characteristics of the open content methodology are:
- virtual “habitat” environment – location of senses,
- free partaking in communities,
- management through the method of social discourse,
- distinguishing of personal contribution to the overall result is impossible in principle,
- each result of an individual’s activity becomes commons,
- availability of supporting technological environment, namely social information infrastructure (Net),
- ethics of planetary responsibility.

Manifestations of Open Content

We are going to extract from the different projects taking place in various countries and fields of activities and social communication the essential common features and find out main driving forces and mechanisms. The following should be underscored:

1. The open content projects are set up for solving of definite problems. The specific goal of a project may be refined but initially in must be defined in terms of product (result) and not of process. The results of each project and contribution by every participant have a sense to the extent they contribute to public commons.
2. The goal of a project should be not only very definite but also socially sound. The more significant goal is the more resources, attention and energy of the participants it may attract. The goal should be generous and ethically sound. The explicit formulation of the goal is directly related to accumulation of energy and motivation of the participants. When the goal is degraded, the motivation is also degraded, and the prospects of success of the project and effectiveness are decreased.
3. Ideally, the open content projects have no need in any hierarchies for the project management or attaining the result, even in the form of some experts’ institute. The net model works due to the fact that there is a limited number of possible rational reasons (ideas, decisions, hypotheses) while the number of the participants in the project is unlimited (possibly all habitants of the Planet). In this case, a full set of hypotheses is guaranteed, and the choice of the best one becomes simply a math task, according to the theory of decision taking. In real life, the need in some hierarchy may happen but it should be situational. The excess of rights over necessary level causes inequity of the participants unfavorable for motivation and frightening adherents away.
4. Development of the open content projects on major problems allows accumulation of social energy and canalizing it in line with the most important social tendencies as far as such a model of social activities play at the same time a role of an organizational mode of social discourse. In modern world, these two functions are usually separated: actions are empowered to ones and meaningful information and analysis belong to others. A decision taken through social discourse are collective, they are carefully considered by all stakeholders and at once the fact of collective decision-making generates collective responsibility for its implementation and mechanism for

implementation. Thus, knowledge immediately becomes an action and the divide between thoughtful but futile discussions and thoughtless actions disappears (in particular, the conflict between competent science and operating government).

5. Free model of participation presumes equity of all possible opinions. Equity of the participants presumes careful attitude towards motivation and leveling of opportunities to contribute to the project and its results through offering different models of participation, interaction and learning for unskilled, disabled, young and adult, people of different languages, religions, cultures, minorities, etc.

Being laid at the basis of new post-non-classical social and production institutions, the open content methodology is capable to reorganize the society in a way making the global community able to meet adequately the challenges of globalization, cope with severe crisis situations resided in modern world, e.g. poverty, inequity, global diseases, ecological problems and other disasters putting humankind on the verge of survival.

If applied to research on all aspects of modern education, the open content methodology is to provide a holistic approach, facilitate overcoming of fragmentariness and disintegration in research policy and processes, promote innovation research and practice involving all stakeholders and harnessing their potential in favor of development of education, hence of societies.

Distributed Classification Systems and Folksonomies as an Alternative for Portability, Reusability and Sharing Content for eLearning

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Research paper submitted under Theme #2:

Discussion or critique of research design/methods for online distance education/e-learning

The European Union has been setting on the agenda, for years now, among the urgent issues to be addressed, the topics of "reusability of contents" and "pedagogical resources and knowledge sharing".[1] These issues convey a dramatic economic efficiency dimension. As obvious as this dimension might be, it should not hide other major political and pedagogical aspects such as the increasing cooperation between institutions in Europe, the adoption of sharing and collaborative working habits, or the creation of lasting and sustainable data warehouses of pedagogical resources. The concepts of portability, reusability, and sharing are the key for today's challenges, raised by data format standardisation, contents description, and even the interoperability of the systems using these datas, as well as storage and transfer of the pedagogical contents themselves depending on the cultural contexts and national pedagogical traditions. This is the rationale behind big programs, many EU-funded, aiming at delivering real-world solutions to the issues of access to the content, and offering tools and models needed to select, create, use and re-use e-learning content. **Recent workshops, held in Brussels and initiated by the European Commission in the context of the eLearning initiative, show that the need is still accurate and**

[1]Decision No 2318/2003/EC of the European Parliament and of the Council of 5 December 2003 adopting a multi-annual programme (2004 to 2006) for the effective integration of information and communication technologies (ICT) in education and training systems in Europe (eLearning Programme).
http://europa.eu.int/comm/education/programmes/elearning/programme_en.html

call for a new evaluation of the so-called "eLearning content reusability" paradigma : "New models are required for selecting, producing, using and re-using content for elearning; e.g. learning objects, co-ownership, public-private, free/open. Users need the skills and competence to deal with this"[2].

But **the issue of "content reusability" is tightly bount to the eLearning approach, and more widely to the web philosophy that education content editors have been developing for years, as well as educational software producers have, influencing the representations in educational institutions.** The models set up during the last years tend to match the "virtual classroom" metaphor, and the "virtual school library" concept, avoiding thereby any frontal opposition with the academic practices they reflect: "The learning management system was designed explicitly to emulate traditional practice. The basic unit and structure of instruction remained the course; the basic unit of person remained the class, and for the most part, albeit with new technology, the time-honoured techniques of instructional delivery, interaction and testing were emulated in this new environment. If learning management systems imported anything new to traditional learning, they did so though migration from existing practice in distance learning".[3]

These are ad hoc web systems, designed especially for the educational world, with a restricted access, (allowed selectively to the education community members), and where class groups follow learning paths filled with selected resources, under the monitoring of a teacher or tutor.... According to this approach of eLearning : "[The] Learning resources would be authored by instructors or (more likely) publishing companies, organized using sequencing or learning design assigned digital rights and licences, packaged, compressed, encrypted and stored in an institutional repository. They would be searched for, located, and retrieved through something called a *federated search system*. When needed, they would then be unpacked and displayed to the students, a student who, using a learning management system, would follow the directions set out by the learning designer, work his or her way through the material, maybe do a quiz, maybe participate in a course-based online discussion."[4]

***Learning objects* (LO), *learning management systems* (LMS), *learning content management systems* (LCMS), *content packaging*, *federated search* and *learning design* allowed the educational world to develop eLearning practices and, from this point of view, acted as stepping-stones for school in the digital world. By doing so, they also heavily influenced the question of content sharing and re-usability.** These tools created a specific market, with its own tendencies and cycles, including grapes of new solutions. Then, this market itself has been fuelling a second

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[2]Report on the consultation workshops 'Access Rights for e-Learning Content' & 'Creating, sharing and reusing e-Learning Content' Held in Brussels on 27 & 28 October 2004.
http://europa.eu.int/comm/education/programmes/elearning/doc/workshops/elearning%20content/workshop_report_en.pdf
[3]Stephen Downes, "The Buntine oration", International Journal of Instructional Technology and Distance Learning, http://www.itdl.org/Journal/Nov_04/invited01.htm November, 2004.
[4]Ibidem.

market, tightly linked to this first one, addressing regulations normas, content description, packaging and delivery standards. Software editors are now in a loop, and can't stop providing new tools and functions, considering the intrinsic rules of technical evolution, the need for periodic renewal on markets, and the pressure of concurrence. That's why the standards and formats creators are bount to perpetually refreshing their specifications, normas and standards, and preventing the horizon of interoperability from getting too far from the present day. This horizon, indeed, constitutes their main justification. And the threat of loosing leadership in this strategic field is always close. **The endless quest for interconnection between closed and heterogeneous virtual pedagogical systems, often more and more specific, might appear sometimes to the observer as and endless run. Despite (or maybe because of) this perpetual qualitative extension, the real interoperability goal, truly implemented not only in technics but in real life uses, among the pedagogical practitioners, seems to be more distant everyday.**

A proof of this lies in the shape taken today by the (few) real experiments of content exchange, which are still, most of the time, state-of-the-art meetings, accessible (and intelligible) only to experts and techno-maniacs, such as the plugfests. Most of the time, the goal there is to create a federation of systems, to put them together through interconnection, and to bind together the datas they possess... **We should not underestimate the fact that today, the focus is much more on the "reusability of contents", defined as a technical goal, rather than their real "reuse" in everyday life teaching acts or course creation by the teachers.**

The hegemonic logic which has been prevailing until now, when it comes to content management, indexation (and eventually creation), is the paradigma of *federated search systems*, calling for *federated classification systems:* these content management architectures tend to federate the different parts of a system in a node. The philosophy of this scenario is now under pressure, and is being challenged about its ability to answer to some re-usability key questions, among which the sharing of bookmarks on existing resources, to pick one of the hottest on the agenda.

The philosophy of the most common repositories is a continuation of the federative centralized model, relying on sets of metadatas who are meant to define the formal structure of the classification:

- Metadatas are defined centraly. They are meant to assign to any future content a unique place in the logical repository. They are ontology driven, as they induce statements not only about the place but even about the nature of the pedagogical resource. This ontologic pretention is an important source of complexity, when it comes to linking systems relying on different metadatas: then, the problem is about making match different vision of the world.

- Metadatas are extremely heavy to fill: much has been said about the time needed for a sincere teacher willing to go through the LOM items on one single picture element of his course, which is often evaluated at forty minutes of added work. This extra-work (and the lack of pertinence of some items, added to the lack of pertinent ones sometimes) has been highlighted, and skirting strategies have been set up, that could put in question the meaning and sense of the whole metadata program: self-filling of metadatas by the learning management system or the federated repositories, cutting in the metadatas set during their implementation. L

If we were frontally asking today in a teachers' meeting the naive question: **"Considering the amount of money invested until now, who can really show us, within the Union, a country where teachers really benefit daily, in their common tasks, from opportunities to find and re-use contents thanks to the corporate tools they have been offered by their institution in their pedagogical uses? And which tool is the most efficient in this purpose?"**, we would be exposed to a polite silence... Maybe, at last, would a teacher raise his hand, and testify that "Yes, I'm using a tool to easily find already existing contents that can help me in my teaching, and this tool is...Google"[5].

[5]"Because learning objects are invisible to Google, there have been several projects designed to make them discoverable; for the last two years I have been involved in one of them, the eduSource project, based in Canada, which has as its objective the linking of collections of learning objects, known as repositories, to support what is called a federated search. In the e-learning world in general this has been the next new thing; IMS has released a Digital Repositories specification, and instead of Google, operators of learning content management systems are intended to access these federated searches.

Without lingering on this for too long, let me say that a federated search is everything that Google isn't. With Google, information about every website in the world is collected in one place; the user accesses the Google interface and searches it all at once. In a federated search, the information – in this case, the learning object metadata – stays where it is, in individual repositories. When a person conducts a search, this search is sent to each repository in the network individually. Thus, if there are ten repositories in a federated search network, the search is conducted ten times, once on each repository, and the results are sent back to the searcher.

If this process seems odd and cumbersome, it is. In practice, the federated search over even a small number of repositories is significantly slower than Google. It is also exclusive; in order to be a member of the federated search network, it is necessary that a repository be able to support an instance of each and every search. It's like requiring that every website have the capacity of Google. But most importantly, it exercises control over the search results. Because metadata originates only from the source repository at the time of the search, access to the metadata can be blocked if, for example, the searcher does not have the appropriate license. Moreover, the only information about a learning resource to be had is that information provided by the vendor.

What Google has, that a federated search system by definition cannot have, is what I call third party metadata and what Google calls PageRank. In order to order search results, what Google does, essentially, is collect information about what other people think of the resource, and to incorporate that into its search. For example, Google counts the links from other sites to the resource in question, and if many people link to the resource, it is ranked higher. No such ranking is available to searchers in a federated search network; the only ranking possible is that provided by the vendor, and that is rather more likely to have to do with the vendor's business model than any third party information about quality, classification, usability or suitability".

Stephen Downes, "The Buntine oration", International Journal of Instructional Technology and Distance Learning, http://www.itdl.org/Journal/Nov_04/invited01.htm November, 2004.

A second approach, open and decentralized, is the approach instantiated by the World Wide Web itself. New tools are gaining ground; the lasting success they met among the users and the mass audiences deserve to be carefully studied. In the field of content management, new services emerged, allowing the users to spontaneously propose classification of their bookmarks, for example. These metadata-free systems tend to be known as Folksonomies, i.e taxinomies created by the average user, without any previous masterplan about the structure of the universe. User-oriented, these tools build on the idea that open systems have strong possibilities to self-regulate.

The *Distributed classification systems* (DCS's), opposed to *Federated classification systems* (FDC's), **can be defined as open, evolutive and inclusive systems. They seem to foster effective reuse and sharing of many kind of resources, in the global web where their success is massive. They allow us to reach many goals :**

- **to create a useful and smart interoperability**: they are interoperability sensitive, and offer compliance with the standards proposed by the W3C (*e.g. On the social bookmarking software del.icio.us, I'm allowed, as hundreds of other users are, to make a "mark" on a resource using a tag "for example, the tag "ePortfolio" ; any other user can benefit from this bookmarking action by syndicating the RSS feeds from his news reader. In an other way, I can start very easily a database of bibliographic references on, let's say, constructivism simply, calling the RSS flux of the tags "scaffolding" and "Vigotsky" from cite Ulike*) ;
- **to set up a more comprehensive (**and maybe more human-oriented ?**) classification system taking into consideration the cultural representations as well as multilinguism** because DCS rely on individual choices : here, the users are the elementary unit and their preferences are the main "knowledge capital" of the classification software. The categories created to classify those preferences are not centrally determined, as they are in the FCS, but rather created on the way by the users, who have the initiative to tag the contents they want to tag, flagging them up for themselves and for the community. The tagging, as shown in the works dedicated to this topic, creates organically a growing mass of pertinency, increasingly consolidating when a same tag is used increasingly to describe a content. The main result of this process is that the social and technical model generated is in the same time flexible and "up to the user": each new content will be easily and quickly described and classified by the person proposing it to the community. Moreover, this kind of classification allows **the setting up of statistic mechanisms on which the reputation and ranking of the resource**: the more people do express their choices and preferences on the resources, the more the system learns about what is relevant, what makes sense for its users. This mechanism is known as collaborative filtering. Finally, *tagging* reveals

the cultural underlying basis of our vision of the world: classification schemes depend on the culture and language of the tagger, and reflect a vision of the world that might change with time. A Distributed Classification System allows **the coexistence of many perceptions about a single object**. While an ontological classification system, in the heart of a federated classification system, based upon metadatas, tends to assign a single place of belonging to the object, the distributed philosophy of tags allows the coexistence of many attributes on a single object, and many conceptions about its nature and its possible re-use ;

- **to induce exchange and content sharing** because DCS behave as vast open databases where the user can begin with self-oriented thinking (“*I'm tagging for myself in order to be able to locate the content in the future*”) and smoothly shift to communautary behaviors, without any added cost (“I'm tagging in order to allow others to find contents” or “I'm taking advantage of the contents located and tagged by the others” or “I'm enjoying the resources already created and classified by others” (e.g. in the context of a participative work about children of the world”, I can find the picturing I was missing thanks to the search of tags “*portraits , kids, Yiddish”).* Finally, DCS can act as proposition tools, on the basis of similarities or coincidence of preferences and tastes between many users and suggest spontaneously a content to a user (this smart and useful feature is well known by customers of the Amazon site, when the system comes to you with unexpected and tempting selections of books, designed according to the user's taste system proximity to others. This commercial implementation is likely to be used wisely to suggest to the teacher some unknown and relevant resources that he would not have thought of before.

  These are the three goals we have been seeking for a long times, with powerful and big scales projects accumulating normas and standards

The synoptic view allows a presentation of contrasts between the two models of architecture (and their philosophy) of the web with pedagogical purposes:

Centrally ordered and federated architecture	Decentralized architecture
Ex-ante Metadatas	On the fly produced tags, depending on the needs
Focus on the quality of classification	Focus on the efficiency of search
Abundance of normas and set of normas	Abundance of content
Regulation authorities	Communautary Regulation
Institutional tools with one to many relations	Individual and collective tools allowing a whole range of relations between people : many to many, one to one, many to one
Ontological Classification	Individual choices synergy classification
Sharing is a plus: first, creation, the classification, then, eventually, publishing and then, provided the needed tools are available, sharing. The process is from the individual (private account, workstation) to the web.	The web is present from the very beginning: publishing and sharing are often embedded, we share with and for the others, we take part and receive.
Reusability as an horizon	Reuse as practice

These trends, mixing tools and new practices, are an opportunity to be explored. Actors in education, separately, in a decentralized way, have already been experiencing these new tools and initiating new practices often known under the vast concept of web 2.0 -chosen to highlight the discontinuity with yesterday's tools and practices-, and proposing a new way to share and classify pedagogical contents.

The topic of effective reuse of contents is more than ever on the agenda. If individuals are already adopting these tools, institutions and specially institutional libraries cannot ignore them. Our current research work addresses this issue: how to bring DCS to educational institutions? What are the steps to mitigate the barriers? One of the answer found today, probably one among very few is the University of Pennsylvania’s PennTags project that integrates tagging with the book catalogue allowing readers to tag catalogued items. In Europe, **there are several questions on social software from an educational perspective that researchers and practioners should answer if we want to foster pedagogical contents sharing and reusing in schools.** Among that urgent questions are: privacy and control of pupils and students data within proprietary and open-to-the-world web services, risk of the use of these tools for students and pupils such e-predators, use of open source social software in education.

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AN OPEN SOURCE APPROACH TO E-LEARNING CONTENT DEVELOPMENT FOR THE DEVELOPING WORLD

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ABSTRACT:

Can e-learning actually provide a level playing field for developing countries in the area of education? So far, it has not, but the obstacles are perhaps diminishing. The Internet offers fantastic educational resources -- effectively a global knowledge base. However, much of Internet content is oriented towards the needs and interests of industrialized countries. Here we propose an approach for developing countries to pool efforts to create a digital commons of e-learning resources that are appropriate and relevant to their specific needs.

1. E-LEARNING FOR THE DEVELOPING WORLD

1.1 EDUCATION AS ANTIDOTE TO POVERTY

"Education is the only antidote to poverty"
– A.R. Bawa, Dep Minister Education, Ghana (Bawa, 2003).

While cheap, universally available education is desirable everywhere, it is most desperately needed in the developing world, especially in rural areas where access is most limited. For most people in developing countries, education is not a goal in itself, but is instrumental to other needs. In addition to the direct costs of education, there are also opportunity cost – time lost for other kinds of employment. In many poor countries, this applies even to children, for they are also working assets of the family, e.g. to work the fields. The benefits of sending children to school must be seen to clearly outweigh the costs. These benefits are seen most clearly as offering new economic opportunities, which is itself an educational challenge.

1.2 E-LEARNING AS ENABLER FOR E-BUSINESS

There are a variety of related definitions of e-business -- most include the notion of business processes that exploit Internet technologies. A somewhat broader notion suggested by the Gartner Group [www.fourthwavegroup.com] is that e-business is "a phenomenon involving a significant change in the cultural, economic, societal and market interactions that people and businesses experience in dealing with one another."

For the purposes here, let us assume that e-business involves the enhancement of economic opportunities via Internet technologies. In this sense, one typically imagines the ability to start new enterprises, opening access to international markets, linking to venture capital, etc. In short: enabling access to (the positive features of) globalization.

But many people in developing countries, this comes as a culture shock. They have lived in relative isolation, familiar only with their local culture and practices. Thus, the transition to e-business requires adaptation and learning about the outside world and its business practices. The focus in this paper is on e-learning support to facilitate this adaptation to e-business.

1.3 A VISION OF E-LEARNING FOR DEVELOPMENT

Like most new technologies, e-learning has had initial impact mainly in the industrialized countries. The developing world so far lacks the infra-structure and availability of computer resources to make serious investment in e-learning developments. When governments in poor countries face shortages of food and medicine, investment in education may be seen as a luxury.

Around the world, education is normally considered as a responsibility of governments. Every government has a Ministry of Education. The implicit assumption is that educational developments are done "top-down", from national priorities and programs, extending eventually to the local level. In many countries, public education is also complemented by a private sector educational institutions, such as private universities and private secondary schools. Another variation that is appearing in many developing countries, are educational initiatives that are partnership effort between the government and certain private companies. The companies are typically large technology-based multi-nationals, such as Cisco, and Micosoft. These public-private partnerships have had some success, especially in areas of technical training. While the commercial linkages may be criticized as motivated by globalization interests of the companies (providing lower cost trained labor supply), they also have the clear advantage of linking the educational time investment of individuals to a broadened range of economic opportunities, Kersemaekers, (2002).

There are also examples of educational models that develop "bottom-up", without major investments or direction from governments or corporations. Significant among these is Committee for Democratization of Information Technology (CDI), a non-profit, non-governmental organization started 1995, to "promote social inclusion, by using information technology as a citizens rights and developing tool" [www.cdi.org.br]. CDI works in partnership with low-income community centers and special needs individuals, such as physically handicapped, psychiatric patients, homeless children, and prisoners. The design of CDI has some remarkable merits. Most impressive is the degree of motivation and involvement it achieves among its students. Another stunning characteristic is its “viral growth” where schools tend to replicate into hundreds more. An additional noteworthy characteristic is that the growth of CDI schools is done on a minimal budget, with little or no outside investment. However, it will be noted that the education made available from CDI is basic computer literacy, and a sense of familiarity with the potential applicability of the technology, coupled with aspects of citizenship and social responsibility. CDI does not compete with conventional schooling in offering the broad range of subjects normally associated with primary and secondary education.

1.4 PROVIDING THE TELECOM INFRASTRUCTURE

One of the immediate concerns in discussions about e-learning in developing countries are the technical requirements of providing computer technology and telecommunications access. As is widely recognized, these are necessary but not sufficient conditions (Warschauer 2003).

Thanks to widespread de facto standardization of operating systems (Windows, Linux), there is already relatively easy portability of software among hardware platforms. As the earlier CDI example illustrates, it is possible to assemble workable computer labs through heterogeneous collections of computer hardware acquired by donations and creative reengineering. A more serious challenge, especially for remote areas, is Internet access. Like previous generations of telephone technologies, the bulk of telecom infrastructure is built from cable networks. These have relatively easy availability in the cities, but the fan-out from these hubs to remote areas can leave whole regions without access.

However, new possibilities are emerging via satellite (Global VSAT Forum, 2002). Stimulated by the demand for entertainment, satellite TV has been expanding quickly to remote areas. With relatively modest extensions, this same satellite infrastructure can now offer Internet access. For instance, with an initial equipment investment of about $1000 and monthly connect charges at about $100, one can now get a 500 kb connection in most of South America and soon Africa [https://register.earthlink.net]. (For instance, satellite access to the Internet is now available in the Amazon jungle (SpaceDaily 2002)). While these prices may out of reach for most individuals in developing countries, they might be sufficiently economical to support a remote cyber-café.

1.5 DEMAND AND SUPPLY FOR E-LEARNING

The link between educational investment and economic opportunity has always been tenuous, both at strategic level and at the individual level. Strategically, the more successful examples of economic development, e.g. Singapore and South Korea, have also made heavy investments in education, especially at university levels. However, just where to make those investments is less clear, since building educational infrastructure coupled with the educational process itself often moves more slowly than market demands.

At the individual level, the issue is where to specialize. If one is beginning a four-year university degree, the employment market could shift substantially in the intervening time. For individuals in developing countries, the problem may be the more basic one not of which area to specialize in, but whether to pursue education at all. The choice is more difficult because the relative personal costs are much higher. For a poor young man in a rural area, the cost of secondary education may that the family loses its strongest worker for half the time. For a woman (e.g. in Muslim countries), there may be additional stigmata. These relative personal costs are even higher for tertiary education, which may require leaving the home altogether to attend university in a faraway city.

These kinds of constraints are strong arguments for e-learning applications. E-learning can offer anywhere anytime access to education on a self-paced program, that can be customized to individual backgrounds and needs. A farm worker can take courses at night. A father whose education stopped with grade school, can take remedial courses without embarrassment. A woman can take special interest courses in the private context of a computer screen. Moreover, the same e-learning facilities can help individuals search for employment opportunities, and the specific knowledge packages that might be relevant for those opportunities. This is a kind of “just-in-time” education.

It is easy to visualize the wide range of benefits that e-learning could offer for people in developing countries. There are however, three main resource constraints:

- financial -- these people are poor, and can only pay very small amounts for education beyond what is provided free by the government.
- telecom – in most developing countries, telecom infrastructure is lacking outside the big cities.
- content -- the content for on-line courses needs to be developed to fit the local context. While some subjects, e. g. algebra, may be globally generic, nearly any topic involving social aspects (e.g. management) has cultural dependencies, that need to be contextualized. Presentation styles may also need local adaptation. Obviously, course content needs to be offered in the local language.

Of these, perhaps the most challenging is the development of localized courseware content. This needs to be developed, or at least adapted, locally – both to make it locally relevant, but also to make it economically viable, with costs of production that are compatible with the revenues that the local market can produce.

2. OPEN SOURCING E-LEARNING CONTENT

Open source software systems[1] have now emerged as a real, economically significant phenomenon for producing high-quality, broadly usable software. While the emergent character of open source projects is still the focus of much study, enough has been learned that some are trying to generalize this to other areas. For instance, a close sibling to open source is open content (Cedergren, 2003), of which there are also a number of

[1] we are aware of the distinctions in terminology between “open source” and “free software”, as reflected by their respective organizations: Open Source Initiative [#open-source_initiative] and Free Software Foundation [#free_software_foundation]. Throughout this paper we adopt the now popular usage of “open source” in a generic sense, intended to include all software where the source code is freely available.

highly successful projects. In this paper, we consider another area of potential application for open source (and open content) project models, namely e-learning.

Open source systems are often admired as a kind of self-organizing project management strategy. Related, but somewhat distinct from this are the aspects of creative synergy in (the more successful) open source projects. Individuals from different parts of the world, who have no prior acquaintance, can modify and extend each other's creative work to produce an evolutionary product beyond what any individual could achieve. Indeed, several of these projects compete successfully with large scale corporate projects (GNU/Linux vs MS Windows for example).

To a certain extent, e-learning might be considered simply as another application domain for open-source projects. For instance, various kinds of computer aided instruction (CAI) software might be produced as open source. On a larger scale, the more complex kinds of software known as learning management systems (LMS) might also be produced as open source. Indeed, there is already a significant open source LMS project called Claroline [www.claroline.net].

But, unlike most open source software, e-learning contains a heavy dose of content. In this regard, a major challenge for open e-learning is the development and global distribution of content that is appropriately modularized and adaptable to re-use in a variety of educational contexts. (The MIT Open Courseware initiative is mainly a sharing of digital content [http://ocw.mit.edu/]).

Additionally, e-learning might also embrace a digital medium intermediate to open fsource and open content that might tentatively be termed 'open lessonware'. Open lessonware is animated and interactive digital content. It is typically designed using a graphical user interface (GUI) that is easy to learn by non-technical people – thus distinguishing it from open source. For instance, the teacher/author interface might resemble that for presentation software (e.g. Powerpoint). One can easily pick up and modify someone else's presentation file for a related purpose. One can easily imagine other kinds of authoring software with added functionality devoted to producing interactive lessons for students.

In this paper, we are primarily interested in this open lessonware kind of e-learning application. Our goal is not to dwell on the technical requirements for such systems, but rather on the emergent aspects of the potential community of teachers that might provide a globally shared library of such lessons. Such a resource could be of immense value, especially for developing countries.

3. SCENARIO

Consider the following scenario:

> A grandmother in Guangzhou, China, creates some flashcards to teach color words to her granddaughter. The older brother converts this to a computer game (including audio in Cantonese), which is put on the Internet.. A mother in Singapore finds the game, and modifies it with Mandarin pronunciation, adding some additional vocabulary for flowers. A schoolteacher in Taipei finds the Singapore version of the game, and changes the Chinese characters to the traditional style still used in Taiwan, also adding vocabulary for butterflies. Another teacher in Korea adapts the game structure for Korean, extending the vocabulary to include pictures birds as well as their calls. A teacher in England finds the Korean version, and adapts it to teach identification of English birds by their calls.
> And so on…

This little scenario conveys how interactive e-learning software might evolve. In actuality, there exists relatively little such learning software on the Internet with this evolutionary character. While one may find various freely available programs, e.g. to learn Spanish, seldom is there any creative synergy among the projects. Thus, one may find a variety of lessons for beginning Spanish grammar, but these tend to be repetitions of the same material, with little opportunity for students to extend beyond the basic level. It might be noted that this is also a major failing in the commercial marketplace for educational software. Each new educational product tends to begin from ground zero, with little creative advancement from one vendor's product to another's.

As noted earlier, the functionality we are pursuing shares some features of both open source and open content. For purposes of discussion, let us hypothesize that a new kind of authoring tool is available called LESSON-MAKER, which is for use by teachers to produce interactive lessons. We also imagine a companion program called LESSON-PLAYER that is used by students for performing these interactive lessons. We assume that both programs are freely available at no cost. (We might also assume that they were developed as open source projects, but that is not the main issue in this scenario.)

The purpose of LESSON-MAKER is to enable widespread collaborative development of e-learning materials -- what we have called open lessonware. The lesson-specific content and interactions are stored in a 'script' file, e.g. in an XML format with specialized tags for the various kinds of content and interaction involved in the lesson. These lessonware script files are input to the LESSON-PLAYER software that conducts an interactive lesson with the student. These lessons may be simple matching exercises, like the color words example above, or they might be more complex, such as lessons in trigonometry.

The LESSON-MAKER authoring software should be easy to learn and use by teachers of all grades (primary, secondary, university), throughout the world. It should be easy for a teacher in one part of the world to pick up a lesson from any other country, and adapt it for local purposes. The creation of new lessons will make use of a graphical user interface with various kinds of drawing tools, depending on the desired student interaction. These tools will themselves be modular, allowing the addition of more advanced tools later on, as needs evolve.

4. FORMS OF OPEN CONTENT

4.1 WHAT IS OPEN CONTENT?

What is typically called digital content, or e-content includes essentially all things digital that are not executable code. This includes text, images, sound and video. It could be anything digital — that is, anything that could be distributed or accessed electronically — that is not software. This sort of content could be images, audio files, movies and text.

As a bi-product of commercialization of content, content has come to be packaged in discrete, priceable units. By contrast, open content tends to evolve in a much more fluid fashion. Barlow (1994) comments:

> “Because there was never a moment when the story was frozen in print, the so-called "moral" right of storytellers to own the tale was neither protected nor recognized. The story simply passed through each of them on its way to the next, where it would assume a different form. As we return to continuous information, we can expect the importance of authorship to diminish. Creative people may have to renew their acquaintance with humility. … Jazz improvisations, stand-up comedy routines, mime performances, developing monologues, and unrecorded broadcast transmissions all lack the Constitutional requirement of fixation as a ‘writing.’ Without being fixed by a point of publication the liquid works of the future will all look more like these continuously adapting and changing forms and will therefore exist beyond the reach of copyright.”

As a partial approximation to this vision, one sees more and more that books, especially scientific and technical books, come with a corresponding website, where the author can post updates.

4.1 OPEN E-BOOKS

There are several open content projects that focus on providing a freely accessible library of books. These are normally for classic texts where the copyright has expired. The oldest of these is *Project Gutenberg* [http://promo.net/pg], originally launched in 1971 by Michael Hart. Project Gutenberg provides a library of books in electronic form (html) and is currently approaching 10,000 online books. However, since the texts provided generally pre-date digital media, there is a substantial conversion problem. The rough conversion of physical book pages to digital media is done by scanning in the pages of the book, and running them through OCR software. However, this still leaves many errors that must be corrected by manual editing.

The need for manual editing has lead to the creation of another remarkable project known as *Distributed Proofreaders,* founded in 2000 by Charles Franks [www.pgdp.net]. While it was originally conceived to assist Project Gutenberg, it now has a broader objective to support the digitization of Public Domain books for a variety of projects. It currently involves the participation of thousands of volunteers, to do the editing and corrections after OCR scanning. Whereas these projects refer to the conversion of books that have already been written, the Wikimedia Free Textbook Project [http://textbook.wikipedia.org] is an open collaboration project to write new books. So far there are 169 book modules ("pages") in this project.

4.3 OPEN DIGITAL ENCYLOPEDIA

Another very large open content collaboration, also numbering in tens of thousands of volunteers, is the open digital encyclopedia known as Wikipedia [http://www.wikipedia.org]. Wikipedia's goal is to build a collectively created online encyclopedia, offered as open content. Wikipedia's organization could be described as anarchistic compared to the some other open content projects.

4.4 OPEN COURSE MATERIALS

Complementary to these developments, are the actions of some universities and educational institutions to make their course content materials available publicly via the Internet. The most noteworthy example here is an initiative of Massachusetts Institute of Technology (MIT), to release all course materials for all university classes on the Internet by 2005 [http://opensource.mit.edu].

4.5 OPEN E-MUSIC

The widespread exchange of digital music via peer to peer networks (e.g. Napster) has received great notoriety. While the technical logistics of this employ substantial creativity, it has little to do with synergistic creation of new music.

On the other hand, there are some other developments that do have aspects of open collaboration. One of these is so-called lyric databases – on-line collections of song lyrics. Many of us have a fragment of a dimly remember song echoing in our heads. But we cannot quite get the rest of it from our memories. As it turns out, you are not alone. There are thousands of others that have had the itch to remember the rest of the song, and have combined efforts to tally these in on-line collections of song lyrics. As Lessig (2001) points out, "these thousands produced a far better, more complete and richer database of culture than commercial sites had produced."

One could also imagine a parallel evolution of sheet music provided on-line. At present, this is mainly done as scanned images that are exchanged. One needs a further mark-up language (like HTML) to make this easier. However, an even more robust standard already exists in the form called MIDI (musical instrument digital interface) [www.midi.org]. MIDI files not only represent the notes like a musical score, but also other acoustic aspects of tone. A MIDI file can therefore be used to perform the music digitally. While some distance collaborative composition experiments have been done, this remains a largely undeveloped opportunity for open collaboration.

4.6 OPEN E-MOVIES

A digital repository of more than 10,000 different movies has been collected by Rick Prelinger [www.archive.org/movies/prelinger.php] . Many of them are characterized as "ephemeral" or temporary – which has made it legally possible for Prelinger to digitize and offer them as public domain content of the Internet. The variety of movies in the collection includes corporate, educational, and official information movies as well as advertisements. The digitized versions are in the public domain, so they can by re-used by anyone without violating copyright restrictions (Cedergren, 2003).

4.7 OPEN E-GAMES

"Anyone who makes a distinction between games and learning doesn't know the first thing about either." Marchall McLuhan (quoted in Falstein, 2002). Computer games are especially interesting, not only as a class of software that is moving towards open source, but also as a model that connects closely with the interests of e-learning.

4.7.1 OPEN SOURCE GAMES

Hargreaves (1999) remarks: "Nintendo, Sega, and Sony are already virtually giving away their hardware in order to sell games. … if I was a game development company I would be looking really hard to find ways of reducing my programmer salary expenses. One obvious approach would be to open source your engine, and let other people improve it for you. …

the most sensible strategy would be a two pronged approach. You sell a shrink-wrapped product to one set of users, while giving away your sources to another group of people, who are your peers working on different game development projects. …Open source ideas might not apply very well to the end product of commercial game development, but they work superbly for reusable infrastructure projects like a game engine, where your artists are the users."

Just such an open source repository seems to be emerging – by analogy to SourceForge, it is called WorldForge . The WorldForge project aims to create an open-source library and tools and resources for people who want to develop on-line games -- more specifically Massively Multiplayer Online Role Playing Games (MMORPG's). The vision is to "foster an independent community in which many free games can develop and evolve with unique role-playing oriented worlds and rules, running on a wide selection of server and client implementations with a standard networking protocol tying everything together." [www.worldforge.org/media] The WorldForge project has so far not produced any complete, playable games. There are various games under development -- but the project is still working on developing the supporting tools. "WorldForge's mission is to produce the necessary tools and technologies that will allow the creation of graphically rich games of cooperation and socialization. We strive to blur the distinction between player and maker, and wish to establish a positive community environment for current and future free game developers."

4.7.2 E-GAMES FOR E-LEARNING

Somewhat along the lines of WorldForge, Silverman et al. (2003) is developing an e-learning game toolbox, for rapid assembly of a certain class of e-games, with an e-learning agenda to them. He remarks: “We envision a future where many games exist that help people to cope with their health issues, child rearing difficulties, and interpersonal traumas. Further, these games will be so compelling and easy to revise, that many players will feel compelled to contribute their own story to the immersive world – a contribution that is both self-therapeutic and that helps others who see some of their own dilemma in that story. This will be an industry that is consumer grown, since they will be the creators of new games for other consumers.” This is in marked contrast to the objectives of most commercial e-games, which offer addictive, immersive entertainment but have little education focus, and provide few if any directly re-usable components.

A further dimension to this line of e-game development is the notion of interactive drama. Interactive drama is like game playing, but with the plot line pre-determined by the author, whereas with game playing the story creation is more the responsibility of the player.

4.8 OPPORTUNITIES AND CHALLENGES FOR OPEN LESSONWARE

Having now reviewed different forms of open collaborative development in areas of open source and open content, we now consider some aspects more specific to the notion of open learnware proposed earlier.

4.8.1 INTERACTIVITY OF CONTENT

Even though there is much activity in the area of e-learning, most of it is essentially passive in nature. The student may download texts to read, or perhaps hear a lecture via streaming video. Like a large classroom, these seldom allow the chance for active participation on the part of the student.

By contrast, a fundamental characteristic of the proposed learnware notion is that it is interacts and engages the student. In an article entitled “What ever happened to programmed learning?” Kimbrough (1997) remarks:

> “We already know about multimedia and it's called television. It's not engaging and enriching. We know "Sesame Street" at best is not harmful. It encourages passivity. The natural response to a great show is to sit back and watch it. You're wowed by fireworks, but you're not engaged. Compare the involvement to a play or a book, where you're really involved with the characters, care about them and want to know what happens. [However] there are tremendous successes. They are in a broad class of software called simulation software. What the software does is mimic a real-world system with enough accuracy that's appropriate to your task. A real example is a flight simulator. … There already are math-tutor programs for children, which diagnose errors and give feedback. The military uses war games. Businesses have management games that simulate parts of the economy. They teach people how their performance can be improved with elementary modeling. There's tremendous work with experimental games in lab situations -- games on markets, negotiations, any sort of decision-making that involves coordinating with other decision-makers who may not have the same objectives that you have. “

These sorts of interactive gaming notions are essential to the design of learnware.

4.8.2 LOCALIZATION AND TRANSLATION OF CONTENT

We fully intend for learnware to be used globally. But clearly, as regards e-learning one size does not fit all. There are important differences not only in language, but in the choice of examples and other references that make the lesson meaningful. For instance, a cow in India has a much different significance than it does in Argentina.

Beyond that, student learning styles may differ. To some extent these may be individual differences, but in other cases they may have a cultural aspect.

While we may think of language in terms of the major languages such as English, Spanish, Japanese – there can be many variations by geographical regional and by social class. To some extent the use of visual imagery can help reduce the burden on written language.

4.8.3 CHALLENGE: DYNAMIC CONTENT

Beyond the localization and translation of content to regional and social contexts, there is a dynamic aspect to the content itself. While fields like mathematics may be relatively stable in their content, areas like technology or pharmacology need to be continuously updated.

This notion of dynamic content is is about capturing current information generated from various sources, converting it into appropriate content, and delivering it to the learner in the required form at the right time. It is also about capturing relevant collaborative "experience" of various learners just-in-time and disseminating it in the appropriate form -- to make learning efficient and effective.

5. OPEN SOURCE OPPORTUNITIES FOR E-LEARNING

The collapse of the Soviet Union in August 1991 was widely regarded as proof of the failure of socialism as an economic model. Capitalism and the profit incentive were the only practical way to achieve innovation. But in that very same month, only a few days later, the software industry began to produce a counter-example: the open source movement. This was the launching of LINUX, the first successful open source project (Hasan, 2002).

Open source software is produced by programmers who volunteer their time on the collaborative development of a software product. While the software market continues to be dominated by for-profit developers, numerous open-source products are now available [#open-source], some of which dominate their market niche. LINUX itself is currently considered a significant competitor to Microsoft's operating system.

Open source software is nominally free of charge, but it typically requires greater technical expertise to install and use it. One may argue that this is a hidden cost.

Nonetheless, for developing economies, open source software is an attractive alternative. Not only is it cheaper, but it also helps reduce dependence on first world countries. The fact that greater technical competence is required locally is actually an advantage for developing countries, since it stimulates local technical capacity development (Yee, 1999).

At present there is no open source version of a learning management system, but this would be a likely development. For instance, an open source component server already exists [#jboss]. As was observed earlier, there is wide variety of Internet tools that are relevant for various e-learning functions, and many of these are also freely available. Such tools include search engines, email, discussion and news groups, various kinds of collaborative authoring, conferencing and instant messaging including voice and video.

A more interesting speculation is the possibility of open source development for e-learning content. A significant development for this is the Open Content project, begun in 1998 by David Wiley ([#open_content]). This project offered the first license designed specifically to support the free and open sharing of content, based on collaborations with the open source software community and commercial publishers. This project has been superceded by the project Creative Commons [#creative_commons], which Wiley has recently joined.

7. TOWARDS A DIGITAL COMMONS FOR E-LEARNING

7.1 WHAT IS A DIGITAL COMMONS?

In medieval times, the commons was a public area in a village, that all may use for grazing their cattle. The so-called "tragedy of the commons" is that it is in each individual's interest to graze his/her cattle as much as possible, leading to overuse which destroys it for everyone. Hardin (1968) writes:

> "Therein is the tragedy. Each man is locked into a system that compels him to increase his herd without limit – in a world that is limited. *Ruin is*

> *the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all*."

The metaphor to a commons is often cited as paradigm of collective goods, where market mechanisms alone do not manage the resource optimally, necessitating government intervention.

Lawrence Lessig [2001] distinguishes a different type of commons that he calls a digital commons. This notion refers to public resources on the Internet for free sharing of information and software, including re-use for new creations. The distinguishing aspect of a digital commons is that the resource is not diminished by usage, hence cannot be overused. Indeed, because usage encourages further creativity and further contributions to the commons, the more the resources of the digital commons are used, the *greater* is their total value. Lessig (2001) elaborates this collective synergy effect:

> "The new builds on the old, and hence depends, to a degree, on access to the old. Academics writing textbooks about poetry need to be able to criticize and hence, to some degree, use the poetry they write about. Playwrights often base their plays upon novels by others. Novelists use familiar plots to tell their story. Historians use facts about the history they retell. Filmmakers retell stories from our culture. Musicians write within a genre that itself determines how much of the past content in needs to be within that genre. (There is no such thing as jazz that does not take from the past.) All of this creativity depends in part on access to, and use of, the already created."

It is this kind of communal synergy that we seek to create in the educational domain, especially for developing countries.

7.2 CRITICAL MASS ASPECTS

We find e-learning community as a fitting example of a collective good. A collective good is characterized by i) jointness of supply and ii) impossibility of exclusion (Hardin, 1982). E-learning community is in joint supply for one's consumption of e-learning information does not adversely affect the size of the information e-learning commons.

This is unlike disjoint goods such as a pizza where one's consumption of it reduces the availability for the others. We regard e-learning community as open in nature. The openness here denotes that information in the e-learning commons accumulated via voluntary contributions will be made available to all via the internet.

E-learning community is not just a collective good, but it is also interactive in nature. This interaction is broadcasted and stored unlike in the case of telephones where the interaction is targeted, direct and instant. A key challenge in the development of an e-learning community is that of enticing content from voluntary contributors. The enticement is challenging especially in the early stages of community formation for the community's worthiness is low. A volunteer contributing e-learning content at an early stage is less likely to benefit from the small database. It however gets easier to entice voluntary contributions once the database grows in size. Oliver et al. (1985) define this key challenge as the challenge of attaining "critical mass".

In their seminal paper, Oliver et al. (1985) analyze the dynamics of critical mass attainment via accelerating and decelerating production function. Production function is a curve that plots one's contribution towards the likelihood of a collective good. In the decelerating case, the curve is convex shaped where initial contributions steeply enhance the likelihood of a collective good. In the accelerating case, the curve is concave shaped where early contributions contribute little towards the likelihood of a collective good. Markus (1987) uses the critical mass rationale for analyzing interactive media in which she concludes that the production function for interactive media would mostly be accelerating in nature. We show that the production function for e-learning communities would as well be accelerating in nature through a simple conceptual analysis that follows.

A contribution towards an e-learning community takes the form of an interactive teaching lesson. The value of a community increases with the number of such lessons in the database, the extent of topics covered and the quality of contributions. In order to be regarded as of high value by a wider audience, the community requires a critical mass of interactive teaching lessons. While it is a challenge to predict the critical mass, we can surely claim that adding one, two or five teaching lessons in the early stages does not increase community's perceived value steeply. However, when there are a few thousand of teaching lessons, a large population would find the community as valuable. This would mean increased participation at least in terms of downloading lessons from the community. While an individual's contribution would add little to the production function, the number of individuals contributing towards the collective good would enhance significantly at this stage resulting in the production function taking off in an accelerated manner.

The challenge for one developing an e-learning community is to attain the critical mass of content. This can happen only when adequate numbers decide to contribute towards the community. Granovetter (1987) while analysis the threshold model of collective behavior bases his explanation on the assumption that one decides to act when the perceived cost is less than the perceived benefits of acting. In other words, one acts when the net benefits equals or exceeds one's threshold to act. The model further assumes threshold as distributed implying that potential participants perceive costs and benefits differently. Moreover in a collective good, one's threshold to act is affected by the amount of contribution made towards the collective good. The e-learning community developer by providing incentives can minimize the threshold of a critical mass of potential participants to the extent that they would decide to contribute content. Two types of incentives that can be provided for enticing participation are discussed below;

The first type of incentive can be provided through developing mechanisms for ranking one's contribution. The number of downloads and the content quality as perceived by those who downloaded the content can for instance be ranking measures. However, simply creating these mechanisms alone are inadequate. Efforts should be taken to make relevant administrative bodies and procedures recognize a contributor's community ranking. The organization of open source communities inherently includes mechanisms for recognizing one's contribution. A contributor is considered as talented when he or she is a part of the steering committee of an open source project. For the committee member, this recognition is saleable.

While the first type of incentive is indirect in nature, the second recommends providing a direct incentive via micro payments. When this logic is implemented, one who has contributed a lesson would get paid a small sum of money for each download. Government and non governmental organizations can by paying the transaction costs contribute towards education activities. The direct and indirect types of incentives proposed here are complementary in nature.

The emergence of e-learning communities is affected by not just the collective action aspects, but as well by the institutional factors. The process of creating course contents varies vastly from one institution to another. While the process is highly centralized in the case of Madras University (India), the process is highly decentralized in Scandinavian countries in general. When course content creation is a centralized activity, only a small percentage of the available pool would have access to the e-learning database. In the decentralization case, there will be a large number of users and likely contributors. The developer's objective should then be to encourage decentralization in developing countries.

In summary, the requirements for creating a digital commons for e-learning involve two key aspects:

- Attaining an initial critical mass of contributions from which further contributions can evolve.
- Having sufficient incentives that users (teachers) will not only exploit the commons top draw materials as input for their own lessons, but will also have incentives to deposit new resources into the digital commons.

7.3 EVOLUTIONARY REQUIREMENTS OF LESSONWARE

An important difference between open source projects and open lessonware is what is called 'forking'. In open course projects, this happens when the developers disagree over some design aspect, and a subset decides to go off in their own direction. This is considered bad for open source projects. In the case of lessonware, however, forking is a common and desirable occurrence – motivated in part by needs of localization, translation, and different learning styles. Whereas in open source projects, all contributions lead to the latest version of the software, in open lessonware developments, each sub-version continues to have its own localized purpose. Thus, if we imagine a growth metaphor for open source projects, it might resemble an oak tree, with numerous roots leading to a single sturdy trunk. The metaphor for lessonware might more resemble a banyan tree, which has numerous inter-locking trunks, each with its own roots.

For open source projects, there are several major repositories where the numerous projects can be located. A principle example is SourceForge [http://sourceforge.net], which also offers development tools such as concurrent versioning software (CVS) and other relevant services to open source projects. Nonetheless, each of the member projects is quite independent of its neighbor.

Now let us imagine an analogous repositories for learnware, call it LearnForge. What are its properties? We would consider such a repository to be a prototype for a digital commons for open e-learning. Contained in LearnForge would be of a variety of e-learning resources (open software, open learnware, open content) as well as the associated developer (teacher) community. Our main concern here is how to nurture the growth of such a digital commons for open e-learning.

In the introduction, we presented the goal as a globally shared library of e-learning materials (software, content, scripts). However, the metaphor to a library might be too restrictive, since it tends to connote a kind of centralized control and management that we do not mean to imply. A more apt descriptor might be as a digital commons, for e-learning. A digital commons may have certain agreed upon protocols and rules, but it is not (necessarily) under any specific management authority. A commons is a repository for certain kinds of public goods. In the digital case, these may be globally dispersed, connected by means of a common index (e.g. portal), or perhaps discovered on the fly, as in various peer-to-peer models (e.g. Napster).

The original notion of a commons was a public area in a village, that all may use for grazing their cattle. In such cases of physical public goods, the more it is shared, the less its residual value. However, in the case of a digital commons, such as the sharing of information and software on the Internet, the more it is shared, the *greater* is the value. It is this kind of communal synergy that we seek to create in the educational domain, especially for developing countries.

8. SUMMARY OF E-LEARNING PROSPECTS FOR DEVELOPING WORLD

While we consider that an e-learning commons would be of value for industrialized countries, we believe it could have a much more profound impact for developing countries. There is broad consensus that education is a major priority for all countries, but especially for developing countries. The challenge is provide educational solutions that are cost effective -- that somehow fit into the modest budgets of these countries, yet provide education that is *appropriate* -- adapted to the local culture and economic conditions. Key challenges:

- Improve educational opportunities
- Improve professional employment opportunities

There is growing concern that the new e-technologies, rather than creating a "level playing field" for international competition, may actually be exacerbating economic differences, especially for developing countries. An important aspect for <u>*positive globalization*</u> is knowledge transfer and assimilation into local cultural contexts.

Previously, we summarized the growth conditions for an e-learning commons to be:

- Attaining an initial critical mass of contributions from which further contributions can evolve.
- Having sufficient incentives that users (teachers) will not only exploit the commons top draw materials as input for their own lessons, but will also have incentives to deposit new resources into the digital commons.

The following recommendations are speculative, but we believe worthy of exploration. We believe that an effective solution might include different roles between industrialized countries and developing countries to achieve the e-learning commons, based on different applicable incentive schemes.

The open source projects that we have observed are primarily a phenomenon of first world countries, where there is sufficient disposable income to permit altruistic gifts of one's time and efforts to achieve a collective good that is of general value to everyone. This applies both to the creation of open source software, open content, and potentially to open lessonware. The individual incentives for this creativity are largely intangible and non-economic. There may also be economic incentives for companies and educational institutions to contribute time and effort for common e-learning materials, e.g. for standard background subjects.

As a further incentive for teachers to contribute lessonware, a digital record might be kept of downloads, which might comprise part of the teacher's public service performance for promotion reviews. This might also include tracking of the downloads of further lessonware derived from the teacher's production (a kind of pyramid scheme of brownie points). This, we believe, might be sufficient to create the initial critical mass of lessonware and other e-learning materials to make the e-learning commons attractive.

The more significant challenge is to have the e-learning commons promulgated throughout developing the developing world, with frequent and detailed localization of its content in a series of evolutionary re-creations. An important part of the challenge is that teachers in developing countries do not have as much leisure time as in industrialized countries. Indeed, in most poor countries there is no such thing as "a teacher" – "not because teachers don't exist but because teachers are also farmers, shopkeepers, tradespeople, parents and have many other roles" [www.unicef.org/teachers/discuss].

We believe that the best way to achieve creative contributions to the e-learning commons from the developing world is to provide financial incentives. This notion is generally regarded as taboo for open source contributions – that programmers participate in open source for self-actualization and other, more altruistic motives. Teachers in poorer countries may also feel these motivations, but they are much more constrained in their time. They need to eke out a living for their family. We seek to make their creative contributions instrumental to this goal and potentially providing a light at the end of the tunnel of poverty.

A possible solution for doing this is a combination of micro-payments and so-called "network marketing" also known as "multi-level marketing" (MLM) [www.network-marketing-works.com]. Network marketing is essentially a legalized form of pyramid scheme, where there can be an arbitrary number of sub-agents before the final sale. The notion here would be that each teacher/author would be remunerated a tiny amount for each download (or some other measure of usage) of their lessonware, as well as a fraction of this amount for each version of someone else's lessonware that was derived from theirs. The amounts paid would be accumulated as micro-payments.

In first world countries, the notion of micro-payments never gained much momentum because the amounts were too small – even for large numbers of transactions. For instance, at $.01 per transactions, a million transactions generations only $10,000. This does not make anyone rich in the first world. However, for a poor teacher in the third world this is a fantastic sum.

So, to summarize, what are the prospects for e-learning in developing countries? To start with, there is have a serious problem. The economic divide between rich and poor countries is widening -- over the past 35 years, the income ratio separating the world's richest from the world's poorest nations has nearly tripled (Watkins 1999).

On the other hand, we seem to have most of the pieces at hand for solving this problem Education, it is commonly argued, is the key to reducing this divide. E-learning is a technology for multiplying education at diminishing marginal costs. Computer technologies become exponentially cheaper. The Internet provides the ideal infra-structure for e-learning, and access is steadily reaching the developing world, via various telecommunications media, ranging from fibre-optic cables to VSAT satellite links in remote areas. E-Learning technologies are developing into generic Learning Management Systems. Inter-operability standards such as SCORM allow for the flexible interchange of learning objects and packages. Furthermore, various educational content resources are becoming globally available – notably the MIT CourseWare Initiative.

So – where are the remaining obstacles? The principal challenge might be characterized as developing an open source model and industry for e-learning content. In order to effectively service the needs of the developing world, this industry needs to draw on educational talent from those same countries to produce, adapt, and package e-learning content.

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[http://www.gnu.org/copyleft/gpl.html]
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Developing education businesses for global markets: the ITEV model and the dilemmas it raises.

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Abstract

This paper presents the outcomes of an institutional research project targeting high growth, revenue generating courses, conducted over four years at a prestigious, research intensive, Australian university. The Innovation and Technologies in Education Ventures (iTEV) project was established to evaluate the benefits of technology enhanced learning and to provide evidence of return on investment. The first phase of the iTEV project evaluated several pilot studies generated through an academic led process resourced on an innovation grant model. This phase revealed the infrastructure issues facing a traditional campus-based institution in managing online course development and distribution for distance education students. It failed, however, to establish a business model for revenue generation. Following this first phase iTEV implemented a managed investment model, working with Deans to sponsor courses that were subjected to a three phased business development approach. The University provided funds which were directed towards project management and instructional design. Two models were introduced: one regarded the course as a partnership with The University having shared equity and risking its return within academic led processes; the second model regarded the course as an independent business. The University was the investor providing a fully repayable loan on terms agreed with the Dean and monitored against performance. Outcomes from these projects were captured in case studies that demonstrated the diversity of models in use and compared financial data. This paper presents the iTEV project and discusses the strategic and operational implications for a research intensive university. It also raises the many professional dilemmas faced by academic and management staff in adopting business practices in a university environment.

Introduction

The University of Sydney is the oldest university in Australia and the largest of those whose primary focus is research. Other Australian universities – particularly some with a stronger emphasis on teaching – have been faster to adopt flexible and distance education and to develop online courses. The increased demand for programs that minimise attendance requirements has hitherto not been a high priority for research intensive universities. External pressures, including diminishing government funding, a competitive interest in post graduate professionals and a "fight for excellence " in attracting top research funds, staff and students, has forced the Tier One universities to explore a wider market (Curren 2004, Marginson, 2006). The wider market of emerging consumer learners has characteristics and expectations however that challenge the traditional, campus based and predominantly undergraduate research university.

There are many opportunities – across all of the University's faculties – to develop post-graduate courses that are highly competitive in markets much larger than their traditional base. Many departments and schools within the seventeen faculties of The University of Sydney are now looking to the development of new courses that can be delivered in a more flexible way.

There are significant risks associated with the development of programs in a globally competitive, commercial environment. The risks are not only financial, they extend across all areas of accomplishment that the University considers important – research excellence, quality learning and teaching, and authentic community engagement.

High growth programs, designed to scale and for distribution worldwide, have up to now been the domain of specialist or dual mode distance education institutions with system support and infrastructure designed to match. Now, with the availability of ICT tools on the desktop and increased confidence in new pedagogical approaches supporting distributed learning environments, there is a growing cottage industry within universities (Tiffin and Rajasingham, 2003). Individual academics and small clusters at the School/Department level are able to develop distributed programs with very little regard at the start for sustainability in the face of success, ie attracting large numbers of students.

With atomistic development and cottage industry systems, the risks escalate as student numbers grow. Operational and financial risks include: the quality of administrative and advisory services; ensuring regular supply and access to learning materials and information; selecting and briefing adjunct faculty; standardising assessment; and, ensuring a robust and reliable support system for the learning environment. These operations add up to a significant overhead. In most research intensive universities a shared services approach, which would enable a more rational and effective development pathway for the development of high growth programs, requires significant business process re-engineering. Implementing shared services where these have previously been silo operations is a long term solution. For universities caught up in the development of distributed eLearning programs within the cottage industry model, management solutions are needed in the short term to manage risks which are more immediately threatening than the operational and financial ones mentioned.

For a research intensive university, coursework growth has the potential to undermine research productivity. Research intensive universities must sustain their research rankings, at all costs. Research suffers when academic staff find themselves peddling coursework in popular areas and not able to hand over the administrative support and teaching burden as student numbers grow. University researchers are now in open competition for funding with industry based researchers who do not carry a teaching load.

Quality learning and teaching is now also a public process and, with increased privatisation, of interest to those who pay real dollars for the experience – the learners, employers, parents, and governments. Teaching performance, based on quality audits and student satisfaction surveys, is now tied to funding in Australia. It is therefore no surprise that risk taking initiatives, which in education means addressing the needs of emerging markets and designing innovative programs, are best avoided if they are going to pose threats to the brand. Some universities do not have a choice when it comes to building tuition revenue by developing new products, but for a university like Sydney which is relatively wealthy, the financial imperative is not a strong incentive at the individual and department level.

The University of Sydney now receives less than 20% of its revenue from Government. Like all Universities in the fully publicly funded era it was able to run its operations with a huge dependency on the goodwill and pro bono contribution of practicing clinicians, industry specialists and alumni. The growing dependence on commercial activities, particularly in the learning and teaching arena, is now confusing this relationship. Accountability, transparency and the ability to cost activities more accurately is actually forcing program costs to rise in order to distribute income more equitably. This poses a major risk to research intensive universities where authentic community engagement is fundamental if they are to remain relevant, responsive to professional bodies and continue to benefit from the partnerships and alliances that support them.

The challenge then, is to minimise risks in programs that are clearly needed, and designed to be, revenue generating.

Using business discipline to minimise risks

The University of Sydney initiated an institutional research project that has resulted in the development of an approach to the management of post-graduate course development that regards an academic course as a small business venture. The business discipline implements management processes that serve to minimise risks in this cottage industry phase of development. The Innovation and Technology in Education Ventures (iTEV) project was established in 2001. It was located within the Office of the Vice-Chancellor and was funded through the Vice-Chancellor's strategic development fund. Applying an action research cycle iTEV has had three distinct phases of development:

iTEV Phase One: evaluating innovative delivery technologies

The Innovation and Technologies in Education Ventures (iTEV) project was established to evaluate the benefits of technology enhanced learning and to provide evidence of return on investment. The first phase of the iTEV project evaluated several pilot studies generated through an academic led process resourced on an innovation grant model. Programs in Law, Project Management and Gerontology were supported in the development of online delivery, multi media resources and business development. The three programs were presented to an international panel and evaluated for impact. (www.usyd.edu.au/itev). The evaluation supported the high quality and innovative design of the pilots. The pilots revealed the infrastructure issues facing a traditional campus-based institution in managing online course development and distribution for distance education students. The investment in the pilots was generous and not replicable across the University generally. We needed to find a generic process that would establish a business model for revenue generation.

iTEV Phase Two: implementing a managed investment model for postgraduate programs regarded as small businesses

iTEV implemented a managed investment model, working with Deans to sponsor courses that were subjected to a phased business development approach:

- Venture definition or Feasibility study.

  A project is approved by the iTEV steering committee, the iTEV team then evaluates the opportunity and conducts a risk assessment of the faculty's capacity, commitment and appreciation of the demand for the program. This phase scopes the business and supports a preliminary business concept with data on the characteristics of demand aligned with the design of the products and services. This phase provides the Dean and the Steering Committee with the confidence to proceed with the venture. It is fully funded by the iTEV fund.

- Business case.

  A standard business case development is followed to quantify demand, map the competitive environment and propose the business model, with financial analysis. It includes a resource and implementation plan. The Dean undertakes to finance the business case whether or not the business then proceeds. If it proceeds, the cost of the business case can be rolled into the loan required.

- Project startup.

  The decision to start the venture requires immediate funds to provide business development support to the academic team such as business and project management, instructional design and marketing. The start up funds enable the venture to get beyond break even point with the surplus capacity needed for ongoing management support.

Two models were introduced with the funding program: one regarded the course as a partnership with The University having shared equity and risking its return within academic led processes. This model was applied in the Faculty of Veterinary Science with the Master in Veterinary Public Health Management and the Faculty of Engineering with the Project Management Graduate Program. The second model regarded the course as an independent business with The University as the investor providing a fully repayable loan on terms agreed with the dean and monitored against performance. This was applied in the Faculty of Health Sciences on the Master in Sexual Health Program and the Faculty of Medicine for the Sydney Professional Master of Medicine Program.

Outcomes from these projects were captured in case studies that demonstrated the diversity of models in use and compared financial data. Two other cases were included that had received limited investment from iTEV. The Master in Pain Management had benefited from an iTEV project evaluating its business model and the Master in International Education that participated as a case study without previous iTEV investment. iTEV funding support in these cases had varied from $20,000 to $250,000.

The internal report on these cases revealed that it was not possible to compare the financial development costs due to variable factors relating to nature of discipline, design parameters and delivery constraints. Fixed and variable development costs showed a wide variation and reflected the inability of the financial systems at the time to isolate costs to specific programs. Failing the availability of local data, iTEV adapted a cash flow analysis tool developed at the University of British Colombia by the DET. The tool predicted a return on investment of 40.9% over a six year period for a hypothetical program at The University of Sydney if the enrolment growth was 30 in Year 1, 60 in years 2 & 3, and 90 in years 4 & 5. It included $1000 spent on marketing for each new enrolment.

The cases revealed some critical success factors that have helped to guide the third phase of iTEV's development:

Programs need a venture team supporting but independent of the academic specialists including:

- An academic entrepreneur and research leader as sponsor
- Professional project and business management including marketing and sales competency with an emphasis on learner/customer relationship management
- Instructional design competency in designs that scale, are transnational and include systematic support for stakeholders in the whole value chain
- A governance or board structure to monitor performance to achieve strong growth projections

iTEV Phase Three: Strategic business development for faculties

The project is now in its third phase, designed to integrate the outcomes within the work of the faculties generally and to disestablish iTEV as a research and development unit. The University has recently restructured and devolved responsibility for business development and entrepreneurial investment to the Deans. The seventeen faculties will operate in about seven clusters but with a much greater horizontal integration to enable interdisciplinary program development. The business processes and tools that have been developed by iTEV along with reports of projects and ventures have been made accessible to The University community. iTEV projects are now at the faculty level, working with Deans directly on business development strategies that articulate continuing professional education and postgraduate coursework with the dual aim of revenue generation and the identification of high quality personnel for research training.

A "course as a business" model

The first test of any business is not the maximisation of profit but the achievement of sufficient profit to cover the risks of economic activity and thus to avoid loss. Drucker (1973).

The remainder of this paper describes the approach of regarding a course as a small business. As mentioned earlier, this approach has proven to be useful in helping to identify, quantify and reduce financial risk. It will also help to ameliorate risks in other areas. The most important of those may be to minimise the possibility of damage to, and increase the likelihood of enhancing, the reputation of The University – the "brand name" – that underpins the scale of this opportunity.

From a business perspective, The University's reputation translates into a "brand name" that is a very valuable intangible asset. It provides the opportunity for courses that can be marketed at premium prices, and/or can be distributed to a much wider audience in the Asia-Pacific region, and beyond. The area of postgraduate education is among the most important for the realisation of this strategy.

Value chain analysis is a useful tool used to define the key components of elearning and distance education businesses (Standing Stones, Elloumi, 2004). By applying value chain analysis to education program development it is possible to map the interdependencies of the business and student support systems with the technology infrastructure and academic course development processes. This mapping of the total learning environment has proven very useful in presenting the business perspective to academics immersed in their subject.

The "course as a business" model has both strategic and operational implications for the management of courses. Some limit, and some may enhance, its usefulness. Before considering the implications, it is important to define what is meant by the management of a business.

The functions of business management

The functions of management for a business are planning, organisation and control. This simple idea was proposed by Peter Drucker in 1955 (Drucker 1955). Though management theory has developed a lot since then, it remains an elegant and powerful concept. It has particular relevance to managing small and medium size organisations.

It suggests a continuing process in which “organisation” – meaning all the activities of the business – is planned in advance and controlled after the event. Control systems enable managers to refine their planning of future activities. It is an iterative process.

For a start-up business – such as a new course – proper planning must precede the commencement of activities, including the development of the product.

Universities are traditionally good at the organisational aspects of developing and delivering courses. New courses are often developed by one or more academics and are subject to stringent oversight as to their academic content and rigour. Their delivery, by the author or others, is subject to strict quality assurance processes to ensure their efficacy for students and to protect the reputation of the institution.

Formal plans however, are not often seen (though individuals might rigorously plan their work. Formal control systems are even more foreign. Budgets are not usually prepared or published at this level within the institution, even for costs and resources that are easily measurable. Performance is rarely measured against what was expected before the course started, apart from student assessments and some elements of quality assurance programs. Student numbers are often the main measure of success.

Strategic Implications

Some strategic considerations arise from regarding a course as a small business.

Business Strategy and Autonomy

An important tenet of business management theory is that strategic planning should apply to a “strategic business unit”. The underlying principle is that plans should be prepared by those who have the responsibility to do so, and operations should be managed and controlled by those who have the authority to do so.

A “course” is not autonomous. It is subject to the imperatives of the larger organisation in which it operates – the school, the faculty, the university. It is dependent upon the policies and procedures of those higher organisational units, and in many cases also on services they provide.

Another consideration, particularly within the rich tradition of The University of Sydney, is that the academic staff needed to develop and deliver the course – akin to the employees of a small business – in fact enjoy considerably more autonomy than most employees. Their cooperation is more voluntary than compellable.

These represent serious limitations to the general applicability of the model. iTEV has had mixed success in applying its novel approach, as might be expected.

Professional Management

To be successfully managed as a business, a course needs professional managers. Given the diversity of the activities involved in developing and delivering a post-graduate course in e-learning, a management team will usually be needed. Apart from an academic “program” manager, it may also involve a professional “project” manager to perform and/or oversee activities such as market research, marketing, recruitment, delivering student services, instructional design, managing the technology interface and administration.

Both the program and project managers, if not the whole team, should be involved in planning the whole project. They should ensure proper reporting (control) systems are established to enable performance to be measured against plans, and plans to be updated, at least annually.

iTEV has had some success in recruiting and funding professional people to work in development teams. They have included qualified project managers, instructional designers and administrative staff. In some cases they have greatly enhanced the work of the academics, and in one case enabled a course to be offered within six months of the start of its development.

Up-Front Investment

New courses are traditionally designed by an academic specialist in a particular field who then often delivers the course, at least initially. The costs of course development are therefore largely made up of academic salaries. They are not necessarily regarded as "costs" to the course, and do not involve any additional cash expenditure.

Developing flexible learning courses and offering them to larger, possibly remote audiences involves many additional activities. Many involve direct costs, and many have to be paid far in advance of any fee income. They can amount to hundreds of thousands of dollars (not including academic salaries).

The model is useful in regarding this as similar to investment in a new business. It is likely to benefit from proper planning and proper financial control, however those funds are provided. The model may also allow notional measures of "return on investment" to be estimated for those who provide the funds. That could include estimating return to the faculty that pays the academic salaries for development (assuming that they in fact receive a proportion of the resulting fee income).

Where fee income from students is split between different parts of the institution – as is usually the case, at least notionally – the model may allow estimates to be made of the differences in returns on investment to different parts, eg to university administration, college, faculty, school, department or even the "return" of the course itself.

Operational Implications and Dilemmas

Regarding a course as a small business has many implications for the way its activities are conducted and managed.

Academics as Entrepreneurs

An interesting analogy is to regard the academic who "drives" the development of a new course as similar to the entrepreneur who starts a small business. Those, such as venture capital managers, who invest in start-up businesses have developed strategies to manage their investments. Strategies include establishing a "board of directors", instituting proper planning and reporting systems, providing business advice, and ensuring adequate administrative support. They often, after the start-up phase, use their influence to support or replace the entrepreneur with professional managers experienced in managing a high-growth business.

iTEV was involved in reviewing the performance of one course developed by a very capable, entrepreneurial academic. His reputation, drive and dedication produced strong growth in student numbers, despite being in a very competitive market. But he needed to do everything. As the course grew quickly, elements of its management began to falter, and with that so did student satisfaction. iTEV's review resulted in the appointment of an independent manager for the whole course. Its growth and success have resumed.

Returns and Risks

Professional management of that course has demonstrated another similarity with high-growth small businesses. A well-managed course, once established, can have relatively low variable costs, and therefore high "profit" and return on investment.

These are similar characteristics to the high growth, high gross margin businesses favoured by venture capitalists. If high returns can be demonstrated in particular instances, it may be possible to attract development (investment) funds from other sources. The idea of forming joint ventures may be extendable from those that are based on academic relations to those that are purely commercial. An important parallel is that they may be high risk ventures, meaning that returns may vary significantly – from high to negative, or even loss of the investment funds.

Students as customers

The model would regard students as customers. They may pay significantly higher fees than in the past, and demand a commensurately high level of service. Some services normally provided by a central facility within the university may just not be good enough. They must be either enhanced or replaced at the local level, or even by the management team. iTEV cases have provided support staff to ensure that prospective students do not have to "wait in line", or even attend campus, to enrol in the course.

Some roles may be reversed to serve both academic and commercial purposes. Academic staff may play an important "marketing" role. Prospective students (customers) – making what for them is an important investment decision – often seek direct contact with the academic manager to gain assurance that they will be exposed to research and scholarship of international standing.

Competition and marketing

The course operates in a competitive market. This dictates the need for a marketing function in the management team. In an institution like The University of Sydney, whose faculties are accustomed to attracting only the best and brightest, marketing is foreign. It is regarded by some as contrary to the ethos of the institution, especially a prestigious, research-based institution.

The functions of marketing – including the concept of understanding the market by conducting market research – can enhance the commercial success of a course. They may have advantages in other directions as well, such as enhancing the reputation of the institution – or perhaps a particular discipline – within a profession or community.

In one of iTEV's case studies, a strong marketing plan resulted in much higher initial enrolments than were originally anticipated. Its successful launch made good impressions in industry and government circles. The following year, the faculty abandoned the "business planning" approach. Commercial team members left and were not replaced. The "project" was then managed by one administrative assistant, a couple of days a week. New enrolments plummeted.

Instructional Design

The role of the instructional designer is critical to the success of flexible learning courses. It is another role not always used in campus-based courses, and may be regarded as rather "commercial". It is so in the sense that the instructional designer, apart from enhancing the presentation of a particular unit of study, also ensures a consistent "look and feel" of all units of study that make up the course. The role is as important to flexible course development as are many commercial roles, eg industrial design, in commercial product development.

One of iTEV's clients was unwilling to use an instructional designer, especially in the rush to develop the initial core units for presentation in the first semester of a new course. The development team was also influenced in its planning of the whole course to use a core subject developed elsewhere within the faculty. The author of that course was unwilling to consider changing her preferred face-to-face format into a more flexible one. The anomalous situation of having overseas students enrolled in a course that included one core unit only deliverable on campus was resolved but emphasised the need to take a program, rather than a single unit of study, approach.

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Developments in learning theory and the liberation of new approaches to program design enabled by elearning technologies make a team approach to program development essential.

Conclusion

The iTEV project has asserted the benefits of business management practices in the development of profitable education programs. It has done this within a research intensive university where individual autonomy and random acts of innovation thrive in a cottage industry approach to program development. A shared services model will enable improved management controls across the university but requires considerable business process re-engineering that will take some time to achieve. Until then, the risk management afforded by adopting a model that regards education program development as akin to running a small business assists in protecting the university brand. Research excellence, quality teaching and learning, and authentic community engagement dominate the university's strategic goals. Developing education businesses for global markets is a high risk opportunity and very carefully managed in this University's context, and at all costs.

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European Distance Education Network (EDEN) Workshop
Research into Online Distance Education and E-Learning
Making the Difference

Business models, value chains, Australian universities and the Bologna agreements

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Abstract

This paper presents an Antipodean perspective of modern developments in distance education and e-learning. It focuses on issues arising from national and international agreements concerning trade in services and what those may mean for universities competing in the industry of higher education. It argues from, an Australian point of view, that the playing field is not level and can not be due to the different rates of development of information and communication technology in countries around the world. Infrastructure developments are necessary to underpin the uptake of e-learning and are a necessary pre-condition for sustained competition in higher education. Fully developed business models, based on the use of enabling technology, and aligned with institutional goals and objectives, will therefore be essential components of the emerging environment. This argument suggests that the administrative bureaucracy will have important roles in the decision-making surrounding e-learning and distance education that may reduce the emphasis traditionally placed on the pedagogical aspects of higher education. This, in turn, may mean that practicing and theorising distance education/e-learning may take on more business orientation than has been the case till now.

Introduction

The Australian government response (DEST, 2006) to higher education developments stemming from the Bologna and Lisbon agreements is curious and mixed in terms of likely ramifications for those universities offering distance education and/or e-learning. The European agreements clearly position the universities in Europe within a competitive industry. One objective for establishing the Bologna agreement was, according to the explanatory document of the Confederation of European Rectors' Conferences (CRUE, 2000, p. 4), presented as follows:

> the Declaration wants "in particular" to increase "the international competitiveness of the European system of higher education". ... The signatory countries explicitly express their goal to "ensure that the European higher education system acquires a worldwide degree of attractiveness equal to [Europe's] extraordinary cultural and scientific traditions".

Australian universities will have to take note of the development of such education 'blocs' for they are bound to present significant challenges to the current *status quo* in international higher education in which Australia currently enjoys a leading place in its export of higher education products and services. One reason underlining the need for a watchful university sector is given by the present federal Minister for Education, Julie Bishop, in a recent press release—

> The [Bologna, *sic*] Process aims, among other things, to provide for easier movement between institutions and, on completion of undergraduate study, the receipt of a transcript that facilitates entry to higher academic degrees and employment. If Australia is not able to maintain alignment with these developments, a significant proportion of the current 32,000 European enrolments in Australian institutions may find other destinations more attractive. Similarly should Asian countries or institutions choose to align with the Bologna Process, Europe may become a more attractive destination for those students. (DEST, Ministerial press release April 2006)

One thing that is curious about this statement is that it only recognizes those students from Europe, who have physically come to our shores, as being of interest in driving institutional interest in the Bologna processes. The fact that European students elect to study, via distance education, with Australian universities seems to have been overlooked in the analysis. Perhaps the economic flow-on benefits to Australia of students living and studying Australia are more significant than those emanating from distance education, however, <u>both</u> these forms of education are included as parts of the World Trade Organization (WTO) agreement on trade in services (GATS). In the former case we are witnessing 'mode 2' trade while in the latter, distance education, case we are seeing 'mode 1' trade. A failure to first identify and then to comprehend the significance of the <u>two</u> forms is especially puzzling when the culprit is a Minister. Nonetheless, the Europeans are underway with significant reformation of their higher education sector and the signatories to the agreements are volunteering to undertake the reformation processes in order that the wider European 'area' is focused on an 'harmonized and integrated', though not necessarily 'unified' view of this sector.

The recent multi-national agreements in Europe should be viewed as attempts to standardize European infrastructure so that the entire Union gains benefits from enhancing the transferability of credentials, mobility of students and, overall, the standard of skill and knowledge available within their workforces. The agreements are therefore targeting the development of political, social, legal, and perhaps technological infrastructure. What is already evident from the senior representatives of the universities of the member nations is that there are significant concerns about financing the initiatives at the level of individual institutions. The universities in Europe will therefore also have some serious decisions to make as they come to grips with the new higher education marketplace. Financing the new developments to bring them into line with the EU agreements, among 45 countries[1], will be a matter that will be watched with some

[1] The 45 countries are as follows: Albania, Andorra, Armenia, **Austria**, Azerbaijan, **Belgium**, Bosnia-Herzegovina, Bulgaria, Croatia, **Cyprus**, **Czech Republic**, **Denmark**, **Estonia**, **Finland**, **France**, Georgia, **Germany**, **Greece**, Holy See, **Hungary**, Iceland, **Ireland**, **Italy**, **Latvia**, Liechtenstein, **Lithuania**,

anticipation from the other countries with vested interests in the trade in higher education. Similarly, the ways in which member countries organize themselves to meet the new requirements, structurally and educationally, will also be an interesting series of case studies. Observers may in fact closely examine the responses to see if they can glean better (inside) knowledge of the ways in which institutions are negotiating their own business models and value chains, a point that we will return to later in this paper.

This paper soon moves to consider the possible ramifications of the Lisbon and Bologna agreements and those of the GATS agreement of the WTO for Australian higher education and the universities that comprise the sector. It does so with an emphasis of the place and role of distance education and e-learning in Australian universities, both increasingly enabled by use of sophisticated information and communication technology (ICT). This Antipodean view recognizes that there is international competition in higher education in both WTO 'modes' and while it is cognisant of the importance of 'mode 2' ('consumption abroad') competition, it will nevertheless concentrate on 'mode 1' ('cross border supply') trade in services. Such trade in services has been done for some time from Australia using distance education approaches often heavily reliant on print based media. Increasingly however, the trade is moving toward web-enabled formats and for this reason we include both distance education and e-learning in our analytical 'crosshairs'.

With regard to the web, this paper uses the OECD (2005, p 35 and also Bell *et al*, *2002*) taxonomy that suggests that higher education, and distance education in particular, can be

- *web supplemented* - where student have a choice as to whether, or not, they participate online
- *web dependent* - where student participation online is mandatory
- *fully online*

Hybrids are already occurring and sometimes the terms 'mixed mode' or 'blended learning;' are used to refer to situations in which education on campus is enhanced by, or partially replaced by, use of web-based technology. Recipients of such approaches thereby have extended flexibility and choice about how best to achieve their subject/unit goals and can do so in keeping with a range of life, family and business commitments.

It is easy, however, to forget that the enabling technology of the web and the often hidden, though equally necessary, infrastructure that must accompany the web, can not be assumed to be in place across the globe. For this, and other reasons, it is important to keep in mind that the developed countries of the European Union as well as those in the Americas and the Asia Pacific will have significant leads on, and responsibilities for, the

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Luxembourg, **Malta,** Moldova**, Netherlands**, Norway, **Poland, Portugal**, Romania, Russian Federation, Serbia-Montenegro, **Slovak Republic, Slovenia**, **Spain, Sweden,** Swiss Confederation, Turkey, Ukraine, **United Kingdom**, the former Yugoslav Republic of Macedonia. (European Union countries in bold).

countries which do not have the necessary educative, legal, technological, political, and social infrastructure to support web-based approaches to higher education. To pursue the notions already presented and to further elaborate on the critical infrastructure, we now move to the central discussion in this paper and the core argument that is to be developed.

The importance of infrastructure in distance education and e-learning

If one examines the Economist's (see the EIU publications) 'e-readiness' and 'e-learning readiness' reports with a view to better understanding the relative positioning of the 45 signatories to the European Union initiatives discussed above, it is easy to discern the disparity in levels of development of the various nations. This suggests that the desire to have the Bologna processes completed by 2010 will be sorely tested as there is much to do to build the educational and other infrastructure required to achieve those goals.

Drawing on prior work done by the author (Dean 2005), the EIU research provides the basis for some interesting analyses, as follows

> The Economist Intelligence Unit (EIU, April 2003, and 2003), has produced a series of publications (from 2000) about national 'e-readiness' which provides a map of a country's state of preparation for utilising the web for business and for investment in web developments around the globe.
>
> In the inaugural rankings by the EIU, for the year 2000, Australia was ranked second behind the U.S. as being the premier e-ready countries with the U.K. and Canada being next in line (EIU, May 2001 p. 1). Subsequently, the rankings have fluctuated with the Scandinavian countries making further progress up the EIU scale to follow the U.S. as leader but with Australia moving backward to sixth place in the 2001 ranking (EIU, 2002). By 2003 Australia had fallen to ninth place and the U.S. had lost its first place ranking to Sweden (EIU, 2003). It is interesting to note that the world's greatest exporters of higher education (U.S., Australia and the U.K.) are well represented in these rankings and, as far as Australia is concerned, it would seem to indicate that competition with these countries is to continue, and increasingly, that competition is likely to be via electronically enabled facilities. The rankings also confirm the importance of developments that have occurred in Australia over the past decade or so, often under the steerage of the federal government, in relation to building a robust electronic commerce infrastructure.
>
> The Economist Intelligence Unit has also recognized the importance for education of the use of the web and has consequently developed an 'e-learning readiness' report. The EIU rankings are based on 150 qualitative and quantitative indicators taken from four broad sections across the countries involved. Of the 60 countries ranked, Australia was placed 11th with a total score of 7.71 out of 10. This placed it 0.23 behind the 8th ranked U.K., 0.66 behind the 3rd placed USA, and 0.71 behind Sweden, the highest ranked country (EIU, 2003, p. 16). The EIU report

was not targeted solely at higher education so some limits are imposed on what can be deduced for the current study. However, this report together with Australia's continuing high placement in the broader e-readiness rankings tend to indicate that Australia is well-placed to take advantage of the web and the potential that is associated with using it as a new format for business. So, even if Australians were uninterested in taking distance education approaches to higher education, the country is still in a position, technologically speaking, to seize the web-enabled opportunities to provide this avenue of education to people in other countries. But as was shown in Chapter 3 [of the dissertation *sic*], the demand for this approach to higher education in (and from) Australia has now reached approximately 15% of the total cohort. The current status, together with the forecast demand figures to 2020 given in Chapter 3, therefore suggest that the web will be a real focus for development of future educational offerings from Australian universities. ... For the moment it is important to restate the distance education implications of external demand for Australian higher education. IDP reported that:

> By 2025, it is forecast that the total demand for international higher education in Australia will exceed 996,000 students. …transnational or offshore (through offshore campuses and distance education) programs will account for 44% of this total demand. On this basis, by 2025, the demand for international onshore higher education in Australia will exceed 560,000 students (IDP, 2002 p. 3).

The 44% figure (438,240), though speculative, points to a significant expansion in demand from international students and is therefore of some significance in terms of demand for escalating the further use, and development, of the web for Australian higher education. Over the forecast period to 2025 the estimated demand is approximately equal to 20,000 students per year who will be seeking non-traditional approaches to Australian higher education.

This prognosis for Australian higher education of course did not include the Bologna developments that are now occurring in Europe and the way in which the Australian government and Australian universities respond will be worthy of close observation in the months ahead. However, if the Australian universities wish to preserve their current foothold in the competitive marketplace of higher education they will need to be mindful of the European initiatives and make some important decisions about the likely ramifications of the Bologna processes. The desired development of mobility of credentials of students in the EU will no doubt provide a political base for decision making in Australia with the use of the web for distance education or e-learning in Mode 1 trade in services likely to come under increased scrutiny.

The EIU reports clearly show that Australia has developed the necessary legal, technological, and political infrastructure to support increased higher education trade via the web, though it perhaps not as clear cut that the pedagogical development has kept apace. Here we can still draw on, and learn from, extant distance education theories to see if the web can facilitate efficacious education for students. If that turns out to be the case (and the necessary data sets for Australia are pitifully inadequate to support such a claim) then Australian universities would be well placed to continue to be an attractive destination or source for students in either Mode 1 or 2 trade in services. Ensuring that the EU nations recognize Australian university qualifications would seem therefore to be an important stimulus for action in response to the Bologna initiatives.

With the necessary infrastructures already in place in Australia, the question then remains as to how the Australian universities will respond to the threat or opportunity represented by the EU activities. One way that universities can respond to the new developments (and indeed to the potential of the web in general) should be obviated in their strategic plans, which in turn will hint at their business models and their value chains. To better understand why this may be the case the paper now moves to a discussion of those elements.

Business models and value chains in Australian universities

The past decade has been one of rapidly changing circumstances in Australian higher education with diminished federal funding for universities being a major catalyst for a ‘critical business response’ from the universities affected. Facing cuts to revenue sources, universities have had to look to cost cutting measures on the one hand and to innovative approaches to producing income to meet shortfalls. Their business models have therefore warranted a review, as has an introspective look at the way in which they create value during their operations been necessary. A business model is essentially the “architecture for the revenue” in an organization and, as the past five years have shown, several universities and start-up, for-profit, institutions around the globe have failed to make the necessary connection between the market and the way in which the architecture of their revenues was to work. On its own this is evidence enough to suggest that modern universities in Australia, and internationally, need to study this phenomenon if they are to navigate into the still muddy waters of web-based education. From the failed UKeU through to the ‘virtual universities’ that have come and gone, we are seeing example after example where the business model has not been able to sustain the momentum required to support the ongoing operation of these institutions.

Allied to the business model is the value chain. The value chain is a tool of business analysis that enables an organization to see, on the basis of a division of ‘primary’ and ‘support’ activities, where it is that the institution is currently adding value in the creation of its goods and/or services. Space restrictions in the current paper prevent a deep analysis of the value chain of universities (in Australian or elsewhere), but it is necessary to point out that an inadequate understanding of where a university is adding value for its stakeholders is a recipe for poor performance, even to the point of failure. Australian universities competing for international and domestic students need to be able to clearly articulate their value adding capabilities for students, staff, partners, and for the other stakeholders in the public university system. One example where the themes in this paper can coalesce is for an Australian university to seize the opportunity presented by the Bologna processes by becoming affiliated with, and recognized by, the universities in the European 'bloc' by ensuring that their courses are able to equip graduates with the same opportunities that is intended for the countries that are now signatories to the Bologna agreement. That agreement is not confined only to European institutions, and any Australian university that makes the effort to conform to the Bologna requirements will be able to add yet another aspect of value to students who study with, and then graduate from, the Australian institution. This of course will require attention to quality assurance processes (part of the value chain) as well to business models that can optimise investments in information systems and information technology to extend high quality distance education (or e-learning) to the students as customers.

Needless to say, Australian universities have first to perceive the Bologna developments as being one of opportunity, rather than one of threat, so that their strategic planning is adjusted to allow them to prepare for achieving this institution goal. Infrastructure to enable the conduct of e-learning must also be in place as part of the business model and value chain and paramount to all of this is a need for an underlying senior management commitment tot he concept in the first place. Whilst individual academics may be able to incorporate web-based technology into their own subjects, competing in the changing higher education marketplace requires systemic approaches rather than one-off endeavours of individuals or small groups of interested academics.

We return full-circle therefore to the importance of infrastructure in any institutional approaches to the take-up of web-enabled approaches to distance education or e-learning. Such infrastructure is necessary within institutions as well as more widely within the wider society and has technological, legal, political, social, and educative elements. With the necessary infrastructure in place, an Australian university can hope to be at a starting place to compete for revenues in ways previously unattainable. Their business models do, however, have to be restudied and amended where necessary, in order that cost efficiencies and operational effectiveness is achieved. Being in the market place of higher education, it is also essential that the educational products and services are efficacious and frequently assessed for their quality. Such inspections need, however, to be more than mere 'bean-counting' exercises, and, as value-adding is so important, it is essential that the processes of quality assurance are oriented to the gaining and retaining of wider trust in the wider domestic and international communities.

In this regard, it would be an interesting debate/exercise to examine the long-standing theories in distance education (see, for example, the work of Michael Moore, Borje Holmberg and Otto Peters), to see what they have to offer in such obviously commercially oriented approaches to the delivery of higher education. On the surface, Peters' ideas about industrial models of assembly and production seem to have an obvious fit with e-commerce value chains and the production of information and knowledge products and services. Holmberg's long-standing concern for the pastoral care of students, based on the 'guided didactic conversation' seems equally capable of being entrenched and enhanced via electronic communication media that are now almost ubiquitous in the western developed world. Michael Moore's conceptions of 'transactional distance' and 'student autonomy' also would seem to have relevance in a web-based education.

Utilizing those, and new 'digital' theories, would surely aid universities in their quests to optimise investments in technology and information systems by becoming informed about the ways in which modern students might hope to learn and to 'consume' their higher education products and services. If such an investigation led to senior decision-makers being committed to e-learning, then the institution and it stakeholders would be the better for it, as such commitment is a necessary precondition for entry into ecommerce. Rankle the purists as it may, the increasing use of commercial, business-oriented, models and analogies in the university seems to be here to stay. Reduced funding and increased demand for accountability and transparency seem sure to steer the university management to look to business analogues for inspiration and instruction. Business models and value chains will therefore be common fare in senior planning meetings in the years ahead. Linked to those will be the lessons learned from ecommerce over the past decade and a realisation that information technology and information systems are avenues for enhanced capacity to complete in a changing field of global higher education.

Conclusion

The Bologna agreements and the overall workforce planning in Europe have implications for Australian higher education institutions. In order to seize the opportunity presented they need to respond. Web-based technology will be one element of the equation of response that will also help to serve the predicted burgeoning demand for online e-learning in the years ahead. Information systems and information infrastructure will need to be in place in each institution as well as in the wider society. When that is all evident, then universities can look to revising their strategic planning to include moves to different business model that will see value being created along the value chain in ways not previously achieved. In Australia, the federal education Minister, Julie Bishop, is right as far as she goes in her statements to date – the global nature of commerce means that initiatives in Europe will have repercussions in Australia, and Australian universities can perceive them as either threats or opportunities. One set of responses, however, can be via distance education or e-learning (Mode 1 competition) and those institutions choosing to generate revenue via this means will need to be mindful of the arguments laid out in this paper. It is still less than clear for universities as to what constitutes the appropriate business model, and a variety of people with varying skills and knowledge will need to work together in order to find and operationalise those models. Key staff in these 'experiments' will be those of the distance education community, but they will need also others with keen business instincts and experience. Both groups will need to listen to their customers if models for achieving electronic models of education are to be sustainable.

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E–learning: a value chain and business analysis

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Abstract

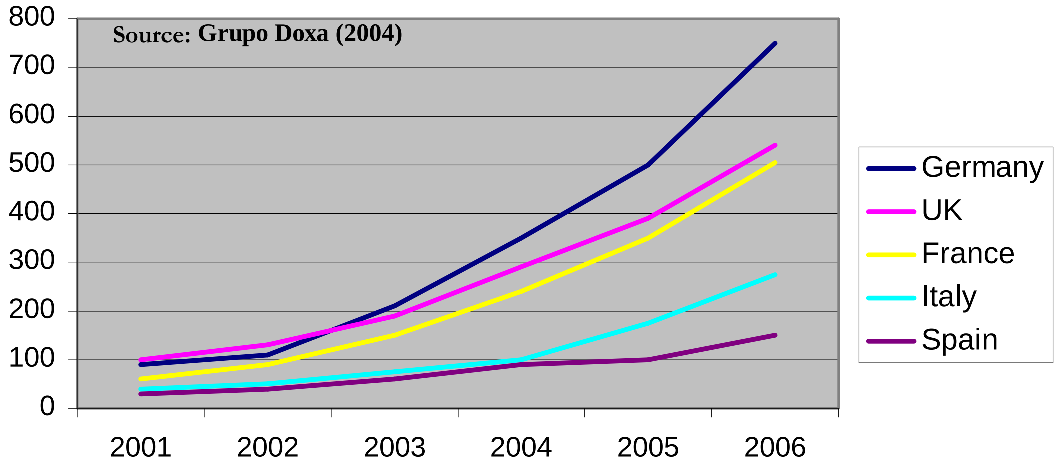
This paper examines aspects of the infrastructure required to realize the full potential enabled by e-learning approaches around the globe. It uses the value-chain business analysis to indicate what is required, where development is up to, and why this is important in distance education and for e-learning advocates. It also argues that business models need to be well understood so that chosen approaches to the provision of e-learning can hope to optimise investments in terms of human, financial and technological capital.

Introduction

The OECD says universities are considering how to unleash the potential of e-learning. Key barriers include **infrastructure** and funding, along with scepticism about the pedagogic value of e-learning and staff development. The challenge is to use the technology to teach in new and effective ways to get academics and technical staff to work together and to reduce costs by using open standards software, by replacing on-campus teaching, and by encouraging peer and automated learning. Though partnerships potentially raise several issues, collaboration is "a key characteristic of e-learning that could help institutions to share knowledge, and good practices, and achieve benefits such as advanced technology and educational quality in addition to enhanced market presence and lower costs." State or national governments can also play a significant role in the strategic direction of e-learning;
(Online resource at http://www.comminit.com/trends/ctrends2006/trends-295.html – bolded word emphasised for the current paper)

The quote above is comment on a policy briefing paper (OECD, 2005) that points out, among other things, that the infrastructure needed for e-learning in higher and continuing adult education is of crucial importance if the potentials of this approach to education are going to be realised. This paper investigates aspects of the infrastructure necessary to engage in e-learning and, from a business perspective, argues that the institutions involved in e-learning will need to understand their value chains and business models if they are to prosper. Adding value in an increasingly customer-centric economy is a necessary condition of service provision. Knowing how and

where value is being added is of critical importance in e-learning due to the nature of the products and services being offered and because of the need to optimise the significant investments in information and communication technology that enable this approach to education.
When considering the analysis of a sector from the point of view of the business opportunity it represents, not only revenue forecasts should be considered (see Figure 1), but also the identification of the actors in its value chain and the business models these actors can use to develop their economic activity is crucial.



According to IDC forecasts, only in Europe, the provision of online education will continue to grow up at a rate higher than 20% until 2008.

Figure 1. E-learning market trends.

The value chain of those involved in e-learning, as it happens in other technological sectors, is characterized by the appearance of actors focused at specific niches of the sector (see Figure 2). Some of them are common with other e-business branches, like network providers and network operators, and thus they won't be studied in this paper. Similarly, the underlying provision of the web infrastructure implies that actors are involved in developing transparent legal, political, and technological protocols, rules, and regulations. For reasons of space and relevance these actors and the immediate roles they play will not be considered in the current argument. The platform providers also offer general services, although in the case of e-learning the needed platform presents some special characteristics.

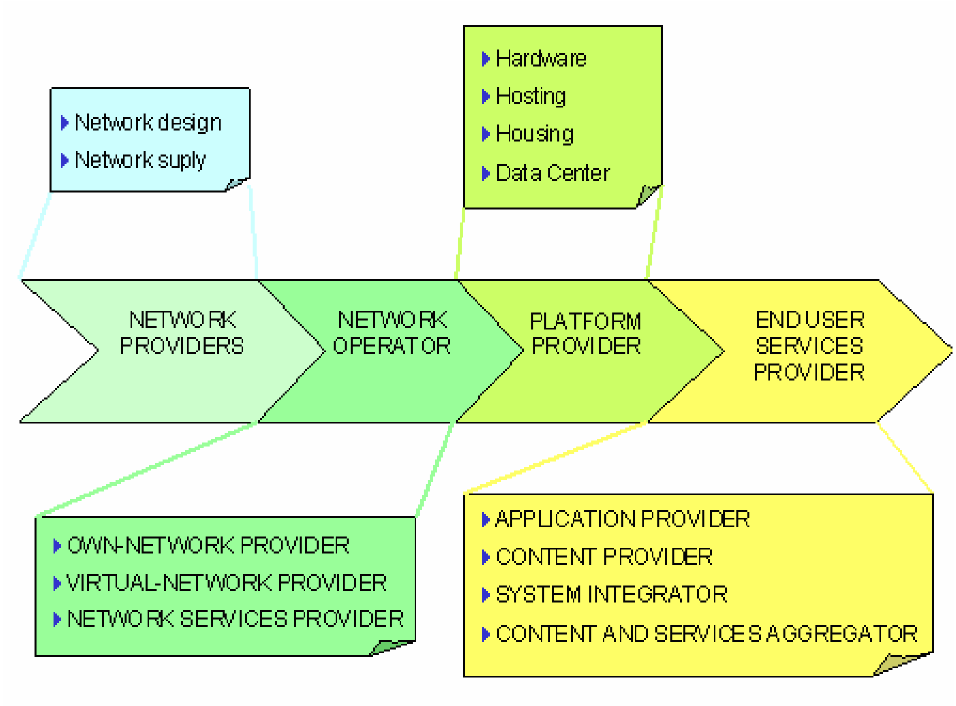


Figure 2. E-learning value chain.

Although we will follow this classification here, it should be underlined that the tendency of the current market is toward companies that offer a global solution, as has already been the case in other examples of e-business. It won't be surprising that organizations involved in the provision of services and products within the higher education value chain make decisions to alter their business models to amalgamate, or to establish strategic alliances, with other actors for mutual gain.

Platform and applications providers

This segment refers to all those companies that dedicate their efforts to the development of software tools and hardware for the exploitation of an e-learning solution. A sizeable proportion of the technological platform is generic and it is for this reason that the analysis here will be centered on the peculiarities of distance education/e-learning.

It is outside the scope of this analysis to offer a detailed description of an e-learning platform. However, it is convenient to know its main components, since it will help to understand the niches and existent business opportunities in this sector (see Figure 3):

– LMS (Learning Management System): it is in charge of the interaction with the final users presenting them with the learning objects (lessons, courses, etc.).
– LCMS (Learning Content Management System): it provides access to the repository of learning objects and delivers them to the LMS.
– Courseware: they are also known as authoring tools and refer to the software used for content generation and their packaging in learning objects.
– Communication tools: in a virtual learning environment, mechanisms of interaction between the students and the professor should be provided.

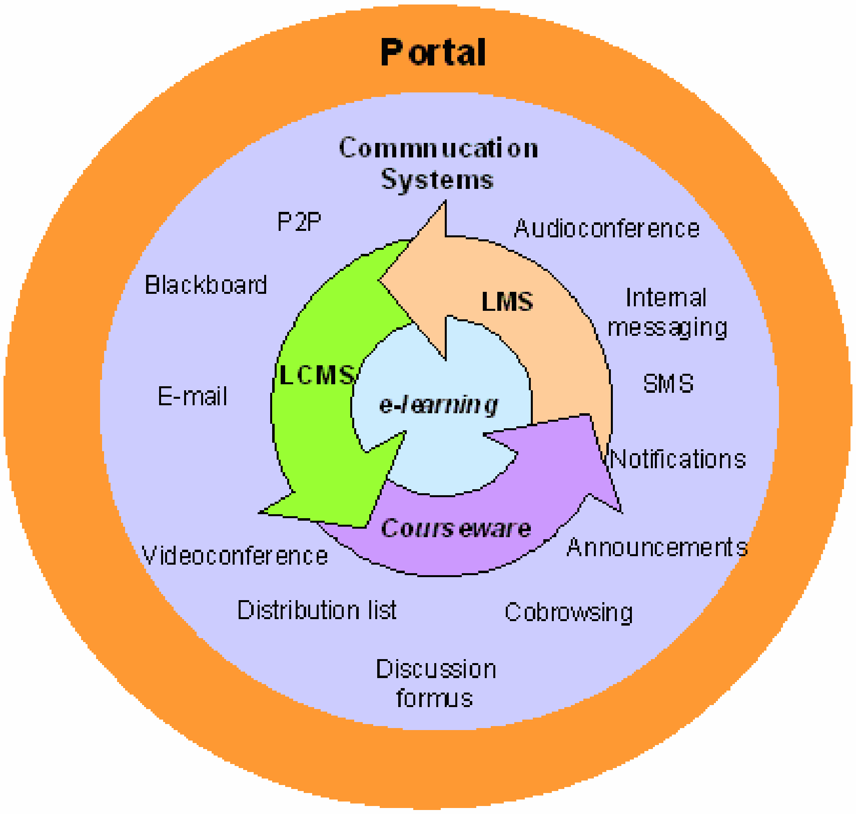


Figure 3. Components of an e-learning platform.

Where e-learning platforms are based on proprietary software revenues are obtained mainly from license costs (generally, dependent on the number of users) plus customization, installation and maintenance fees. The drawback for the users is the technological dependence on the provider that forces them, once they have acquired the technological platform in question, to be under the commercial strategy of the vender. This is also one of the reasons that have contributed to the emerging success of the open source software (OSS) movement.

OSS is characterized by the public readiness of the source code of the applications so anyone with the appropriate knowledge can modify it and adapt it to their needs. Around open source software, several business models have been built, all of them with revenues around the selection, customization and maintenance of the software instead of the licenses. On the other hand, the importance that is being conferred to the technological independence of specific companies and to the establishment of a regulatory framework that facilitates open source against proprietary software, has changed the business of software development drastically. This trend is already being recognized in e-learning and distance education environments with the development of movements to collaboratively develop source code for a variety of projects, as Sakai, Moodle or dotLRN.

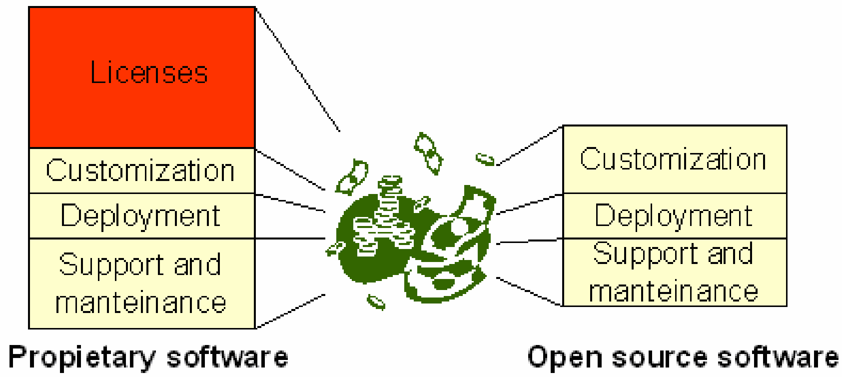


Figure 4. Revenue model for proprietary software against open source software.

Content providers

The Internet has allowed for a change in the paradigm of the distribution of information. Indeed, now that the electronic relationships have been made possible for the general public as well as government institutions and businesses, distributing content is as simple as enabling access through the Internet so that those interested, and/or authorized, users will be able to download it or include a link to these information resources. These characteristics of universality, readiness, interactivity, and permanent access have revolutionized the business around content generation and distribution. Universities around the world will be well advised to consider the implications of these trends for their own value adding activities and business models. Indeed some universities, such as the UK Open University and the MIT in the United States, have developed 'free information' policies which some observers believe will cause their competitors angst. The underlying message in these initiatives is that the provision of information alone is a necessary but insufficient component of education.

Content providers offer formative actions to their clients. A representative example of a content provider is the university. However, for their particular characteristics, universities usually embrace the whole value chain of e-learning, since they have the necessary means to produce contents to be exploited in a well defined market. In fact, many universities, such as the Polytechnic University of Valencia (http://poliformat.upv.es), have grown programs of online education, as a complement for their traditional offerings. Also, some universities have arisen as completely virtual campuses and they don't offer classroom–based learning as is the case of the UOC (Universitat Oberta of Catalunya, http://www.uoc.es).

The main problem with which the content providers must deal, is the belief that any content on the Internet should be free, something that is very difficult to support taking in to consideration the high cost of the content generation processes. Usually, the solution is to offer general content in a free way and customized or specialized contents with payment. This is, of course, where value adding occurs for universities along their value chains. So while MIT might make its content free online, it does not follow that a student who has 'consumed' it all is eligible for a MIT qualification. Instead the academic services that nourish and assist students in their intellectual maturation are the means by which the same information is turned into a valuable commodity. Certification is then the means by which the institution attests to the passage of the student on their intellectual journey. It can also be the case, furthermore, that the information and knowledge once created can have extremely low marginal costs associated with its duplication and dissemination. But the fact remains that the initial creation of that information and knowledge is a very costly undertaking as government and university research budgets attest. Allowing for this is one aspect of the growing understanding of how to turn information and knowledge into valuable assets and it is also this aspect that drives the knowledge management initiatives around the globe.

One example of learning content providers is the Open University (http://www.open.ac.uk/), —one of the latest projects of the OU is the offering of free learning materials since October of 2006. Contents will be organized in two sites: one for students, in which they will find material, study guides and formative itineraries; and another for instructors, in which content reuse will be promoted to build courses and other educational activities.

The future evolution of the sector concerned with content development will arguably be determined by the consolidation of international standards that indicate how to pack the contents generated in reusable learning objects so that they are can be interchanged among the platforms of different providers. In this sense, the work done by organizations such as ADL, AICC, IMS or IEEE acquires a great importance. One immediate consequence of the standardization of learning objects is that the production costs of a course diminish since it is possible to build it starting from learning objects already existent. On the other hand, this modularity simplifies and reduces the elaboration of customized courses which may be seen to undermine their potential pricing as they will be less proprietary and consequently returns for value adding will diminish as far as content generation is concerned. Institution will therefore need to turn to enhanced student servicing in order to generate revenue streams based on the same content as is being used by other education providers. Once again a deep knowledge of an organization's value chain will be needed and this may mean that the business models that they adopt will reflect an amended attitude to the products and services that they deliver. Furthermore, the underlying infrastructure will be critical if student-centered services are to be of high quality and value. Text-based products and services will not be sufficient on their own to provide the higher education of the future.

Portals

From the end user's point of view, a portal is a website through which the users gain access to diverse contents. Because they are the contact point with customers, they become one of the most critical information systems, since their conception should be aligned with the marketing strategy, the commercial strategy and the business objectives of the organization to which it belongs to.

Internet portals began as content aggregators, each one with a very different nature and dedicated to the widest public possible (horizontal portals). A portal of this type is a ‘compound’ for a number of sections or channels of more specific content. However, given the enormous quantity of existent information on the Internet, the vertical portals arose as an example of specialization in services or products of a special topic and/or specific market or audience. This general trend has also been reflected in the e-learning portals. In this way, there are generic online portals of courses (such as MixMail, http://www.mailxmail.com) and specialized portals (such as http://hstelearnig.mit.edu).

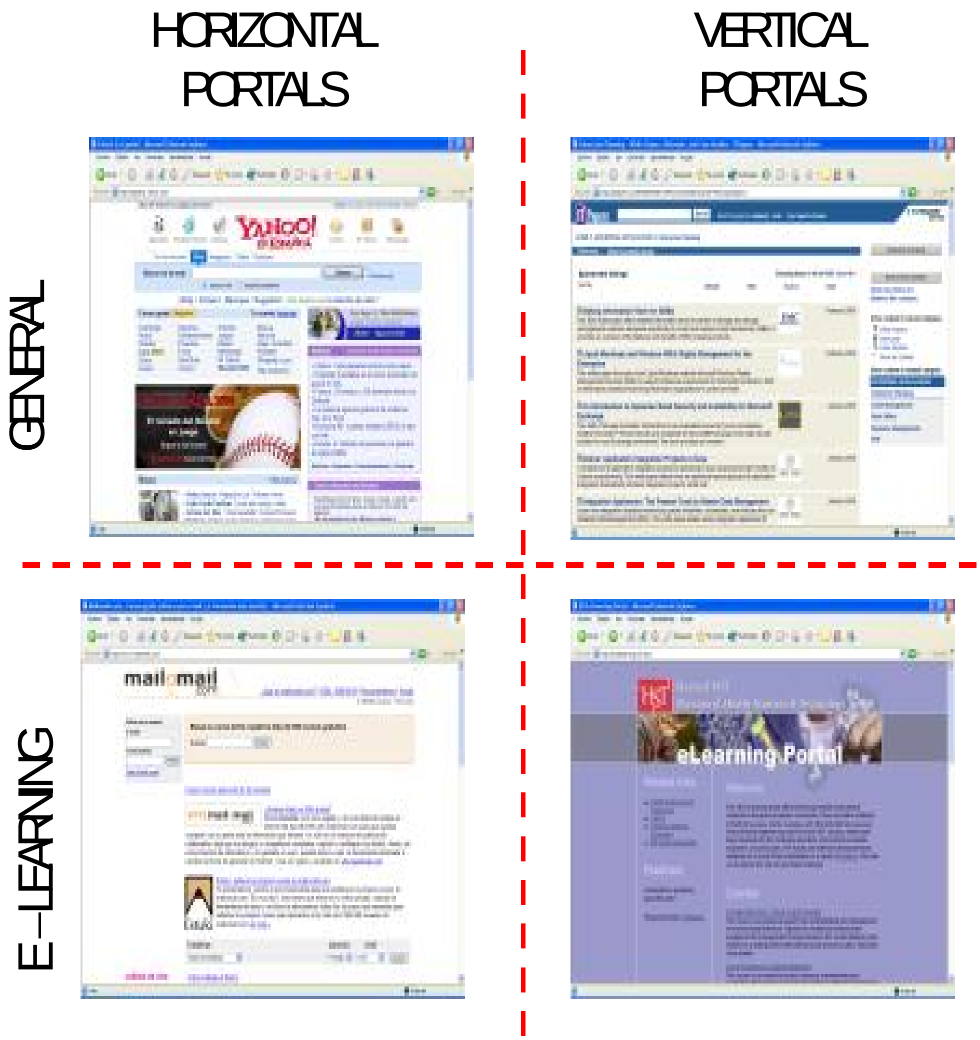


Figure 5. Horizontal and vertical portals.

The main problem of the portals is the selection of their sources for content. The most immediate option is their own production, however, this alternative it is often very expensive and not very profitable except in very concrete cases in which target market characteristics allow for doing it in this way. For this reason, many of the portals chose the acquisition of contents from an external source or by the inclusion of links in their pages to other content portals. The final decision will be influenced by business models and how the organization generates value.

Another critical issue is the price of the knowledge contained in the portal. There are portals in which the only condition necessary for access is to register as a user (as in VirtuaCursos, http://www.virtuacursos.com/) — that registration allows the user to enjoy a wide list of courses. In these cases, revenues usually come from the publicity introduced during the course and mailed to the registered users. Educational approaches of this type are characterized by the student facing the contents alone without the existence of a professor to support them. In fact, this is one reason why deploying an online education strategy has had a relatively low uptake. Nevertheless, in the last few years a new trend has been detected: to consider e-learning as a marketing tool and so some companies (such as Cisco Systems, for example) organize courses or online sessions related to a specific area and take advantages by making the qualities of its products stand out inside that area.

In other cases, the online education is not free but rather the users pay a price, sometimes considerable, for the access to the educational material. The derived revenues of the amount of the registrations allow remuneration of professors, educators, etc. and allow the institution to support students at every moment, guiding them during the learning process. This is likely to be among the most common situations in the universities and education centres as they struggle to understand the new environment of e-learning.

Service providers

As this is a more heterogeneous sector, it is more difficult to define it because of the wide variety of services that can be offered to end users.. Nevertheless, there is a significant actor in this sector: the LSP (Learning Service Provider). LSPs not only provide access to their e-learning platform in an ASP (Application Service Provider) manner, but rather they usually complement their offer with added value services such as strategic consultancy or e-learning deployment projects management. Figure 6 shows the web site of Grupo Élogos, a Spanish LSP that offers services like education outsourcing, e-learning consultancy and specialized education and training.

Figure 6. Example of LSP (Grupo Élogos).

LSPs are increasingly becoming a most appropriate alternative for companies not dedicated directly to IT, since it allows them to be centered on their main business activity, accelerates the installation process, and can diminish the IT investment needs and associated risk of their IT investment, and can provide for greater flexibility in terms of responding to commercial and market pressures such as in terms of decision making for their strategies.

Conclusions

The e-learning market is relatively young and shows a high level of fragmentation with multiple activity sectors. This requires that the organizations try to settle down in more than one segment simultaneously, either in a direct way or through strategic alliances (as shown in the recent coalition of the Grupo Doxa and Fycsa to form Élogos).

On the other hand, an aspect that will mark the success of the different business models will be, besides the reduction of costs, the creation of value added to the offer of services, focusing the efforts especially in those that provide bigger margins. In this sense, a proliferation of the pattern discussed above for the LSPs is expected.

Summarizing, e-learning, thanks to the advances in the technological and content standardization of platforms, is forecast to be significantly developed during the next years. Whilst it may be prophesised as being one of the business sectors with the greatest potential and opportunities, we need to be reminded of the OECD citation that commenced this paper. The simple fact remains that institutions have yet to turn the potential into a stable, sustainable, and desirable form of higher education for the various stakeholders.

The argument presented in this paper recognises that the situation will only change when the decision makers more fully understand the implications of the web for value creation and that business models will need to be developed in order to satisfy the various demands that university stakeholders will place on them for their educational products and services. Essential components of the movement toward e-learning will be the development of international standards for learning objects as well as for the underlying technology infrastructure that can be used to lead to efficient, effective, and efficacious learning systems.

Acknowledgement

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Comparing E-Learning Implementation within Business vs. Academic Organizations: Two Case-studies

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Theme #1: Research into institutional Planning, Management, and Quality Development for Online distance Education and e-learning.

Introduction and aim of study

The implementation of e-learning strategies within universities and business organizations is entering the mainstream. For example, in the United States, 65 % of schools offering graduate face-to-face courses also offer graduate courses online (Allen and Seaman, 2005). Also, according to the 2005 e-learning survey held in Australia, 53% of vocational education and training business presenters reported that they are involving e-learning strategies within their units (2005). Most organizations use mainly asynchronous e-learning technologies for course delivery, which provide flexibility and convenience for both teachers and learners as they allow participation at any time and from any device that has an Internet access (Bates & Poole, 2003).

While e-learning is gaining acceptance as an alternative option to the traditional face-to-face experience, it also creates new challenges and opportunities for the implementation and delivery of post high school education as well as for business training. Previous research indicates that several factors affect the success of the process of implementing e-learning strategies. Many of these factors relate to faculty and trainers as an important group of stakeholders (Olcott & Wright, 1995; Ensminger, 2002) whose instructional role is affected by this change (Wolcott and Betts, 1999; McLean, 2006).

The main purpose of the present study is to compare the implementation of e-learning within two organizations: business vs. academic. In the present study, we compare the series of actions and choices over time through which teachers within the organizations evaluate e-learning strategies and decide how to continue incorporating e-learning into ongoing practices. While both organizations chose almost an identical e-learning technology, there are substantial differences between them: First, the business organization is a place for career development while the other is an educational organization that mainly qualifies students for their future careers. Second, the business firm is a private for-profit organization, whereas the academic institution is a public, non-profit organization. The funding of the business firm is based on private resources, whereas the academic institution is funded mainly by the government and other public resources. This fact has an impact on the organization’s character and essence. Third, the training and the teaching goals of the two organizations are very different. The training within the business firm is geared mainly toward increasing the organization’s financial profit. In contrast, the teaching goals of the academic organization are training future researchers with highly qualified degrees and certificates.

When analyzing the e-learning implementation in these two organizations we need to take into consideration that these differences might have an impact on the decision process as a whole.

The theoretical framework

The theoretical framework of the current research is based on Roger's Innovation-Decision Process, which is part of his Diffusion of Innovation Model. Rogers (1995) describes a five stage model of the innovation-decision process through which an individual (or other decision making unit) passes:

(1) *Knowledge stage* - occurs when the individual is exposed to an innovation's existence and gains some understanding of how it functions.

(2) *Persuasion stage* - occurs when the individual forms a favorable or unfavorable attitude toward the innovation.

(3) *Decision stage* - occurs when the individual engages in activities that lead to a choice to adopt or to reject the innovation.

(4) *Implementation stage* - occurs when the individual puts an innovation into use.

(5) *Confirmation stage*.- occurs when an individual seeks reinforcement of an innovation-decision already made, or reverses a previous decision to adopt or reject the innovation if exposed to conflicting messages about it

The process as a whole, from the first stage to the last one consists of a series of actions and choices over time through which an individual (or an organization) evaluates the new idea and decides whether or not to incorporate the innovation into ongoing practice.

The focus of the current paper is on the last two stages of the process: the implementation and the confirmation stages. The reason for this is the fact that policy- makers from both institutions, the business and the academic, decided to adopt e-learning as an institutional strategy.

As defined, the fourth stage, *implementation*, occurs when the individual puts an innovation into use, e.g., integrating e-learning methods within the teaching process. The fifth stage, *confirmation*, occurs when an individual seeks reinforcement of an innovation-decision already made, or reverses a previous decision to adopt or reject the innovation if exposed to conflicting messages about it. In the current paper this stage will be explored by the means and strategies the two institutions choose to imply in their path of innovation adoption. Each of these stages are characterized with certain patterns of attitudes that we will describe further in the paper.

Rogers distinguishes three main types of innovation-decisions: 1. *optional innovation-decisions*, choices made by an individual independent of other members of the organization to adopt the innovation, 2. *collective innovation-decisions*, choices made by consensus among the members of system, and 3. *authority innovation-decisions*, choices made by few policy- managers who compel their decision on the organization (1995). In both organizations the *collective innovation-decisions* was the main path of the process.

But, in the academic institution some *optional innovation-decisions* were found, as the faculty had some freedom with the instructional design of the e-learning component within their teaching. For example, he/she can decide what types of content will be developed (e.g., ppt, word, html or other) or if to add audio or/and video to the textual content.

One of the factors that contribute to a successful innovation-decision process is a *change agent* that can be either individual(s) or units within the organization. According to Rogers (1995) the change agent influences clients' innovation-decision in a direction deemed desirable by the organization. Change agents usually introduce innovations into a client system that they expect will have consequences that will be desirable, direct and anticipated. As we will see later in the paper, an assigned change agent was found only in the academic institution. We will elaborate the impact of this fact on the innovation-decision process

Method

In the present study, we analyze two cases - studies: one focuses on a financial firm and the other is a research university. Each case-study will be examined by using semi-structured interviews with twenty-five trainers (Kurtz, 2006) and a survey filled by nineteen faculty (Kurtz et al, 2004), as well as informal talks with policy makers in both organizations The data is mainly quantitative. Personal reflections of the authors who were actively involved in the implementation within both institutions is another primary source for the analysis.

The analysis will be described as follows: First, we shall provide a short description of each institution. Secondly, we shall compare the innovation process on the basis of Roger's model. Finally, we shall summarize the implications of the study.

Description of the business and the academic organization

The business organization is one of the leading financial institutions in Israel. It has around 10,000 employees, spread all over Israel and abroad. In 2004 the financial institution has record net profits of $489 million. The institution has a strong reputation of commitment in the training of its employees. Its large employee body number and increasing demands for on the job training enforced the management to integrate e-learning strategies within the traditional face-to-face employees' recruitment and training.

The academic organization is one of the largest campus-based universities in Israel. Its student body numbers some 30,000. The university offers 6,300 different courses, taught by 1,500 members of the academic faculty. Over the last half a decade, the academic organization, similar to many higher education institutions worldwide, is incorporating e-learning technologies into the on-campus teaching.

A comparative analysis based on Roger's Innovation-Decision process

The implementation Stage

In both institutions, from the top management to the trainers and faculty levels, there was a clear and positive intention to put e-learning into practice- and they did. For example, almost all faculty in the academic institution reported that they combine face-to-face meetings with online teaching; 42% integrate the face-to-face meetings to a *high* or *very high* extent and 26% to *low* and *medium* extents respectively. They find this combination helpful for a successful teaching-learning process (Kurtz et al, 2004). The same is within the business firm. Most of the trainers regard the innovation implementation challenging and they think it fit as an add-on to their training means (Kurtz, 2006).

According to Rogers, certain degree on uncertainty about the expected consequences of the innovation might exist for the individual at the implementation stage, even though the decision to adopt has been made (1995: 173). In both organizations questions like: “How do I use e-learning?”, “How does it work?”, “What problems am I likely to encounter, and who will help me to solve them?” were raised. Some of them were concerned about the ways of using e-learning properly. According to Rogers's model the change-agent has an active role in assisting the clients as they begin to use the innovation. A new assigned center for this purpose was established only in the academic institution. The center’s mission is to develop, deploy and research the use of e-learning in higher education. The center develops methodologies for the learning and teaching of academic courses and supports the production of such courses. In the business firm the Information Technology unit was assigned to provide technical support as well as advisers from outside the organization. The different support sources had a negative influence on the information-seeking and information-processing of trainers about the advantages and disadvantages of e-learning. Trainers in the business organization were concerned by the cause-effect relationships that are involved in implementing e-learning strategies, and particularly the possibility that they might not be needed as instructors any more. This concern can be explained by the fact that part of the e-learning modules were developed as self-paced learning content - student can learn any place, any time and without depending on the instructor and/or classmates. He/she can take exams via the e-learning system and get immediate automatic feedback and even, in some modules, the final grade. Within the academic institution, on the other hand, a lesser worry of faculty for their role as teachers was expressed. Partly due to the emphasis on interactions between faculty and students that were embedded within the e-learning modules.

Another concern of the trainers in the business firm dealt with the time delayed interactions with their students. Questions like: “I am used to give answers immediately to students questions, now it takes time until they get it. How can I handle this time gap?”, Represent this concern. The consequences of these concerns will be shown the next and final stage.

The confirmation Stage

As described previously, at the confirmation stage the individual seeks reinforcement of the innovation-decision already made, or reverses a previous decision to adopt or reject the innovation if exposed to conflicting messages about the innovation. At this final stage, the individual seeks to avoid a state of dissonance or reduce it if it occurs (Rogers, 1995:181).

Clearly, the trainers at the business organization had a high degree of dissonance. A majority of the trainers said that they were looking for guided resources but almost did not get it. Some trainers reported a feeling of uncertainty especially for the appropriate instructional design techniques and how to evaluate the performance of students. Consequently, the majority of the trainers reported on an excessive workload and feelings of insecure with the continuity of the process and its impact on their position as trainers.

A different scenario was found at the academic institution. Many of the faculty reported that they find the use of e-learning a rewarding and enriching path for their teaching. A large part of them acknowledged the benefits of using e-learning techniques and said that they integrate them into their ongoing teaching. When asked about their level of satisfaction with their use of e-learning, a slight majority (59%) replied that they were about equally satisfied with a classroom setting as they were with the use of e-learning. 29% indicated they were more satisfied with the use of e-learning, and only 12% felt generally more satisfied with classroom setting (Kurtz et al, 2004) .

The positive attitudes of the faculty as compared to their counterparts in the business sector can be explained by the establishment of a support unit that functions as a change agent and the implementation of pedagogical concepts that put emphasis on interactions and collaboration of the faculty with the students.

Conclusions

Both organizations passed the implementation stage successfully. They reached the stage in which e-learning has become an integral part of the ongoing training and teaching operations. But the fact that the business organization has not established a support unit or any other change-agent and the use of self-paced learning pedagogy contributed to a less grounded consensus of the innovation within the business firm as compared to the academic institution. The consequences are shown at the final stage with a massive gap of confirmation between the two organizations.

Final words

The field of e-learning is growing rapidly both in higher education and in the business sector. New technologies are introduced at a rapid rate challenging decision-makers to apply them into teaching and training methods. A significant amount of research on the transition of faculty or trainers from face-to-face instruction to e-learning is available but the literature offers little evidence of a comparative research such as the current study. Though our research is limited to a comparative study of two organizations, it is hoped that the results of the present study can assist administrators at universities and in the business sector in implementing e-learning technologies. The findings should also help faculty and leaders identify and address issues related to the transition from on-campus delivery to online teaching. Finally, these findings could help researchers refine and focus additional questions related to the organizational implementation of e-learning and the critical role played by faculty and trainers in this global transition of teaching and training. .

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Reflections Concerning the 'Invisible' Online Learner

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Abstract

While much has been written regarding the learning behaviors of students participating in online courses, little research has been conducted to ascertain whether or not students are still engaged and actually learning even when not visibly involved in online discourse with other students and faculty. This work summarizes a study of inactive students enrolled in an online graduate course, augmented by further reflections of the author, based on subsequent experience and observation of online student behaviors over a five-year period. Study findings identified how much time is spent in course related activity, what the reasons are for "invisibility," and if preferred learning styles influence students' online behavior. The data revealed that these students do spend significant time in learning-related tasks, even when not visibly participating, and they feel they are learning and benefiting from this low-profile approach to their online studies. Further research and reflection since this study reinforce these findings, and suggest that research on invisible learners is a critical area of investigation to better understand the dynamics of asynchronous learning and teaching at a distance. This work also brings to the fore a need to examine the impact that 'invisible' instructors may have on student behaviors and course effectiveness in online environments.

Introduction

In 1999, this author was asked to evaluate a new course offered as a pilot in an online Master's of Distance Education program delivered jointly by University of Maryland University College and Oldenburg University (Germany). The following year, I had the opportunity to observe the course online, and subsequently, I revised and mentored this same course, which I occasionally taught over the next three years. In these various roles, I acquired a keen interest in the phenomenon that has been referred to by Helmut Fritz as "witness" learners (1997), and which I have subsequently referred to as "invisible" learners. This inquiry resulted in a study of learners defined as such, and to several publications and presentations on various aspects of that research (2002a, 2002b, and 2003).

Now, with the added benefit of five more years' experience designing and teaching a variety of online courses in three graduate programs for three institutions, it seems an appropriate time to reflect further as a practitioner, and to augment my prior investigation with more observation, anecdotal reporting, and analysis regarding the so-called 'invisible' student. It is my hope that the earlier work, coupled with more recent practice, will generate further interest in this phenomenon, and also will foster an on-going exchange of ideas and insights among colleagues who are intrigued by e-pedagogy, especially as it applies to the teaching-learning dynamic with students who appear less actively engaged in online discourse. This research activity has also prompted further interest in the parallel phenomenon of 'invisible' online instructors and its effect on student satisfaction and course success. This presentation is primarily intended to demonstrate how a preliminary quantitative research study can prompt further investigation; re-affirm initial findings with qualitative data obtained through experience; observation and analysis, guide the researcher to new realms of inquiry; and ultimately result in a comprehensive study of related phenomena.

As interactive modalities increasingly facilitate the connectivity across time and space between students and teacher, and students with other students, attention to the phenomenon of online interaction has gained heightened interest among those seeking to understand and enhance the teaching-learning process at a distance. In considering learning activity in this particular environment, we might assume that it correlates closely to what is visible (i.e., students' written words that appear on the monitor), and conclude that if there is no visible online activity, then little or no learning is likely occurring. Assuming that some learning might indeed occur even when students in online courses are not posting comments, what could be contributing to this tendency to "lurk" on the periphery of course activity? Are they auto-didactic learners who prefer to remain as anonymous and autonomous as possible? Do they forsake opportunities to participate because thinking about what to write online is more formal and less spontaneous than oral, face-to-face dialogue typically is? Do they frequently have a thought they are mentally composing, but others often seem to express the same idea before they can do so? Are they having technical difficulties mastering the intricacies of the particular online platform being used? Or are they simply too busy to actively and regularly participate?

What we may not see in asynchronous environments, literally and figuratively, is what else is going on that contributes to participants'learning. It is easy to assume that unless learners in online formats are actively participating by posting frequent and relevant contributions, they may be benefiting relatively little from this more passive experience. And, we might assume that unless students are posting comments that are directly related to the designated topic in, for example, a threaded discussion forum, their learning is likely to be further compromised. Thus, for those students who, even if they do regularly log-on, but who do not engage at all in a particular discussion, or who seem to be offering irrelevant or, at best, tangential remarks, we might conclude that they neither contribute to, nor benefit from, the experience. Some distance education theorists argue that the dialog between student and teacher is the essential defining element of distance education. It is curious that, although an historical tenet of distance education is the notion of learners autonomously constructing their own knowledge, instructors facilitating the learning process for distant students often become alarmed when dialog wanes in their courses.

Helmut Fritsch, director of the Center for Research in Distance Education at Fern Universitaet (Germany), offers an insightful appraisal of student participation as measured by the frequency of online entries at specific points in time as a course progresses. He developed the notion of "witness learners" (i.e., students who are not actively participating via written contributions at a particular point, but who nevertheless are still engaged in the process as observers (witnesses) of the written exchanges taking place online between other students. He argues that learning, even in this more passive and less visible mode, is still occurring (1997). This was the working assumption that this study sought to investigate.

The 2000 Study

An online master's degree program offered jointly by the University of Maryland University College and Oldenburg University (Germany) enrolled two sections of a Foundation of Distance Education course in fall 2000. Mid-way through the semester, it was noticed that 24 out of a total of 55 students in the two sections had not actively participated (i.e., they posted no online messages during one or both of the modules wherein two prominent guest faculty, who had authored the required textbooks, were both conducting a week-long online conference with each cohort. Since the course format requires online participation to successfully complete academic requirements, and because the articulation of ideas (whether presented on paper or transmitted electronically) is viewed as an inherently critical element of the learning process, this behavior is seen by faculty as an activity that ultimately serves as a key criterion for ascertaining academic success.

A questionnaire was designed and administered to these 24 seemingly "inactive" students, with the intention of identifying the primary factors influencing their non-participation in this particular component of the course. This author designed a 29 questions instrument, and then transmitted it electronically to the target population in Fall 2000, midway through the academic term. It should be noted that this study did not take into account gender, native language, and whether or not this was the respondents' first online course

Findings

All twenty-four students responded within the prescribed deadline. The first set of nine questions asked for data regarding total hours spent during the two-week conference period on various course related activities. The second set of questions asked respondents to identify factors that deterred them from posting comments. The last set of questions was intended to obtain data related to students' learning styles in an online environment. Summing up respondents' comments regarding the primary reasons given for non-participation: Three admitted that their limited interaction online is similar to how they would behave in a classroom setting, and several expressed intentionality to write comments more frequently, but didn't because by the time they were ready to do so, others had already posted similar ideas. Four students admitted to being self-conscious about writing in this forum, one due to being a non-native English speaker/writer, another to being shy, and the other two were just not sure how best to express themselves. Interestingly, two stated that they frequently compose messages, but didn't post them; it may well be that this behavior is a more common phenomenon than we might have initially conjectured. It was also clear that many were reluctant to offer online comments just for the sake of being "present." A preliminary analysis of final course grades offers intriguing evidence that performance cannot be easily correlated to participation or that frequent participation necessarily leads to better performance on graded assignments. (Note: detailed findings of the 2000 study are documented and can be accessed elsewhere).

Discussion

What might we discover, at least preliminarily, from this data? Regarding how much time is spent on course-related activity, even though little of it is visible to the faculty or to other students, we can state that our intuitive assumption is correct that some activity, though mostly invisible, is taking place. Indeed, if over a two week period in the lives of busy adult students, each spends an average total of 44.6 hours engaged in these various course-related tasks, it must be assumed that some learning is taking place in an ongoing fashion. It is quite remarkable, given that this respondent group was identified on the basis of low participation, that such a significant amount of time (i.e., 22+ hours per week) is presumably devoted to academic activity in this one course.

It is evident from the responses regarding reasons for low participation that a significant factor affecting online activity for some students is a certain level of discomfort with the electronic environment, causing some hesitancy to contribute, and then the moment is lost. Most students want to "get it right" before they commit themselves to online dialogue because the written format seems so "public." It may be that online discourse feels more formal and premeditated, while classroom discussion lends itself to a more spontaneous, informal exchange that is not recorded and therefore is less likely to be retained. That three-fourths of the respondents indicated they prefer to read rather than write may suggest a learning style preference, but it could also relate to a lack of confidence with the medium. And, although it might be suspected that time constraints would be used frequently as an explanation for low participation, the data revealed that lack of time was a relatively negligible factor.

It is important to recognize that students' inclination to interact can depend on a variety of factors, including age, personality, learning styles, professional experience, etc. As Kearsley (1995) and others have noted, it may be that the more autonomous, self-directed learner is also more reflective, and so requires less stimulation and reinforcement from interacting with more "other-directed" peers It should be emphasized here that we are not endorsing low-visibility behavior in online courses as a desirable trait; the purpose of the study was to begin to better understand those factors contributing to low-visibility participation at certain points as a course progresses, and to determine if learning-related activities might be occurring "behind the scenes

Reflections

With the benefit of mentoring a variety of online courses in the five years since the 2000 study. I attempt here to further examine, through experience and observation, these same dynamics regarding the invisible online student, in hopes of better understanding and more effectively supporting these learners. If we can better discern what is going on with this learner behavior, then we might adopt instructional approaches that more appropriately accommodate the needs of all learners Accordingly, I have again addressed the original questions,, and have added others to expand the scope of inquiry. The rationale for this is that every online course I have mentored over the past five years includes one or more such learners, and they present a special challenge to the distance educator who wishes to honor differing learning styles, while not compromising course effectiveness

- Should the online instructor be lenient in assessing the invisible learner's minimal participation in online dialogue if other course requirements are satisfactorily met?

The value and importance of online participation in threaded discussions must be emphasized from the outset of each online course, especially if the instructor intends to factor that activity into student assessment. To not do so early only exacerbates the situation when the instructor eventually notes minimal participation by some, and so must then become the enforcer, possibly creating an atmosphere of “forced” interaction. To allow minimal participation by some students, with the thought that they will have to suffer the consequences later when graded, is likely to incur the ire of more engaged students. Strong performance in other course components cannot compensate for mediocre performance in online dialogue.

- Given that online course environments are generally enhanced by a community of scholars actively contributing to the course, especially via online threaded discussions, can it be argued that the invisible learner’s behavior is parasitic, in that s/he frequently takes from, but seldom contributes to, the course?

The online instructor should make his/her position and rationale clear at the outset as to the parameters of participation and performance. Explaining the nature and purpose of learning communities or other desired collaborative activities may not ensure adequate participation by all, but it provides a cue from the instructor that this form of involvement is highly valued. Of course, if the instructor does not exhibit the type of online behavior expected of students, interaction becomes problematic to encourage or enforce.

- Is the evidence consistent that invisible learners, despite their minimal engagement in online interaction with instructor and peers, actually do learn and perform on graded assignments as well as, or even better than, the more visibly active students?

In five years of observing and assessing the work of online students, the pattern described in the 2000 study seems to remain consistent- that the invisible student generally does as well as the moderately visible student, but not as well as highly visible peers. This does suggest, as was noted in the earlier work, that so-called ‘lurkers’ may often represent the more reticent students who feel they are engaged and learning, even if only posting minimally. Still, it must be said that there are typically one or two students who are not only not visible, but who are also largely disengaged from the entire course, hoping to satisfy minimum course requirements and salvage at least a passing grade.

-Does the more “public” aspect of the online environment hinder certain types of learners from actively participating, or might the absence of face-to-face interaction actually encourage more expression of ideas and opinions?

I am convinced that, in the online courses I have mentored, the richness of online discourse has been significantly greater than it would have been with the same student populations in classroom-based courses. This is especially the case with classes containing students of varying ages and experience. Consider the following: younger traditional-age students in my face-to-face classes have generally been reluctant to express themselves as openly as the older adult students, especially in the early stages of a course. But when I have taught the same course in an online format, with the same demographic mix, I observe that the degree of candor and boldness of expression among younger students is generally equal to that of their older counterparts often evident from the very first week’s online discussion. The online setting seems to allow for a certain sense of anonymity, and tends to equalize the legitimacy of anyone’s thoughts, regardless of age and experience.

- Might the low visibility of some students be a function of little or no prior experience with online studies?

Students new to the online course environment are generally able to adapt rather quickly, and there is little evidence that their lack of familiarity with a particular platform inhibits their participation. An example of this is the course noted above, which students were informed relatively late would be delivered online. Four students expressed annoyance or apprehension, explaining that they had no prior experience with online courses and wondered if this would compromise their ability to successfully complete their studies and ultimately affect their final grade. Yet, barely three weeks into the course, these same four students had all contacted me to express their pleasure with the course, and all were as visible as their peers, most of whom had taken online courses before. It is interesting to speculate if perhaps it is the newness of the experience that makes these digital-age learners especially active and eager to master the medium as effectively as others.

Augmenting the initial set of questions posed above, my subsequent experience as an online instructor has prompted a new set of questions; these are presented below, with preliminary responses. This expanded line of inquiry might constitute the basis for a more comprehensive follow-up study.

- Does a dominant interaction pattern among course peers influence the behavior of others? Do inactive students tend to reduce the participation level of their more active peers, and do the more active students prompt some inactive ones to participate more?

It seems that more active students are likely to gradually increase the participation level of some less active peers, but leas active students generally do not prompt a lower level of participation among active students. However, those few who could be characterized as "hyper-active" students (posting incessantly about everything) are likely to intimidate inactive students to remain so, and to sometimes annoy the more average participants, many who are astute enough to recognize that quantity is not a convincing substitute for quality.

- Do regular and ongoing postings enhance threaded discussions, or is it sufficient for students to post occasionally, such as on weekends when they may have more time to devote to their studies?

While not as problematic as the completely invisible student, the "weekly visitor" can certainly be a vexing behavior for the online instructor. This is the student who typically makes a single 11th hour (literally) appearance, usually posting late on the final day of a unit of study. This "batching" approach results in the student seldom actually participating in much ongoing threaded discussion with peers, but rather simply trying to summarize his/her comments and reactions relating to an entire week's topic(s) in one convenient, catch-all posting. At that point, even though these students generally tend to be quite reflective and articulate, their contributions are somewhat anti-climactic, as other students have by then completed their postings, and are turning their attention to the next unit's readings and thinking about what to post on new topics.

- Does an established cohort group in an online course affect participation levels of new students?

Fairly consistently, groups of students who track through a sequence of courses together adopt a "cliquish" style of interactive behavior (e.g., addressing one another directly by name in postings, frequently engaging in personal chat), so much so that this can make new students (and even the instructor) feel like interlopers. In these situations, the instructor should create a separate venue for off-topic conversation. Also, by avoiding addressing students directly by name at the beginning of a posting, instructors may influence students to do likewise, thus creating a more communal forum for all.

- Does the type of questions posed by the instructor influence the style and frequency of response postings?

If the instructor tends to pose questions requiring "Just give me the facts" type of replies, rather than those that elicit more expansive answers, reflective learners will be less enthusiastic in responding to the first category. In this situation, the instructor can inadvertently discourage engagement from those students who may have the most to offer. Questions based on assigned readings ought not be designed to merely confirm that students can provide accurate information from those sources, but that they can synthesize ideas, arrive at new meanings, and convincingly articulate and apply their understanding and insight.

- What is the effect of older learners with high-expertise on younger learners with little work experience; and likely none in the field of study? Does this disparity in age and experience influence participation?

My experience suggests that the anonymity provided by the online setting tends to diminish, or at least make less obvious, such differences, and so these have a negligible influence on participation levels. The low-expertise student's postings may not quite as sophisticated as those of a high-expertise peer, but this does not seem to discourage activity. It is important that the online instructor avoid too frequently posing questions and soliciting comments that are contingent on experience or expertise.

- Does use of instructor-authored readings influence the nature/tone of learners' comments?

It might be presumed that students would be more reluctant to challenge material they are asked to comment on if written by their course instructor. In my experience, students with less expertise in the area of study are generally reluctant to challenge any published author, regardless of whether s/he happens to be their teacher or not. Graduate students at more advanced stages of study and who may already be quite accomplished practitioners in the field, are more inclined to comment candidly and critically, even if it applies to the work of an instructor/author.

- Does use of more elaborate platform features (e.g., graphic displays, video clips, and other visuals) elicit more engagement than text-focused online course environment?

While it might be expected that younger students, who are products of the interactive digital age, are likely to be more responsive to entertaining technological accoutrements, it seems that most mature students could care less about such online enhancements, provided that the instructor establishes and the platform provides a supportive and responsive learning environment in which students can progress satisfactorily toward their learning goals. Students' positive or negative responses to online courses are much more likely influenced by instructor behavior, than by elaborate technical features that can, in fact, become a distraction.

The Invisible Online Instructor

We must recognize that online instructors may be just as 'invisible' as their students. If so, what is the likely impact of such behavior on student satisfaction and overall course effectiveness? Teachers serve as powerful role models, for better or worse, for what is expected of students in the online environment. Early in a course, students typically detect the instructor's style and most likely emulate it to some extent. What can be especially damaging to overall course dynamics is an effective start to course interaction

by enthusiastic and active students who, noticing the absence of regular faculty presence, alter their own behavior, on the assumption that interaction and visibility are probably not valued by faculty if s/he does not practice it. Minimal visible online presence from faculty, slow response time to queries; tardy feedback regarding assigned work- all these faculty behaviors can give unintended cues to students that online interaction does not seem to be the instructor's priority, and so need not be the student's priority either.
Consistently, the single greatest criticism from online students expressing dissatisfaction when responding to online courses evaluations is lack of instructor engagement. This is especially the case when faculty has identified course protocols, which they themselves do not adhere to. And there is always the possibility that students may also influence less-than-desirable instructor behavior. For instance, an instructor may have every intention of being a highly visible participant in his/her course, but then witnesses so little student engagement in the early phases of the course, that s/he drifts into the same pattern of invisibility, rather than serve as a role model for more visible participation.

What factors contribute to instructor invisibility in online courses? Some of the variables identified below may occur singularly or in various combinations. I suspect that most of these are likely to be operant relatively early in a course, rather than develop gradually over the life of a course.

The instructor simply has little experience or no insight into the role;
The instructor doubts adequate rapport can be established with online students, regardless of what pedagogical practices are utilized, and so is reluctant to invest much time in the process;
The instructor, especially adjuncts with other employment in addition to teaching, underestimates the amount of time required for an online course, is too busy to devote adequate time to it; and so must find ways to reduce time on task;
The instructor has not had the benefit of any training in online pedagogy, and so does not recognize the value of frequent interaction;
The instructor assumes that occasional participation is acceptable to students;
The instructor feels somewhat overwhelmed by the volume of postings, and so puts off replying, or finds ways to post "generic" replies to a large number of postings; or conversely,
The instructor develops a pattern of responding directly to individual students, making others feel left out of the conversation;
The instructor decides s/he can do a better job of responding thoughtfully and thoroughly on weekends, and so remains largely invisible during the week;
The instructor determines there is really no need to post anything, once assignments are given, unless a specific question is posed;
The instructor assumes students are all self-directed learners, and prefer limited instructor involvement, structure, and direction;
The instructor over-emphasizes collaborative learning among peers, and is reluctant to appear as overly authoritarian;
The instructor is hesitant to offer his/her own ideas and opinions on discussion topics for fear of stifling student dialogue;

The instructor sees his/her proper role as monitoring or summarizing online dialogue, rather than actually participating in it;

The instructor sees his/her role as limited to providing instructions, assignments, resources, responding to questions, and grading;

Finally, the instructor exacerbates his/her invisibility by not posting any self-authored lecture notes or readings, thus minimizing not only instructor presence, but also instructor as credible authority on the subject.

Conclusions

These ruminations and responses could be perceived as an attempt to formulate yet another set of "Best Practices." But it is perhaps more accurate to define these reflections as a series of inquiries aimed at discovering if the process by which students ultimately learn approximates what faculty initially intended in designing course content and in facilitating the course's progress. In the end, it should be acknowledged that online instructors really do not teach; rather, they create conditions for learning. The more traditional view of pedagogy might be described as largely a matter of structuring content so that students may move logically in a linear direction via a managed process. But, as we have gained experience and insight into the realm of online pedagogy, we have discovered that learning is not so much a managed process, as it is a fostered process, one by which the learner forages; that is, looks for tools to assist in identifying and solving problems.

There is an inherently evolutionary process underway for both teacher and learner in the online environment. Both, to some degree, are experiencing a transition in their respective functions, both undergoing a quite profound redefinition of the teaching-learning relationship. One is trying, in effect, to disengage from his/her historical role, while the other is expected to move to higher levels of engagement. For both, it truly requires an "unfreezing" process of unlearning old habits. In a 2001 study this author conducted of fifty faculties in five institutions transitioning from classroom to distance teaching, when asked what they considered to be their most important role, 38% selected the option of "mentor" and 32% identified themselves primarily as "facilitators." Only 22% referred to themselves as "teachers." As instructors and learners make the transition from face-to-face interaction to a relationship that transcends time and space, each undergoes a fundamental role change, as both seek new ways of knowing and new levels of meaning. This present work hopefully provides a modest contribution to that understanding.

What is now proposed is to pose these questions- from 2000 and 2006- in a more comprehensive follow-up study that could serve as a "book-end" project, complementing findings from the initial study with these more preliminary assumptions based on experience and observation. This would provide a series of three investigations, to determine if the invisible online behavior chronicled here would remain largely consistent throughout each investigation and analysis. It is hoped that this would provide a sufficient amount of data and discussion to prompt others to conduct their own research regarding the 'invisible' learner. In addition, we recommend that any further investigation of this invisibility phenomenon include the 'invisible' instructor. And it might be particularly worthwhile to examine correlations between a relatively invisible instructor and a high incidence of student invisibility in such courses.

From the findings to date presented here, can we arrive at any preliminary insights about what transpires "below the surface" in an online context that either helps or hinders learning? We can probably conclude that essentially the same "witness learning" phenomenon occurs in both formats- classroom and online. Certainly, most students are actively engaged in learning activities, often in an auto-didactic fashion, even though there may be relatively little obvious manifestation of that activity. It could be suggested that the image of an iceberg serves as a useful analogy here, in that most of its mass is hidden beneath the surface, just as is the case with our invisible students' learning.
It is premature to declare that a certain level of interaction in online discourse is an essential ingredient to student success or course effectiveness. In fact, all online learners are invisible to the teacher; that some are less visible than others is not necessarily an indicator that the benefits of the learning experience are being compromised. Those who are involved in the instruction and assessment of online learning are reminded that although the medium is technology-based, the actual learning remains largely an invisible process, just as it is in courses delivered at fixed times and places. We are reminded here of Dewey's observation regarding a critical element of the teaching process: to create conditions for "productive inquiry" that takes place independent from the teacher. In the online learning environment, teachers must be attentive to process as well as content to ensure that this inquiry is indeed occurring, however invisible it may be to them.

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Research into Online Distance Education and Learning
Making the Difference
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Paper submission for Theme 2: Research into innovative online teaching, learning and knowledge building

Learner Independence and Interdependence in Online Communities of Inquiry: The Case for Teaching Presence

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Abstract

Historically, a core value of distance education has been independent study shaped by often rigorous design protocols and support structures of the educational institution. However, more recently, distance education appears to be in a process of re-examining the teaching and learning process. Peters (2002) states that education in general is experiencing a "radical and far-reaching restructuring process …" (p. 26) and will have a disproportionate effect on distance education. According to Peters (2002), "the digital revolution has already begun and is well underway in distance education" (p. 34). Much of this centers around access and interactivity and "how useful it is to become members of virtual communities of students" (Peters, 2002, p. 35). What is not clear is the exact nature of these interactions and communities and how these changes will modify the core value of distance education – learner independence.

The core question here is to what degree should online distance education hold to the ideal of independent study? An argument is made for the importance of considering both learner independence and interdependence in an online learning environment. Evidence is presented regarding the importance of teaching presence in the determination of the role of online learner, particularly as it relates to independence and interdependence. Novice online learners and their instructors were questioned regarding their reaction to the experience of being online. Responses were examined in relation to the perceived need for learner independence and interdependence in online communities of inquiry.

Introduction

Becoming an online learner requires adjusting to the required behaviors or 'role demands' (Blau & Goodman, 1995) appropriate for the medium. From the perspective of the individual, learning online requires the development of competencies in the role of 'online learner'. As a relatively new role in society, competence will occur over time as the role becomes normalized as a common and identifiable state. In this early stage, online communities of inquiry will assist learners in the developmental process of 'role making' (the self-construction of a new role) and 'role taking' (the adoption of known or observed role behaviors) as they maneuver this new experience.

It is argued that distance education is in a transition from a structural to a transactional paradigm (Garrison, 2000). That is, a shift is in process from the institutional organization of learning and the self-instructional course package to an interdependent and collaborative approach made possible by new and emerging communications technologies. Teaching and learning is moving from the institution design perspective that objectified teaching (Peters, 1994) to sustained teaching presence that includes flexible design and sustained facilitation in a collaborative environment. There is a move to transactional learning, while maintaining time and place independence.

The role emerging for online learners is one of both independence and interdependence. The role and its associated responsibilities represent a new set of standards, standards that more closely match those of life outside the classroom. This is a considerable educational outcome as students become more self-directed. However, these challenges and adjustments need to be understood and managed through teaching presence to allow students to function successfully in an online community of inquiry, and beyond. (Emes & Cleveland-Innes, 2003; Garrison, Cleveland-Innes & Fung, 2004; Cleveland-Innes & Emes, 2005).

Independence in an online learning environment takes on particular meaning. A synchronous interaction allows students to maintain a temporal and spatial independence, but the issue of independence becomes one of self-direction and self-study. Self-direction occurs where learners "...are motivated to assume personal responsibility and collaborative control of the cognitive (self-monitoring) and contextual (self-management) process in constructing and confirming meaningful and worthwhile learning outcomes." (Garrison, 1997, p. 18) The choice has become using communication technologies to access self-instructional course materials enhanced with opportunities for individually controlled "social intercourse" (Peters, 2000, p.15) or use interaction capabilities to build communities of inquiry, flexible designs, and enhanced opportunities for collaborative learning. It is the difference between providing chat rooms for social support and facilitating purposeful critical discourse. Self-direction and passive teaching presence is more often a characteristic of traditional distance education. The role of the teacher was inherently diminished through the design process and the replacement of the teacher by the institution or a tutor.

To use terms introduced by Moore (1990), do we maintain structure and offer dialogue where the student wishes to avail him or herself of this option, or do we hold dialogue central to the educational experience and introduce structure where it is advantageous. In essence, structure and dialogue parallel issues of design and facilitation. In this regard, Garrison (1989) comes down on the side of dialogue. Sustained two-way communication, not independence, should be the core of any educational experience. This marked a clear shift from structural (independent) to transactional (interdependent) approaches found in communities of learning (Garrison, 2000). Developments in communication technology have made online communities of inquiry a distinct possibility in distance education. To help guide research and understand collaborative and interdependent online learning, the community of inquiry framework has shown to be a useful model (Garrison, Anderson & Archer, 2000; Garrison, 2006).

Background

The three core elements of a community of inquiry are social presence, cognitive presence and teaching presence. Each element supports the others and contributes to collaborative inquiry. The transactional and community approach uses sustained interaction and critical discourse as the primary means of learning. Teaching presence acts as the integrating function for cognitive and social presence. In other words, teaching presence brings together the social and cognitive presence elements and adjusts the design and activities as needed. Creating online communities of inquiry requires sustained support and guidance. Teaching presence is integral to sustain a community of inquiry. This is in contrast to traditional distance education where teaching presence and social presence are at best an option to students.

In a recent study of adjustment to online communities of inquiry, Garrison and Cleveland-Innes (2004) concluded that teaching presence in the form of facilitation is crucial to the success of online learning. This is a form of interdependence that may be critical to online learning, such that it requires a new definition in the amount and character of learner independence. There is a growing body of literature pointing to the relationship between teaching presence and perceived learning (Jiang &Ting, 2000; Picciano, 2002; Pawan, Paulus, Yalcin, & Chang, 2003; Shea, Pickett & Pelz, 2004; Swan, 2001). Swan (2001) concludes “interaction with instructors seemed to have a much larger effect on satisfaction and perceived learning than interaction with peers” (p.322-323). Wu and Hiltz (2004) state that the instructor’s role is crucial to effective online discussions and “more online guidance, more structured discussion topics and considerable time devotion are required for instructors” (p. 149).

Teaching presence in the form of interaction with the instructor may be critical in the early stages of development as an online learner. In a study of adjustment to online learning, novice online learners identified the actions of the instructor needed for support and satisfaction when engaged online. At the same time, instructor interviews suggest that instructors hold specific expectations for online learners as well, and communicate these expectations in varying degrees. In terms of instructional and instructor approaches, there is a difference between direct instruction, facilitating online learning and the design and organization of a course (Pelz, 2004).

In its application then, there are three distinct aspects to teaching presence: direct instruction, facilitation and design. This is not an argument for one approach or another but, instead, to explore the educational impact of different approaches. Contextual constraints and educational goals shape the balance and integration of structure and dialogue – independence and interdependence. The role of teaching presence and its components of design, facilitation and direction are central to integrating communications technology and enhancing interaction. This raises important questions about learner independence and interdependence in reconfiguring distance education.

Methodology

Sample

Participants were enrolled in two graduate programs at Athabasca University. Two core courses taken early in each program were purposively selected to include the greatest number of novice online learners. One hundred and forty-four students from 19 distinct courses over four terms were included in the study. Of these 144 students, 61 identified themselves as ‘first-time’ online learners. Data from this sub-group were analyzed.

Courses were delivered using a combination of print and electronic media and online conferencing. The online conferencing component provided the opportunity for student engagement and group interaction. Required conference participation was used for assessment in some courses while it remained a voluntary activity in others.

Data collection

This study used a previously validated instrument (Garrison, Cleveland-Innes & Fung, 2004) to measure the extent of student identification with behaviors, expectations and requirements of the perceived role of online learner. Questionnaires were sent by email during the first two weeks of each term and again during the final two weeks of each term. The questionnaire provided quantitative data through 28 Likert-type questions derived from the community of inquiry model. Using pre- and post-questionnaires, students enrolled in these entry-level courses in two different graduate degree programs at Athabasca University, Canada, were asked to assess their adjustment to online learning.

Forty-two percent of the participants reported this was their first experience in an online learning environment (n=61). Responses to scaled items regarding online competence indicated an moderate to extensive adjustment from time 1, the beginning of the semester, and time 2, the end of the semester, in 60% respondents. That is, respondents rated themselves more closely to experienced online learners in the post-questionnaire than in the pre-questionnaire. This verified the existence of a developmental process for this sub-group in the sample and that there was an adjustment to the online learning environment. (Garrison, Cleveland-Innes & Fung, 2004).

In addition to scaled items, the questionnaire included open-ended questions related to activities and outcomes, becoming part of the online learning community, and the design and facilitation of online learning (see Appendix A for questions). Responses were coded for evidence of student awareness of the need for independence and interdependence in the experience of online learning.

Data Analysis

Responses from self-completed surveys of open-ended questions by novice online students and transcript data of instructor interviews were reviewed. All data was text-based. Two research assistants, in collaboration with research principals, analyzed data for themes using the constant comparison assessment method. This initial coding focused on the adjustment to online participation for students, as seen through the eyes of the students and the instructors.

Second level analysis sorted these comments into the three components of teaching presence: direct instruction, facilitation and design and organization. Third level analysis of student data identified adjustment comments related to learner independence and learner interdependence. Concepts such as self-reliance, lack of direct instruction, and ownership of learning illuminated student perceived requirement for independence and interdependence. Finally, student comments in each area were coded according to affective orientation; positive or negative comments toward the need for independence or interdependence. Negotiated inter-rater reliability is over 90% agreement.

Table 1. below outlines the final taxonomic structure of student comments in the analysis regarding learner independence and interdependence.:

Table 1.

	Independence	**Interdependence**
Direct instruction	Positive Comments	Positive Comments
	Negative Comments	Negative Comments
Facilitation	Positive Comments	Positive Comments
	Negative Comments	Negative Comments
Design & Organization	Positive Comments	Positive Comments
	Negative Comments	Negative Comments

Findings

The purpose of this study was to assess the experiences of first-time online learners and their perceptions of the adjustment to online learning. Responses to open-ended questions reflect varying aspects of adjustment around the issue of learner independence and interdependence.

A total of 51 descriptions were identified in relation to teaching presence. Descriptions ranged in length from one sentence to six sentences. These descriptions were further analyzed and coded for reference to one of the three components of teaching presence: direct instruction, facilitating discourse, and design and organization. Of 51 descriptions, 10 related to learner independence and exhibited both positive and negative responses to the perceived need for independence. By contrast, seven descriptions related specifically to learner interdependence. Tables 2 and 3 provide examples of comments for each embedded category, as described above. (Lengthier student responses can be found in Appendix B).

Table 2. Learner sample comments regarding independence

	Learner independence
Direct instruction	I find that there is little instruction provided, but that is okay with me (#129)
	It was a challenge initially to need to be so self reliant (#407)
Facilitating discourse	The instructor's role was limited to facilitation (#139)
	Difficulty coming to grips with the fact that instructor allows students to regulate discussions (#70)
Design & organization	Takes a lot more responsibility for time management and initiating work (#132)
	Usually have to go through the marking of my assignment to know the actual requirements (#146)

Out of a total of 51 comments relating to teaching presence, 10 specifically addressed adjustment regarding independence in relation to the instructor. All these comments outlined the realization for more independent, self-directed work. In some cases, comments indicated a neutral or positive response to this realization. Notable are the strategies employed to adjust: "more outside research," "more meticulous and detailed in note taking and study" and "take on more responsibility." In other cases, students expressed difficulty accepting the "bulletin board methodology" of online conferencing and the sense that "receiving assistance/guidance is still required" but missing. In some cases the level of independence required was seen as a deficiency on the part of the instructor, in others a change in role of the instructor from direct instruction to facilitation. Affective comments like "it was a challenge," "had difficulty coming to grips …." and "overwhelming" identified the negative side of the adjustment.

The three factor teaching presence structure of direct instruction, facilitation and design and organization was well represented. All comments represent one or more of these aspects of teaching presence. More comments were made regarding the specific role of the instructor – direct instruction and facilitation – than on the broader instructional issues of design and organization.

Table 3. Learner sample comments regarding interdependence

	Learner interdependence
Direct instruction	Allows for a more thorough exploration of the subject matter (#55)
	Most of what is posted online are expressions of opinion / anecdotes that do not further my understanding (#143)
Facilitating discourse	Allows for a much broader range of perspectives (#55)
	Spend a lot of time reading through comments that have not been vetted (#143)
Design & organization	Liked the small working groups (#418)
	Spent hour per day writing e-mails explaining and re-explaining the assignment and our progress to the group (#129)

Seven detailed responses offered insights into the students' sense of interdependence online. Three of these comments related to the relationship between student and instructor. All others related to learning and instructional activity with other students. Affective orientation to interdependence was at times positive, other times negative; variation exists in perceived quality of online interdependence and the assessment of its value. The three factor teaching presence structure of direct instruction, facilitation and design and organization was well represented here as it was with learner independence.

Table 4. Instructor sample comments regarding learner independence

	Learner independence
Direct instruction	Expect students to work through materials and ask for assistance when needed
Facilitating discourse	Stay out of the way; assist when needed
Design & organization	Students follow schedule and study guide, but manage their studies Provide clear instructions Allow flexibility when personal issues arise

Table 5. Instructor sample comments regarding learner interdependence

	Learner interdependence
Direct instruction	Allow students to teach each other; only intervene when the students go off course or reach inaccurate conclusions Provide online “lecture”
Facilitating discourse	Encourage interaction among students--“collective intelligence” More intervention = less open communication among students
Design & organization	Provide information about rules such as netiquette

Tables 4 and 5 provide examples of instructor reference to learner independence and interdependence. (Lengthier student responses can be found in Appendix C).
Negative and positive responses were not identified. The three factor teaching presence structure of direct instruction, facilitation and design and organization was well represented in instructor comments as well. Seven different instructors provided a total of seventeen descriptions of teaching presence that related to the sub-topics of independence and interdependence. In general, instructors were cognizant of the impact they had on

fostering independence and interdependence. From instructor comments, reducing direct instruction can plays an important role in fostering learner independence; levels of direct instructor versus the less directive facilitation of interaction played a critical role in fostering learner interdependence. Comments identify that design and organization strategies can be applied to support levels of independence and interdependence.

Discussion

Student comments identify adjustment to a new level of learner independence and the realization that there is less direct instruction, and at times little facilitation, in online environments. Comments included strategies employed by students to work more independently, and some students welcomed this opportunity.

Students are adjusting to multiple aspects of the online learning environment, some more subtle than others. Obvious are the adjustments to the use of technology and communicating without the cues of face-to-face interaction. More subtle role adjustments have to do with the relationships between the individual students and the instructor, and the relations between the students. The extent to which the 'self' is responsible for the acquisition and interpretation of knowledge and skill requirements is the extent to which learner independence is exercised (Collier, 2001).

There is an important distinction to be made between desired independence on the part of the 'self,' and required independence as set out by the instructor and the design through the three aspects of teaching presence. The reaction of 'self' (the individual learner) to the demands of the required level of independence from the instructor and the design is based on the match between the expected and desired level of independence and what is demanded. Those desiring a greater level of independence and perceiving a requirement for greater dependency on direct instruction, facilitation and instructional design will feel a necessary adjustment. Conversely, those who desire a relationship with greater dependence (more direct instruction, more facilitation and more structure from design and organization) but perceiving a requirement for greater independence will also feel the need to adjust. In either case, the self perceives and responds to the need to adjust. Some students adjust readily (student #129) and others resist (student #70).

Conclusions

According to these findings, students demonstrate that it is "useful ….. to become members of virtual communities of students" (Peters, 2002, p. 35). The nature of these interactions and communities does appear to modify but maintain the core value of distance education – learner independence. In addition, learner interdependence is a requirement in this new role.

Based on this analysis and interpretation of detailed data from students and instructors, we can conclude that teaching presence holds a unique character in an online community of inquiry. Comments validate the three factor structure of direct instruction, facilitation and design and organization. In addition, students identify the uniqueness of the learning environment in the identification of unmet expectations and the requirement to add new activities to the role of learner. This validates that an adjustment process is required, and that teaching presence is central to that adjustment process.

Instructors presented expectations regarding learner independence. Students identified the need to adjust to greater independence, and identified ways in which they were making that happen. At times, negative affect toward instructors for not being more active or present was noted. In this case of unmet expectations, it seems evident that online design and facilitation should include discussion and clarity early in each course, such that expectations can be identified and managed.

The role of online learners presents a new relationship between independence and interdependence, such that an adjustment to online learning is required. In this new role are behavior and skill requirements that more closely match those of life outside the classroom. This is a significant educational outcome that assists students for all learning requirements while in program and while engaging in continuous, lifelong learning. (Emes & Cleveland-Innes, 2003; Cleveland-Innes & Emes, 2005). The challenges and adjustments need to be understood and managed through teaching presence to allow students to function successfully in an online community of inquiry, and beyond.

Limitations of the study

Participants in this study were new to online learning, but most were new to graduate study as well. Some of the required independence, and even perhaps the interdependence among peers, may be an adjustment to graduate study as well as online learning. Instructor expectations are likely representative of graduate study requirements as well as expectations of online learners.

Further research

Online undergraduates, and online participants in post-secondary technical and trade training, need to be examined in relation to role expectations and the adjustment process to this new role. In addition, further work into the ideal instructional strategies to foster adjustment to online learning, and identify and support an appropriate balance between learner independence and interdependence, is required.

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Appendix A. Questions Regarding Learner Adjustment

1. With regard to specific ***learning activities and outcomes***, please describe the adjustment to online learning that you experienced. Describe your adjustment in terms of the presentation of the problem or task, the learning activities (exploration, integration, feedback), and the quality of learning outcomes.

2. With regard to the ***learning community***, please describe the adjustment to online learning that you experienced. Describe your adjustment in terms of your ability to project yourself socially, emotionally and to communicate openly.

3. With regard to the course ***design and facilitation*** (i.e., teaching), please describe the adjustment to online learning that you experienced. Describe your adjustment in terms of organization, support, and direct instruction compared to a face-to-face classroom experience.

4. What is the nature of your preparation for an online academic discussion (react to previous postings, reflect on new ideas, do further reading)?

5. How does an online academic discussion benefit the quality or depth of your learning?

6. How important is the social climate in facilitating a quality academic discussion?

7. What percentage of your academic postings have a social component?

Appendix B. Teaching Presence: Student Comments

Independence

It was a challenge for many initially to need to be so self reliant versus trying to figure out how to please the professor with the right answer but once we grew accustomed to it.

Direct instruction was minimal by the professor and cohort, however I have adjusted to this by being more meticulous and detailed in my own note taking and study so that I could compensate for this deficiency.

It initially seems that there is less support than a face-to-face environment. I have not received any communication from the instructor as of yet, and to be honest I don't know who the instructor is. As such, I feel that I'm on my own learning the material and I will concentrate on ideas that I have been exposed to in previous face-to-face courses dealing with identical subject matter. Other methods I will use to will be to do more outside research in university libraries and to find professors in these facilities that would be willing to answer my questions or to point me in the right direction to answer my questions.

The adjustment to learning activities, in terms of responsible ownership and accountability has shifted from the instructor to me; It's up to me to do most of the work (exploration, integration, etc.), though receiving assistance/guidance is still required.

In terms of direct instruction, the "teaching", in my opinion, has changed somewhat. The switch from lecture-based, F2F, one-to-many "teaching" of content to one where it is necessary for me to "teach" myself.

I find that there is little instruction provided, but that is okay with me.

I initially had difficulty coming to grips with the fact that the instructor allows the students to regulate their own discussions and learn through open discussions.

The instructor's role was limited to facilitation (at least in this course) so I adjusted to this by making myself take on more responsibility for understanding the subject matter.

For online learning, it is important to take a lot more responsibility for time management and initiating work.

Even though there are printed instructions for students to prepare their assignments, I still had to read those instructions many times to understand them. Usually I had to go through the marking of my assignment to know the actual requirements.

Interdependence

The adjustment to online learning for me is keeping up with large discussion groups. Online, because of time delays, 'conversations' spin out among members and it's difficult to follow, participate, and give feedback in many discussions at once. However, it also allows for a much broader range of perspectives and a more thorough exploration of the subject matter.

I also did not like my first prof – had difficulties maintaining respect, and as a result was not inclined to accept her assessments of my assignments.

Courses excellent, prof in the most recent really excellent. Feel lucky for the opportunity. When I send an email, I get almost immediate response and it's always useful and proactive.

"Online learning" is a misnomer. I am doing my learning from materials mailed to me, including a course notebook and assigned readings. Then I read through all the comments posted by my classmates to see if any of them are engaging with the material in a way that helps me. Most of what is posted online is expressions of opinion/ anecdotes that do not further my understanding of the material. If I were not required to go online because part of my grade depends on it, I don't think I would bother. My basic adjustment is that I have to spend a lot of time reading through comments that have not been vetted, that are repetitive, and that do not further my own learning. I find the "bulletin board" methodology very dissatisfactory.

In the course which required class participation, the number of messages that were simply restatements of the same position were overwhelming!
What a waste of time to read all of that! The teachers were not in evidence during the online "discussions" other than to pose a question every once in a while. In fact, I found it shocking that students who were stating things that were taken out of context or were simply inaccurate were not corrected, and their misinformation was simply allowed to coexist with correct information, as though all of it were equally valid.

I felt comfortable about emailing the instructor directly with a question, and was pleased with the prompt response. I might feel more comfortable in the conferences if the instructor were participating more.

I think that group experiences, particularly for an introduction course should involve more instructor facilitation. To adjust to the situation, I found I spent at least one hour per day for the total duration of the assignment writing e-mails explaining and re-explaining the assignment and our progress to the group.

Appendix C. Teaching Presence: Instructor View

	Learner Independence
Direct Instruction	o I wanted to start with reasonably concrete are you familiar with Bloom's taxonomy? (interviewer responds yes) Yeah, ok, I wanted to start with reasonably concrete and instructor-driven assignment requirements in the early weeks of the course and move to much more self-directedness as I move into the . . . sequence of assignments until finally . . . have them take direction of their term essay rather than write on two assigned topics. o Not everyone is a good self-directed learner, so one of the facilitator's roles is to probably help them overcome and become a better self-directed learner in the general sense and assisting them with the content and even in aspect of interactions with peers. o I think by and large, I believe people teach themselves. People learn they are not taught and you may present them with a lot of information and ideas, suggestions and so on, but in the end it is how they approach the assimilation, the interpretation of the material that determines how well they understand it in the end. o We handle that situation by merely explaining the role is not teach but to help you to work through these materials and come through an understanding of the materials on your own but with our help if it's needed. o I keep open a separate forum for students to interact with me one-on-one if they wish. That's **student driven**.
Facilitating Discourse	o . . . stay out of the way and read what they are saying because they are chatting. There is a lot of chatting amongst themselves when there's a thought to be continued, on an instructional line of thought, then I'll continue help to continue that line of thought. I introduce the topic of conversation … I design the question in such a way that students will follow a thinking process and come up with some kind of conclusion I guess it's some sort of thought manipulation kind of thing you know we all do that on a daily basis . . . And then during the week and depending on where my students are going I might put another set of thoughts that would take the conversation in another direction. o I take a fairly non-directive role. I see myself primarily as a facilitator um I am a subject matter expert . . . , but primarily . . . my teaching style is not didactic I allow the students to take the topics and explore them fully and occasionally at a later date and intervene pull out threads and tie them together, but generally I facilitate the discussions online.

Design & Organization	
	o I expected them to be able to access the course and fulfill the assignments on a computer. Beyond that, there are no specific preparedness expectations regarding online learning as opposed to classroom learning. o That they meet the requirements that are stated overall--it's stated on the web site . . . they are to have certain technological skills and capabilities. It's pretty straight forward material that they are expected to know to have email, be able to use the internet, that sort of thing. And again, it's pretty basic skills these days. o I had a number of students who had emotional problems and you know husbands, vacation time (giggles), all kinds of things that weren't necessarily in line with [the institution's] proposed schedule so the idea that it would be better to . . . in my mind it was better to accommodate their circumstances rather than try to force them to complete a certain amount of work in a certain amount of time. The reality of their life they weren't going to have that much time to do it within that particular framework. And there were students who had to go under medication so they could actually focus on their studies there were all kinds of things like that that came up. Other students probably most of the time didn't hear about it but there were certainly those kinds of situations that presented themselves. o I had a tendency to provide more information in terms of directions about how things could be done so that over and above what was in the course material that students received and to request clarification, asks the students to seek clarification if there was any uncertainty in their minds. o I've learned over time that really students don't always read the study guide (giggle). So now I do every week at least every two weeks I do sort of . . . a looking ahead where I give them some indication of what's coming in the next couple of weeks in the way of activities and I remind them of deadlines and you know if there's a reading that other students have had difficulty with in the past, I kind give them a heads up you know this particular reading can be problematic, but . . . remember this and so on and so on.

Appendix C. Teaching Presence – Instructor Comments

	Learner Interdependence
Direct Instruction	o Well, I need to be present, so they feel they're getting their money's worth because it's not independent study. They're paying for a teacher. So I need to be there I can be completely out of the way . . . I need to introduce what they're talking about, guide where they're going provide direction if . . . they're starting to really go down a trail that's going to lead them the wrong way . . .
Facilitating Discourse	o The level of interaction usually around assignments not a lot of people needed, wanted or asked for . . . if it was offered assistance in interpreting and applying information in the course most interaction was around assignments, and, in fact, what I tried to do was to encourage interaction between students as an important way of exchanging and evaluating information—more so than just ah interaction individually. o I think it's sort of the collective intelligence again so many different people in so many different backgrounds within which they would see a particular concept would depend to some degree at least on their personal background and how they would see it being applied within their particular context and so always felt it was important for people to share their particular perspectives helps you to look at something from a slightly different angle and every different . . . o But I have noticed that the more I try to guide and direct online interactions, the more people tend to get quiet. It changes the focus back to the authority of the professor, which is precisely one of the things the course is designed to ward off. But no matter what the degree of my involvement has been there is always one or two who want more—which seems to me to be an issue these students have with online learning in general.
Design & Organization	o some of the things that I do as part of my teaching is I send out an email on netiquette on being careful to treat each other with probably more respect than you might in a F2F because people might not understand the intent . . . and I'm sure that's an extremely standard thing because I think everyone knows is very aware that misunderstandings can occur in an online context unless you take good care of it that they don't. I always reinforce that.

EDEN Workshop 2006 Conference Paper

e-Competences in online students of Humanities at UOC

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1. Students' competences in e-learning: e-Competences

This research was carried out between October 2005 and January 2006 as the last research project in the researcher's doctoral courses at UOC.

There seemed to exist very few studies with data sustaining assumptions about competences applied by learners, or expected from them, when learning in an online setting. Due to scarcity of research on the online learner and a shift in Higher Education in Europe towards a European Higher Education Area, where learning (and teaching) is based on competences (Bologna, 1999), it was thought appropriate to get to know about UOC's online students' competences when learning online. Data had been disclosed in an internal report (DEME, 2005) showing which competences UOC graduates consider they have acquired and use after graduation, although more in the sense of Stephenson's capabilities (Stephenson 1998) as competences for an unfamiliar context and unfamiliar problems, i.e. competences for work and for managing life, rather than e-Competences acquired and used when learning online.

Other than specific competences desirable or required for a subject or a course, there is a set of competences required, and expected, if learning takes place in an online environment. This set of competences, or e-Competences, which are also termed as 'generic', 'general', or 'cross-curricular', common to every online student regardless the subject or course taken, enables online learners to best achieve personal and curricular objectives while studying in an online setting.

Although most of the required competences for online learning are common to competences required in distance education and in learning in general, the traits of an online learning environment (the features of the medium) influence both learning and teaching action in a way that a whole set of learning competences is required for success if learning online.

2. Research question

Both the context and the scope of the research called for restricting the study of e-Competences shown by UOC's students (over 32,000 in 2005) to a sample of them. Therefore the initial question “Do UOC students show e-Competences?” soon became “Do UOC students in the Humanities degree show the use of e-Competences?”

3. Research Methodology

3.1. Theoretical model

In order to try to answer this question, a model of competences for successful online learners was developed, following Birch (2001), as seen in Table 1.

Table 1. Model of e-Competences.
Numbers correspond to items in Questionnaire and Categories in text analysis.

SELF-DIRECTION COMPETENCES	**Self-advocacy**	**1. Skill gap identification**
		2. Intrinsic motivation
	Self-sufficiency	**3. Goal setting**
		4. Work planning
		5. Time management
		6. Task monitoring
		7. Self-discipline
	Self-confidence	**8. Self-awareness**
		9. Knowledge application
METACOGNITIVE COMPETENCES	**Learning process**	**10. Self-orientation for learning**
		11. Self-orientation applied
	Self-evaluation	**12. Self-monitoring**
		13. Reflection
COLLABORATIVE COMPETENCES	**Virtual communication**	**14. Radio speaking**
		15. Active reading
		16. Writing for comprehension and personal style
	Asynchronous response	**17. Engagement**
		18. Timeliness
		19. Respect
		20. Tolerance
	Virtual feedback	**21. Seeking feedback**
		22. Giving feedback

3.2. Instruments

Two instruments were then devised in order to measure the existence of e-Competences as shown by students: a questionnaire and an analysis of the mails posted in the online classroom by respondents to the questionnaire. This dual approach to measuring online students' competences was thought to contribute to the validity of the tools and the research.

Questionnaire

Even with all the reservations that can be raised from subjective perceptions from individuals (Rosa, Huertas & Blanco, 1996), it was considered to be essential, in a study of e-Competences, to know which perceptions students do have about their own competences.

A Likert-type questionnaire (Annex 1) with 22 items (plus an optional one for comments or observations) to which students had to assign a 1-to-5 value was regarded as a tool which combined the qualitative slant (coming from students' perception) and a quantitative slant too, as responses could be measured and analyzed. Those 22 items were statements intended to elicit a response as to their coincidence or appropriateness with the student's personal traits, and they reflected, one by one, the competences put forward in the model shown in Table 1.

Text Analysis

Text analysis of the mails posted in the classroom by the students who filled in the questionnaire seemed to be an adequate tool to find evidence of competences. This was done with a qualitative analysis tool, Atlas-ti. The corpus of texts consisted of mails that had been posted to their classrooms by respondents between the beginning of the term on 14 September 2005 and 28 December 2005 in the case of one subject, *Prehistory and Ancient History* (28 Dec was the deadline for Test 2, with only one more assessed assignment due afterwards), and between 14 September 2005 and 21 December 2005 (deadline for the fourth and last course assignment) for *Anthropology of Religions*.

Since this research was done as the last assignment in the Doctoral courses at UOC, there was no opportunity to observe mails in the classroom until the end of the term. However, most teaching and learning had taken place already. Emphasis was made, on both the questionnaire and the text analysis, to use the same competences from the model for consistency in findings from students' responses and from text analysis of their mails.

3.3. Samples

These instruments were applied to two different cohorts of students within the same degree of Humanities at UOC: one was made up of newly arrived students and the second cohort consisted of students with more experience online. The group in their first term in the degree were spread in two classrooms in the subject *Prehistory and Ancient History*; this subject is taken by novice students of Humanities, i.e. students in their first term as online learners in this degree. The other group was composed of students, again in two classrooms, who were doing *Anthropology of Religions*, a subject taken usually in the last term or at the final stage of the degree. All students in this second group had two to eight terms of experience as online learners in their degree. The group in their first term will be called hence 'A students' and the group with 2 or more terms of experience will be called 'B students'.

3.4. Preparation

Previous to data collection, permission was obtained from lecturers at UOC in charge of the subjects involved and also from the respective teachers for each of the classrooms. After that, in coordination with each teacher, a mail was posted by the researcher in each of the classroom forums informing students about the research, asking for response to the questionnaire and asking for implicit consent for observing their mails in the classroom. Responses to the questionnaire and mail observation would be kept anonymous.

3.5. Collection of data

a. Questionnaire

The questionnaire in Annex 1 was posted right after the informative mail to students. It was sent to the four classrooms on 14 and 15 November 2005, the dates thought to be the most convenient during the term since:

- students were settled in the subject and had had time to become a group (term had started on 14 September),
- there were no tests nor course assignments around that could have affected response.

All respondents (see Table 2 below) sent back the questionnaire completed to the researcher's mailbox within nine days of being posted. Values given by students to each of the items were transferred to a spreadsheet and then statistically analyzed, as seen in 4. Results.

b. Text Analysis

All the mails posted to their virtual classroom by respondents were observed so that each part of the text which showed evidence of one or more of the e-Competences in Table 1 (a quotation, in fact) was given a code so that the presence and frequency of e-Competences could be detected. For instance, this sentence was present in one message from a respondent:

Check this link: [...] In section 2 Ideographic synthetic writing you'll be able to *see Namer's Palette, picture 2.*

This piece of text was coded as *Giving feedback* (being a reply to a student's demand for help), coded as *Timeliness* (being a timely response) and also coded as *A12* (i.e. respondent 12 in A students). This latter coding concealed students identity and facilitated analysis of respondents' mails contributed to the virtual classroom.

4. Results

4.1. Results from Questionnaire

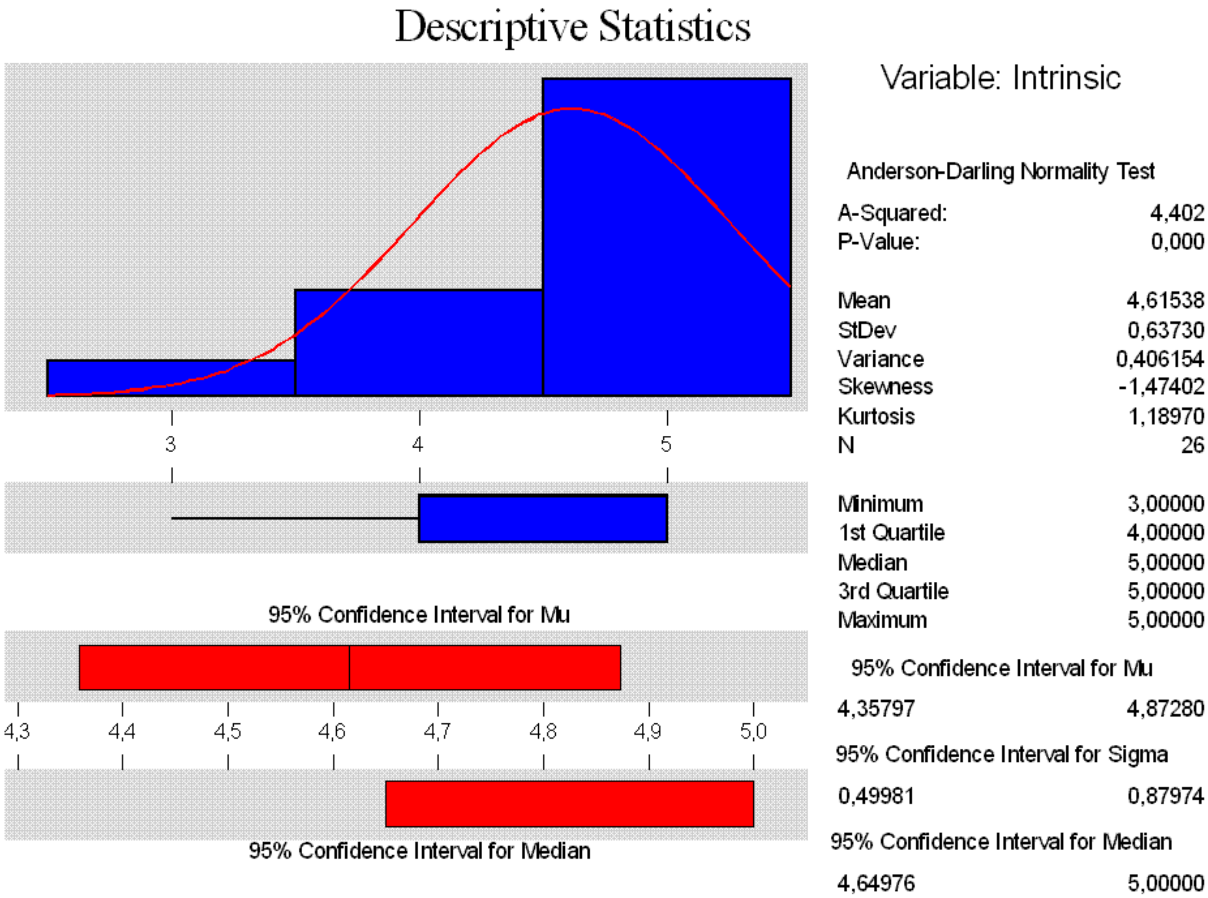
Table 2 below shows that the questionnaire was filled in by just over 15% of students enrolled in each group. There were more women respondents in both groups, with proportionally more women responding in the more experienced students' group. Response seems to be high enough to be significant to the samples selected and possibly even significant to Humanities students as a whole.

Table 2. Respondents to Questionnaire

Group	Responded	Enrolled	% of enrolled	Men	% of respondents	Women	% of respondents
A	26	168	**15,48**	9	**34,62**	17	**65,38**
B	14	89	**15,73**	3	**21,43**	11	**78,57**

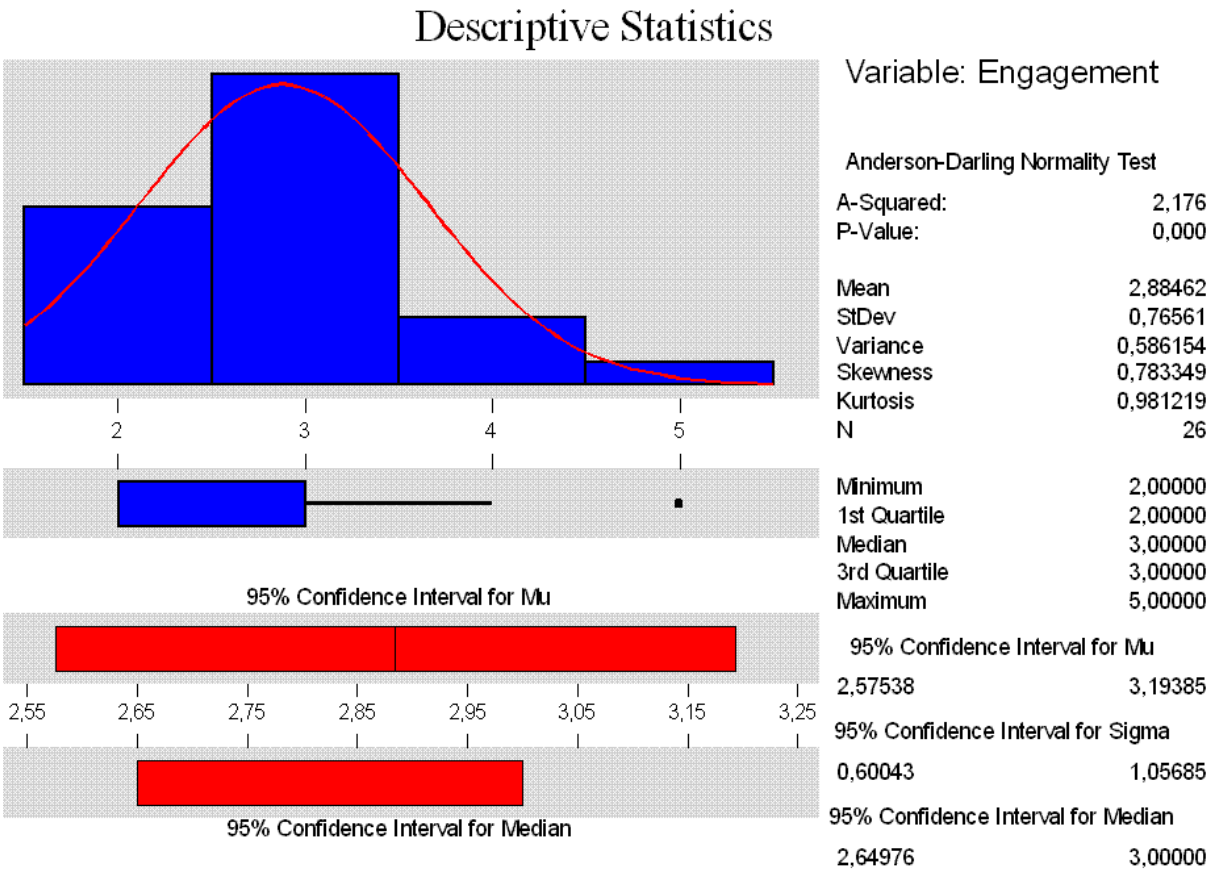
Basic descriptive analysis of responses shows that very few students rated items with value 1 (Never, Total disagreement) and that respondents were usually on the upper part of the 1-5 scale (values 3 to 5) in their consideration as to what extent they matched the statements in the questionnaire. Annex 2 shows the mean, median and standard deviation values for all 22 items in the questionnaire.
The trend for practically all values was consistent for high values of agreement, for instance *intrinsic motivation* as seen in Diagram 2.

Diagram 2. *Intrinsic motivation* for A students.



It is interesting to see that this high, and steady, correspondence of students' perceptions of their own attitudes and actions in relation to the items in the questionnaire is not consistent in one of them, *Engagement*. Diagram 3 shows the one element in the Model that was rated the lowest by A respondents.

Diagram 3. Main statistical values for *Engagement* in A respondents



As the one item that A respondents rated consistently lower, a correlation analysis was performed between *Engagement* results and each of the rest of variables in order to establish a possible correlation. Although the lack of statistical correlation (cause-effect relation) could not necessarily mean the absence of a cause-effect relationship, it seems clear that there is no significant correlation between *Engagement* and the rest of variables, as correlation values are far from 1. (see Table 3)

Table 3. Pearson correlation values for *Engagement* vs. a selection of relevant items

Engagement and Self-orientation for learning	0,158
Engagement and Self-orientation applied	0,538
Engagement and Intrinsic motivation	0,069
Engagement and Skill gap identification	0,009
Engagement and Self-monitoring	0,278
Engagement and Reflection	0,311
Engagement and Timeliness	0,237
Engagement and Seeking feedback	0,261
Engagement and Giving feedback	0,313

A good number of correlation analyses were made, with no significant result, between pairs of e-Competences that could logically be related in a cause-effect relationship, or between competence in the same group, e.g. *Time management* and *Self-discipline*, both part of *Self-sufficiency*. It could be thought that time management would be influenced by students' own level of self-discipline, but there seems to be no statistical evidence of such cause-effect relationship with a correlation coefficient of 0,223 (the nearer to 1 as correlation coefficient the more correlation). Diagram 4 shows linear regression between them, as the result of their correlation coefficient (for a strong correlation the line shown should be a straight diagonal as in Diagram 5):

Diagram 4. Linear regression plot for *Time management* and *Self-discipline,* A students

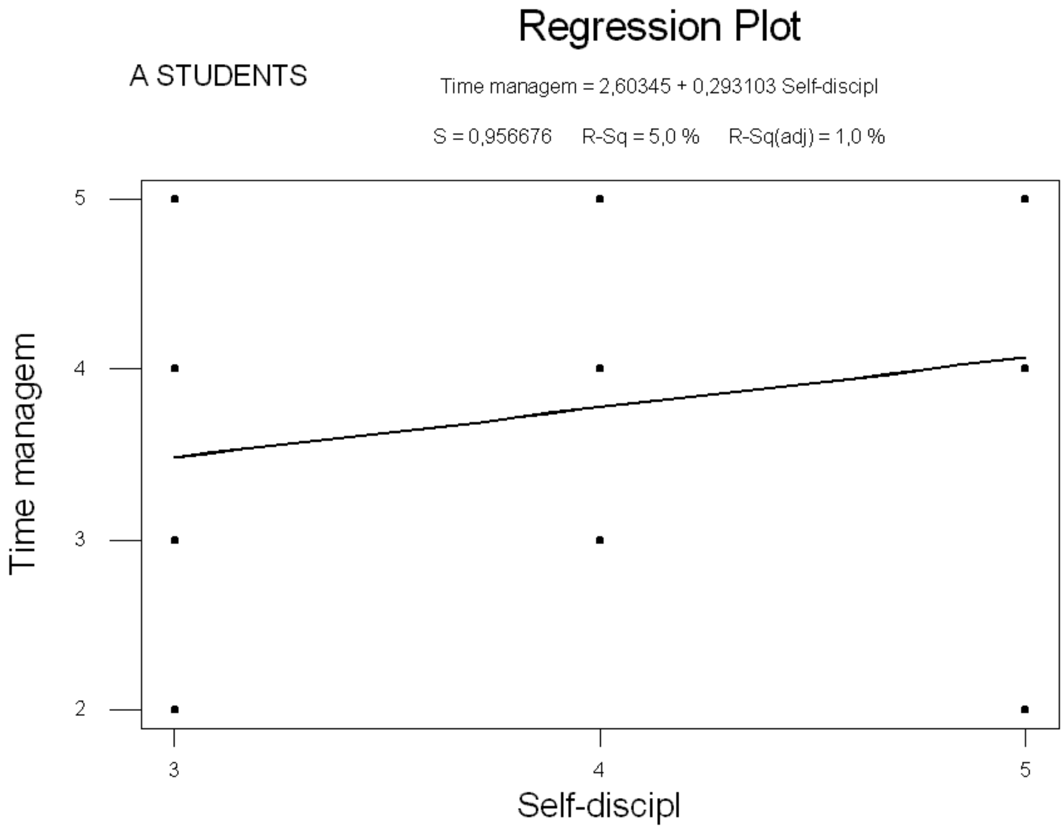
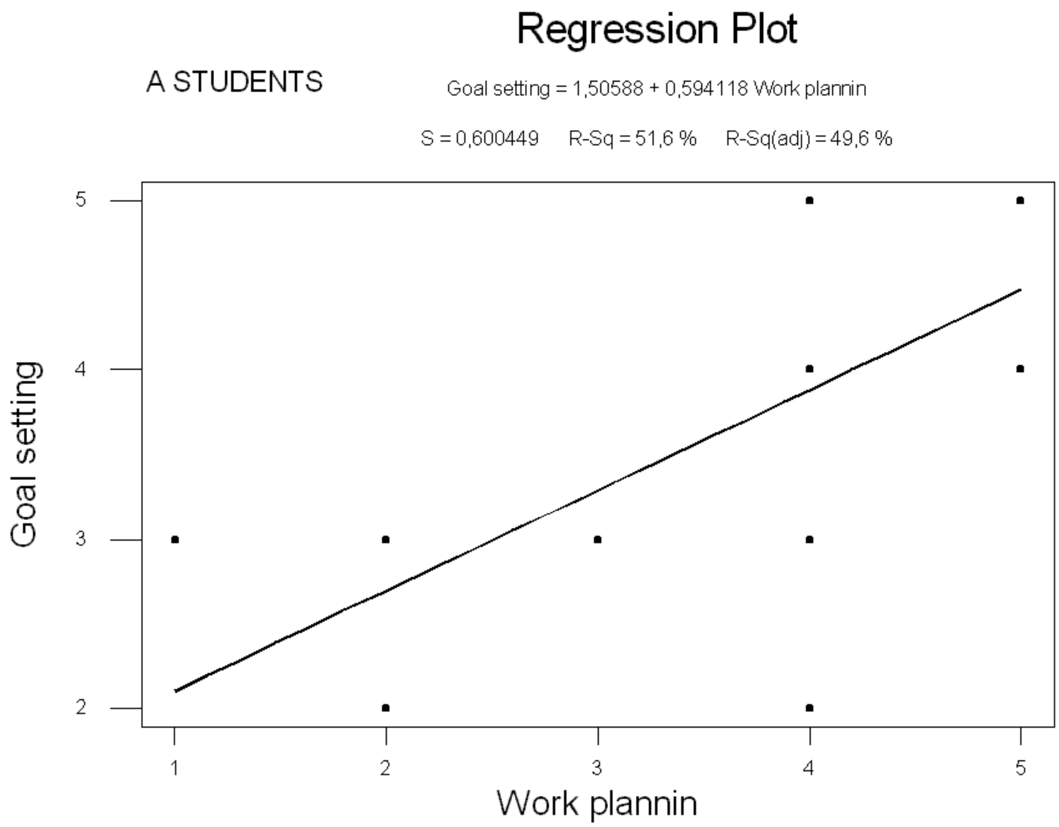


Diagram 5 shows the highest correlation coefficient found, the one between *Goal setting* and *Work planning*, which is 0,71.

Diagram 5. Linear regression plot for *Goal setting* and *Work planning*, A students



Even though *Goal setting* and *Work planning* show the highest correlation among e-Competences, *Goal setting* does not seem to be related in the same way to the rest of competences in its group in the same way, as Table 4 shows. Cause-effect relation is stronger or weaker among items, therefore there is no consistent correlation between competences even within this same group of *Self-sufficiency* e-Competences (see Table 1). Again values nearer to 1 show more direct relationship.

Table 4. Pearson correlation values for *Goal setting* and rest of competences in its group (see Table 1)

Goal setting and Work planning	0,718
Goal setting and Time management	0,619
Goal setting and Task monitoring	0,354
Goal setting and Self-discipline	0,169

As to B students, descriptive analysis shows again a consistent agreement between students' perception and high values rated (see Annex 2), again with scarce correlation among items. In Annex 2 it can be seen that B respondents also rated *Engagement* somewhat lower than the rest of items, although the difference is not so noticeable as with A respondents. Surprisingly, B respondents showed lower ratings for both *Goal setting* and *Work planning*.

4.2. Results from Text Analysis

As to A respondents, text analysis of the mails posted by the 26 respondents provided the results shown in Diagram 6, where e-Competences observed and their occurrences can be seen, grouped by areas. The first figure for each competence indicates the number of instances observed, the second being the number of nodes connected to the competence (this second figure not applicable).

Diagram 6. Competences observed in mails posted in the classroom by A respondents

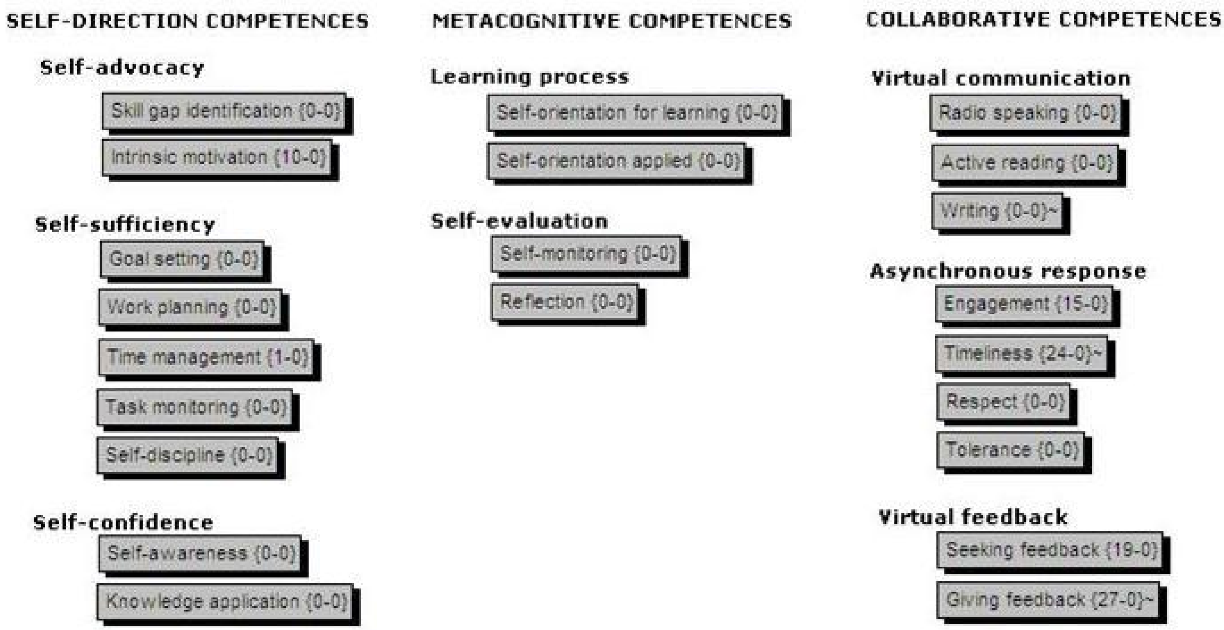
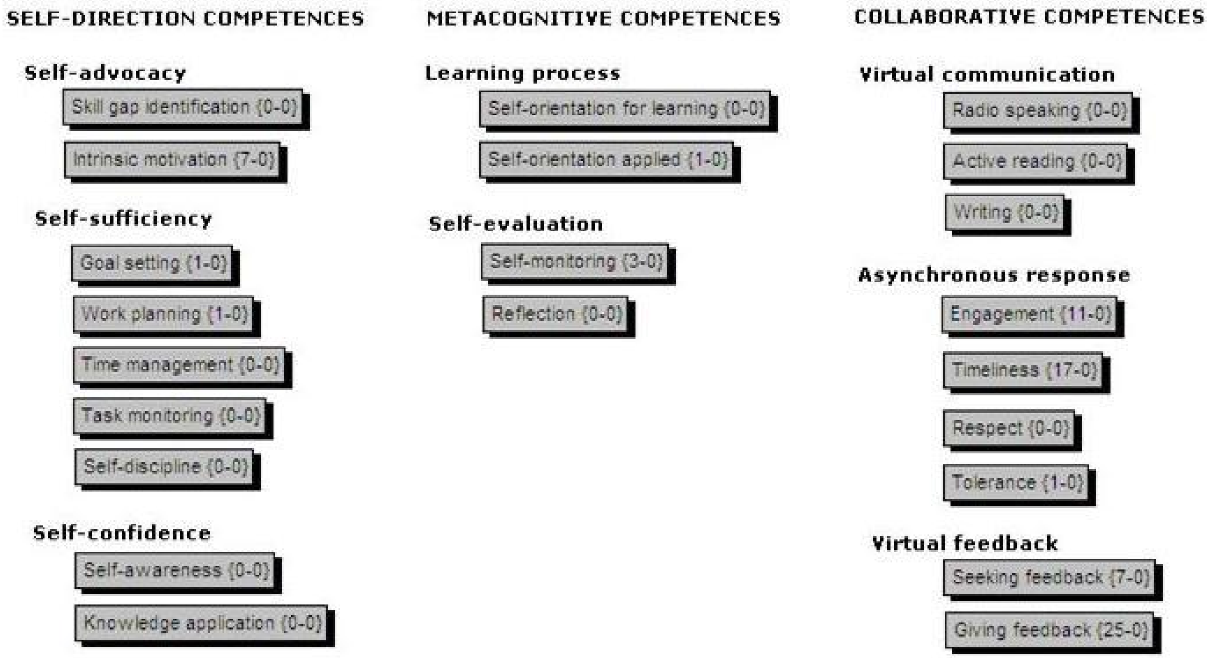


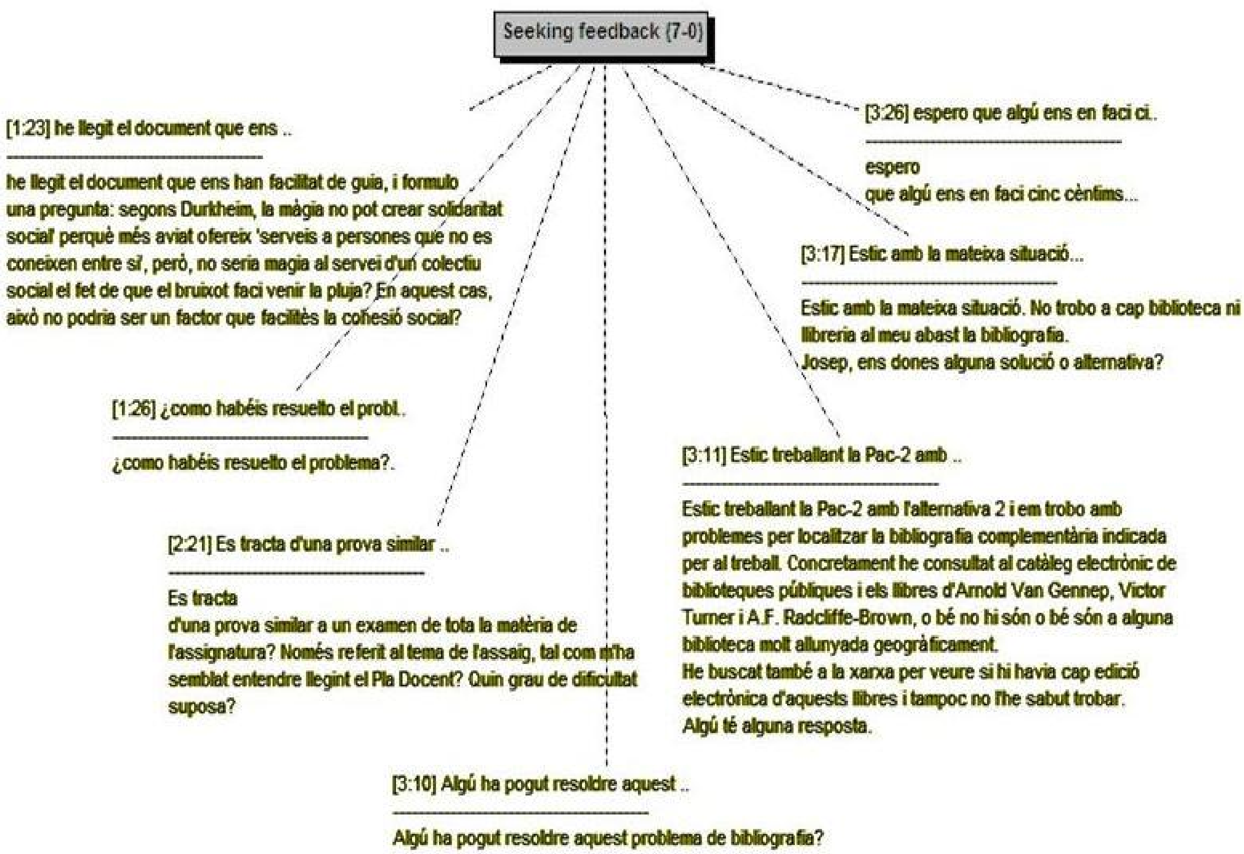
Diagram 7 shows e-Competences observed in the mails posted by the 14 respondents from B students, again the first figure indicating occurrences.

Diagram 7. Competences observed in mails posted in the classroom by B respondents.



The type of instance of evidence collected using the qualitative analysis software can be seen in Diagram 8 below, showing evidences found in mails by B respondents in relation to *Seeking feedback*:

Diagram 8. Instances of evidence for Seeking feedback in mails posted by B respondents.



5. Discussion

It is clear to the researcher that results obtained for B students (students with 2 or more terms of experience as online learners in the degree) cannot be considered as a consequence or derived from those observed for A students (students in their first term in the degree): two different groups of students with a substantial difference in expertise in an online setting, whose variables may have been different, who are at a different stage in their degree and who may not have gone through the same circumstances and experiences as online students. Moreover, there has been no action undertaken on B students prior to observation.

In a way it is as if two pictures are observed side by side, visualizing e-Competences shown by one group of inexperienced students hand in hand with those of a more experienced group, thus getting to know how alike they are (comparison) and also how different they seem to be (contrast). In the SEUSISS Project coordinated by Haywood (2003) and his colleagues, carried out by 7 European universities in 2003 on ICT skills in Higher Education, there was also the need to have a "picture" of "newly arrived" students and another picture of students "well-established" in their degrees, so questionnaires addressing various issues related to ICT skills were designed and applied, specific to each of the groups, then contrasted.

Both groups of respondents seem to have a high level of competences (in their own opinion) as seen in high values in rating items from the questionnaire. One e-Competence however stands out from the rest. A respondents in their first term online were aware that their engagement was somewhat lower or less intense than what is expected from them: *Engagement* is salient among all other items as it is given the lowest values (see Annex 2). This could be an indication of honesty in A respondents, therefore of a certain degree of reliability of the answers to the questionnaire. Had responses not been honest this e-Competence would have probably been rated without deviation. For B students, *Engagement* is not rated as low as for A students but still is a little lower than the rest (see Annex 2).

If we look at results from text analysis, a majority of e-Competences were not observed in the text analysis: 16 out of 22 for A respondents, 12 in 22 for B respondents. It could be argued that most e-Competences might not be observable in the virtual classroom, e.g. *Intrinsic motivation*, *Self-discipline* or *Reflection*, being so personal and individual that they could only take place inside the student, with no manifestation to others, and that only collaborative and cognitive competences could be observed in the virtual classroom. Admitting that in principle some e-Competences are more liable to happen and be detected in the virtual classroom, results suggest that it is possible that any e-Competence can actually be seen manifested if students verbalize it or communicate it. For A respondents, up to 10 instances of *Intrinsic motivation* were observed (see Diagram 6 above); for B respondents, evidence was detected of such personal (and presumably invisible) e-Competences as *Work planning*, *Self-orientation applied* and *Self-monitoring*. This suggests that:

1. Self-direction and metacognition competences are not necessarily undetectable by the researcher.
2. E-Competences undetected in the virtual classroom may still be applied by the learner.

It is worth noting that *Engagement* has been observed a number of times (15) in A respondents, despite lower rating in their responses to the questionnaire. A lower amount of instances (12) for B respondents indicates that engagement as categorized has been lower in more experienced students. This could be important, despite the apparent small difference, if we take into account that B respondents show a lower total of pieces of evidence, 74, compared to 96 from A respondents. On the contrary, B respondents show a wider array of evidence (40% higher than that of A students). At the same time, A students seem to have asked for help more often (19) than B students (7). Therefore results from pieces of text evidence observed in respondents' messages can lead us to think that while respondents A took part more actively in the classroom than their more experienced counterparts, B respondents for their part manifested a wider variety of e-Competences.

Both groups coincide in showing instances of evidence of asking for help (*Seeking feedback*) and giving help (*Giving feedback*), both present and numerous (see Diagrams 6 and 7).

It could be claimed that this research gathered data from “good students” only. Although this might be a possibility, the researcher observed that a good deal of students that were seen participating actively in the classroom, supposedly up-to-date in their work and following the course, did not respond to the questionnaire. And conversely, some respondents to the questionnaire were not to be found in the classroom as regular contributors (precisely respondents A2, A5, A6, A10, A17, A18, B4, and B8).

Data on e-Competences (both as privately considered by students and as pieces of evidence in the classroom) have not been cross-checked with grades as this research had to be finished before the end of the students' term.

6. Conclusions

Respondents from both groups seemed to be aware of what they were doing in order to learn in an online setting. It can be assumed that online students of Humanities at UOC, regardless their experience in the degree, are aware of their e-Competences and to what extent they use them. Observation of respondents' mails posted in their virtual classrooms showed that e-Competences can be manifested.

A respondents showed a higher number of evidence of e-Competences than B students, whereas the latter used a higher variation of them. Text analysis enabled the researcher to realize that although respondents in both groups did not rate *Giving feedback* as coincident with them as the rest of items, evidence observed in mails posted in the classroom shows that helping or informing others is the one e-Competence most visible.

As to the model used, it should be refined and developed further. For instance, it could provide an example or a standard statement for each e-Competence so that evidence of competences could be compared to the standard instance in the model. It could also be completed or more e-Competences could be added; it has been developed by the researcher, with no intervention by students, who could add items or insight unseen by the researcher.

Finally, the scope of this research and the size of the samples cannot allow for generalization within UOC nor for extrapolation to online learners in general. Only results from research on e-Competences coming from larger samples over a wide variation of degrees could be significant and lead to improvement of teaching and institutional policies.

If we are to understand better how the online learner does learn, and what s/he does when learning online, it seems worth observing and getting to know what online learners actually do. In doing so it is necessary to observe which skills students have and which competences they bring into action when learning. And beyond that, successful online learners seem to use a set of skills and competences particularly suited to learning, communicating and collaborating in an online environment. Possibly by identifying and then fostering those e-Competences, online learning will be made richer, more enjoyable, and less frustrating.

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Annex 1.

QUESTIONNAIRE on online learners' e-Competences.

Pleasel reply to fborges@uoc.edu or to your teacher, expressing to what extent your learning corresponds to the following statements. Please fill in a figure from 1 to 5 thus:

1: NEVER, TOTAL DISAGREEMENT.
2: OCCASIONALLY.
3: MEDIUM.
4: OFTEN, PARTIAL AGREEMENT.
5: ALWAYS, TOTAL AGREEMENT.

1. I have a good idea about which skills and knowledge I lack.

2. I usually find satisfaction in completing a learning action, such as a unit of contents, an exercise, an activity or another learning action.

3. I have set up personal goals for my learning (daily, weekly or term goals).

4. I have worked out a plan or plans for my learning.

5. I organize the time I spend learning.

6. I monitor my progress by means of the learning activities in the course.

7. I am able to overcome distractions and impediments to my learning, both at home and at work.

8. I am confident enough to learn from my mistakes in the virtual classroom.

9. I make the most of any chance to test or apply my knowledge and my learning.

10. I am aware of my learning style and my preferences for learning.
11. I apply learning strategies suited to my learning style and preferences.

12. Aside from my academic results, I evaluate my learning.

13. I evaluate to what extent my monitoring of my learning process is fine.

14. I usually manage to put across what I mean or need to say.
15. I understand what my classmates or teacher write in such a way that I am able to "read between the lines".

16. I usually express myself with no grammar, factual or logical errors, and with a personal style.

17. I participate in learning activities in the virtual classroom, e.g. discussions, group work, etc.

18. I reply to classmates and teacher promptly.

19. I show respect towards my classmates' opinions and ideas.

20. I am able to handle disagreement and criticism.

21. I know how (and when) to ask for help or feedback to classmates and teacher.

22. I have given out help or feedback to classmates and teacher.

23. (optional) Comments / observations on particular circumstances, study timetable or organization, skills and learning preferences, etc.

____

Thank you very much!!

Annex 2.
Mean, median and standard deviation values for A respondents.

e-Skill	Mean	St Deviation	Median
Skill gap identification	4.03846	0.66216	4
Intrinsic motivation	4.61538	0.63730	5
Goal setting	3.65385	0.84580	4
Work planning	3.61538	1.02282	4
Time management	3.73077	0.96157	4
Task monitoring	4.53846	0.64689	5
Self-discipline	3.84615	0.73170	4
Self-awareness	4.23077	0.95111	4.5
Knowledge application	3.73077	0.72430	4
Self-orientation for learning	4.15385	0.78446	4
Self-orientation applied	3.96154	0.91568	4
Self-monitoring.	4.42308	0.85665	5
Reflection.	3.73077	1.04145	4
Radio speaking	3.80769	0.63367	4
Active reading	3.96154	0.82369	4
Writing for comprehension and personal style	3.65385	0.74524	4
Engagement	2.88462	0.76561	3
Timeliness	4.23077	0.81524	4
Respect	4.80769	0.40192	5
Tolerance	4.38462	0.69725	4.5
Seeking feedback	4.03846	0.82369	4
Giving feedback	3.19231	1.26552	3

Mean, median and standard deviation values for B respondents.

e-Skill	Mean	St Deviation	Median
Skill gap identification	4.21429	0.69929	4
Intrinsic motivation	4.71429	0.46881	5
Goal setting	3.71429	1.13873	3.5
Work planning	3.50000	1.50640	3
Time management	3.78571	1.18831	4
Task monitoring	4.57143	0.85163	5

Self-discipline	3.92857	0.61573	4
Self-awareness	4.21429	0.69929	4
Knowledge application	3.85714	1.02711	4
Self-orientation for learning	4.50000	0.65044	5
Self-orientation applied	4.21429	0.89258	4
Self-monitoring	4.64286	0.74495	5
Reflection	4.28571	0.91387	4.5
Radio speaking	3.85714	0.77033	4
Active reading	3.85714	0.53452	4
Writing for comprehension and personal style	4.14286	0.53462	4
Engagement	3.35714	1.00821	3
Timeliness	3.78571	0.97496	4
Respect	4.78571	0.42582	5
Tolerance	4.35714	0.63332	4
Seeking feedback	4.50000	0.65044	5
Giving feedback	3.14286	1.16732	3

The importance of visual proximity in online asynchronous learning

Patricia Low Dinneen

Learning has been shown to be highly dependent on visual processing of information (Bransford, Brown, & Cocking, R., Eds., 2000). Whether the information is in the form of pictures and illustrations, text, or shapes, the brain is constantly scanning it into short-term memory and making split-second decisions about what is encoded into long-term memory. Anything visible on a computer screen should, therefore, be considered a visual element because it is what learners see and their brains process.

In this paper, it will be argued that what makes information encoding possible is the visual placement of related elements in close proximity and that proximity is especially critical to success in online teaching and learning. When viewers see two visual elements together, they engage in a third visual activity which is likely to encode and retain information. Essentially, learners make 1 + 1 = 3 (Tufte, 1990). Success in this transformative process depends largely on how visual elements are placed on a page or computer screen. If related elements are placed too far apart, the brain can no longer recognize and process connections.

In the asynchronous online environment, where teachers and students are physically separate (Moore & Kearsely, 1996) and communication does not take place in real time, what is visually presented must explain information, relate concepts, engage learners, and encourage interactivity, all with limited teacher involvement. Regrettably, the over-use of links and poor visual connections between content are threatening these processes because when students are asked to link from page to page information is dispersed and concepts are hard to follow and connect (Kozma, 1991). According to Mayer (2001), the challenge for teachers and course designers is providing sufficient and varied information in close proximity within students' visual field.

In discussing the importance of visual proximity to asynchronous learning, this paper presents the theoretical basis for why visual processing is important, examples of how proximity impacts navigation and interactivity, and some ways that graphical tools and principles are being used creatively to create proximity. The focus is on asynchronous learning because the synchronous environment adds too many variables to cover adequately in this project.

Visual learning processes

Studies of perception show that humans receive information through dual verbal and imagery-based processing channels (Lohr, 2003). For a few seconds, the brain takes in unlimited information through working memory. The brain must then sift through these multiple stimuli, select or reject them, and transfer the selected items into long-term memory within seconds (Atkinson & Shiffrin, 1968, in Lohr, 2003).

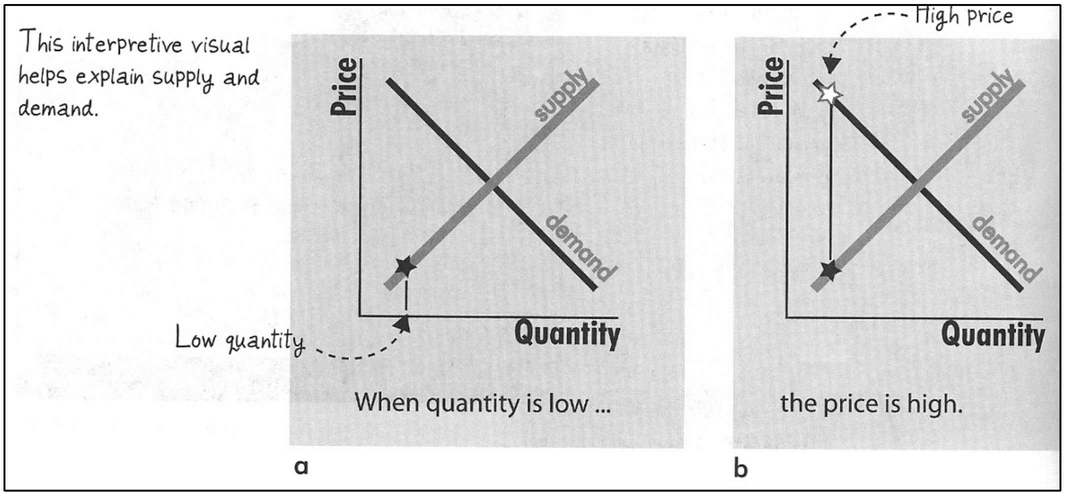
Clark & Mayer (2003) state that, though long-term memory has tremendous storage capacity, it is the link between working and long-term memory that limits what gets through and that this is helped when stimuli are presented selectively and redundancy avoided. Research by Miller (1956, in Bransford, Brown, & Cocking, R., Eds., 2000) supports the need for more discriminate input of stimuli because "short-term memory is enhanced when people are able to chunk information into familiar patterns" (p.33).

Information retention has also been shown to be highly dependent on individuals' readiness for learning and previous knowledge. U.S. National Academy of Sciences researchers found that learners with a higher level of expertise were generally more self-directed and able to use multiple problem solving approaches (Bransford, Brown, & Cocking, R., Eds., 2000).

The potential for visual elements to improve information retention is reported by many sources. Bransford, Brown, & Cocking, R. (2000) cite several studies (Gordin and Pea, 1995; Miller, 1986) and conclude that, "The ability of the human mind to quickly process and remember visual information suggests that concrete graphics and other visual representations can help people learn" (p.215). Clark and Mayer (2003) recommend that courses include words and graphics rather than words alone in their Multimedia Principle.

Visuals' teaching potential is also illustrated in Levin's schema for five basic organizational functions of graphics (in Lohr, 2003).

- *Decorative* visuals are weakly associated with content and function mainly in short-term memory to make material more attractive.
- *Representational* visuals try only to make information more concrete, as an illustration of an apple to show an apple.
- *Organizational* visuals help learners understand informational hierarchy and structure, often organizing data for content recall as in lists, outlines, and charts.
- *Interpretive* visuals help learners understand difficult, ambiguous content, as in models or system diagrams, to translate information from short to long-term memory. Like the following example, they are generally harder to create than the other graphics discussed thus far.



(p. 32)

- *Transformational* visuals, like interpretive ones, are hard to construct. Like the following example, they try to encode information into long-term memory and are often unconventional and difficult to find in traditional teaching materials. The graphic below teaches the Spanish word for letter, which sounds like the English word for cart, by connecting the word's pronunciation with the cart object itself.

(p. 32).

To make the more complex, organizational, interpretive and transformational graphics, graphic designers rely on proximity to unite lines and shapes and to place visuals effectively on a page (Williams, 1994). The importance of proximity is seen in the work of many instructional designers, as well. Clark & Mayer's (2003) Contiguity Principle states that related information, like text and pictures, should be placed next to one another. It is based on studies (Mayer, 1989, Mayer, Steinhoff, Bower, & Mars, 1995, and Moreno & Mayer, 1999) which show that placing text and images in close proximity greatly improve learning. Bransford, Brown, & Cocking, R. (2000) conclude that it is especially important for novice learners to have related information close together.

Information designer and statistician Tufte (1990) who presents large data sets, includes proximity as one of his fundamental principles of information displays and claims that the close association of deep levels of information enhances learning, “If the visual task is contrast, comparison and choice – as so often it is – then the more relevant information within eyespan, the better” (p.50). Tufte further asserts that presentations with high information density, give the user more control over the learning process, a point supported by Clark & Mayer and Huelsmann. Clark & Mayer (2003) support rich data sources for use of in-depth problem solving. Huelsmann (2003) addresses the importance of data richness in his discussion of computer conferencing:

> “It is important to harness the richness (of exchange), and not allow the rich diversity of messages to degenerate to noise. Part of the answer lies in imposing structure in order to make richness comprehensive” (p.109).

Why visual proximity is especially critical online

Visual proximity’s power to connect concepts and guide learners is important to consider in the design of both navigation and interactive activities. These elements are key to the goals of many distance educators to make learners more self-directed and eager to engage in various forms of online interactivity (Barclay, 2001).

Navigation

For strong navigation and to keep learners from becoming disoriented, links must be easy to identify (Zhu, 1999). Wallace, Jagose & Gunn (2003) recommend that multimedia design include: user control; good navigation; clear graphical representations; effective content presentation; feedback and progress monitoring; and useful metaphors. This is especially true with novice learners who rely most heavily on visual cues to grasp and follow a hypertext system (De Jong & van der Hulst, 2002). Over-linking or the poor use of links threatens the quality of many online courses because learners are being asked to remember and integrate information dispersed among multiple web pages and sites (Kozma, 1991; Clark& Mayer, 2003).

Following are two examples from personal experience in University of Maryland University College (UMUC) courses of how poor linking practices can interfere with learning.

***Example 1 – Hypertext links in text*.** This is an excerpt from an online article assigned to students in a web development course. In just 2 paragraphs, there are 5 embedded links to either general sources already summarized in the passage or to large websites.

> Bandwidth is a moving target. Percentages of users using DSL cable modem, ISDN, T1, T3, and 56K change from week to week, with a gradual but steady increase to broadband. According article from WebSiteOptimation.com as of February 2004, more than 75% of American households have Internet access, with 45% having high-speed access. According to an article in the TimesOnline, June 2005, "There are now 34.5m broadband subscribers in the US, a figure analysts expect will nearly double in the next four years." Comcast accounts for most of the subscriptions, at 7.4 billion customers. The the dramatic drop in price, Verizon's DSL service is now cheaper then some dial-up plans. By 2010, Jupiter Research estimates that more than 78% online households will have high speed Internet.
>
> In June 2004, President Bush unvailed his plan "Promoting Innovation and Economic Security Through Broadband Technology". In this plan President Bush has called for "universal, affordable access for broadband technology by the year 2007" He wants to ensure that every American is allowed to choose a broadband company that is right for them. This means putting an end to the broadband monoplies that currently exist. In theory more choices means cheaper prices, however, according to the Consumer Federation of America, to date the monoplies still exist and boradband prices have surpased the rate of inflation.

I found it cumbersome to read the text, visit each of the links and keep from becoming distracted when reading the linked sources. To follow the proximity principle, all but the most essential link might be eliminated, put in a separate resources list as Kmiec, Pinchback & Rebelsky, S. (2002) recommend, or turned into content within the article's text.

Example 2 – Hypertext links in instructions. In the same multimedia class from Example 1, students were given links to WebTycho help desk instructions, such as those for submitting text reproduced below. WebTycho Screen 1 shows part of the opening instructions; WebTycho Screen 2 shows directions that appear after clicking on the link to 'HTML.' Screen 1 has 13 links in 16 short lines of text, with the Plain text, TFE, and HTML links repeated three times. Screen 2 then presents the learner with 5 links in 17 short lines, again with some repetitive information.

These instructions require too much clicking from page to page, and much of information could have been written right into the text to read continuously.

1. Two ways to submit text in WebTycho

WebTycho Screen 1

1. enter text directly into WebTycho text boxes with either Plain Text, HTML or Text Formatting Editor.
2. attach ***non***-HTML files

Places where you will find text boxes for submitting work

* Conferences
* Assignments
* Collaborative Documents
* Announcements (faculty only)
* Gradebook (faculty only)
* Syllabus (faculty only)
* Content (faculty only)

2. Choose a type of text box
Before you begin typing, use Account Preferences to choose a type of text box (Plain Text, HTML, or Text Formatting Editor) before you begin composing.

3. Caution! When to change preferences
Enabling and disabling the Text Formatting Editor and the Spell Checker after you have entered text into a WebTycho text box, but before you have saved or submitted it, will result in a loss of all text as well as formatting.

4. Use the same type of text box for a particular document
Once you create a conference note, assignment, or any other text with any of WebTycho's formatting methods, (Plain Text, TFE, HTML) use that same method each time you edit *that* document. You needn't use the same method for all documents, but you should use the same method for a particular document.

HTML TEXT BOX
(MOST ADVANCED)

WebTycho Screen 2

Recommended for: Lengthy documents composed offline and containing complex formatting.

Not recommended for: Brief notes that require little or no formatting.

Advantages: Available for all text boxes (except Syllabus) when the Text Formatting Editor is disabled in Account Preferences. You do not have to have a complete understanding of HTML in order to achieve basic formatting with HTML tags in WebTycho.

Disadvantages: HTML in WebTycho is used differently than HTML you may be familiar with. Please read this page carefully before proceeding.

Conditions:

- To use an HTML text box you must disable the Text Formatting Editor (and vice versa) with Account Preferences.
- When composing HTML documents with Microsoft Word 2000, be sure to first scan your document with the filter before including the text in WebTycho text boxes.
- **Do not use HTML tags in WebTycho title boxes.**
- Do not attach **HTML** files in WebTycho.

To enable: Go to Account Preferences and click disable beside Text Formatting Editor.

Interactivity

Interaction, an important feature of online learning (Roberts, 2002), depends on information proximity to encourage students to see the relations between disparate data and to comment in meaningful ways. From Suttton's (1999) classification of different types of online interaction, as student-teacher, student-student, student-content, and student-interface, it is also possible to identify how different types of asynchronous learning technologies facilitate varying interactions: email for teacher-student or student-student (Miller, 2001); listserves for learner-content, learner-learner, and learner-interface interactions (Prestera & Moller, 2001); conferencing to encourage student-content, student-student, student-teacher, and, to some extent, student-interface interaction (Ehrlich, 2001); and textual chat for student-student communication, especially for joint problem-solving and to develop rapport (Duckworth, 2001).

The following example from my UMUC experience discusses how lack of proximity in a problem-based activity reduced both student-content interaction and student-student conference interaction.

Example 3 – Guided activity and student-content interaction. In a finance course, Excel spreadsheets with an interest calculator were used to show how changes in interest rates impact other financial elements. Students were asked to program in various interest rates and watch as the numbers on the Excel sheet changed and then to comment in a separate conference.

While this was interactive to the extent that students entered numbers and the pages changed visually, we had to remember numbers from the original to subsequent Excel pages in order to compare them. I found it difficult to keep track of where the changes were occurring and, thus, developed little feel for the interest rate changes. That there was almost no discussion of this exercise in the separate conference area suggests that other students were also not deeply engaged with the data.

Asking students to flip between pages to view changes in annualization rates again dispersed the information and made it very difficult to compare and contrast the data. If the data changes could have been presented next to one another on a single data-rich sheet, the changes would have been easier for students to view, process, and discuss and real interaction enhanced.

At UMUC, and in the Master of Distance Education (MDE) in particular, asynchronous discussion conferences are used extensively to help students process and integrate the concepts and readings (Huelsmann, 2003). Though many distance learning experts, like Ehrlich (2001) and Roberts (2002), say that the threaded written reflections permit thoughtful interactions because learners can take time to read and formulate responses, Klemm (2002) complains that opening and closing messages is cumbersome and diminishes learning. Tufte (2006) argues further that conferencing emphasizes time sequence over content quality and thus separates major points visually and temporally.

In arguing against critics of conferencing as a viable form of academic discourse, Huelsmann (2003) refers to his MDE teaching and states that conferencing success depends to a large extent on proper structuring through threading which “provides a mind map” (p.93). He references the visual aspects of conferencing when he says that how discussion threads are presented is key to relating concepts as “Threading imposes structure and possibly harnesses what might otherwise be considered noise into a source of enrichment” (p.107). Huelsmann also stresses the importance of proximity when he sympathizes with students who have to enter a conference with a long string of unread entries because “To keep the various threads in mind and possibly weaving them together is difficult” (p.106). He recommends that teachers summarize key discussion comments, thus putting key concepts on a single visual page.

The following is another personal example of how visual aspects of conferencing impacted my UMUC learning experience.

Example 4 – Conferencing and student-student interaction. Below is an online conference discussion thread from a UMUC distance education technology. New topics appear on the left and then comments on that topic are indented directly below it.

In the left-hand column, there is one main topic with all response lines directly underneath. In the right-hand column, there are several new topics on the left margin, with responses under each. The more irregular visual pattern of entries in the right column suggests discussion on more varied different topics because the line patterns differ. In my experience, this conversational pattern feels less daunting because one doesn’t have to read a single, long column of commentary. I also have felt more comfortable raising a new point or question since mine would be one of many new topics.

How to go through Module 6
11/28 (
more synch
To Lisa
11/30/05Review and edit!
11/30 Downes
Back to Karen re
Re: 11/30/05 Review and edit!
12/5/05 Clarification
to Karen-Clarification
Re: to Gertrude on Downes
12/7 Olga
RLOs and the Dewey Decimal System
Back to Gertrude and Olga
Re: Back to Patty and Olga
Downes 1998 article
Re Michelle; findings on reading
Re: to Michele on bandwidth
To Gertrude on bandwidth
[Next Topic]

Discussion on ITV
uRe: ITV
Re: ITV
10.12.05 Back to Karen Re: ITV
Re: 10.12.05 Back to Karen Re: ITV
Re: 10.12.05 Back to Karen Re: ITV
Re: 10.16.05 - Back to Ellen Re: ITV
10.16.05 - Back to Jesee and all
ITV Experiences
To Ellen and all- Re: ITV Experiences
Re: interactivity
ITV Experiences
Re: ITV Experiences
Re: ITV Experiences
Back to Gertrude - interactivity
To Ellen re: ITV Experiences
DE Delivery Method Article
Re: Discussion on ITV - blending
Re: Discussion on ITV
Re: Discussion on ITV
[Next Topic

As per Huelsmann’s (2003) emphasis on how threads are presented, teachers should be advised to see whether the visual patterns of discussion flow match what they are trying to accomplish in the conference.

How to achieve visual proximity

To design pages where information is placed in appropriate proximity, designers and instructors must think beyond illustrations and pictures and consider the many tools and principles of graphic design available them to them (N.A., International Journal of Instructional Media, 2005).

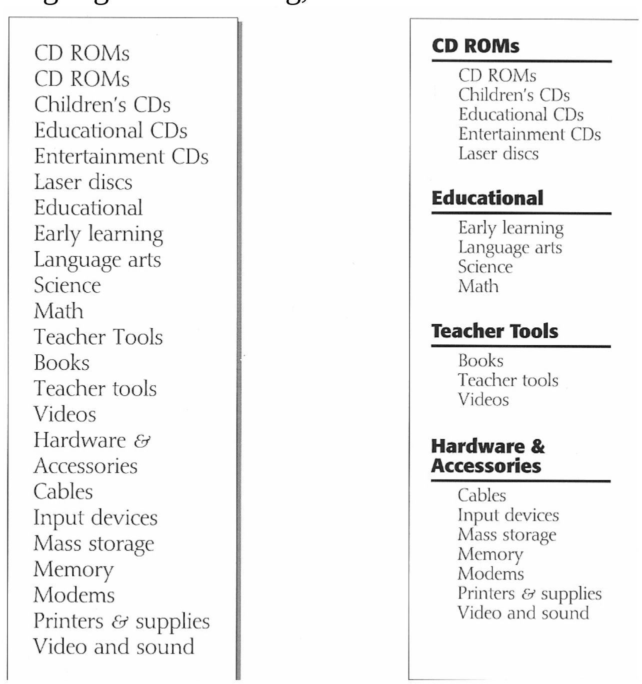
For graphical tools from which the designer can choose, there are (Lohr, 2003):

- Text. Whether alone or grouped in words and paragraphs, letters form shapes and visual patterns which vary with font, size, boldness, and spacing.
- Color. Even small touches of color can emphasize, label, create mood, show quantity or measurement, represent reality, and decorate and create appeal.
- Shape. Simple lines, circles and squares can show unity, imply harmony and show processes. More complex shapes like swirls and pictures generally emphasize key concepts.

The basic principles of design include:

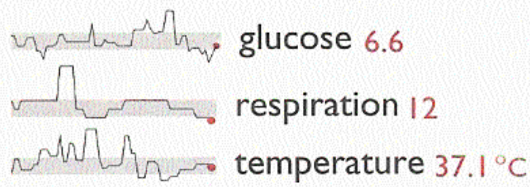
- Contrast to help people notice features that previously escaped their attention (Bransford, Brown, Cocking, 2000).
- Repetition to integrate elements (Lohr, 2003) and promote a sense of harmony, unity, and consistency within a single page or a website.
- Alignment, the process of lining elements up along an edge or imaginary path, to create a sense of predictability and unity (Lohr, 2003).

In a simple graphic below (Williams, 1994), the right side shows how changes in text and contrast through bolding organizes the long, left-hand list into more manageable chunks.



Williams (1994), p. 19

In a more graphically intense example, Tufte (2005) presents a lot of data within a very small space. He uses many graphical tools: what is being measured (text); actual levels over time (the graph); normal limits (the gray bar); the current measurement (the red dot at the end of the graphic and the red textual number); and information relatedness (proximity of elements).



Tufte, (2005). p. 1

A second data-rich example depicts a 2004 baseball pennant race, with each team in a different color. Team wins are graphed on the left; home, road, and percent statistics are in the middle. Though a better scanner would let the viewer see more clearly that each game win/lose is plotted in small lines on the right side, this one visual provides plenty of statistical information to analyze and discuss.

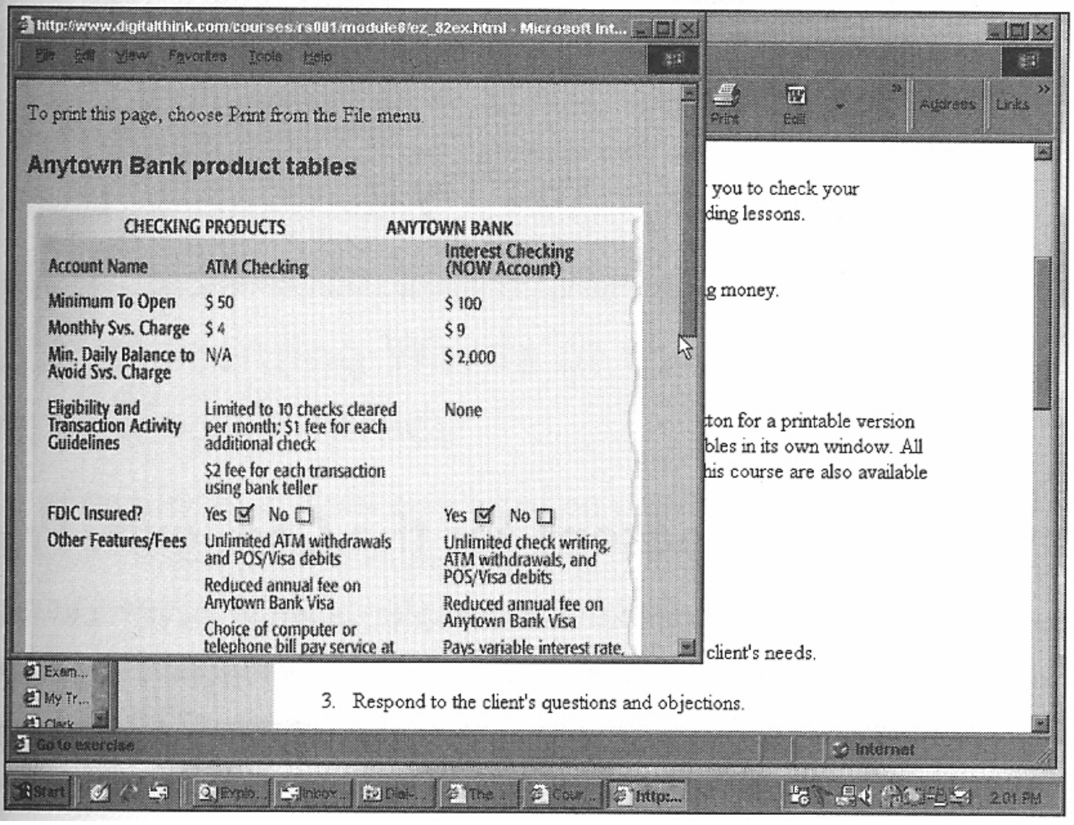
Tufte, (2005). p. 1

Looking back at UMUC Example 2, where financial data was printed on separate Excel sheets, creating a single spreadsheet with the original and changed numbers in one place could have made it easier for students to see the impact of the interest rate changes. This, in turn, could have created more interest and interaction in the conference discussion. Where computer screen resolution may limit the appearance of details (Tufte, 2006), students could print out PDFs or use printed material.

In an example below that deals explicitly with online screen layouts, Clark & Mayer (2003) avoid common violations of visual contiguity: visuals and explanations separated and partially obscured by scrolling screens; feedback on a separate screen from the practice or question; reference links on a second browser screen; and directions on a separate screen from the problem or applications. Here, because the screen is too small to place all relevant information side-by-side, critical information is placed on one screen, with additional information on a second one which the user controls. Dual pages prevent lengthy scrolling down a single page; placing them next to each another prevents flipping through multiple web pages.

Figure 4.9. Screen in which Reference Does Not Cover Question.

With Permission from DigitalThink.



Clark & Mayer (2003). p. 75

Conclusion

While experts, including Tufte, Clark & Mayer, and Lohr all admit that takes effort and time to create data-rich visuals and to ensure that related information is placed in close proximity, they also insists that the investment most often offsets the costs. Placing information and interactive elements close together improves the cognitive processing of information because learners can immediately find and integrate related concepts before them. Online, proximity facilitates navigation of information and discussion forums. It also enables more meaningful interaction with content and between students and teachers because students have more immediate access to the kind of data-rich information that spurs meaningful discussion and collaboration.

With visual proximity of information as a guiding principle, it is thus likely that content presentation and interactivity in online courses can be enriched and improved.

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Proposing collaboration between researchers and practitioners of multimedia learning systems

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Abstract

This paper argues that pedagogic efficacy for multimedia learning systems cannot be achieved by experimental or by summative research in the absence of a comprehensive *pedagogical screenwriting* framework. Following a summary of relevant literature, elements of such a framework are compared with principles advanced by researchers. It is concluded that collaboration could overcome weaknesses on both sides.

Introduction

This paper refers to the micro-level design guidelines for multimedia learning systems proposed by Koumi (2006, Chapter 8). The fifty-odd guidelines are divided into several categories, including:

- Navigational guidance and student control
- Use of language
- Layout of the screen
- Relationship of screen text to audio commentary
- Visuals and commentary should reinforce each other
- Interactive elements

These guidelines are contrasted with design recommendations in the research literature. It is argued that such recommendations have minimal value for practitioners because they address macro-level issues. To be of practical use, the research needs to derive micro-level design principles such as those that are tacitly employed by practitioners, from which the above guidelines were developed.

Van Merriënboer (2001) 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 *summative* papers do exist, written by educational technologists such as Laurillard and Taylor at the UK Open University. These address several detailed design techniques, which appear in Koumi (2006), but mainly they discuss over-arching, macro-level questions, such as how learners might cope without a fixed linear narrative (Laurillard, 1998; Laurillard et al, 2000) and how multimedia learning systems can be analysed (Taylor, Sumner and Law, 1997).

Moreover, when we turn to the theoretical/experimental literature, where we might expect some specific pedagogic guidelines, we find little help for the practitioner. Samaras et al (2006) note that three decades of multimedia learning research have failed to provide a comprehensive framework of design principles for the optimal integration of multimedia elements. Some of these investigations are summarised below, exemplifying the mixed results in the comparison of screen text with audio commentary.

The experimental literature relating visuals and audio commentary

Tabbers, Martens and Van Merriënboer (2001) report several recent studies by Moreno, Mayer, and others, in which multimedia presentations consisted of pictorial information and explanatory text. Many of these studies 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 (2001) 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.

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. 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*.

Moreno and Mayer (2000) presented an animation accompanied by either audio text or visual text and interpreted the superiority of the audio condition as a Split-Attention Principle:

> *Students learn better when the instructional material does not require them to split their attention between multiple sources of mutually referring information* (in their experiment, the information in visual text referred to the information in the animated diagrams and vice-versa)

In a refinement of these experiments, Tabbers, Martens and Van Merriënboer (2000) compared two strategies for decreasing cognitive load of multimedia instructions: *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, one: likely reason they did not consider was 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. The task is certainly complex, necessitating self-paced, head-down, concentrated study of complicated diagrams and relationships. 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.

The above arguments may throw some light on the various conflicting results. However, a fundamental factor may be the differing quality of the experimental learning designs. Inconsistent quality could be another reason for the inconsistent results. Creating synergy between diagrams and synchronised audio commentary is not a trivial endeavour. An inexperienced designer could fabricate a package in which the composition and pacing of the audio commentary actually clashed with the concurrent diagrams, hence interfering with learning. In any case, 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.

The mismatch between intuitive practitioners and experimental researchers

The framework of design guidelines in Koumi (2006) derive from practitioners. They are more detailed than the levels of investigation carried out in the experimental studies described above. This discordance is natural. The variables that can be investigated under the restrictions of a scientifically rigorous experiment 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. Koumi's (2006) framework of these principles is offered as a fledgling design theory for researchers to investigate the practitioners' intuitions.

Currently there is no widespread collaboration between practitioners and researchers. Instead, the aforementioned experimental studies build on theoretical interpretations of previous experiments, such as those compiled by Moreno and Mayer (2000). Based on these results and on various learning theories, the authors propose a cognitive theory of multimedia learning that comprises six principles of instructional design:

- Split-Attention
- Redundancy
- Temporal Contiguity
- Modality
- Spatial Contiguity
- Coherence

It is argued below that these six principles exemplify the mismatch between the research literature and the concerns of practitioners.

The Split-Attention principle was discussed earlier (visual attention detrimentally split between screen text and corresponding diagrams). The principle is intuitively reasonable. Note however that it leads to the either/or recommendation that audio text is always superior to screen text. So there is no conception of a judicious combination of the two, as recommended in Koumi (2006) – namely that screen text should be a sparse, key-word précis of the narration, serving as a visual mnemonic and a reinforcing anchor for the narration. This technique does leave open the danger of splitting visual attention, but with sparse screen text, the effect should not be too detrimental.

The Redundancy Principle asserts that

> *Students learn better from animation and narration than from animation, narration, and text if the visual information is presented simultaneously to the verbal information*

In this principle the authors are referring to text that duplicates the narration, word for word. This approach was rejected a priori by UK OU designers, who surmised that simultaneous reading and listening would be uncomfortable since literate students read faster than a narrator can speak. Instead, the concern of OU designers is the subtle issue of how succinct should be the text so that it anchors the narration but does not interfere with it. Several guidelines in Koumi (2006) address this issue.

Incidentally, in a later book that Mayer co-authored (Clark and Mayer, 2003), a caveat to the principle recommends *the narration of on-screen text in special situations* (p105-8), e.g. for learners who are not native speakers of the language. Notice however that this still refers to verbatim text rather than a key-word précis – despite a recommendation in an earlier section to use on-screen key words in some circumstances (p87).

The Temporal Contiguity principle asserts that

> *Students learn better when verbal and visual materials are temporally synchronized rather than separated in time.*

This principle is a macro-level guideline that cannot help the practicing multimedia designer. In fact, the authors and others have demonstrated that the principle does not hold unless the temporal separation is considerable (e.g. when a large chunk of animation is preceded by the whole narration). Compare this principle with the micro-level guidelines in Koumi (2006), which recommend differential relative positioning of narration and images, depending on the context. That is, narrated words should sometimes synchronise with their visual referents, sometimes precede them (to pre-warn the learner what to look out for) and sometimes follow them (as when the referents are mathematical expressions that the narrator reads through).

The Modality principle asserts that

> *Students learn better when the verbal information is presented auditorily as speech than visually as on-screen text both for concurrent and sequential presentations*

It was noted earlier that Tabbers et al (2000) reported a counterexample in the case of a complex task that benefited from self-paced reflection of the on-screen text.

Furthermore, note the surprising *sequential* condition. In addition to the usual *concurrent* presentation of explanatory text, Moreno and Mayer also tested the effect of presenting the whole text *before* the whole animation and also *after* the whole animation. (They found that audio text was superior in both conditions, as well as when presented concurrently).

The purpose was to determine whether the superiority of audio text was a memory capacity effect (screen text and diagrams overloading visual working memory) rather than a split-attention effect (insufficient attention paid, in the concurrent presentation, to either or both visual components – screen-text and diagrams). The authors concluded that a memory-capacity effect was at least a contributing factor.

Such extreme manipulation of the variables might possibly help to support a learning theory, but is of little use to the practitioner. If an animation needs to be complemented by audio commentary there is no point in delaying the commentary rather than synchronising it. No reasonable multimedia designer would contemplate such a design because it would severely limit any *synergy* between commentary and diagrams. (Indeed, sequential presentation contravenes the Temporal Contiguity principle.)

The Spatial Contiguity principle asserts that

> *Students learn better when on-screen text and visual materials are physically integrated rather than separated*

This is not surprising, but the mistake of spatially separating text from diagrams is fairly common, so the principle is worth stating.

In another sense, the principle is rendered redundant by another finding from the experiment – that replacing the on-screen text by audio narration produced even better learning (hence re-confirming the modality principle). Hence the recommendation would have to be that on-screen text should be deleted altogether, which would render Spatial Contiguity inconsequential

However, the authors' text duplicated the audio rather than being a judicious précis that anchored it, as recommended by Koumi (2006). In this *précis* design, the contiguity principle would still have currency.

The Coherence principle asserts that

> *Students learn better when extraneous material is excluded rather than included in multimedia explanations*

This principle was supported in an experiment by Moreno and Mayer (ibid) in which learning was significantly worse when music was added to an animation with narration. This effect relates to one with a more evocative name, the *seductive-augmentation effect* – defined by Thalheimer (2004) as a negative effect on *learning base material* when the presentation is augmented by interesting but inessential text, sounds or visuals. (The augmentation *seduces* the learner's attention/processing away from the essential items). Thalheimer reviewed 24 research comparisons, 16 of which showed that adding interesting items hurt learning, 7 showed no difference and one showed a learning increment.

Intuitively we feel that making the presentation interesting is a good idea, because it engages the learner. But how does this intuition jibe with the above results? Here is one possibility:

In the UK Open University, producers would often spend hours choosing music that was appropriate to the mood of the story. Typically, even after sifting through printed descriptions of music tracks and discarding many choices, at least 80% of the music tracks chosen for consideration were felt to *jar* with the storyline. In any case, music was normally only played when there was a deliberate pause in the commentary, designed to allow viewers to reflect on the pictures. It is clear that the above experimenters did not follow these provisos, so it is not surprising that their music interfered with learning.

Recommendations for future research and design development

To conclude, all six principles recommended by Moreno and Mayer (2000) are pitched at a macro level that may be suitable for theory building but that only skims the surface of the detailed design concerns of the practitioner.

A diligent search of the literature has failed to uncover any more practicable design principles. Admittedly, the literature could serve as a useful backdrop for the practitioner. However, value is more likely to be obtained in the reverse direction. Namely, before we try to derive design principles based on macro-level learning theories, and refine them through experimental studies, we would be better advised to start from experienced teachers' intuitive, micro-level design guidelines, and progress in the opposite direction, namely

> *micro-level design principles, as espoused in Koumi (2006) (a fledgling design theory)* ➔ *experimental studies* ➔ *refined theory/design principles* ➔ …

Each of the proposed design principles in Koumi (2006) could generate questions to be investigated. For example

- Regarding the use of sparse "anchoring" screen-text, how precisely should this text be phrased, in relation to the audio commentary, so that it anchors the commentary rather than interfering with it?
- Just *how* sparse should the screen text be? Should the screens by themselves (without the audio) be just barely comprehensible to a really top expert in the subject matter, or should they constitute a more substantial outline of the content, as suggested in Koumi (2006)?

Note that these questions concern the nature of the visual text rather than whether it is present or absent. This illustrates the philosophical conflict between the experimental studies and the design guidelines in Koumi (2006). The guidelines aim to integrate narration and visuals in order to achieve optimum synergy between these two constituents. In contrast, the aforementioned experimental studies manipulate the two constituents separately, thereby compromising their synergy. A good media designer would re-script the narration if denied harmonious visuals and would re-draught the visuals if denied harmonious narration. The above experimental studies could not countenance any such reconstruction of audiovisual synergy because this would have defeated their manipulation of the separate constituents.

Collaboration between researchers and practitioners would have a much increased chance of being productive if the investigations compared different ways of *integrating* narration and visuals – different composite designs aimed at optimum audiovisual synergy – rather than trying to unpick the two constituents and manipulate them separately.

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Enhancing the Framework for Virtual Collaborative Learning - Comparison of two Case Studies -

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1. Introduction

The idea of collaborative learning is based on constructivist principles – instead of classic frontal education, which attempts to "transfer" knowledge from teacher to student, learners are expected to create knowledge through interaction in small teams (cf. Alderman 2000). Within theses groups, the learners have to collaborate and cooperate in order to solve a common problem (cf. Bair 1989), whereas the tasks assigned to the groups have to be complex, ill-structured and authentic, in order to imitate real world problems that the learners are likely to encounter in later real world situations (cf. Balász 2004, pp.63; cf. Klauser et al. 2004, pp.7). It is essential for collaborative learning to appear, that each team member takes over active responsibility for the group result and the educator intelligently fulfils the passive role of a tutor. Further, when designing a collaborative learning arrangement, it has to be kept in mind, that it can take place either in a real or in a virtual environment. In virtual collaborative learning (VCL) settings, the participants predominantly use modern information and communication technologies (ICT) to support their interactions. The participants may therefore use a range of tools for both synchronous (e.g. chat, telephone conference, video conference) and asynchronous (e.g. threaded forum, document pool, e-mail) communication.

Placing collaborative learning into the virtual environment helps on the one hand to increase the flexibility of participants by allowing them to contribute to the teamwork independently of time and space. Thus members of the group can interact from geographically disjunct locations, making VCL suitable for international learning settings. On the other hand the concrete design of a VCL setting is harder to set up for the educator due to the wider range of factors to be taken into mind (e.g. technological setup, social issues in virtual communities and coordination of multiple [international] partners).

A framework model for planning VCL settings, developed at the author's chair and introduced in chapter 2, can foster the educator's design process, while leaving enough space for adaptation of the VCL setup to the surrounding educational environment. The authors see especially the ROLES and TASKS assigned to the individual students and their groups and the COMMUNICATION TOOLS allowed for interpersonal interaction as important adjusting screws in this adaptation process.

Based on the experiences of the authors with the VCL setting and concentrating on international learning arrangements in higher education, this paper explores two possible ways of setting up such a special arrangements. Aiming at the further improvement of the framework model and the enhancement of the above mentioned adjusting screws, it will determined which of the two sets of adjusting screws supports VCL aims best.

2. Framework for Virtual Collaborative Learning (VCL)

Since 2001, the Chair of Information Management at Technische Universität Dresden has focused on VCL settings in teaching practice (cf. Schoop et al. 2005), striving to achieve following VCL aims (cf. Alderman 2000; cf. Balász 2004, pp.38):

- enhancing knowledge exchange among and explicating latent knowledge of the participants,
- enabling the learners to solve complex problems,
- enabling the learners to improve their skills in project, time and self management,
- deeper understanding of the learners for different perspectives of a common topic,
- higher effectiveness in comparison to learning in autonomous settings,
- improvement of social skills through positive relationship among the participants and
- better assessment of learning progress through direct individual feedback.

Consequently, since 2001 a total of 18 VCL sessions has been performed in different settings (geographically conjunct and geographically disjunct team members; VCL in higher education as well as lifelong learning). In order to support the systematic implementation of these VCL sessions a framework has been developed (see Figure 1), which can be divided into 3 stages that cover the whole process of the organisation of a VCL session:

- pre-processing (*analysis, concept*)
- processing (*preparation*, *implementation*)
- post-processing (*evaluation*)

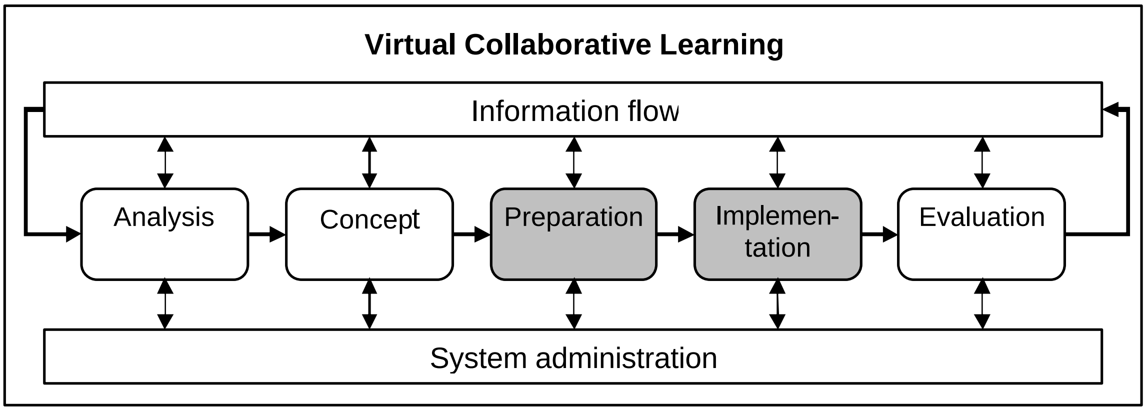

Figure 1: Framework for Virtual Collaborative Learning (cf. Balász 2004, p.75)

Which each VCL session this framework is being further tested with the goal of achieving higher fulfilment of the VCL aims named above. Current research has involved the stages of *preparation* and *implementation*, concentrating on the TASKS assigned to the students, the ROLES within the groups and the COMMUNICATION TOOLS allowed. Table 1 compares the two sets analysed for this paper.

Table 1: Comparison of two sets of VCL factors

		Set 1	**Set 2**
❶	**Tasks**	- tasks given only on the group level - no collaboration among the groups required	- tasks given on the individual level (communication between individuals allowed) - tasks on the group level - tasks on the session level (collaboration amongst the groups necessary)
❷	**Roles**	- mainly activity oriented roles (focus on distribution of tasks)	- mainly expertise oriented roles (focus mainly on interdependence within the group)
❸	**Communi-cation**	- only communication tools on the provided platform allowed (i.e. text-based chat, forum and document pool)	- any ICT tools allowed

❶ Within the set 1, the learners were assigned tasks on the group level only. Each group received a specific problem to solve throughout the VCL session. There was practically no communication amongst the groups. Although within the groups, the interaction was generally very high, there was an isolation of the single teams, hemming the exchange of knowledge among all VCL participants. Set 2 introduces individual tasks, which have to be handled by each participant separately (although coordination/collaboration between the individuals may be allowed), serving both as a later input into the group task as well as assessment criteria of individual contribution. Further set 2 recognises session tasks, which are problems that can only be solved if the groups work together. Individual tasks and session tasks in particular serve to support interaction amongst all participants of the session. Thus social skills, knowledge exchange and the awareness of different views on one topic should be enhanced.

❷ Both sets support the use of roles. A role describes the responsibilities of an individual within the group as well as within the VCL session. However, set 1 uses mainly roles concerned with a specific set of activities that have to be performed (e.g. researcher, critic). This activity orientation helps the group with the distribution of tasks among the team members. Set 2 turns to describing areas of expertise assigned to each role (e.g. media expert, didactics expert). Choosing the roles so that expertise areas are strongly inter-connected and all of them necessary for the solution of the problem should strengthen the group coherence, leading to increased interaction and better feedback among the participants.

❸ Although the tutors do not actively influence the VCL and its outcomes, they still play an important role as coaches and passive advisers. Hence it is necessary for them to be able to closely monitor the progress of the learners. In order to achieve this, set 1 only allows the use of text-based communication tools (forum, chat, instant messaging and document pool). Set 2 places no such restrictions, however the teams have to protocol all communication outside the platform (e.g. telephone or video conference) and all synchronous communication. This allows the learners to choose the media they consider most suitable, thus improving the efficiency and effectiveness of the communication as well as of the learning itself.

3. Comparing two Case Studies

The above described sets have been used in two VCL sessions. Set 1 has been employed in a tri-national VCL session in the winter semester 2005 and set 2 was tested in a bi-national VCL session in the spring semester 2006. Both sessions have been embedded in a blended learning arrangement.

In the following, these sessions will be described and evaluated with regard to the level of achievement of certain VCL aims. Following aims were expected to have been influenced by the change in the sets:

- knowledge exchange and explication,
- different perspectives,
- learning effectiveness,
- social skills and positive relationship and

- individual feedback.

After both VCL sessions, the learners have been asked to evaluate the session on the basis of a questionnaire. Table 2 shows an overview of indicators (measured using scales from 1-low level to 10-high level) likely to demonstrate the level of achievement of the aims and its direction of influence.

Table 2: VCL aims and indicators of achievement

Aim	Indicators
1. knowledge exchange	- perceived difficulty of the VCL (+) - perceived competence of peer feedback (+) - acceptable amount of information in the posts (-)
2. different perspectives	- awareness of different perspectives in own communication (-) - awareness of different perspectives in the communication of others (-)
3. learning effectiveness	- perceived level own learning achievements (+) - perceived effectiveness (+)
4. social skills, positive relationship	- perceived level of relationship to other team members (+) - development of positive relationship (+) - suggested size of the group (-)
5. individual feedback	- perceived speed of peer feedback (+) - perceived helpfulness of peer feedback (+)

Case Study 1: VCL eBusiness 2005

The VCL session conducted between November 23rd and December 12th 2005 dealt with the topic of eBusiness. It was a part of the blended learning course “Principles of eBusiness” at Technische Universität Dresden and belonged also to the TEMPUS TACIS project “Integrative Qualification in eGovernment” (project no.: SCM T037A05-2005). A total of 40 students participated in the VCL - 11 from Germany, 17 from Lithuania and 12 from Russia. The language in use was English. Students were organised in seven groups, every group containing approximately equal number of participants from each country. The project was based on set 1.

Each group received a task that had to be solved within three weeks. Although there was a common cover story for all participants, no overall task was assigned on the session level. Nor did the students get any specific individual tasks. The following activity based roles were assigned within every group by the students themselves: leader, critic, researcher and writer (critic and research represented more than once). The learners were required to use the communication tools provided by the platform (text-based forum, chat conference, instant messaging and document exchange). The response rate to the evaluation questionnaire was 42.5% (17 questionnaires) with similar response rates from each country. Further, the Russian and German students attended an on-site discussion concerned with the VCL project.

The results of the questionnaire on “VCL eBusiness 2005” are shown in Table 3. The indicators show positive influence of the VCL on knowledge exchange. The students considered the VCL comparatively difficult, thus getting opportunity to test their knowledge in a demanding situation. In general, they also considered the posts of other team members rather competent and only 35% complained about lack of information in the posts. The students however encountered problems with the awareness of different perspectives, 59% finding it difficult to present their views and 76% being unable to understand different perspectives of others. There was also a positive evaluation concerning the learning achievements in the VCL and its effectiveness. In the area of social skills the students have been able to create positive relationship to their colleagues; however they did not believe they got to know them well. The students considered groups of 3-4 participants most suitable for the VCL, showing also acceptance for slightly larger groups. The participants considered the feedback they have received quick and helpful. In the discussion the students have complained about restricted use of communication tools, which they considered an obstacle to efficiency and effectiveness of communication within the VCL. They also pointed out that they felt isolated from other groups.

Table 3: Results of the questionnaire on “VCL eBusiness 2005”

Aims	Indicators	
Knowledge exchange	difficulty	6.29 out of 10
	competence	7.64 out of 10
	information	35% of students complained about lack of information in posts
Different perspectives	awareness others	59% of students had problems to present their views
	awareness own	76% of students had problems to understand different views of others
Effectiveness	level of learning	7.30 out of 10
	effectiveness	7.88 out of 10
Social Skills	level of relationship	4.24 out of 10
	positive relationship	6.70 out of 10
	group size	3-4 ideal, 5-10 also acceptable
Individual feedback	speed	7.52 out of 10
	helpfulness	7.30 out of 10

VCL eLearning 2006

The VCL session took place between May 1st and May 22nd 2006. The participants were students of Technische Universität Dresden and University of Szczecin, Poland, attending the blended learning course “Authoring and tutoring processes in eLearning”. Of the total of 20 participants, 5 were from Germany and 15 from Poland. The common language in use was German. The students were divided into five groups, each containing three Polish and one German participant. The project used set 2.

Besides tasks for every team, there was a common cover story and an overall session level task for all groups. In this tasks, the media experts had to work together to develop a media design for all the groups, didactic experts had to develop a didactic strategy and topic experts had to structure the topic of the whole session. The leaders were given an individual task concerned with project management preparation. Participants of each team had to cover one activity based role - leader/writer - and three expertise based roles: didactic expert, media expert and topic expert. The students were allowed to use any communication technologies in addition to those offered on the platform (forum, chat conference, instant messaging and document exchange). However, they were asked to protocol any communication outside of the platform. After the VCL, all participants received the same evaluation questionnaire like in “VCL eBusiness 2005”. The response rate was 100% (20 questionnaires). All students also participated in a discussion about the VCL. There was also a separate debate with the German students.

Table 4 shows the results of the survey on “VCL eLearning 2006”. The students seem to consider the difficulty level only slightly higher than in “VCL eBusiness 2005”. The perceived competence of peer posts was considerably higher, which can be accounted to the expertise orientated distribution of roles, allowing the participants to profile themselves in a particular area. There seemed also to be fewer problems with lack of information in posts. The level of knowledge exchange in the VCL eLearning appeared higher than in VCL eBusiness. Similarly, the students saw comparably less problems with acknowledging different perspectives. This can be also assigned to the expertise oriented roles, which help to explicate and direct the different points of view. Although there is a rise in perceived effectiveness, the participants of 2006 believed they have learned less than those in 2005. The students of the “VCL eLearning 2006” not only felt comfortable with their colleagues, but they also believed that they got to know them well. However, they have shown preference for smaller groups (3-4). Although these participants have had to solve a session level task, they did so in small groups of experts (4-5). Placing the task on this level thus failed to make the students more comfortable with large groups. There has further been a very positive assessment of the speed and the helpfulness of peer feedback. The students have made use of communication tools outside of the platform (particularly telephone conference), however they felt uncomfortable about having to protocol such communication. Not all students used the opportunity to collaborate with members of other groups. However, experts who have organised themselves into thematic groups (e.g. the didactics group) tended to first consult problems with their fellow experts before addressing the tutor.

Table 4: Results of the questionnaire on "VCL eLearning 2006"

Aims	Indicators		
Knowledge exchange	difficulty	6.55 out of 10	↗
	competence	8.60 out of 10	↑
	information	15% of students complained about lack of information in posts	↓
Different perspectives	awareness own	20% of students had problems to present their views	↓
	awareness others	35% of students had problems to understand different views of others	↓
Effectiveness	level of learning	6.94 out of 10	↘
	effectiveness	8.10 out of 10	↑
Social Skills	level of relationship	7.26 out of 10	↑
	positive relationship	8.90 out of 10	↑
	group size	3-4 ideal	↘
Individual feedback	speed	8.90 out of 10	↑
	helpfulness	8.70 out of 10	↑

4. Conclusion

The use of VCL at the Chair of Information Management, Technische Universität Dresden has been very successful, particularly in international settings. However, there is still a need for further enhancement of the systematic framework and in particular the adjusting screws TASKS, ROLES and COMMUNICATION TOOLS to achieve the VCL aims more optimal. The presented change within the framework from set 1 to set 2 of the adjusting screws appears to have led to a higher knowledge exchange, better acceptance of different perspectives and better peer feedback. The framework is going to be tested in further scenarios to assure its effectiveness.

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E-Learning Information in German University Websites- A Game of Hide-and-Seek

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Abstract

The tertiary sector in Germany presently faces new challenges and incentives. Both the excellence initiative of the Federal Ministry and the implementation of the Bologna declaration are forcing the universities to act. In this overall situation flexibility, modularity and market orientation are increasingly perceived as key topics within higher education. The integration of e-learning is becoming a strategic, yet challenging goal. Therefore it is crucial for universities to highlight their e-learning activities and to present a modern profile to the public. This article presents results of a survey on the findability of e-learning information within German universities' websites. We argue that organizational development and the information design of institutional websites are closely intertwined.

1. Introduction

Due to political factors on international and national level, the tertiary sector faces structural changes. Continuity and homogeneity are no longer guidelines for the modern academia. On an international level, the Bologna Declaration forces the institutions to implement a consecutive study model. Due to the ongoing standardization, study programs are becoming more comparable. As a result, the competition on national and international level will rise.

As a national measure the German Federal Ministry of Education and Research offers within the excellence initiative funding for universities who develop an elite profile. Moreover, for the first time since the seventies, German universities in some federal states – depending on the federal legislation – have the possibility to raise tuition fees. Thus, in the future the financial resources will as well depend upon the amount of students an institution is able to attract.

It is of vital importance for higher education institutions to seek new ways to assert their position and strengthen their profile. The crucial role of information and communication technologies in the process of enhancing academic teaching has been highlighted in many conferences, reports and surveys subsequent to the Bologna Declaration (see e.g. Van den Branden, 2004). The institution's website – being the business card of a university (Lederbogen, 2004) – should provide easy accessible information on e-learning and blended learning activities.

Apart from the external viewpoint, the implementation of e-learning has to be accompanied by a fundamental organizational change within the academic institution (Kubicek, Breiter, Fischer & Wiedwald, 2003). Integrating e-learning has an impact on diverse activities like library management, assessment and administration, research, publishing and the cooperation between institutions (Guri-Rosenblit, 2005). Universities are forced to reconsider the efficiency of resource allocation and to evaluate financial aspects of e-learning and student support (Pfeffer, Sindler & Kopp, 2005).

At present, each institution follows its own organizational and technological strategy: In the German University's landscape one can find a diversity of e-learning platforms, research oriented tool developments and initiatives by hands-on practitioners. Likewise, the amount and quality of information on e-learning within universities' websites differs a lot.

To identify different information strategies, we analyzed the content and structure of almost all German university websites. We wanted to know how easily students, teachers and other target groups may find information about e-learning on the institutional web pages. In addition to this content analysis we were interested in the emergence of the website's structure and the reasons for the positioning of e-learning information. Hence we conducted expert interviews with university staff members who are in charge of e-learning consultancy.

2. Research Design

To reflect upon the findability of e-learning information in university websites we followed a three-stage research strategy. Firstly, we considered the perspective of teachers and students looking for support, services, on-going projects etc. We tried to mimic their search behavior through a manual content analysis which was documented in excel sheets. Secondly, we contemplated the providers' position through expert interviews. Thirdly we identified 20 case studies for inner-institutional e-learning portals.

Content analysis: In summer 2005, a research team visited the websites of all institutions of higher education in Germany (Gaiser, Haug, Rinn & Wedekind, n.d.). A total of 350 websites was analyzed. For each site, the first two navigation levels and the web pages of central service units were scanned in order to find e-learning related content. We looked for one or more of the following characteristics:

- direct access to e-learning support units, trainings or material via hyperlink on the homepage,
- relevant hotspot (e.g. "professional training") on the homepage leading indirectly to e-learning support or information (hyperlink is situated at a second navigation level),
- information concerning e-learning on the websites of service institutions like the library, computer center or multimedia department.

In addition, relevant terms were entered in the side-wide search-engine, such as e-learning or virtual university. For each term, the first ten hits of the search results were evaluated to detect references to e-learning services or projects.

The research design implicates that a negative search result does not mean that the institution is not providing e-learning services or information at all. The lack of results rather points towards an inefficient information design. From a user's point of view, ineffectively allocated information is non-existing (e.g. Horn, 2000).

Expert interviews: Mapping e-learning information in university's websites lead to the question why e-learning merely plays a bit part in the net activities of higher education institutions. To include first-hand experience in the picture, we conducted ten interviews with experts who work as e-learning consultants at e-learning support centers.

Case studies: To deepen our insights in the information design process, we explored 20 web portals of e-learning service units. We turned our attention to the allocation of these information pools within the overall architecture of the institutional website.

3. Results

In the following, results of the survey are presented. The accessibility of e-learning information (3.1.) and central service institutions (3.2.) is explored. We also examine how institutions support community building by giving incentives e.g. by presenting e-teaching projects at a prominent point (3.3.).

3. 1. Accessibility of E-Learning Information

E-learning keeps a low profile in German university websites: Only 13% of German institutions of higher education (44 out of 340) provide direct access to information concerning e-learning on their homepage. This means that the majority does not present their e-learning activities at a prominent point. A likewise result arises from the analysis of the keywords when information about e-learning, e-teaching or support is queried: only 17% of all universities receive descriptive results within the first ten hits. Even if we assume a certain “dark figure”, these results still indicate that the implementation of digital media at most universities is accompanied by little attempts to assure easy access.

The difficulties in retrieving information can be seen as a hurdle to start with e-teaching - especially for beginners. When e-learning related issues are buried deeply in the website’s information architecture, this indicates an obvious lack of support by the organization and the supervisory board. The decision makers at these universities do not take into account that information about e-learning is of internal and external interest.

By taking a closer look at a selection of 20 academic institutions, which provide a specific e-learning website within their web portal, we were able to identify some specific problems. Though it is common knowledge for portal developers that the information architecture of a website should reflect the users’ knowledge and needs, not the organizational structure (see e.g. Rosenfeld & Morville, 2002; Sullivan, 2003) many web pages mirror the position of e-learning within the institution, as the following example illustrates:

- Several institutions declare information about e-learning as “projects”. Neither interested teachers nor students would search for information about e-learning here on their first attempt.
- Prima facie, the “project” labeling suggests to users of the site, that e-learning still has a “project status” within the institution; a concept not yet well established but “under construction”.
- Often projects are only listed under the projects name, even worse, just the abbreviation can be found in the navigation bar without any description.
- The impression of “under construction” e-learning material is too often confirmed by content which is out of date: Several expired project websites are still online. Only very few projects inform about their status on the entry page.

Universities obviously face difficulties in integrating the different organizational structures and individual groups dealing with e-learning (e.g. computer center, research projects, software developers) as well as the technological infrastructure into one coherent pool of information. If a central e-learning unit is part of an institutions’ portfolio, it is nevertheless often apart from the overall structure: In some cases users will not even find a link from the website of the e-learning center back to the homepage of the university, let alone other central units.

Small institutions – especially universities of applied sciences – usually have little resources for e-learning staff and respectively do not provide e-learning websites. Typically all activities are focused on the implementation of a learning management system (LMS) and to provide direct access to the LMS. As an e-learning consultant from a small southern university of applied science put it: *"At our institution the learning management system is a synonym for e-learning" (*S. Allweier, personal communication, March 9, 2006*).* In several cases the homepage links directly to the login screen of the LMS without giving any general information. This turns ICT into a "closed shop": People from outside the institution do not have access to the LMS. If a guest account exists, it is doubtful that visitors will go through the trouble of registering, just to find out what is happening in the e-learning field.

3.2. Support Services

The successful and sustainable integration of digital media depends to a large degree upon the academic teachers' will and ability to make use of new teaching possibilities offered by ICT (Hagner & Schneebeck, 2001). E-learning disseminates in higher education settings far slower than it was expected in the Nineties. We wanted to know, how easily teachers can find information about qualification courses, ongoing e-learning projects, support structures, services and funds.

In the content analysis of German university websites, 43 e-learning competence centers were identified, out of which 84% promote e-learning consultancy and training. Only 13% of all German universities offer their staff an e-learning service point. In 16% of all universities e-learning support is situated in the multimedia centre out of which 41% offer e-learning consultancy and training. Only in a few cases (4%) universities present an e-learning competence center as well as a multimedia center on their websites. In only 2% of these cases both institutions offer e-learning consultancy as well as training. This indicates that e-learning support is mostly bundled in one institution which offers the whole range of support. Within the group of traditional service units, only 15% of the computer centers and 2% of the libraries offer e-learning support on their website. Obviously, these established departments do not see e-learning support as one of their main tasks.

A positive result of the website survey is that e-learning support is seldom split up between different service units. Apparently, universities try to create a congruent service profile with a clear scope of duties. Already existing multimedia centers often incorporate e-learning related services into their portfolio.

However, a continuous support of teachers (and students) appears to be insecure: The interviews revealed that in most e-learning centers staff is employed in limited contracts funded by the latest initiative of the German Federal Ministry of Education and Research. In small universities where resources are tight it is not unusual that the e-learning "team" consists of a single person who is also part of the computer center.

3.3. Community Building

Although e-learning communities can support the exchange of information, ideas and materials between the academic teachers, the content analysis of the websites revealed that only at 21% of all websites comprises a specific e-learning section. Only 5% of all websites gave hints to e-learning related working groups.

The lack of community activity can be explained by the specific culture of academia. Lecturers are used to prepare and supervise their classes as lone wolf. An exchange of teaching material or ideas is rather unusual. However, the interviews revealed a high readiness among the e-learning consultants to take part in an inter-institutional e-learning community. Given a platform for exchange, they may serve as local disseminators to promote community building.

A cost efficient option to motivate teachers for taking part in an e-learning community of practice is the announcement of a competition or award for innovative projects. Another solution which takes little effort is to publish examples of good practice on the institutions' website. However, only 14% of the universities include a collection of local e-learning projects in their website. Four out of 350 websites announced a specific e-teaching award.

The role academic teachers are playing for the dissemination of digital media into the whole organization is still underestimated. Innovative projects neither gain enough publicity nor honor. Due to a lack of transparency the university misses the opportunity to promote outstanding projects to the public.

4. Conclusion

Our search for e-learning information reveals that many university websites are still afar from a service oriented and user centered information architecture. This makes it difficult for students and teachers to immerse into new teaching and learning practices.

It proves to be a disadvantage when the information architecture follows the organizational structure. This is especially true since many universities are currently restructuring administration and service units. The emergence of new units and labels makes it even more difficult for the user to find the right person to answer his or her questions.

The provision of online information e. g. by a portal can contribute much to the integration of e-learning services. Unfortunately, quality has its price: to work out a comprehensive resource with general information on e-learning proves to be a time consuming challenge. To represent the state of the art continuous editorial effort is needed (Kerres, Euler, Seufert, Hasanbegovic, & Voss, 2005).

The answer to this problem can be the integration of external web resources. Some best-practice examples show that institution-spanning platforms are a promising approach to network e-learning activists and promote their activities. One example is the German-wide information portal e-teaching.org. It provides general content on didactical, technological and organizational aspects of e-learning, partner universities can add location-specific information about support activities and projects. Another fruitful approach, more prominent in the English speaking community, is the portal MERLOT, a website which provides an exchange platform for e-learning material.

This opens up interesting perspective for future research: A crucial question for a strategic policy to restructure e-learning information in university-websites is a profound knowledge about the information behavior of academic teachers and students. In our interviews with e-learning staff members a majority of the consultants feared that especially teachers would feel uncomfortable when using information pools outside of their institution's website. Therefore, the teams try to maintain their own resources – even if those are poorly structured or merely visible within the university portal as a whole. Further insight into the information behavior of the websites' target groups could smooth the way to more cooperation and quality.

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ICT Integration into Primary Schools in Turkey

Ayşe Kök

Abstract

This paper describes the extent to which ICT is facilitating the implementation of a new educational paradigm in primary education in Turkey.

A qualitative strategy was adopted in the hope that the ensuing generation of insights might illuminate the processes of ICT implementation, but not with the intention that any specific findings should be generalisable.

The Research Questions

The following research questions were addressed throughout this study:

> *To what extent is ICT facilitating the implementation of (elements of) a new educational paradigm in primary education in Turkey?*

It should be noted that in this study, the term ICT refers to multimedia, the Internet or the Web, as a medium to enhance instruction or as a replacement for other media (Pelgrum W. J., Law, N., 2003).

'Paradigm' is a difficult concept to define. This concept is associated with the statement that the traditional model for providing primary through tertiary education, adopted across the world, relies on the following three basic principles (Haddad, W. D., Draxler, A., 2002):

- Learners must congregate in a building where the teaching/learning process takes place.
- There must be a predetermined path, divided into grades, that leads to a diploma, and students must follow this path, regardless of their interests, needs, or abilities.
- There must be a hierarchic structure where the instructor is the provider of knowledge and the students are the recipients.

In this new paradigm, ICTs are not a substitute for schooling, rather, they constitute one integral element of this education model—supplementing and enriching traditional institutions and instructional materials (Haddad, W. D., Draxler, A., 2002). In this sense, ICTs contribute to the whole system of knowledge dissemination and learning (Haddad, W. D., Draxler, A., 2002).

As Haddad and Draxler (2002) argue, the education model developed for the Industrial Age cannot achieve educational empowerment effectively in the Information Age. With ICT tools, the components of the conventional model should be evolved into the corresponding components of the new model (Haddad, W. D., Draxler, A., 2002) (Please refer to *Table 2.0*).

From	To
A school building	A knowledge infrastructure (schools, labs, radio, television, Internet, museums…)
Classrooms	Individual learners
A teacher (as provider of knowledge)	A teacher (as a tutor and facilitator)
A set of textbooks and some audiovisual aids	Multimedia materials (print, audio, video, digital…)

Table 2.0 Evolution of the New Paradigm

Methodology

Research Design

Based on the fact that the nature of the research question and the context of the research are decisive for choosing methodology, qualitative research methodology was found to be the best approach. A qualitative strategy was adopted in the hope that the ensuing generation of insights might illuminate the processes of ICT implementation, but not with the intention that any specific findings should be generalisable (Yagi, R, 2001). Within the qualitative research methodology, a particular attention was given to the case studies.

Case(s) Selection

The cases represent 'typical' classroom practices in Turkish primary schools and represent what is going on in a typical classroom. For this purpose, it has been worked collaboratively with the contact persons from MoNE to specify criteria by which a set of Turkish primary schools most worthy of examination have been identified. It has been planned to select a total number of 10 primary schools due to the small-scale scope of this study.

Schools were selected by the Turkish counterpart Mr. Ebubekir Celik, Assistant Director of the ETGM- a division within MoNE-, together with local educational authorities. The selection was done mainly based on recommendations of the personnel of Educational Technologies General Managament

Data Collection

Sources of data included (Kozma, R., Anderson, R. E., 2002):

- Surveys and interviews of teachers, and students.
- Programme materials, such as teacher lesson plans, instructional materials, curriculum guides, software, reports, assessment instruments, etc, if available.
- Students' products, such as reports, projects, tests, and student-generated websites, if available.
- Classroom observations that described computer placement and resource allocation, etc.

The Interview Guide

Before every meeting a few questions were prepared to gain a better understanding of the organization. A drafted question set for teachers is as follows:

1) Can you start by describing your position/work/role in this school?
2) What do you see as the main challenges when working with ICT?
3) What do you think can be the solutions to these problems/challenges?
4) What are the main benefits of ICTs?
5) How do you consider that ICT can benefit your students?
6) How do you consider that ICTs can be used to increase the quality of education?
7) What are your plans for working with ICT over the next year, the next five years, and the next ten years?

A drafted question set for students is as follows:

1) Why do you think it's necessary to know how to use a computer?
2) What do you like best when you're working with the computer?
3) How many hours per week do you use a computer at your school?
4) What do you use it for?
5) When you first started to use computers, how did you feel?
6) How do you feel now?
7) What kind of job would you like to have when you get older?
8) Do you think computers will be useful then?
9) How old were you when you first used a computer?

Classroom Observations

Classroom observations could only made of about 10 minutes over one visit to each school due to the bureaucratic reasons regarding the observation process.

Case Study

Description of the Schools Visited

The informants' descriptions were made explicit by the researcher's description, so the statements are presented in this chapter through a rich description including contextualizing and interpretation by the researcher (Patton, M., 1982).

1. *Besiktas Elementary School, Besiktas- Istanbul*

This central Istanbul school has over 600 students, and is equipped with an ICT facility that has not been used. The researcher was informed that the school's equipment was robbed shortly after the ICT class was installed. The electronic components were removed from the cases, but the monitors were left intact.

ICT education started only sixteen months ago, when the computers were restored. Since the school does not have an ICT teacher, the Religion and Ethics teacher is holding these classes.

Figure 1. A Typical ICT Laboratory in a Turkish Primary School

2. *Bernar Nahum Elementary School, Ulus- Istanbul*

This small multi-grade school has 1 principal, 15 teachers and 320 students in the school. There are 1 OH projector, 4 computers, 4 TVs , and 3 VCDs in the school. Its class size is limited to 30-40 students/class whereas the average class size now is 33 students per class.

Figure 2. A Typical Classroom in a Turkish Primary School

3. Hasan Ali Yucel Elementary School, Etiler-Istanbul

Every classroom is provided with one computer. The students have access to Internet, moreover, the Parent Teacher Association is functioning with considerable success, and buffers some of the financial burden of ICT opportunities. Besides, this school is one of the pilot schools using educational software developed by private sector companies.

4. Lutfi Banat Elementary School, Levent- Istanbul

Lutfi Banat Elementary School is a central urban school with 300 students, 17 teachers and two ICT classrooms. The ICT classes are taught by 3 different teachers, two of which are formators. Internet access is temporarily unavailable, but the principal has plans to designate one of the ICT classrooms as an Internet class.

5. Sair Nedim Elementary School, Gayrettepe- Istanbul

This is one of the more fortunate schools, as the faculty includes an ICT teacher as well as a formator. The students are acquainted with the ICT technology, as they live in an urban environment, and most can afford a computer. During ICT classes two or three students share a computer, and they are allowed to use the Internet connection for research purposes. The network connection speed is relatively slow, and sometimes results in hardware malfunction.

6. Gaziosmanpasa Elementary School, Ortakoy- Istanbul

The school has 21 teachers, but no permanent ICT instructor. A certified ICT teacher is running 30 hours of class each week through external contract. The single ICT classroom has 20 computers, and 5 additional computers are being used by the administration. The firm supplying the original hardware did not deliver the server connection of the equipment hence the school lacks the essential Internet access.

7. Burak Reis Elementary School, Ortakoy- Istanbul

Although an Internet access does exist, for financial reasons the school is using the connection in moderation. Mathematics and science are taught through ICT, and computer courses are being organized frequently for the benefit of the local public. The demand for these courses generally comes from the teachers, who want the youth to learn basic computer skills such as using Microsoft Word and Excel, as well as theoretical Internet.

Figure 3. Computers in the ICT Laboratory in a Turkish Primary School

8. Anafartalar Elementary School, Akatlar- Istanbul

Located in downtown Istanbul, this school houses 600 students and 25 teachers. One of the three ICT classrooms cannot be used because of ongoing repairs, and there is no Internet connection. Usually, the students have to share computers with two other fellow students during class.

9. Nimetullah Mahruki Elementary School, Yeni Levent- Istanbul

With 20 teachers and 15 computers, the ICT classes are again facilitated by formators in the absence of a permanent instructor. The Internet access is functioning, but technical difficulties such as modem inefficiency restrain the students from using the technology.

10. Ali Yalkin Elementary School, Besiktas- Istanbul

This two shift school has 350 students and 19 teachers. 1 computer and one 70cm TV exist in ICT laboratory. Besides, there are 2 OH projectors in the school. Per her discussion with the Vice Principal, the researcher was told that the structure of this school is better than in other schools in terms of its educational materials.

Findings

Hypotheses Developed

Hypothesis 1: Technology as catalyst or as additional resource?

Technology is a strong catalyst for educational improvement, especially when the World Wide Web is involved (Denz, H., Baumgartner, P., 2000). The rival hypothesis is that technology served only as an additional resource and not as a catalyst (Denz, H., Baumgartner, P., 2000).

Evidence in support of hypothesis 1:

1. The claim that ICT had been a catalyst for positive change in pupil attitudes to school and to homework was supported by evidence from teachers and pupils. According to one student:

   > "I enjoy doing my homework when I have to search for information on the Internet."

1. Teachers' administrative work was made easier via their access to the technology. To exemplify, collaborative working, the opportunity for teachers to work on documents whenever they want and then to pass them electronically to colleagues was a positive benefit.

2. Due to the fact that the whole infrastructure of ICT is one of the main indicators of the schools' approach the education goals for ICT were only reached in those primary schools (Sair Nedim, Hasan Ali) with sufficient and modern ICT-resources.

Evidence in support of the rival hypothesis:

1. The schools' philosophy of improving their education was not only limited to the ICT initiatives. Other initiatives included the establishment of several laboratories regarding some subjects such as chemistry and physics or creating other main emphasis like sports or music. Therefore in these cases, ICT is not the magic word since there were additional resources besides the ICT which served the innovation.

Hypothesis 2: Infrastructure and pupil competence or teachers' ICT competence more important?

This hypothesis assumes that the school technological infrastructure and student ICT competence rather than teachers' competence determine ICT implementation outcomes (Denz, H., Baumgartner, P., 2000). The rival hypothesis is that teachers mediate ICT applications when they are successful (Denz, H., Baumgartner, P., 2000).

Evidence in support of hypothesis 2:

1. With the exception of the ICT pilot school (Sair Nedim) there was a low level of ICT use in primary schools due to the serious problems with the technological infrastructure such as the lack of Internet access.

Evidence in support of the rival hypothesis:

1. At the beginning, there was a small group of interested people who learned and used several ICT-skills such as word processing, design web page, etc. With the technical expertise they acquired, these teachers were able to teach special ICT-subjects in the school. As mentioned before, in the absence of ICT teachers and ICT staff (Besiktas, Burak Reis), the Religion and Ethics teacher was holding these classes and providing technical help. So, the ICT capacity had been strategically built up over a number of years. As one of the teachers stated:

   "Without the enthusiasm of the teachers ICT could not be utilized in schools."

2. The more familiar and comfortable teachers are with using ICT, the more they will use it for their teaching preparation and for their actual teaching. Without the necessary technical knowledge of the teaching staff, the mediation of applications can not be successful. Besides, the main fear of many teachers was that the students might have more technical expertise than themselves.

Hypothesis 3: Academic standards will stay the same or increase, or decrease with improved ICT?

Successful implementation of ICT will lead to the same or higher academic standards in spite of the low quality of many ICT materials (Denz, H., Baumgartner, P., 2000). Academic standards are a function of teacher and school expectations and not of the standards of textbooks, ICT materials, and the like. The alternative hypothesis is that ICT use will lead to a lowering of academic standards as students spend more time on marginally beneficial searches and in browsing poor quality Web and courseware content (Denz, H., Baumgartner, P., 2000).

Evidence in support of hypothesis 3:

1. Evidence from the study was that pupil self esteem and motivation to learn was enhanced with ICT.

   "I enjoy doing my homework's when I have to do some research on the Internet or to look for past news."

2. Pupils were more likely to get help with homework at home, collaboration between pupils was increased, and teachers could plan more effectively together.

3. More information was available and children's horizons were widened. Children have no easy access to a library apart from the school library. One teacher commented:

> "ICT provides a greater resource than the school library, you can get information for projects, it has changed the attitudes to knowledge."

Evidence in support of the rival hypothesis:

1. Concern that basic education might be adversely affected by the initiative was expressed by one of the adult respondents:

   > "In my point of view, students use computers just for chatting or playing games that don't relate to educational purposes."

Conclusion

A New Educational Paradigm?

As Orhun (1995) claims, the most important reasons for not using computers, as well as the problems experienced as most serious in using computers, are the lack of teachers' knowledge and skills and the lack of hardware and software (Orhun E., Hoyles, C., Bowerman, C., Vivet, M., 1995).

In a similar vein, the propositions developed suggest that an attitude shift towards learning should occur in order to optimize the ICT integration into the Turkish primary schools and facilitate the elements of a new educational paradigm in Turkey. Based on the interviews with the teachers, it can be said that the ICT is merely attached to the existing teaching and learning activities without any change in the traditional curriculum or learning objectives. The teaching strategies and learning activities in the classrooms remain more or less intact. To exemplify, the learning paradigm adopted for certain concepts in the classroom is associated with the transmission of knowledge. The paradigm remains the same whether the concept is taught from a text book, software or via the Internet.

List of Abbreviations and Acronyms

ETGM-	Educational Technologies General Management
EU-	European Union
ICT-	Information and Communications Technology
MoNE-	Ministry of National Education
OECD-	Organisation for Economic Co-operation and Development
UNDP-	United Nations Development Program
UNESCO-	United Nations Educational, Scientific and Cultural Organization

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The French Digital Thematic Universities: a critical analysis

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Initiated and funded under a programme of the Direction of Technology of the Ministry of Education, a Digital Thematic Universities (DTU) gathers the faculties of several universities in a given discipline to provide online services nationwide.

The survey took place at the end of 2005. The five DTU surveyed were created in the following order since August 2003:
- Medicine: *Université médicale virtuelle francophone* (UMVF),
- Law: *Université numérique juridique francophone* (UNJF),
- Engineering: *Université numérique ingénierie et technologie* (UNIT),
- Economy: A*ssociation des universités numériques en économie et gestion* (AUNEGE),
- Environment sciences: *Université virtuelle environnement et développement durable* (UVED).

A sixth one, in Human and Social Sciences (*Université ouverte des humanités*, UOH) has been created in the beginning of 2006, and as not been surveyed.

DTU regroup one or more "*Campus numériques*" which were developed between 2000 and 2003 under a previous programme of the Direction of Technology. This is why, even if the last two DTU were just starting their operation by the time of the survey, it has been possible to collect similar data and information as for the others.

The survey uses the following sources:
- Documents, either given by the persons in charge of running the DTU, or accessible from the DTU websites,
- Interviews with the persons running the DTU (Director, Chair or Board Member), or with persons designated by them because of their expertise in a particular domain.

This paper presents in a first part the main characteristics of the DTU, and, in a second part, a critical analysis of this national programme.

An overview of the Digital Thematic Universities

Though having different legal forms, the five DTU have the same structure: a kernel of member organisations (universities, labs…), lead by a Board in which they are all represented, and associated partners.

The objectives set by the programme to DTU are two-fold: to develop digital resources in a given discipline; to propose new curricula. They are supposed to provide:
- A framework to concert on digital resource development at national level and to share experience in e-learning,
- A unique access point to digital resources in a given discipline.

Some of them also provide logistics to produce digital resources (UNJF), or even consider themselves as a training provider (UVED).

DTU are non –profit association ("*association Loi 1901*": UNIT, AUNEGE and UVED), or have a special status as "*Groupement d'intérêt public*" (UMVF). This status, which requires a decision of the Minister, is expected by UNJF, which, in the meantime is based on an agreement between University members.

Each form has advantages and disadvantages: the status "*Groupement d'intérêt public*" allows receiving and managing government funds under the control of a government officer, and requires unanimity of all members for any decisions. A non profit association has lighter decision processes, but cannot manage government funds, and therefore any project has to be delegated to a designated university member of the DTU.

DTU and their members

At the survey time, UMVF had 27 members (32 Universities have a Faculty of Medicine), UNJF had 15 university members (56 Universities have a Faculty of Law), UNIT had 23 members and 16 associated partners (more than 300 schools of Engineering and Universities have a Department of Sciences), UVED had 24 members, of which 4 labs and 3 "*Campus numériques*", AUNEGE had 16 founding members, including the National Distance Education Centre (CNED).

The respective role of the DTU and of its members is distributed according to the same schema:

- The DTU defines the policy to produce digital resources and validate the projects; it offers to its members methodology, tools and training to produce online resources;
- The members produce digital resources and provide online services and online courses.

Some DTU provide special services to their members:

- indexation of digital resources produced by the members (UMVF, UVED),
- production of digital resources (UNJF),
- hosting the digital resources (UNJF, UVED),

All provide technical support. These services are delegated to a single member, or shared between several members.

Some DTU have included, as part of their mission, to define quality standards (UNJF, UVED).

Financial resources

DTU financial resources are:

- Membership fees (according to the number of students),
- Government funding,
- Donations and legacies,
- Sales of resources or services (quite rarely).

Only UNJF and UVED take into account in their budget the sales of resources or of training services. Most of digital resources development requires government funding.

The activities of DTU

The activity of DTU is organised around three processes:

- instruction design / course design shared between a DTU and its members,
- management of the budget dedicated to the development of digital resources,
- support of design and production of digital resources.

Some disciplines (medicine, law, environment sciences) have established standard pedagogical patterns and scenarios for learning activities, which are used as guidelines to produce the digital resources:

- UMVF uses the "Problem-Based Learning" approach, and proposes scenarios for clinical case studies,
- UNJF has developed a set of specifications to publish a resource, to develop a course or exercises, together with methodological guidelines,
- UVED promotes Activity-based learning, and proposes a design methodology through a set of specifications and guidelines.

Digital resources are produced on government funding. Production costs are calculated as a lump sum per "module". The modules being of various kinds (a course, multiple choice questionnaire, a case study, a simulator…) and of various lengths (ranging from a few minutes for a questionnaire to 35 hours of study for a course), the costs are difficult to compare.

Conception costs which are taken into account correspond to the fees the authors would get, and they are generally a lump sum per module. They do not reflect real costs, and they vary from nothing (UMVF, UNIT) to 7,800 € for a 35 hours course (AUNEGE).

Intellectual property rights are considered in contrasted ways: UMVF and UNIT do not consider these rights, while the others attract authors by promising royalties on the sale of the courses added to the fees.

Implementation costs are also calculated as lump sums per study hour, depending on the type of resources. They vary from 250 € for a written document (UMVF) to more than 2,100 € for a multimedia course (UNJF). Maintenance costs are generally included.

All DTU provide training for the authors, few provide training for other categories of staff.

- UMVF and UNIT propose to the teachers online self-study material,
- UMVF adds the possibility to attend a course leading to a certification,
- UNJF proposes training and support for the authors, and also training on the LMS for administrative staff and tutors,
- AUNEGE proposes a training course in Instruction design and technical courses,
- UVED proposes a course for authors in partnership with the Canadian TELUQ, and also a course for tutors.

The tools used by the DTU

All DTU use Open Source software for part or for all of their technical solutions, and XML is a pivot format.

Development tools used are both commercial and proprietary tools:

- UMVF proposes multiple multimedia development tools such as Speechi or Breeze.
- UNJF uses a proprietary publishing suite produced by its provider ANDIL.
- UNIT proposes various tools, among which a publishing suite developed by Compiegne University of Technology, Scenari.
- UVED uses a proprietary publishing suite, Chaînedit, but also uses Scenari.

The Learning Management Systems (LMS) and the portal used by DTU to deliver their resources are heterogeneous. For some DTU, the resources are scattered on many servers operated by their members (UMVF, UNIT); for the others, all resources are stored on a cluster operated by a single member.

The LMS are diverse:

- UMVF proposes several Open Source LMS such as Ganesha, Claroline, Dokeos, together with commercial streaming facilities (Realvideo).
- UNJF uses Moodle.
- UNIT proposes various LMS.
- AUNEGE was using WebCT at the time of the survey.
- UVED was envisaging to use Moodle.

The portals also are diverse:

- UMVF portal is based on SPIP,
- UNJF portal is based on K-SUP,
- UNIT portal is based on PLONE.
- AUNEGE had not chosen at the time of the survey.
- UVED was envisaging a proprietary solution using Open Source software.

The offer of DTU

The main offer of DTU is access to digital resources for learning, i.e. to "*learning objects*[1]". The type of access varies:

- the access to learning objects can be totally open and free (UMVF),
- the access to learning objects can be partially open and free, partially restricted (UNIT),
- the access to learning objects is restricted to students enrolled in a university member of the DTU (UNJF, AUNEGE, UVED)

Learning objects granularity is extremely diverse: it ranges from a 35 hours online course (UNJF, AUNEGE) to a 20 hours online course (UVED), to a HTML page or a PDF file. Simulation modules (UNIT) or the disciplinary bank of digital resources (UMVF) can also be found under a single object title!

The number of learning objects available depends upon their nature: UMVF presents more than 2,000 PDF documents to prepare the National Exams; UNJF presents about fifty courses to which are attached other resources such as Multiple Choice Questionnaires.

Some DTU also propose distance learning courses delivered by their members. This offer either comes from previous "*Campus Numérique*" programme, or is build upon the aggregation of learning objects developed. They generally correspond to a full LMD year (UNJF, AUNEGE, UVED). These courses are online tutored courses, generally including some face-to-face sessions.

To compare the offer of the DTU is not easy. There is no common indexation system agreed: all have planned to index their learning objects using metadata, but all have not done it so far. The set of metadata chosen is based on the IEEE LOM[2]: the 1484.12.3 version used by

[1] Wiley, D. A. (2000)
[2] IEEE. (2001)

SCORM (UMVF, UNJF), or the new French profile currently experimented in France (UNIT and UVED). These sets of metadata are not totally compatible.

Some DTU also use a second way of indexing their objects, according to disciplinary classification systems, like:

- MedCircle Quality Criteria and Mesh thesaurus for UMVF ;
- Dewey classification for UNIT.

The courses are not only indexed as learning objects, but also as… courses, and thus use other types of metadata. There is no single set of metadata:

- UNJF uses a French set of metadata, K-SUP, developed as a proprietary solution,
- AUNEGE had not decided by the time of the survey.
- UVED was inclining to use the new standard under development, CDM, used to harmonize data exchange in the ECTS system[3].

The major part of the DTU resources are in French. A few objects in English were retrieved from the UNIT portal. UNJF and UVED were envisaging to provide courses in English. The main DTU offer appears to target only a francophone audience.

The demand for the DTU

The actual and the potential demand for the DTU resources are difficult to estimate, because few data are available; and they come from heterogeneous sources which are not comparable.

The only reliable figures are those coming from the "*Direction des études et de la prospective (DEP)*" from the Ministry of Education, providing the number of students enrolled by domain[4]. To consider that these figures represent the potential demand for the DTU offer, it should be demonstrated that all the enrolled students are potential users, which is not established so far. To calculate the potential demand, the following should be taken into account:

- all students do not have access to online resources,
- these online resources do not cover the first two years of the "licence" degree, which *de facto* exclude a large number of students[5].

The priorities for the development of resources have been given to the Master degree in most of the previous "*Campus numériques*" and in the DTU, and the result is that the "licence" degree, in which the biggest number of students are registered, is not covered. Thus, the potential demand can be estimated at the quarter of the DEP figures.

We do not either have any information on other categories of potential users, such as the teachers from the universities members of the DTU, or foreign students from other francophone countries.

DTU offering distance learning courses provided by their members (UNJF, AUNEGE, UVED), have expressed commercial objectives, which gives an idea of their estimation of the potential market. These figures are at maximum about 1,000 students for the most ambitious of them!

[3] http://svn.utdanning.no/projects/cdm-ects/trunk/CDM-ECTS-overview.html
[4] See the figures for 2004: http://www.education.gouv.fr/stateval/grands_chiffres/gchiffres2004/gchif_e4.htm. These figures range from over 100,000 in Environment to 172,730 students in Law.
[5] In fact, more than 75% of the students, according to the DEP sources!

Only DTU offering a limited access can provide reliable figures at the moment. These figures are generally those of the students enrolled in a "*Campus numérique*" course which have been integrated into the DTU offer. They indicated a few hundredths of students during the year 2005.

The access to the resources can only be evaluated using the portal logs, which do not provide any indication on the type of user, or on the way the resource is used. Using the average number of different machines having accessed the portal per month, the highest figure (UMVF) is around 5,000 machines for a month.

The only way to have reliable data on the access to DTU resources would be to make the registration compulsory, and to track connections of each registered user.

Questions unresolved about the DTU programme

This section summarizes the questions that appear to the researcher concerning the programme, which have not been answered during the survey: what is a DTU? What does it offer? Who uses DTU services to-day and what are their usages?

DTU: an ambiguous concept

The first question is: what is a DTU? For Gatien (2000), "*broadly speaking, the words "digital university" refer to the successful migration of many key activities from paper-based methods to digital methods*". Such a definition generates the following image: a university providing online courses, where administrative aspects can be dealt with online (application, registration, payment of admission fees…), where it is possible to communicate online with teachers and peer-students, to access online resources (labs, libraries…), or even to develop collaborative research online[6]. This is the image corresponding to UVED, and partly to UNJF or AUNEGE, in which some services provided by their universities members are accessible online through the DTU portal.

UNIT and UMVF are referring to another model, the MIT Open Courseware[7], i.e. a "*Web-based electronic publishing initiative*" which provides free searchable access to course material, and claims that it "*is not a distance-learning, or a degree- or certificate-granting initiative*", that "*there is no registration process*", and that it "*does not offer the opportunity for direct contact with MIT faculty*" [8]. Clearly, the MIT OCW cannot be named a "digital university", in Gatien's sense.

The question is not about the relevance of the DTU model, though the issue has been raised by some authors[9], but about the coexistence of these two models under a single name, which is confusing for the users. Furthermore, the DTU inspired by the MIT OCW model do not take the precaution MIT has taken, i.e. to warn the user that it is not a training service or an education service! To reinforce the ambiguity, the term "training" (*formation*) appears in the homepages of several DTU, sometime to designate an online course delivered by a member of

[6] Ibidem
[7] Voir http://ocw.mit.edu/index.html
[8] http://ocw.mit.edu/OcwWeb/jsp/feedback.jsp?Referer=AboutOcw
[9] Several authors involved in the development of digital universities ask the following question: "*where is learning in a series of learning objects?*" To cite only two of them: KOPER, R. (2001) or FRIESEN, N. (2004).

the DTU (UNJF), sometimes to designate a learning object (UMVF)… which even says in its header: “this document is not intended to replace a course or a course manual[10]”!

Some clarification about what is a DTU would certainly be useful.

Lack of legibility of DTU offer

A second effect of the above mentioned ambiguity is the lack of visibility of DTU offer, which appears to the user as extremely complex, as presented above.

On one side, we find “learning objects[11]”, on the other distance learning courses. Sometimes, the same object can be accessed on the DTU site in both ways: integrated in a course as part of a distance learning programme, and as a stand-alone object. In the first case, the user should register to the course delivered by a university member of the DTU, in the second it can be accessed without any registration.

The DTU offer is heterogeneous both in its structure and in its access mode. This is not good for its legibility. And this lack of legibility is reinforced by the choices made in order to make the offer easy to search, i.e. the choice of indexation methods, which are two-fold, according to how the resource is considered: as a learning object, the indexation will use both keywords and a metadata set based on a LOM profile; as a course, the indexation will use another set of metadata, like CDM for example. The user has to know what he/she is searching for… And it not possible to have a search result covering simultaneously both type of resource.

The sets of metadata chosen by the DTU being different, there is currently no possible aggregation of the offer of all DTU for a single search. And, beyond these technical problems which can be solved, the question of the opportunity to keep the double nature of the offer remains.

Lack of clarity of DTU users and usages

Apart from the small number of users registered to an online learning programme, the statistical data from the DTU portal logs do not allow to know what kind of users are accessing the resources (students? teachers? plain folks?). They do not allow either to know the duration of visits, nor the usage of the resources (to learn? to teach? for another use?).

It is therefore impossible to have any idea about who the users are and what their usages are. It is also impossible to evaluate them, and the relevance of this programme, which has produced an important amount of digital resources, and has mobilised a large number of universities and of faculty staff.

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A quali-quantitative research pattern for the surveying of a competence profile of the teacher using ICTs in a blended learning project

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Research and training: ICTs in vocational training

ISPFP (Swiss Pedagogical Institute for Vocational Training) is a national institute dealing primarily with the teachers' training operating in vocational education. Parallel to the training department, the research department is responsible for diverse and multidisciplinary R&D projects, whose objective is to have some spin-offs on the training design too.
During the last years one of the themes on which we have focused our attention, for the important chances and the potential repercussions both on the side of apprentices and the teachers' one, is the integration of ICTs in the vocational training and in particular in the didactics.

The concrete research and reflection opportunity was given by a four-years long (2000-2004) national project, called ICT.SIBP-ISPFP and managed by ISPFP itself, whose objectives were primarily to integrate and improve ICT-related competences in vocational training. One – the so called "bricklayers project" – of the more than 60 subprojects composing the wider project and developed in various vocational schools in Switzerland, was analysed in details. It concerned a blended learning experience with two first-year classes of the bricklayers apprenticeship, and lasted a whole school year[1].

In that period of time, in order to have some precise indications about the trend and the impacts of ICTs in vocational training, the necessity to monitor and collect data about the involved teachers' practices and competences had to be faced. The methodological and theoretical emerging question was about [1.] how to monitor an educational innovative programme which integrates the use of ICTs and [2.] to build a new professional profile (*référentiel de compétences*) of the teacher who operates in a context able to exploit the didactical potentials of technological tools. This would have enable us [1.] to have a set of indications about teachers' practices, representations, beliefs, and feelings during a blended learning experience; by analysing it [2.] to reflect on the construction of a set of competences able to define the professional profile of an ICT-updated teacher; and [3.] to have an empirical basis to design a renewed teachers' and teachers' trainers training path about ICTs.

The theoretical approach and the methodological framework

In order to define a renewed professional profile of teachers' related to ICT, the theoretical foundation of the research design was primarily founded oh the concept of *competence*, which is constituting of a competence profile (*référentiel de compétences*). Nowadays the interpretations of the concept of competence are several and various, creating a sort of conceptual nebula[2], which is not so useful to conduct a research pattern. This polysemy, anyway, forced us [1.] to clarify the

[1] Three distance phases were foreseen (each of them three-weeks long), during which the apprentices "attended" the school being at home, by means of an online learning environment (OLE) developed on purpose. For further details on the project see Cattaneo *et al.* (2005) and Cattaneo (2005).
[2] See also Schneckenberg & Wildt (2006).

theoretical dimension of the concept of competence and [2.] to make it operational within the methodological approach, as to let emerge the competence profile.

The theoretical perspective of our study is that which interprets the concept of competence as complex and dynamic, strongly situated (for this reason connected to the situations in which the competence itself is acted), deriving from the combination and mobilisation of different kind of *resources* (knowledge, know how, attitudes), in relationship with the conditions of the contexts and therefore with the objectives created by it (Le Boterf, 2000)[3].
Starting from the idea that the competence is *in-situ* built, we organised the methodological pattern in a way which could have permitted to let the different resources (as said declarative knowledge, procedural knowledge and attitudes) emerge from the practice of real didactical situations using ITCs.

First of all some *entretien d'explicitation* (Marc & Picard, 1989; Vermersch, 1994; Cesari, 2005) were conducted longitudinally with the twelve teachers and tutors involved in the project: this particular kind of interview allows, through a peculiar sort of interaction between the interviewed and the interviewer, to live again a particular professional practice, in order to analyze in details what the professional did in action and to make it explicit; considering that the ability of a professional to do something is often embodied in the subject himself and that an access to it has to be created by using some specific techniques. This first step allowed us to have a great amount of textual data, ready to be analysed.

The corpus and the quali-quantitative analysis

The corpus was composed by 45 interviews, each of them more than one-hour long. These were analysed by two different points of view, and by using indeed two different analysis softwares.
The first one is Atlas.ti (Muhr, 1997)[4], a software which permits to the researcher to manage a great amount of data, helping him to codify it, to systematize the originated categories, and to visualize it. The theoretical premises of this tool are related to the Grounded Theory (Glaser & Strauss, 1967; Strauss & Corbin, 1998) which has preference for letting the categories of analysis emerge from the data, rather than pre-hypothesize them. In fact the term "grounded" means that the analysis is deep-rooted in textual data themselves.

In order to have a real interplay between a qualitative analysis[5] and a quantitative one, both aiming to investigate texts, we parallely made a second kind of analysis. In our intention, the combination of these two approaches should have "balanced" the researcher's ingrained and subjective intervention to which risk the first method could have exposed. This kind of internal balancing strategy was also pursued by starting the analysis using simultaneously both these approaches, and then trying to have – through a comparison – a direct feed-back action of the first on the second, and vice versa.
This integration also responds to the necessity of not considering "quality" and "quantity" as two incompatible paradigms: in our perspective, by exploiting and maintaining the different epistemological nature of the two paradigms, it is possible to operate a profitable dialog not only

[3] From a literature review on this theme, trying to make a systematisation of this complex panorama and to lead a comparative linguistic study about the use of the term "competence" in some of the most important European languages (Boldrini & Ghisla, 2006), we agreed in this study to consider competence as an integration and combination - made up in situations - of different resources. This idea meets clearly Le Boterf's theory about the fact that «la compétence professionnelle ne réside pas dans les ressources (connaissances, capacités, …) à mobiliser, mais *dans la mobilisation même de ces ressources*. Elle est de l'ordre du "savoir mobiliser". Pour qu'il y ait compétence, il faut qu'il y ait mise en jeu d'un répertoire de ressources (connaissances, capacités, capacités relationnelles)» (Le Boterf, op. cit., pp. 57-58).
[4] See also http://www.atlasti.com/de [26.06.06].
[5] Atlas.ti is a tool which could be considered part of the CAQDAS: Computer Assisted Qualitative Data Analysis Softwares; see also http://caqdas.soc.surrey.ac.uk [26.06.06], and Lee & Fielding (1995)'s contribution.

between quality and quantity, but also among all the other elements of that *continuum* existing between descriptive and experimental, numeric and not-numeric, natural and artifical research (Silverman, 1997).

The second used tool was Alceste (acronym which stands for *Analyse des Lexèmes Cooccurrents dans les Enoncés Simples d'un Texte*); this latter was created by Max Reinert (Reinert, 1986), Professor at the Saint-Quentin-Yvelines in Paris, and operates on the basis of a statistical treatment of textual data, founding on the psycho-social assumption that the recurring of the words inside a discourse is not just a casual fact.

Some results of the Atlas.ti analysis

As said before, our objective was to identify, starting from some underlined quotations in the interview texts, the *resources*, and then the wider *competence areas* composed by the resources themselves. This latter operation was conducted in parallel by two researchers in order to avoid some biases due to the subjectivity of the classification of the resources. 929 items were considered and the following results in terms of competence areas and their specificities were found (Table 1.):

- the first category, considered on the basis of a quantitative criterion, is surely the one concerning the didactical aspects, which alone groups more than the half of the all quotations As this category is not homogeneous inside, it has been divided into two main dimensions: accompaniment on one hand and all the other declinations on the other hand: that is to say that "motivation" and "problem solving" can be easily assimilated with "e-L: didactics", which, on its turn, picks up other didactical strategies.

- The second category, which concerns some teacher's "personal characteristics", shows the same unhomogeneity, since "flexibility" is just one of the characteristics – evidently with a lot of occurrences, as, for example the declination about "person" and "meta-reflection".

- Then there are three other categories which, although less represented than the first two, have the pregnancy to be separately considered. The third one, with the label "psychology", has almost a disciplinary character, with which we point out some aspects related specifically to adolescence – in case of apprentices – and their dynamics, and related to the management of the relation with the other, and, finally, related to the specific object "learning".

- "Collaboration" has a more organizational value, as it concerns the attitude to team-working, to the division of tasks, to the organization of resources in a same project.

- As last, there is a category that in our opinion some years ago would have appeared with a different weight: it's about specific technical aspects set by ICTs.

General competences (and %)		Principal declinations (and %)		Nr. occurrences
Didactical aspects	(53.93%)	Accompainment	(13.13%)	122
		e-L: didactics	(36.06%)	335
		Motivation	(2.15%)	20
		Problem-solving	(2.58%)	24
Personal characteristics	(17.33%)	Flexibility	(6.03%)	56
		Meta-reflection	(6.89%)	64
		Person	(4.41%)	41
Psychology	(10.98%)	Psychology	(10.98%)	102
Collaboration	(10.55%)	Collaboration	(10.55%)	98
e-L: technique	(7.21%)	e-L: technique	(7.21%)	67
Total			*(100%)*	*929*

Table 1. Absolute and relative distribution of the occurrences for "General competences" and their "principal declinations".

Some results of the Alceste analysis

Referring to other texts (Image, 2000; Reinert, 1993) for what concerns the methodological details about Alceste, we show here a brief and rapid data analysis.

The total u.c.e.[6] of our *corpus* are 7304, all selected for the analysis, which originated as output the following dendrogram[7]:

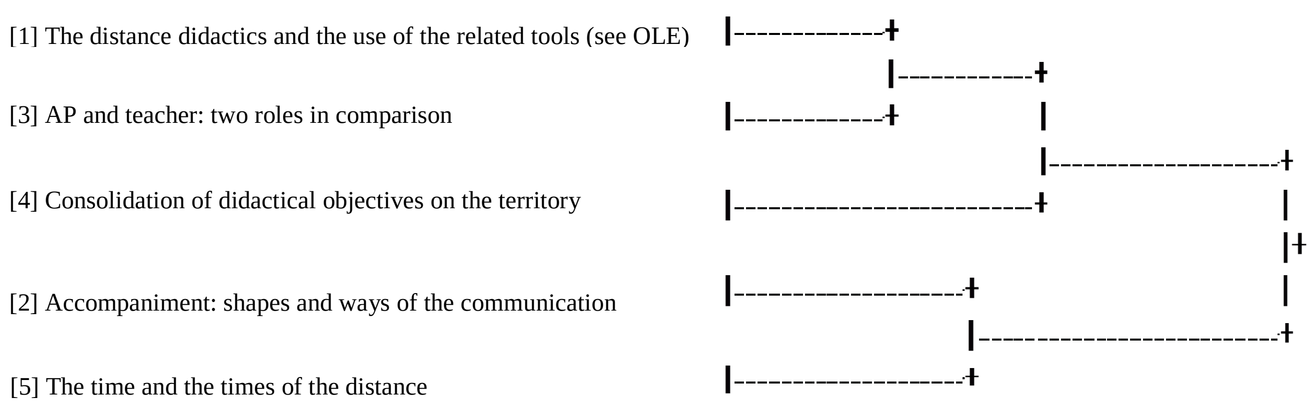

Figure 1. The five classes emerging from ALCESTE analysis represented in the dendrogram.

[6] U.c.e. stays for Unités de contexte élémentaires. «Il s'agit, non pas de comparer les distributions statistiques des "mots" dans différents corpus, mais d'étudier la structure formelle de leurs cooccurrences dans les "énoncés" d'un corpus donné» (Reinert, 1993, p. 9). In order to be able to analyse the textual productions, Alceste automatically defines, using a statistical heuristic (ivi, p.17) some enunciates, or, better said some "Units of Context", on the basis of two criteria: one related with punctuation, and the other to the number of words, defined as *simple forms.* Differently said: «L'u.c.e. répond à l'idée de phrase mais calibrée en fonction de la longueur (évaluée en nombre de mots analysés) et de la ponctuation» (Image, 2000, p.9).

[7] We do not present here the content of the class n.3, as it is concerning the theme of the role between the teacher and another tutoring role involved in the project and represented by the so called "Practical Assistant in Computer mediated Communication" (AP), i.e. those "tutors" who participated to the interviews.

Starting from the analysis of the specific terms of each class, we can reconstruct the *emerging lexical worlds*. From the reading of the specific vocabulary, of the most characteristic u.c.e. in the classes, and of the significant absents – those words i.e. significantly less present in the class than in the rest of the corpus – it is possible to understand and interpret in depth the content of each classes.

- *The distance didactics and the use of the related tools (with specific reference to the OLEs).* In this category we find the main thematic of the distance didactics such as the necessity of a specific planning of activities and didactical materials, the considerations about the management and use of an OLE, the reflections about the necessary conditions in order to plan and develop cooperative activities and team-work in network. "Presence" and "distance" are, therefore, two emerging concepts in a category that we could describe as an analysis about the suitable and *useful* didactical *use* of *OLEs* and of multimedial *tools*.

- *Consolidation of objectives on the territory.* Fundamental in this class is the *balance* emerging from the protagonists' point of view about the activities foreseen by the *project*: in this sense the interviewed subjects operate a comparison with the didactical activities supported by the ICTs experienced before, directly related to the reached *objectives* and the impacts on the *territory (context, school,…)*, in an *experimental* perspective, grounded in the *experience*.

- *Accompaniment: shapes and ways of the communication.* The class #2 is a long list of actions operated by the teachers in order to realize that accompaniment and that *tutoring*, which frequently is defined fundamental for the learning characterized by distance interactions. In this category emerges a set of *communicative strategies* with the different tools at disposal (*e-mail*, *telephone*, *sms*) for solving *problems* (technological or not) faced by the apprentices. In addition to this, there are themes concerned the communication management and, therefore, the definition of a netiquette, and of some other rules requested by the on-field-practice.

- *The time and the times of the distance.* Central is here the thematic of the assignment, but in particular connected with that of the revolution in time (and consequently in behaviours) which are imposed by distance didactics. By saying "time" we are referring to a micro-dimension – in the rank of "minutes" spent to see a streaming video, or in the OLE, and to a macro-dimension which involved the organisations of one's activities all over a week.

The integration of the two analysis: the 11-competences profile

From the comparison and the integration of the two analysis, the so obtained 11 families of competences[8] are:

1. *Mastery of tools*. The teacher knows and is able to use the different didactical technologies. In particular he/she knows the potentialities of each tool and he/she is able to use them and manage the hardware-side and the software one.

2. *Didactical values of the tools*. The teacher is able to choose among different tools on the basis of their characteristics and of the objectives that have to be reached. He/She knows the specificity of each technology, non only in a technical sense, but above all for what concerns the usage potentialities in the didactics. He/She can identify which instrument is suitable to

[8] It is possible for each competence area to have, in the protocol at our disposal, a very accurate and precise description of the knowledge, the know-how's and attitudes entailed in it, as they emerged in the interviews. Here, to be more synthetic, we report just the competence areas. We use here the term "teacher" referring to the teacher who makes use of ICTs in his/her didactics.

different didactical situations and in relation to the pedagogical models chosen. He/She can also alternate different tools in order to reach diverse objectives.

3. *Didactical planning*. The teacher is able to make a project-based didactics. He/She can adapt in itinere the training path to the audience's need; he/she can effectively alternate presence and distance situations, creating blended learning situations, which implicates a particular attention to the preparation of didactical materials, of instructions and objectives. From these latter the teacher wonders about which competences are enabled by the blended learning situation.

4. *Didactical strategies*. The teacher is able to use didactical strategies specifically related to ICTs. In particular he/she doesn't apply to the distance situation a traditional presence didactics, but he/she knows and he/she is able to make operational peculiar didactical approaches for the distance learning. He/She is aware of the distance dynamics and he/she is able to face them and use them in order to obtain better results in learning, making use, each time, of the collaborative and cooperative learning, the *parcours* individualisation, of the problem solving, of the learning by doing, ect.

5. *Familiarity with the new normative and symbolic context*. The teacher has internalized a new training system which gets over the traditional and Aristotle's unities of space and time. In particular he/she now knows that the training has not a unique place and time anymore, neither a unique form (formal training versus informal training). The teacher is able to act in this new framework, to adapt to it, and to take advantage of it, seeing its potentialities.

6. *Accompaniment*. The teacher is able to build a support to the learning process. In particular he/she can use strategies such as scaffolding, tutoring, coaching, mentoring, which support the students and facilitate in his learning path. Doing this, the teacher brings into play his resources related to Computer mediated Communication, and his/her ability to manage and animate groups.

7. *Posture de recherche*. The teacher is able to develop a constant reflection on his/her own practices. In particular he/she is able to wonder about acted didactical situations, and to assessing their impact; he/she can put his/her experiences and errors to good use; in the realization of the didactical projects, he/she is able to adopt an experimental perspective, in a research-action perspective.

8. *Relational dynamics*. The teacher can create positive and profitable pedagogical relationships with his/her students and with other participants to the work-group. In particular he/she is sensible to the relational dynamics, open to listening and helping, he/she is able to engage him/herself in dedicate time, energies, and care to the relationships, taking care, in particular, of distance interactions, by feeding them in presence, and, indeed, preparing them in presence.

9. *Ethic approach*. The teacher is able to reflect on the ethic aspects imposed by the new technologies, and to accomplish suitable and consequent training situations. He/She is in fact able to teach a critic use of the technologies, in particular of the Web, by creating and negotiating shared usage rules (netiquette).

10. *Flexibility*. The teacher can be flexible, open, reactive, adaptable to diverse contexts and situations: that means he/she is able to adapt him/herself to new space-time contexts, made possible by the use of ICTs and characterised by the flexible reorganisation of time and by the decentralisation of spaces.

11. *Team-work.* The teacher is able to operate effectively and efficiently in a team work. That implicates, in addition to the above mentioned relational abilities, the capability to work in a network of professionals, exploiting and integrating each competences, creating and maintaining a positive atmosphere, organizing a fair division of tasks on the basis of the roles and working in a interdisciplinary perspective.

Having at our disposal the whole competence profile, we finally wanted a validation process made through a survey delivered to about 100 teachers also using ICTs, survey which foresaw an attribution to each of the 11 competences concerning its importance; the results confirmed the "very important" character of all the underlined dimensions, confirming their pregnancy.

Some peculiar points emerging from the *référentiel* are:

- *the preponderant interest for didactical aspects.* Tools are in this perspective interesting as vehicles, mediators of contents. The interest is therefore focused on knowing the *specificity of the tools,* in order to be able to choose with *ratio didactica* which is the most suitable instrument, in order to *plan* a didactical path conforming to the different potentialities made available by ICTs;

- *teacher as researcher and part of a network*

  - some elements reinforce the necessity to develop a *posture de recherche* as an adaptability answer to the changing contexts, which impose to adopt, in a proactive way, an experimental perspective and, on the other side, to have an habitus for "meta-reflection", the innate attitude to build a praxis-reflection circularity on one's action (Schön, 1983);

  - in addition to this, the teacher cannot perceive himself any more as an isolated professional, but as a part of the network which composes the school organisation, which shares the some challenges, the same objectives and collaborates as a real *équipe,* with an efficient division of roles and labour;

- *the necessity to deepen the role and the accompaniment dynamics.* The teacher is anymore seen as a transmitter of knowledge, but rather the one who orchestrates, leads, acts as a companion in the discovering of knowledge. It's worth to deepen this *scaffolding* function in its different facets such as *coaching, mentoring, monitoring, tutoring,* etc. A second dimension refers to the necessity of *mastering communication* in its shapes and modalities: the teacher should have experience and cognition not only (and "simply") of *tools,* but also, and above all, of the *psycho-social dynamics* involved in communication.

Some conclusions about the research pattern

The wide overlapping between the results of the qualitative path and the quantitative one shows that a multi-methods analysis can assure some stable results, even though the qualitative one is often object of criticism because of the well-known biases of the categorization.
Anyway the qualitative method based on a deeply-rooted analysis in the texts permits not to move away from the real and acted practices of the professionals in the context of ICTs related didactical situations. The analysis and categorization of people's real practices is a way to reconstruct [1.] their resources and [2.] the related wider competences areas.
The concept of *competence profile* allowed us to have an overview of the professional profile of the teachers which is made up of set of competences empirically pointed out, and which will be useful for the design of training path for teachers using ICTs. In this direction, a praxis-reflection

circularity, on the didactical experience using the ICTs seems to be the way to be taken to investigate the impacts of E-Learning and Distance Education.

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FROM PSYCHOMETRICS TO ePORTFOLIO - HOW DO WE ASSESS eCOMPETENCE OF ACADEMIC STAFF?

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KEYWORDS

eCompetence, competence development, eCompetence assessment, eCompetence diagnosis

ABSTRACT

In the light of ICT-driven innovation in our society, the relevance of human resources management for a competitive corporate sector and of competence development for an effective educational system is currently stressed. Beyond doubt, the concept of competence is complex; it includes many challenges in its transmission into practice and there is a need for additional research on methods and instruments for competence diagnosis and assessment, in particular in the field of eLearning. This paper introduces the concept of eCompetence for the context of higher education. Its main focus is on the discussion of a range of methods for assessing and measuring eCompetence of academic teachers.

1. THE RELEVANCE OF eCOMPETENCE IN EDUCATION INNOVATION

The 2006 policy paper of the ODL Liaison Committee has amongst other things stressed the importance of human resources development as one key driver for a competitive knowledge society. It has pointed out the role of the education and training system in societal innovation, the need to rethink and to innovate this system, and to implement the life-long learning perspective as well as to foster the underlying learning-to-learn competence within education at all levels (ODL Liaison Committee 2006).

The topic of competence development in general and of eCompetence in particular is closely linked to these wider policy reflections on ICT - driven societal and educational change. In the higher education area, recent discussions have evolved in eLearning on the strategic challenge to implement new technologies in a sustainable way into universities (Euler & Seufert 2004, Duderstadt et al 2003). eCompetence research represents one aspect within this discussion. Its main interest is on the role of the human factor in technology-driven innovation in universities. In current human resource management models, individual competences of the employees are defined as the most limited resource of the organisation (Albrecht 2005, North 2005). When we apply this assumption to eLearning the higher education sector, eCompetence is, at its core, dealing with the development of personal competences in the creative use of ICT. You cannot innovate a university without developing the competences of its academic staff members.

2. ACADEMIC TEACHERS AS GATEKEEPERS FOR INNOVATION IN HIGHER EDUCATION

Academic staff is playing a key role in education innovation. They are the 'process owners' or 'gatekeepers' of the research and teaching activities within the university (Kerres, 2005). Higher education teachers define and plan the curricula. Digital tools offer a wide range of options to enhance teaching and learning in universities, if they are embedded into innovative pedagogical concepts. But the design of innovative teaching scenarios is demanding new competences from the academia. Staff members need to be aware of and to understand the innovative potential of the technology that is available for their research and teaching - they need to develop competences to cope with the technological challenges in their workplace (Salmon 2004).

3. WHAT IS eCOMPETENCE IN THE HIGHER EDUCATION CONTEXT?

In the scientific debate, various approaches to competence can be found. Weinert differentiates at least nine different ways, in which competence is defined or interpreted (Weinert 2001). For the construction of a theoretical eCompetence framework, this paper will focus on the action competence approach and its main implications. The action competence concept can be seen as holistic approach, that systematically combines cognitive and motivational components into a coherent dispositional system. Based on the action competence approach, the focus of the eCompetence concept is to analyse the educational context, in which the competence of academic teachers to apply ICT in teaching and learning becomes manifest.

Competence is not limited to the acquisition of skills. Competence is dealing with the ability to handle challenges that occur in a specific situation in an adequate way. Competences are expressed and demonstrated in an act of performance and they are always related to a specific social context. Van der Blij defines competence with a focus on performance as "... the ability to act within a given context in a responsible and adequate way, while integrating complex knowledge, skills and attitudes" (Van der Blij, 2002). The definition of Van der Blij integrates consistently the key components that a theoretical eCompetence concept needs to include.

Although eCompetence is using a technological focus, the required competences for academic staff are not limited to the 'e', the electronic component of the term. eCompetence needs to be interpreted in a wider mode. It includes not only technical aspects, it is understood as the educational ability to use ICT in teaching and learning in a meaningful way. Here we focus on individual eCompetence for discussing on how to diagnose and to measure this competence type of the individual teacher.

Considering closer individual eCompetence, we identify the following key components: the action competence the teacher, which includes his or her general cognitive disposition to act; and the particular context in which the performance of the teacher is situated, which are those teaching and learning scenarios which embed or rely on the use of ICT.

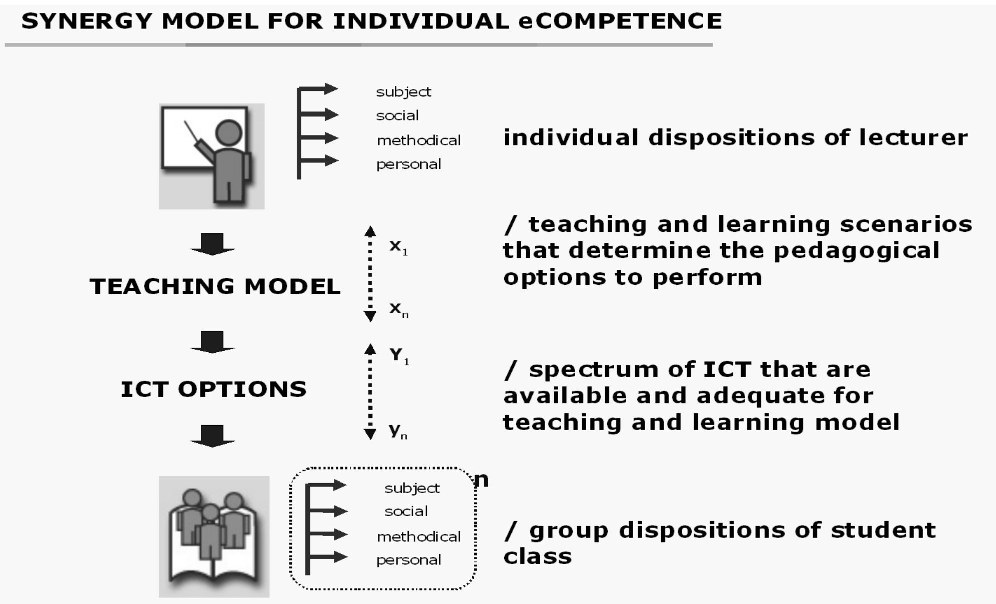
The first key component is the action competence of the individual university teacher. As outlined above, action competence sets the focus on the performance dimension. Erpenbeck & Heyse have constructed a model that defines and integrates four key competences personal, social and communicative, methodical and subject matter competences into an overarching action competence (Erpenbeck & Heyse 1999). We use this action competence model and its inherent implications in our individual eCompetence concept.

The second key component of eCompetence are ICT-enriched teaching and learning scenarios. This eContext is not yet specified. As the dimension in which the performance occurs, eCompetence can only be inferred in a meaningful way from a specification of the situative context. As contextual environment, the eContext determines the options of the lecturer to perform in a given situation. Which variables are included in this eContext?

From educational science perspective, we can start with pedagogical models that have emerged for the design of lectures and courses in universities. Ideally, the teacher selects from a range of pedagogical models for teaching and learning one model that seems appropriate for the specific course or teaching scenario, in which he or she will interact with the student group. Once the teacher has selected an appropriate teaching model, a selection of adequate ICT tools for use in the pedagogical scenario can take place. The ICT options available for the teacher are arrayed in a spectrum of electronic variables which range in their complexity from simple electronic documents to highly complex electronic learning environments. This way, the eContext is a second spectrum of variables in the concept individual eCompetence which is combined with the spectrum of pedagogical variables the teacher also needs to consider for his or her performance.

When we combine these two spectra in a synergy model for individual eCompetence, there is one additional key component to be added: this is the eCompetence of the students which interact with the teacher in the ICT - enriched teaching and learning (Schneckenberg & Wildt 2006).

Chart: individual eCompetence model for academic teachers



4. APPROACHES TO MEASURE eCOMPETENCE OF ACADEMIC TEACHERS

It is easy to infer from the model, that the eCompetence concept integrates a high number of variables which influence the competence and performance of the teacher in a given eContext. On the basis of this complex context, we need to think about adequate methods and instruments that can be used to measure eCompetence of academic teachers. Still, the eCompetence concept contains one important constraint for the selection of adequate methods: the measurement of individual eCompetence is always related to a particular institutional innovation scheme. Only in relation to the detailed institutional strategy, which has been taken by a university, individual eCompetence measurement is possible and purposeful.

This methodical constraint is expressed in a research project of the Dutch Digital University, which has developed an instrument named 'professionalisation tailored to the organisation'. This instrument can be used to realise an inventory of competencies related to the innovation readiness of a group of faculty members. In the field of ICT, individual competence measurement gives an insight into the personal eCompetence of the teacher which is related to the eCompetence of the group of involved stakeholders in the innovation process, the shared vision of the innovation results and the relevant wider institutional context. But the results are only relevant for the specific organisational context of the group (Stalmeier 2006).

Keeping in mind this constraint, we can consider a range of methods and instruments that might be applied to measure the individual eCompetence of the academic teacher. Approaches to measure competence are often based on psychological diagnosis instruments and psychometric tools. The diagnosis of eCompetence on the basis of quantitative psychological and physiological performance indicators which are recorded in a media laboratory environment could generate valuable data for a reconstruction of the motivational background of the personal competence development interest. Weinert remarks at one point: "If one wants to infer properties of individual competencies from inter-individual performance differences, one has to account for motivational factors by varying assessment conditions" (Weinert 1999). The variation of assessment conditions for performance indicators can only be feasibly controlled and measured in psychological laboratories. In academic practice, to implement psychometric diagnosis for academic staff would proof problematic - given both the challenge to set up such an laboratory situation for a real teaching performance in a university course, and the opposing attitudes of the academic target group towards having their teaching performance assessed in a laboratory situation.

The same hindrance of academic opposition would probably apply to external assessment through tests. External assessment through testing is not really feasible for academic staff members. Scientists, in particular when having reached professorate status, may find it hard to accept external test systems as method for assessing their personal competences. So, while in theory external assessment through testing academic teachers might be adequate for competence measurement, in practice academic culture is reluctant to having applied this method widely.

A third option in this type of measurement is the external assessment of the teacher's eCompetence by the students. A widely used assessment format is, e.g., a questionnaire for students that enquires about the teaching performance of the lecturer in a given ICT - enriched learning environment. The outcomes of the student assessment can efficiently be compared with a self-assessment of the academic teacher on his or her eCompetence and thereby serve as a cross-reference for the data interpretation.

Self-assessment is in fact widely a used and accepted option for the target group of academic staff. It can for example be based on a checklist of individual eCompetence profiles, that the university has developed as target values on the background of its specific innovation model. A more challenging task in the self-assessment of the teacher's eCompetence is the motivational dimension. The general motivational influences on the performance of the academic teacher in a specific eContext cannot be directly measured. What can be measured, are competence-specific motivational attitudes. In this regard, promising approaches focus on aspects of the self-concept and self-efficacy beliefs of the academic teacher about the origins and use of specific competencies (Weinert 1999).

In this research perspective, McClelland & Boyatzis have developed a methodology for assessing work-related competence in the corporate sector, which could be applied to diagnose eCompetence of academic teachers in universities. This methodology is called the behavioural event interview - which is based again on the critical incident interview. This critical incident interview asks the interviewees to reflect on their behaviour in critical situations they encountered in their workplace. In the behavioural event interview, researchers first select two sample groups within the organisation, where the study is carried out: the first group are outstanding, and the second group are average job performers in a specific work context. Next, the researchers take in-depth interviews with the actors from both sample groups: the interview questions focus on the way the interviewees do their work.

The clue within the interview is thereby to emphasise the questioning on critical situations: the specific research focus is on those decisions and those actions which the interviewees have taken in critical situations, when the work processes have been developing exceptionally well or bad for them. After having taken and recorded the interviews, the transcripts are analysed and specific behavioural indicators which can be identified and extracted from the reflections of the actors are notated. These indicators are then clustered into a set of competences for both sample groups of the study. The contrasting selection of the two sample groups helps to identify more clearly those competences of the outstanding performers which make a difference and are the foundation for their success in the work context (Boyatzis 1982).

One method of competence measurement, which is recently becoming quite popular in the higher education context, is the ePortfolio approach. The main idea behind the ePortfolio is to map and to electronically document individual competences in a specific field, which have been acquired in the personal development process (Batson 2002). Thereby, the ePortfolio does not differentiate between formal, non-formal and informal learning processes. As a method, the ePortfolio could be understood as a form of self-assessment of individual competences. The method itself does not differ much from the questionnaire-based self-assessment, the different format allows nonetheless a more flexible mapping and documentation of individual competences.

One concrete example where the ePortfolio approach is applied for mapping and managing Competence of academic teachers, is the TieVie network of Finnish universities. TieVie is a Finnish nationwide support service project of the Finnish Virtual University providing training in the use of ICT in educational settings. The training is intended to all the teachers and other staff members in Finnish universities, with participants from all 21 universities in Finland. During the training, the participants document all the work products, which they have done during the course, in an electronic portfolio. The purpose of the ePortfolio is twofold: it is used for as self-reflection tool for the personal competence development of academic teachers; and most of the portfolio documentation is accessible for all stakeholders involved in the innovation process, except one reflection part, which is restricted to private use (Ruotsalainen et al. 2005).

A second example on the use of ePortfolios in higher education institutions is given by the SURF Foundation of the Netherlands. A detailed description of the models used, and the implementation contexts is given by Aalderink and Veugelers, who predict, that the ePortfolio - as competence mapping model, and the 'folio thinking' - as conceptual approach in the field, will remain a strong trend in the near future in the Netherlands (Aalderink and Veugelers 2005).

Another feasible option for measuring and assessing eCompetence of academic staff could be a peer review evaluation. The peer review is deeply rooted in the academic tradition. The precondition to measure eCompetence in a peer review approach is nonetheless the existence of a community of practice, where academic teachers meet and share each otter's ideas and perceptions on the use of ICT in teaching and learning activities. Once again the peer review of the individual teacher's competence and performance would necessarily be based on a set of common values or criteria that this community shares. This is a consensus-based model, which is recently linked with the discussion on faculty readiness for technological innovation processes in universities.

A prominent input into this debate has been given by Hagner, who has made a classification of four different types of faculty members in relation to technological innovation readiness. The peer review method of competence assessment in a single university would have to develop indicators based on the different faculty member types and relate the assessments to this classification. Hagner writes on this method: "Conduct an assessment of faculty readiness that includes both their existing level of use and what they would like to do given the right conditions. Make sure you learn what they consider the 'right conditions' to be" (Hagner 2000).

Finally, the KKR - Kasseler Kompetenzraster, tries to assess group competences in a specific work context. The KKR is one instrument for the analysis of group processes in order to understand competence development and to assess existing competence levels within a group. The KKR approach is quite work-intense - it calculates 30 hours assessment work for the analysis of a group session, and the group size is restricted to 5-7 persons maximum (Kauffeld et al. 2003). The scalability of the KKR is thus limited and its operationalisation in university contexts questionable. Still, network analysis or group competence measurement approaches like Hagner's faculty typology or the KKR can be interpreted for our research field as strong indicator that the individual eCompetence of the academic teacher has to be observed in relation to the particular performance context.

5. CONCLUSIONS

The discussion of approaches to measure eCompetence of academic staff members has started with a clarification of eCompetence. The general concept of competence is used in many different ways in the research literature. A meaningful definition of the competence term can only be reached, when it is applied to a specific context. In the case of eCompetence research this context is set by the conditions, in which ICT-enriched educational processes in higher education take place. The concept of action competence has been introduced and applied to the specific eContext. We have discussed individual eCompetence, considering its inherent key components - the individual teacher, the pedagogical model, the ICT options and the student group, and we have merged these components into a holistic model.

Next, we have discussed a spectrum of methods and instruments that could be feasible for measuring and assessing eCompetence of academic teachers. Some methodologies may be more favourable and adaptive to the particular academic environment and the willingness of scientists to participate in assessment sessions. Some proposed measurement approaches are applicable to assess individual competences. There are also approaches that assess distributed group competences. For all described methods it is important to recognise the decisive role of the context: eCompetence can only be measured in a meaningful way according to standards that are set in specific institutional contexts and conditions.

There is a strong tension between abstract policy plans to standardise ICT competences and the particular variables and performance conditions in real contexts. The wider the definition of ICT competences is spanned, the less concrete and specific are the implied conceptual assumptions - see, e.g., the key competence definition of the European Commission (European Commission, Key Competences 2005). The same relation applies to methods and instruments for measuring competences: The wider and more universal the approach to measure competences is chosen, the less valuable are the results and the interpretation of the collected data. On the societal background of the rising complexity that we face in our lives, the policy strive to define and foster a generalised set of key competencies seems understandable and justified. But there is no easy, scalable solution for macro-level competence development strategies in society and education. We rather need to think in terms of modularised competence management approaches that fit the specific meso- and micro-contexts in which they are being developed.

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Reverse analysis of online students' interaction and its moderation: an emerging methodological approach to study e-moderation.

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Abstract

The focus of this paper is an emerging analysis approach based upon the open coding of online transcripts. The overall aim is to assist moderators and those who study moderation to be more analytical in learning from several records of data of what happened online during the e-moderation activity. The analysis described here is part of a PhD project that aims to re-conceptualise the way that tutors moderate the online discussions of students in Higher Education (HE) contexts.

Introduction

Teaching and learning in an Asynchronous Learning Network (ALN) is one of the main focuses of educational research over the last decade. The primary goal of research in the field of ALN is the process of learning and the pedagogy that supports effective learning (Benbucan-Fich, Hiltz, and Harasim, 2005). The process of learning and the pedagogy in an ALN have been examined by a number of researchers in the field of computer mediated communication (Harasim, 1990; Henri, 1992; Newman et al., 1995; Gunawardena et al., 1997) and e-moderation in particular (Mason, 1991; Berge, 1995; Salmon, 2000; Garrison & Anderson, 2003). The work of these scholars suggested that computer-mediated communication may facilitate deep and meaningful learning and that the online learning experience may be enhanced by effective online tutoring by a moderator.

E-moderation, as a sub-set of e-learning , may include a variety of strategies and teaching approaches , i.e. questioning, scaffolding, feedback, task structuring in order to engage the students in the learning process. I argue here that the study of e-moderation should primarily be an 'educational study' with all the complexities that this may mean for the researchers (i.e. multi-dimensional approaches in the analysis: psychological, pedagogical and sociological). This approach contrasts existing relatively current frameworks of researching e-moderation (Salmon, 2000), which were not devised to deal conjointly with educational issues as for example the three aligned elements of intended learning outcomes, activity and assessment. As a result important pedagogical questions remained answered (Lisewski & Joyce 2003). In addition to this, having carried out an extensive literature review in the area of e-moderation {Vlachopoulos (2003)} I reported a significant lack of researches in the area of online learning in respect of authentic naturalistic contexts where online teaching and learning is part of an ongoing programme in Higher education. When working with learners on credit bearing courses, there are added pressures on tutors and moderators to meet the perceived needs of the system and of learners. The potential for learners to make the most of the online discussions has yet to be achieved; it is suggested that the tutors have a role to play to support the students to succeed as learners in the online discussions. In order to examine the way online tutors execute their roles, more methodologies, which will allow a micro-level analysis of the online interactions, are required.

Research on teaching and learning in the Asynchronous Learning Networks: a brief review

The principles of the theories of Constructivism and Socio-constructivism have driven most of the research into online students' interactions and its moderation in the ALN (Pena-Shaff, et al., 2001). Educational researchers here reported findings based mostly on quantitative data, i.e. rate of participation and interaction. However, quantitative data does not address either the nature of the process or the quality of the learning taking place in an ALN. Mason (1992), almost 15 years ago, explicitly warned the research community about the danger of generalising findings about learning and teaching by mistaking student activity for learning and the quantity of interactions or rate of participation for quality of interaction (cited in Pena-Shaff & Nichols, 2004). Nevertheless a careful examination of the research in ALN over the last decade shows that Mason's warning was not seriously taken into consideration.

From the early 1990's, when the concepts of online learning and online interactions were making their first appearance in teaching and learning literature, and for more than a subsequent decade researchers approached the field of asynchronous online learning with an interest in the levels of participation and level of interactions among participants of the online conference by collecting, analysing and presenting quantitative data gathered from computer conferencing systems. Using mostly quantitative methods i.e. quantitative content analysis, those researchers developed a plethora of theoretical frameworks (coding schema) for the analysis of learning processes online. Henri (1992) was the first to develop a framework which included the interactive, cognitive and even meta-cognitive processes of the online learning. Many others followed, building upon and expanding Henri's framework (i.e. Newman, 1995; Gunawardena et al., 1997; Pena-Shaff et al., 2001).

Some of the difficulties that scholars have reported with their quantitative studies included the selection of the unit of analysis, lack of reliability of the developed frameworks, the contextual factors as well as the lack of triangulation with different sets of data. Anderson et al. (2001) reported difficulties with the selection of their unit of analysis. Their concern was that depending on the selection of the unit, the analysis process can be extremely time consuming and subjective (open to different interpretations by different coders). In relation to the above issues of reliability, Rourke et al. (2001) published a table with 19 studies on computer-mediated communication from which only 10 had reported any form of reliability. Other studies, for instance Gunawardena et al. (1997), reported results based merely on a small scale research which was conducted using a sample of experts in computer-mediated communication. As expected, their results were criticised as highly subjective. Pena-Shaff & Nicholls (2004 :247) referring to Gunawardena's study argued that 'it's not clear how their findings would apply to discussions undertaken by students, who are themselves not yet proficient in the arts of persuasion and argument'. Finally De Laat and Lally (2003) argued that most of the quantitative content analysis studies do not triangulate with other robust and qualitative approaches that might offer access to further evidence. De Laat and Lally (2003:11) clearly reported that from their experience ‘it is not easy to research the processes of these (online) interactions using a single method’.

In similar vein to the above, researchers in the area of e-moderation appeared to be using given or suggested frameworks of online tutoring. Since Mason (1991), who was one of the first scholars to conceptualise the roles that tutors play online, many others scholars built on her ideas to devise their own frameworks of e-moderation. Mason (1991) had divided the moderators’ roles into ‘social’ ‘pedagogical’ and ‘intellectual’ roles. Berge (1995) and most recently Salmon (2000) continued to build upon Mason’s ideas with very little new concepts added into the research body of e-moderation. Berge continued to refer to Mason’s three roles adding a fourth one (technical role) while Salmon (2000 & 2004) created a 5–stage model which also included activities on ‘socialisation’ ‘pedagogy’ and ‘technological issues’. There was very little, if any, attempt by the above scholars to be specific in their analysis about the purpose of the moderation activity and the particular contexts from which their moderation frameworks emerged.

It is argued in this paper that in order to initiate a discussion around the issue of learning online, one should include analysis of the tutors’ interventions (the e-moderation and its impact) within a given context. It is important in such e-moderation analysis to trace the obvious and immediate students’ reactions to the various e-moderators’ interventions, while, of course, acknowledging the fact that there might be other elusive or delayed reactions. In the following section of this paper, the focus will be on an approach used to analyse the impact that particular tutors’ interventions had on the ability of students to work online in particular tasks. The analysis described is part of a PhD project that aims to re-conceptualise the way that tutors moderate the online discussions of students in HE contexts.

The Study

The subject of inquiry in this PhD project is a re-conceptualisation of e-moderation. The principal research question investigated is:

- What are the main decisions that the e-moderator makes, in choosing and designing inputs and in deciding when and how to intervene to respond to students’ contributions in asynchronous online discussions?

Research Setting

The research took place in 2004 in two different higher education settings in the UK using the case study approach (Yin, 1994):

Setting one

A Masters course within the School of Education at the University of Manchester was selected as the first setting for this research. Three e-moderators and seventeen students from different countries participated over a period of one academic semester in
a blended master’s course in ‘Communications, Education and Technology’ that was delivered using a mix-mode approach (face-to-face tutorials and VLE sessions)

Setting Two

An undergraduate course within the School of the Built Environment at Heriot-Watt University in Edinburgh was selected as the second setting for this research project. One e-moderator and twenty five students participated over a period of one academic term in a blended course that was delivered using both traditional face-to-face tutorials and an asynchronous virtual learning environment (VLE).

Data Collection

Data in this study was collected using a variety of methods:

a. A pre-course student questionnaire used in order to collect demographic information (age and gender of the students) as well as information about the students' attitude towards the on-line learning, and their past experiences in using computers and online discussions
b. Three sets of interviews with the e-moderators (before, during and after the moderation activity); and a focus group interview with students at the end of the moderation period to discuss their views on the usefulness of the moderation offered
c. The online transcripts from the online discussion board
d. A series of recorded verbal protocols from the e-moderators using the 'think aloud' approach. The purpose of this activity was to collect information about what the moderators were doing in terms of e-moderation activity, what they were about to do and what they hoped to achieve. A digital recorder was provided for the purposes of the recording of the protocols.

Forward and Reverse analysis of online interactions

The various interventions that shaped the 'moderation activity' of each of the moderators in the two case studies were captured during a coding process of the online transcripts from both the e-moderators and the students followed the grounded theory principles (Strauss & Corbin, 1990). This process was described by Anderson and Kanuka (2003:176) as 'grounded theory-based content analysis … a more structured way of qualitative content analyses'. The coding process started with an open coding. With this open coding all the data were split into discrete parts using the 'meaningful unit' approach (Chi, 1997). The coding process was assisted by the use of NVivo 2, which is commercially available qualitative analysis software. During the coding process, theory memos were written to record the development of concepts and categories. Those memos included information obtained by the other forms of data, such as the verbal protocols and the interviews, which contained elements of feelings and intentions on the part of the moderators. The coding process ended only when all segments of the transcript were allocated a code. A Kappa reliability check was conducted with two independent coders and a result of agreement of 61% was achieved. The open coding process generated a set of 21 categories for the e-moderator's interventions and 17 for the students' interventions, which are presented in the Tables 1 & 2.

The different codes generated during the open coding process were then conceptualised under two main categories: e-moderation of the **process** and e-moderation of the **content** **(**for the e-moderators) and engagement with the **process** and engagement with the **content** (for the students), as shown in Tables 1 & 2. The e-moderation of the **process** refers to the e-moderator's interventions in the process of doing an online discussion, whereas the e-moderation of the **content** refers to e-moderator's interventions in the content of the discussed topic during the online sessions. In relation to the students' codes 'process' refers here to the different stages that the students followed with the help of a moderator to take forward the online discussion towards the completion of a suggested task, i.e. by providing feedback to each other about how to discuss an issue or instructions on how to make a decision online; while 'content' refers to the development and assembly of ideas, topics, questions that the students discussed.

Process (Tutors)
Social Comment
Expectations
Agenda-Time
Clarifying roles
Self Presentation
Technology
Monitor Curriculum
Encouragement
Misunderstanding
Direct Instructions
Constructive Instructions
Question about the Process
Feedback on the Process
Content (Tutors)
Direct Content Input
Content Summary
Feedback on the Content
Bringing Resources Online
Providing Examples
Agreement with an opinion
Disagreement with an opinion
Questions about the content

Table 1. Tutors' interventions

Process (Students)
Social Comment
Setting group rules
Instructions
Expectations
Self-evaluation comment
Time problem
Expressing a feeling
Question about Process
Feedback on Process
Reporting a Technical Problem
Content (Students)
Express an opinion with justification
Express an opinion with no justification
Agreement with an opinion
Disagreement with an opinion
Feedback on the content
Bring Resources Online
Summarising Content Online

Table 2.Students'

The classification of students' interactions under 'process' and 'content' categories is not a new approach in education. For example Biggs & Collis's (1982) SOLO taxonomy introduced, among other concepts, a multi-dimensional approach to reflect on students' learning with questions about both the process and the content of a learning experience. Bloom's (1956) taxonomy is another example of how content and process have long been moving together at any stage of a learning experience.

What followed from the coding was an analyses process. The analysis process used in this study was characterised by John Cowan (2005) in an email exchange as a ‘reverse analysis of interactions’. The distinction between the ‘forward analysis ‘, which most of the researchers in the study of e-moderation used and the ‘reverse analysis’, suggested here, is that in forward analysis, the researchers start from what people hope will happen, and keep searching, perhaps with a fair amount of wishful thinking, for evidence that they were correct and successful. In reverse analysis, the researchers begin from what happened and which they or the students value, and work back to find out what contributed to that.

The main steps of the reverse analysis process followed in this study were summarised by John Cowan (over a discussion meeting) as follows:

1. You (the researcher) start from identifiable or claimed outcomes. This, after all, is what really matters in a learning and teaching situation.

2. You then trek back (rather than track back), to the analysis you have already made, independent of expectations or outcomes, of the interactions between students with students and students with moderator. On this second visit to the competed analyses, you seek out those elements in the analyses which seem to have contributed, or not contributed, to the identified learning. It is important at this stage to be on the lookout for claimed outcomes for which there seems no contributory input. The point here is to look for links, *and absence of links*, from interactions to learning claimed or evidenced.

3. You then trek back again, this time to your record of what the moderator told you, looking for what they were hoping to achieve, being their hopes either before or during the interactions.
If we are interested in moderation, what we want to know is what worked, and what didn't work. This, then, will prompt us in either case to ask "Why?"

What was significant in the end of analyses was the tracing back, through questions which begin from outcomes:

a. What, if anything, in the interactions between students and students, and between students and moderator, seems to have contributed to the online discussions?

b. To what extent was the moderator's contribution intended and purposeful?

c. What was ineffective? What parts of the moderator's intent seem to have led to nothing; and what aspects of the interaction do not seem to have contributed to the claimed learning outcome?

What did I learn from the reverse analysis process?

Many researchers would argue that it is relatively easy to develop ways to code online messages- thus the proliferation of coding systems. My concern with the development of any coding scheme for the study of online transcripts is just how it pushes my understanding forward. Coding of data can have quite a lot in common with illuminative evaluation. It describes a situation to us, and leaves us to make our own judgements based on that description. However, it is the analysis which follows the coding that matters.

In this study the use of the 'reverse analyses' allowed me to firstly analyse from facts (what happened) and then helped me interpret (by triangulating tutors and students voices). For example, I first noticed that a moderator chose to comment on certain points of this type of the students' messages, and not on others. Then, but separately, I interpreted the data. For example a moderator has made many comments of this type, on many students' postings; it seems something which is of importance to him or her.

By tracing back what followed the moderators' interventions and triangulating with what the moderators told me about their intentions and how the students commented on a particular moderation style I had a better understanding as to what in fact worked and what did not work during the moderation activity. It is not the purpose of this paper to present findings of 'effective' and 'ineffective' moderation; rather what I hope I have offered is an analysis approach based upon open coding of online transcripts, with an overall aim to assist moderators and those who study moderation to be more analytical in learning from several records of data of what happened online during e-moderation activity.

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Mapping Academic Collaboration Networks: Perspectives from the First Year of the Reusable Learning Objects CETL†

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Abstract

The 'Reusable Learning Objects' Centre for Excellence in Teaching and Learning (RLO-CETL) is a five-year project (2005-2010) involving staff from three universities (London Metropolitan, Cambridge University and the University of Nottingham) in a collaborative programme of development, deployment and evaluation of a range of multimedia learning objects that can be stored in repositories, accessed over the Web, and integrated into course delivery. One of the goals of the RLO- CETL is to provide sustainable and reproducible processes that will allow sector-wide collaboration, so as part of the internal formative evaluation of the RLO-CETL, we are concerned to analyze its character, boundaries and evolution, and how this develops in relation to individual and institutional contexts, priorities, structures. In this paper, we present some of the results of 'mapping' tasks in which twenty-eight participants (who included lecturers, tutors, students, multimedia developers, administrators, evaluators and managers) represented and talked about the networks of people with whom they communicated. There are aspects of the maps that indicate how the network of the RLO-CETL interacts and overlaps with institutional and individual networks.

Keywords

SNA, HE, Collaboration, RLOs.

1 Introduction

This paper describes how a ‘network mapping’ activity has been used to shed light on the nature and role of academic collaboration within a multi-institutional Centre for Excellence in Teaching and Learning (CETL). This initial exploration is by nature descriptive and does not, for example, analyze particular maps or use detailed analytic frameworks – although we point up the value of some important concepts drawn from various ‘network theories’. In addition, each ‘network mapping’ activity incorporated a focused, semi-structured interview, and we have only drawn on these in order to clarify issues and address questions raised by the ‘maps’ at this stage. The activity we describe here, then, explores individuals’ conceptions of the structure of the CETL network and their perceptions of their role (and the roles of others) within the network.

† This paper is based on the work of the Centre for Excellence in Teaching and Learning in Reusable Learning Objects (RLO-CETL). This is a five-year development and research project funded from 2005-2010 by the Higher Education Funding Council for England. Prof. Tom Boyle (London Metropolitan University) directs the Project and the Management Group members are John Cook (London Metropolitan), Dawn Leeder, Rob Alton (Cambridge), Heather Wharrad and Richard Windle (Nottingham). Other members of the team and further details available at: http://www.rlo-cetl.ac.uk

1.1 The RLO-CETL

The UK's Higher Education Funding Council for England have funded a multi institutional five year (2005-2010) project involving three universities (London Metropolitan University, Cambridge University and University of Nottingham) to develop, deploy and evaluate electronic, reusable learning objects that will be made available across UK Higher Education through the Centre for Excellence in Teaching and Learning in Reusable Learning Objects (RLO-CETL – www.rlo-cetl.ac.uk). Each of the three institutions undertakes two projects per year, the topics of which are purposely generic in order to facilitate reuse within and across institutions. A number of different roles can be identified within the CETL; in addition to managers and administrators, subject tutors in the three institutions are involved in the identification of areas for RLO development; in developing specifications; in provision of content; and most critically; in the deployment and evaluation of the electronic content within their undergraduate courses. Multimedia developers work from the specifications provided by tutors to develop electronic resources and advise on appropriate technologies, design, accessibility and other issues. Evaluation of the project is essential to ensure its maximum effectiveness and quality and this has prompted the development of the RLO-CETL evaluation strategy. The strategy reflects the overall design of the CETL, in that a series of mini-project evaluations are 'embedded' within a broader evaluation of the CETL as an emerging network; as such two final groups are evaluators in the three institutions and students who provide learner perspectives and contribute to evaluation both generally and of specific RLO's.

The literature on networks is wide and represents a range of different perspectives (see [1] for an overview of the application of different 'network theories' to educational contexts) and we have found one of the more useful characterizations – particularly given our concern with communication between members of the CETL - to be that offered by van Aalst: the systematic establishment and use (management) of internal and external links (communication, interaction, and co-ordination) between people, teams or organizations ("nodes") in order to improve performance. [2] Even this definition is limited as it implies that networks are established and that notions of 'performance' are unproblematic. We, on the other hand, do not know the true nature, size or scope of the network which the RLO-CETL is seeking to foster and sustain; similarly, we do not know how closely it conforms to models such as the 'communities of practice' described by [3] and [4]. It may be that other models of sustained collaboration such as 'communities of discourse' [3], 'learning organizations' [5], or 'knowledge innovation networks' [6] are more appropriate lenses through which its activities may be viewed and guided, particularly given the CETL's concern both with technologically- enhanced 'collaboration-at-a-distance' and with innovation rather than preservation of practice. Understanding these issues is necessary in order to accurately describe and assess the nature and benefits of collaborative activity across the CETL. At the same time, this understanding has the potential to inform the building, over the lifetime of the CETL, of replicable, sustainable processes and practices which will allow sector-wide development and gains.

1.2 The Mapping Task

The mapping activity used was based on one developed within the “Learning How to Learn” Project (part of the ESRC’s Teaching and Learning Research Programme in order to generate baseline representations of an organization’s active network (see [7], [8], [9]). The activity was open-ended, with respondents being asked to draw their communications and to represent with whom and how they communicated. It was suggested at the beginning of the activity that it should take about 15 minutes. Participants were encouraged to explain what was foremost in their mind as they compiled their map and this auditory commentary was transcribed for all participants. This commentary provided context and meaning for the maps that were drawn, and provided insights into the significance of the network elements they represented.

Participants were not constrained in how they represented the elements of the network, and the questions used to prompt them were concerned with their description of what they were doing, rather than with any explicit or implicit approval or guidance (see Figure 1 for the schedule used to introduce and support the task).

Figure 1. Mapping Activity Schedule and Prompts.

RLO-CETL Mapping Activity

We would like you to visualize the networks you are involved in and are going to ask you to communicate these through drawing rather than writing.

Whilst you are drawing we would like you to explain verbally what you are doing and we will tape-record these as annotations to the drawing.

Using pictures, and lines to link the pictures to show connections, could you show with whom and how you keep in touch?

If you are unhappy with the idea of pictures, use words in boxes, indeed annotate the drawing as much as you like. There is no ‘right’ or ‘wrong’ way of doing this! Many people start by locating themselves at the centre of a personal network, but this is not essential. The whole task should take about 15 minutes.

Prompts:
Have you have included everyone with whom the organization communicates?
Do the links best represent the way you want to show how communications happen?
Do you communicate with anyone else externally to the RLO-CETL about RLO-CETL issues?

Some of the maps resembled organizational charts, while others employed geographical metaphors; in some cases metaphors were employed and small cartoons, icons and symbols were drawn. Despite this variety, the vast majority of the maps that were drawn were some variety of ‘ball and stick’ or ‘mind map’ representation, with ‘nodes’ (people, places, organizations) connected by ‘links’ (means of communication or other interactions, co-attendance at events or institutional structures). In some cases modes of communication (email, phone, face-to-face and others) were represented. This allowed a consistent descriptive framework to be employed across the majority of the maps.

2 The Mapping Activity: Outcomes

Twenty-eight participants were asked to complete the network mapping activity – see Table 1 for a summary of their distribution. Mean times to complete the task are included as an indication both of the fact that is a relatively quick means of collecting data and of the fact that all participants, regardless of role or institution, were able to engage with the activity to at least the expected level. The activity was very well received, no participants declined to take part, and everyone produced a map (examples are included in Appendix 1). Respondents commented how they appreciated being consulted about their participation on the CETL, and they were largely positive about the mapping task as a useful, reflective task. The openness of the activity allowed the participants to emphasize those issues more relevant to them (while still allowing comparison across cases) and everyone involved was able and willing to express their views and perceptions.

Table 1. Summary of Maps Collected by Role and Institution and Mean Time Spent on Activity.

Participants (n=28)	Frequency	Mean time on activity (min)
Managers	6	19
Evaluators	1	11
Tutors	10	22
Students	2	16
MM Developers	7	17
Administrators	2	13
Institution A	11	19
Institution B	7	20
Institution C	10	17

Initially a purely descriptive frame was utilized (Table 2); as mentioned above, 'nodes' and 'links' were identifiable across all maps. We used types of nodes and links identified by the participants themselves as further sub-categories. We also described the overall structure of the maps and any particular metaphors used in relation to the network as a whole or elements of it.

Table 2. Descriptive framework for initial description of maps and associated data.

Nodes	Internal to CETL	Manager Tutors Administrators MM Developers Students Evaluators
	External to CETL	Institutions National Bodies and Organizations International Bodies and Organizations
Links	Face to Face Telephone	
	Electronic	Email Others (MSN, Wiki, Forum)
Structures	Patterns	Hierarchy, Directional Web, Decentralised Radial, Centralized

3 A Potential Analytical Framework

Given our concern about the lack of firm conceptual basis for the analysis of educational networks, we looked to a broader literature. We identified a number of theoretical frameworks offering a more complete and fruitful approach to analysis of at least some aspects of networking, of which Social Network Analysis (SNA) was the richest and most widely applicable. It appeared to offer a better account than the 'Communities of Practice' [4], particularly given the dispersed nature of the CETL and the fact that the close collaborations characteristic of Communities of Practice (while they may have been occurring within institutions) appeared to be less common across the CETL.

SNA characteristically describes networks by using some kind of proxy measures ranging from the broad and abstract (for example, Milgram's work on friendship, [10]) to more sharply-defined measures such as co-appearance in films [11]. All of these approaches and the analysis associated with them, however, are based on view that the whole network can be 'known' and that links are bimodal (they either exist or they do not) or quantifiable. In contrast to the ‘complete network’ analysis, our maps represented individuals’ views of the network links available. Such analyses are referred to as ego-centred perspectives of networks [12]. In this approach to network analysis, there is no assumption that individuals have oversight of the entire network, or even that an entire network exists. While the respondents characteristically located themselves (or their organization) at the centre of their maps, what was evident both from the maps and the accompanying interviews was that these were very specific (and in some cases limited) views of the networks to which they belonged and had access. As is the case in other ego-centred studies, the boundaries of the network being studied only emerged as data were collected [13], and even then were, in some cases, poorly defined. In contrast, whole network approaches have clearly established boundaries ahead of surveys or interviews with selected respondents.

4 Some Emerging Themes from Our Analysis

A first theme is that of *Conceptions and Perceptions*, which is closely related to the distinction between 'whole-network' and 'ego-centred' perspectives. The maps can be seen as combining the participants' *conceptions* of the CETL (a whole-network perspective, although perhaps an imperfect one) with their *perceptions* of the role it plays in their lives (an ego-centred perspective). Some participants – notably those managers involved either in the original establishment of the CETL or who have taken on management and coordination roles subsequently – have the clearest conceptions and tend to represent organizational roles, communication channels and processes in their maps. They also represent the CETL as a 'network of networks' (or perhaps a 'network of communities') linking *groups*. Other participants' maps are dominated by their *perceptions* of how the CETL operates on a day to day basis; these are typically less complete maps with fewer nodes and links, and tend to stress their links with *individuals*. They do, on occasion, reveal previously unknown sources of advice and information upon which individuals draw – exemplifying Marsden's point about the size of the network only becoming known in the course of data collection and analysis.

A second theme is that of *Strong and Weak Links*. The maps show evidence of both Granovetters’ [14] classes of link; within institutions and between managers, participants report that there is the regular, two-way and multiply-redundant communication characteristic of *strong linkage* while for many of the other participants their perception is of limited, single-mode access to information (either through email or from face to face meetings) – in some cases, these were represented by participants on their maps by showing long lines, or dashed or dotted lines, or the nodes at the end of the links were indistinct; at least some of the weak links were external to the CETL. It is important to remember that according to Granovetter, weak links are by no means less valuable than strong links – they just operate differently. This is a different issue from that of how effectively communication systems work within the CETL, which leads to our third theme – 'special' network roles.

5 Next Steps

There are certainly a number of strategic directions which the CETL might take over the coming years and some of these could be informed by thinking about networks. At present, we are particularly interested in the nature of the strong and weak links within the network and the extent to which individuals are beginning to form what [15] have described as 'intensional networks' of high value links which they nurture and work hard to preserve. We are also interested to discover to what extent the CETL can be sustained as a *network* in which participants have some localized 'strong links' but a potentially much larger set of 'weak links' on which they are able to draw as and when appropriate; or will there be a 'gravitational' effect in which 'cliques' (not a pejorative term in SNA!) operate largely independently of each other.

A second approach to exploration of links draws once again on the work of [6] and specifically on their use of more structured data collection tools to map networks and establish the nature and strength of links. Using the initial mapping task as a 'name generator' we have surveyed all 28 participants in the original sample using a grid in which they are asked to report on their modes of communication with all the other participants (face-to-face, phone and email) and also the frequency with which this occurs (daily, weekly, monthly, termly or annually). We also asked them to report with what frequency they ask for advice from, or provide advice to, each other participant, so that we can measure the 'advice size' of individuals and networks and, following Hakkarainen *et al.* characterize any specific patterns or differences in networking activities across the CETL. Analysis of these data and comparisons with those collected from the less structured mapping tasks are now taking place

We also intend to repeat our mapping tasks over the lifetime of the CETL and to attempt to track the development of its networks. This will allow investigation of the interaction between individual, institutional and CETL networks; and between intensional networks and other, more formal organizational structures and processes. Ultimately the purpose of these activities is formative. Early, anecdotal responses from participants have been very positive and we are interested in exploring the extent to which data collection activities and analytical frameworks we develop become embedded in the organizational repertoire, and the implications (technological, organizational and ethical, amongst others) of reflection on networks and networking.

Acknowledgments

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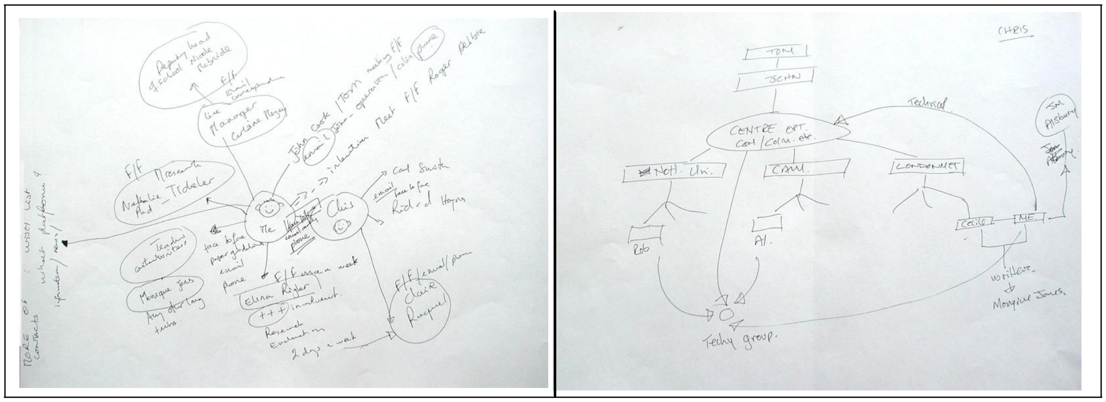
Appendix: Sample Network Maps

Figure A.1 A tutor's map (left) and the map of the MM developer (right) who works closely with this tutor



COGs, CLIPs and Other Instruments to Support Cooperative Learning in Virtual Learning Environments

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Professor of Online Education http://home.nettskolen.nki.no/~morten/
NKI Distance Education www.nki.no
June 2006

Abstract

Adult students seek individual flexibility and freedom. At the same time, many need or prefer group collaboration and social unity. These aims are difficult to combine. There is a tension between the urge for individual independence and the necessity to contribute in a collective learning community. Thus, cooperative learning seeks to develop virtual learning environments that allow students to have optimal individual freedom within online learning communities. The pedagogical and administrative challenges with regard to accommodating both individual freedom and cooperation are explained in the author's *Theory of Cooperative Freedom* (Paulsen 2003) and made more specific in this paper. It shows that cooperative learning can be achieved through a set of instruments or means. The paper presents some of these means. To illustrate this with practical examples, the paper presents NKI Distance Education's visions and experiences with cooperative learning.

Introduction

This article builds on the author's *Theory of Cooperative Freedom*[1] and illustrates the theory with examples from NKI Distance Education in Norway. The institution, which is organized as a department of the NKI Foundation, is Scandinavia's largest provider of distance education with 12-14,000 students. More than 50% of the students are enrolled in NKI's more than 450 online courses. To handle this, NKI has a self-developed LMS system named SESAM. The system is developed to support NKI's model for large-scale distance education with individual student progress as it is described in the article NKI Fjernundervisning: Two Decades of Online Sustainability http://www.studymentor.com/studymentor/NKI.pdf (Paulsen and Rekkedal, In Paulsen 2003).

The article also refers to a report (Paulsen 2005) from an online survey about NKIs systems and plans regarding individual progress planning, supervision and cooperation. The survey was answered by 154 NKI students from November 11, 2004 to January 31, 2005.

Individual, Cooperative and Collaborative Learning

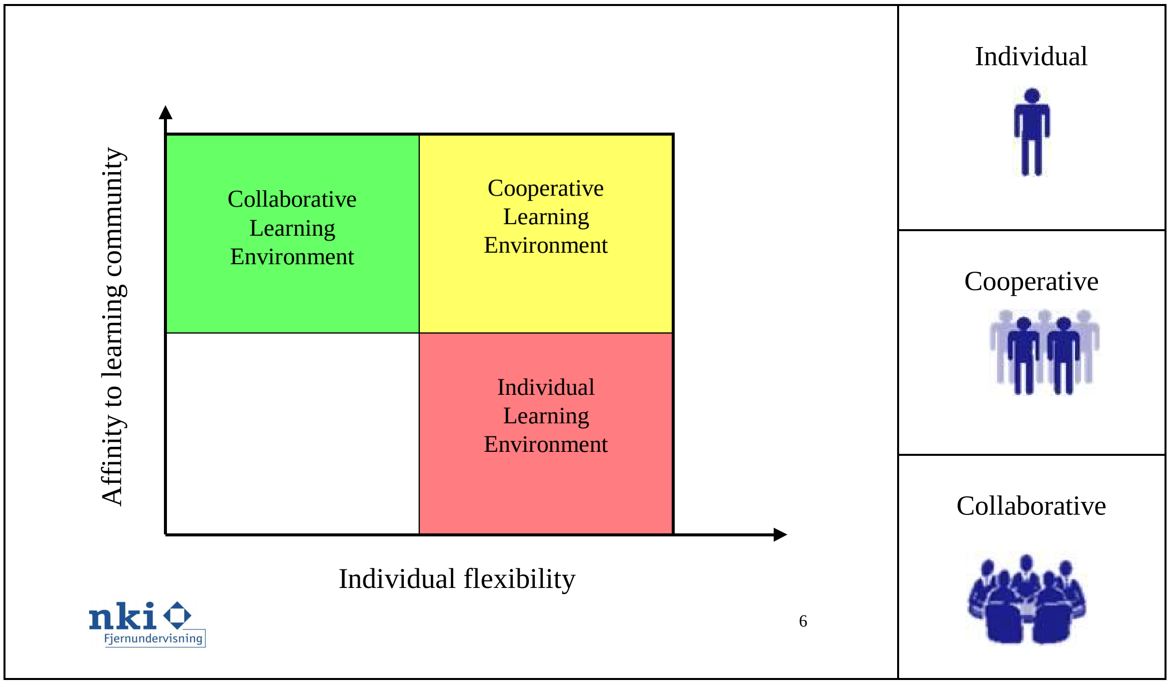
Learning theories can be individual, collaborative or cooperative. Individual learning provides superior individual flexibility, but very limited affinity to a learning community. It has a strong position in online education delivered by institutions with a tradition in distance education. Collaborative learning requires participation in a learning community, but limits individual flexibility. It is common in online education offered by traditional face-to-face institutions.

[1] The first version of the theory was published in my monograph *From Bulletin Boards to Electronic Universities* (Paulsen 1992). It was updated in my book *Online Education and Learning Management Systems* (Paulsen 2003)

In contrast to the first two theories, a cooperative learning theory focuses on opportunities to encourage both individual flexibility and affinity to a learning community. Cooperative learning seeks to foster some benefits from individual freedom and other benefits from cooperation in online learning communities. It thrives in virtual learning environments that emphasize individual freedom within online learning communities.

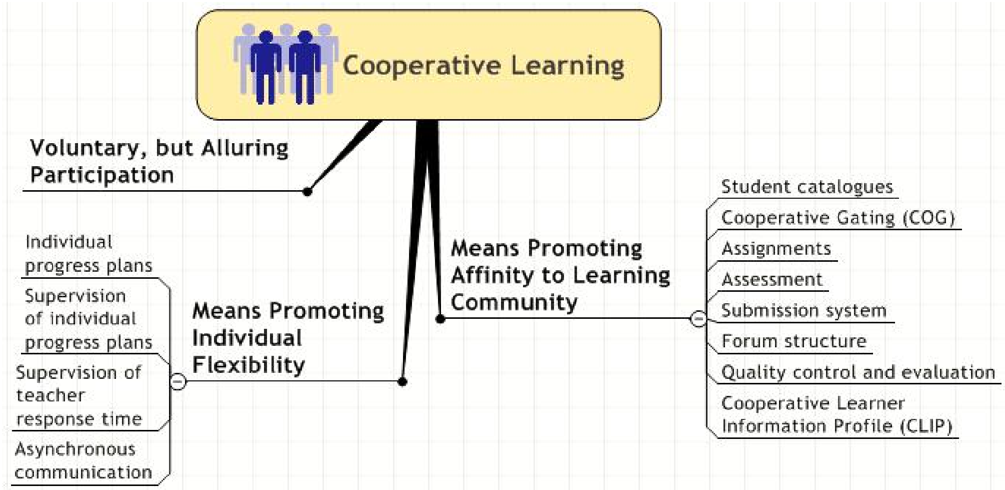
The differences between the three learning theories are illustrated in Figure 1.

Figure 1. Individual, cooperative and collaborative learning theories



Cooperative learning environments could be well or poorly designed. A well-designed virtual cooperative learning environments is built on a number of means that support individual flexibility and other means that facilitate affinity to a learning community. As illustrated in Figure 2, this article presents and discusses some of the most pivotal means that should be handled in a virtual cooperative learning environment.

Figure 2. Mindmap showing cooperative learning issues discussed in this paper



Voluntary, but Attractive Participation

A cornerstone in cooperative learning is that cooperation should be voluntary, but attractive, appealing and alluring. It should be offered as an attractive opportunity to those who seek cooperation. The challenge is therefore primarily to help those who are interested in cooperation to find suitable learning partners. In addition it is necessary to persuade or allure the rest to contribute to the learning community. This means that students should not be allowed to completely withdraw from the learning community. Total seclusion should not be regarded as appropriate behavior. Students should at least be visible as potential partners and resources for others. The dilemma is that students, who not contribute to the community, cannot be perceived as learning resources for others. The potential of the learning community will then be diluted. So, one may argue that a successful cooperative learning community may depend on a contract or mutual understanding that all members have an obligation or commitment to serve as a resource for the learning community.

Means Promoting Individual Flexibility

In cooperative learning, individual flexibility and freedom is paramount. *The Theory of Cooperative Freedom* (Paulsen 2003) suggests that the facets of flexibility that is of special importance are time, space, pace, medium, access, and content. Some means that support flexibility in time and pace are discussed in the following.

Individual Progress Plans

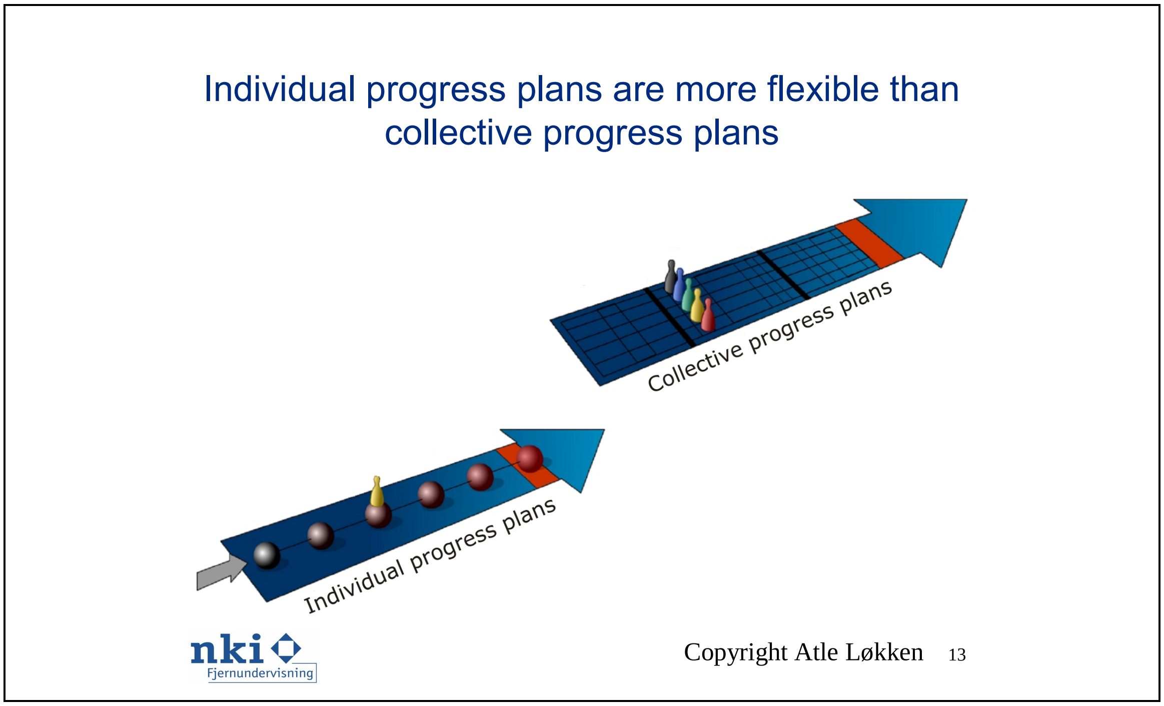
One of the most strategic decisions providers of online courses need to make is whether the students' progress plans should be individual or collective. This is the ultimate dilemma and challenge for cooperative learning, because its focus on individual flexibility favors individual progress plans while collective progress plans make cooperation easier. The two models are illustrated in Figure 3.

It is possible to use various schemes for progress planning as illustrated in the following three models with varying degrees of enrollment flexibility:

- Traditional universities enroll students once a year.
- Athabasca University enrolls distance education students once per month.
- NKI Distance Education enrolls students every day.

This paper focuses on how cooperative learning could be achieved within NKI's model. This is the only one of the three models that supports individual progress planning.

Figure 3. Individual versus collective progress plans

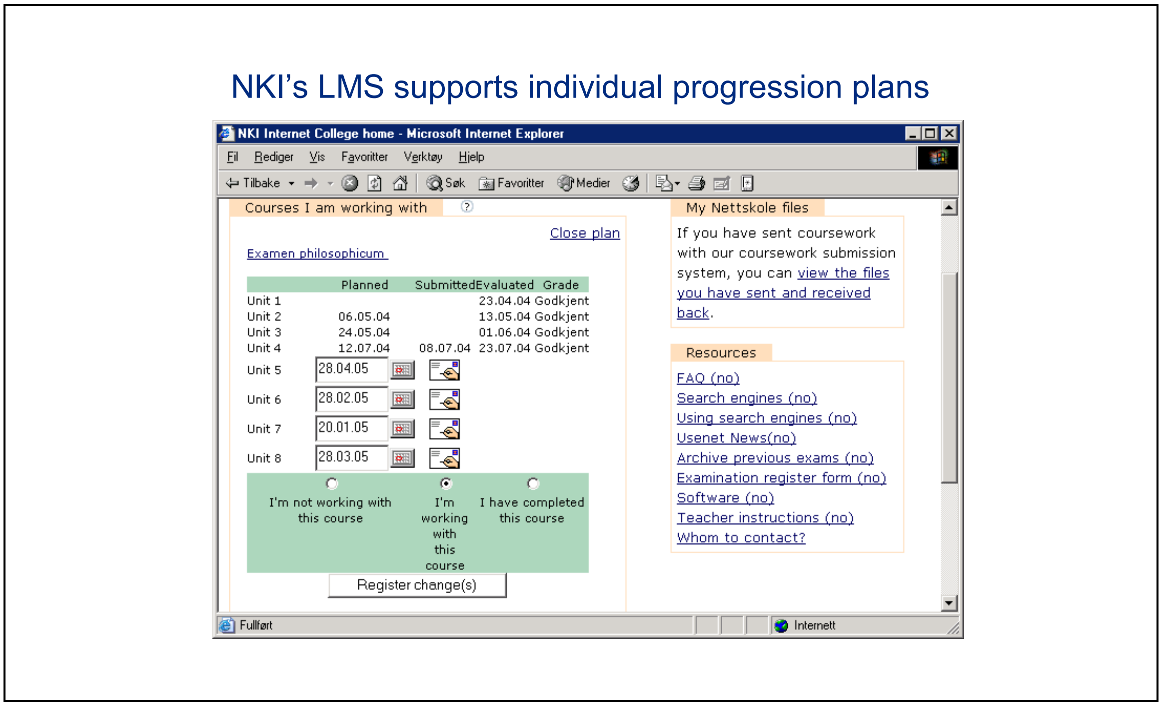


Tools for individual progress planning could support planning and tracking of student progress in a learning environment with individual pacing. Such tools could provide various progress reports and opportunities to initiate automatic and manual reminders to procrastinating students. The tools could:

- Help students develop individual progress plans in courses and study programs
- Provide various progress reports allowing students, teachers and administration to detect procrastination and initiate a set of services to help student proceed
- Reduce dropout rates by improving support to and communication with procrastinating students
- Suggest potential partners for cooperation based on the database of progress plans

As shown in Figure 4, NKI has integrated tools for individual progress planning in its LMS system SESAM.

Figure 4. NKI's tools for individual progress planning



One challenge regarding individual progress planning is to decide how voluntary or obligatory it should be. The more students using the planning system, the more useful it is. As illustrated in Figure 5, the students' contact list would be less useful if it only showed planning information for some of the students.

NKI introduced the planning system as a completely voluntary option in May 2004, and the number of students who have registered their individual progress plans is continuously growing. In June 2006, about 3100 students have registered their plans. This is large number of students, but it still constitutes less than 50% of the student population.

Figure 5. NKI's contact list for students showing some progress plan information
The student names are not real

Lærer: Marit Amdal
Studieleder: Diane Daviknes

Etternavn, Fornavn	Profil	Neste innsending	Planlagt innsendingsdato
Andersen, Ann Grete	☑	2	oktober 2004
Hansson , Vanja	☑	2	januar 2005
Dickensen , Marte		9	november 2004
Evensen, Knut	☑	2	januar 2005
Fagerstein , Gry	☑	1	oktober 2004
Greff, Stine Merete	☑	2	januar 2005
Grefsrud , Camilla	☑	2	januar 2005
Hansen, Karine	☑	16	januar 2005
Haugsdal, Birger	☑	5	oktober 2004
Hollerud, Reidar	☑	9	desember 2004
Hytten, Pia	☑	1	november 2004
Larsen, Erland		1	januar 2005

Supervision of Individual Progress Plans

In a cooperative virtual learning environment, supervision of individual progress plans could be supported by the individual student, automated e-mail and SMS messages, tutors, administrators and cooperative students. The most interesting and controversial strategy is to allow students to receive information about other students' progress plans. Some students oppose strongly that other students may access their individual progress plans. One may however argue that these students may be the ones that will benefit most from having more focus on their progress plans.

Currently, NKI is testing and evaluating its system for supervision of individual progress plans. When students log on, they see the number of days to each of their planned submissions. If one ore more submissions are overdue, the student is reminded. The teachers receive similar information for all their students when they log on. The following example illustrates the type of information the NKI supervision system provides for teachers:

According to the students' progress plans, you can expect to receive 16 submissions next week. The following students are more than 20 days behind their schedules:			
Student	Course	Submission	Days behind schedule
Nordmann, Mari	Accounting	2	23
Nordmann, Kari	Accounting	4	24

NKI is also testing, improving and contemplating good procedures to remind and encourage students who are delayed. The following means have been implemented:

- Standard e-mail reminders generated automatically and regularly by the LMS
- Tools that make it easy for teachers to send personal e-mail reminders to procrastinating students
- Tools that help administrative personnel send seasonal bulk reminders to procrastinating students
- Student access to catalogues that provide information about other students' progress plans. This provides additional incentives for maintaining up-to-date progress plans. Some students may contact and encourage peers who have problems following their plans.

The reminders must be activated in a proper sequence and with adequate intervals so that students perceive them as personal and informative, not as irksome spam. It is also necessary to purge overly overdue plans so that the users perceive the plans as real. Plans that are more than 100 days delayed seem to be more annoying than useful. Further, it is a danger that the system unintentionally exposes dropouts to public contempt.

Flexibility in Time is Best Supported by Asynchronous Communication

Asynchronous communication offers much individual flexibility in time, while synchronous communication makes students dependent on each other. E-mail and discussion forums are examples of asynchronous communication. Chat, videoconferences, telephone conferences, and face-to-face classes are examples of synchronous communication.

Because of its flexibility in time, asynchronous communication should be the preferred form of communication in a cooperative learning environment. Synchronous communication could however contribute to students' sense of belonging to a learning community. Therefore synchronous communication could be a voluntary option, but not obligatory.

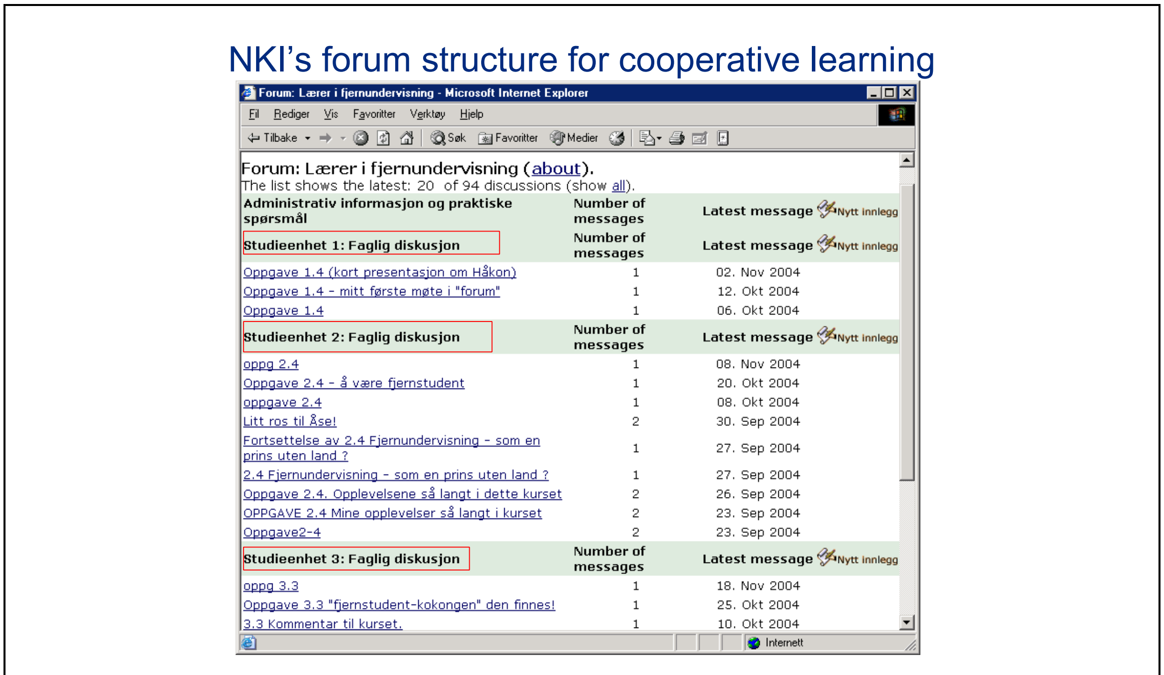
Cooperative Forums

Discussion forums are excellent means to promote learning communities. It is however necessary to consider how access to a forum should be granted to establish an effective learning community. Should it be open or closed? Voluntary or obligatory? Large or small? There are no simple answers to these questions. NKI has about 350 discussion forums. Some work excellent, others have no activity. It is often hard to understand why.

Discussion forums are usually organized and structured in topics or threads. As the number of contributions grows, the structure often becomes unwieldy and disorganized. When students have individual progress plans, it is even harder to organize and maintain a suitable structure. So, the users should be able to easily find new contributions and to sort the contributions by topic, date, and contributor to make it easier to follow the appropriate contributions.

When using individual progress plans, it is especially important to stick to a structure that clearly channels the contributions to the appropriate sections. If so, students can more easily find the contributions that are relevant for them. To support this, the administrators of NKI's about 350 forums usually structure them with one section per study unit as indicated in Figure 6. These are fixed sections that cannot be altered by students.

Figure 6. NKI's typical structure in discussion forums provides one section per study unit



Submission System

NKI's submission system was initially developed to track and supervise the time used from students' submissions to teachers' grading. It automatically records the time of submission and the time of grading.

By channeling both submissions and registration of grades through web-interfaces, the LMS system can provide features and reports related to:

- deviations between the actual submission date and the planned submission date

- unacceptable delays between submissions and registration of grades

A submission system can be developed further to include functionality for cooperative portfolio evaluation and for submission of cooperative papers.

Supervision of Teacher Response Time

NKI's research and evaluations maintain that swift response time is essential for student satisfaction and perception of a tutor's work. In cooperative learning environments with individual progress plans and many courses, it could be wise but difficult to continually supervise response times for all teachers. This is of course a controversial issue, since some teachers may resist the idea of being supervised this way.

NKI has handled this by integrating a tool in the LMS system that records the time it takes from a student submits a paper to the teacher has registered the corresponding grade. The system allows NKI to provide the type of information at the teachers' web page as shown in Figure 7.

Figure 7. Response statistics shown at the teachers' web-page

> NKI's goal is that it should take less than 3 days from a student submits an assignment to the teacher registers the grade.
>
> The last six months the teachers' overall average is 3 days; your average is 2 days. The last three month the teachers' overall average is 2 days; your average is 1 days.

The system was introduced in May 2004 and it resulted in much discussion in the teachers' online forum. A few teachers voiced strong criticism, doubts and reservations. Others identified shortcomings that needed to be solved. Initially, the system showed average response times with two decimal points. This was not a wise choice because we never intended such detailed supervision and because the system itself was not accurate enough to provide correct data on this level. The result was that several teachers claimed that the statistics showed an average response time that was a fraction too high. However, it was interesting to observe that the average response time the during the last six months dropped month by month during the Fall of 2004. In October it showed 3.97 days, in November 3.06 days and in December 2.76 days. Since then, the average has only exceeded 3 days during the summer holidays.

Means Promoting Affinity to Learning Communities

There are a number of means that could be used to strengthen affinity to virtual learning communities. It is paramount that the participants are visible and accessible. In addition, the community members must be urged and allured to contribute to the community and to benefit from it. In the following some of these means are discussed.

Student Catalogues

Student catalogues are important tools for showing students that they have access to a learning community. A comprehensive catalogue providing much relevant information about many students is crucial to get an overview of the learning community. Student catalogues usually provide information about all students enrolled in a course. However, if students also could access information about students enrolled in other courses provided by the institution, they may benefit from taking part in a larger learning community. A catalog that even includes alumni students could be of interest for students who seek advice on courses they consider enrolling in or on future employment.

To facilitate cooperation the student catalogue should include information that makes it easy to initiate and maintain communication. This may be e-mail addresses, telephone numbers, chatting identities etc. that could support electronic communication. It may also include information on geographical location such as zip codes that could make it easier to identify potential partners for occasional face-to-face meetings. Similarly, it may include progress plan information so that students may identify peers who are working with the same study unit as they are. Finally, one may argue that student catalogues should include CV-type information to make it possible to search for peers with special competencies.
Student catalogues must handle privacy issues properly. Some information in student catalogues may be regarded as sensitive and it may require student consent to be included. Some students may also be opposed to inclusion in a student catalogue. The challenge is therefore to find the balance between gathering as much information as possible to stimulate cooperation without trespassing students' privacy thresholds. A viable solution is to ask students for permission to make the information available for either the administration, the student enrolled in the actual course, or all students in all courses.

CLIP

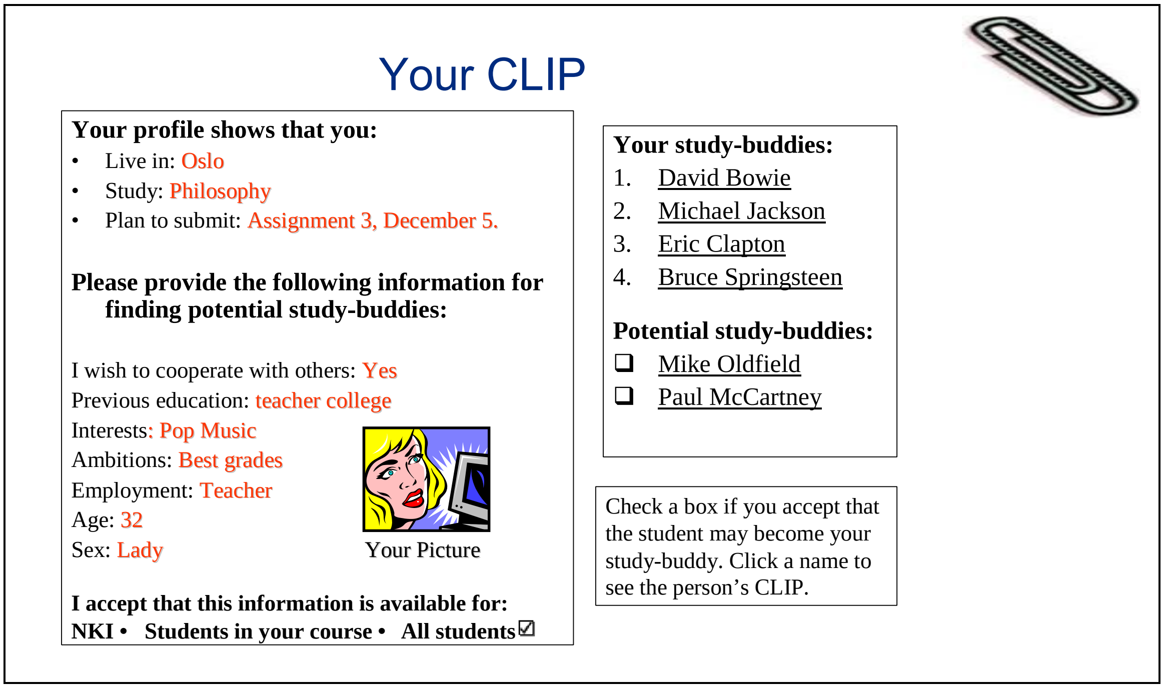
The acronym CLIP – *Cooperative Learner Information Profile* has evolved as a result of the author's deliberations on effective cooperative student catalogues. It was inspired by the acronym LIP (Learner Information Package) that is used in conjunction with the IMS standardization initiatives on accessibility[2].

Using CLIP, LMS systems may help students find study-buddies or learning partners that are motivated and suitable for cooperation. CLIPs could herald a new and innovative pedagogy for cooperative learning. CLIP could provide efficient tools for establishing smaller and larger groups with the right mix of students. It could be used to establish contact between junior students and more experienced students that are willing to function as personal mentors. It could also be used to establish small colloquial groups that live in the same geographic area or that have similar progress plans. These groups could result in reduced dropout rates and better learning.

Based on the CLIP and some algorithms for teaming students, the system should suggest partners that have CLIPs that make cooperation interesting. A prototype of a CLIP user interface is illustrated in Figure 8. The students should be provided with enough information to establish contact and tools to maintain cooperation. However, to develop suitable algorithms for this is probably not a trivial task.

[2] See http://www.imsglobal.org/accessibility/ for more information about LIP.

Figure 8. User interface illustrating a Cooperative Learner Information Profile



In a large institution, teachers could also benefit from finding partners for cooperation. Therefore NKI, provides teachers with a discussion forum and dynamic information that lists contact information for all 150 online teachers and the online courses they teach.
An online survey (Paulsen 2005) answered by 154 NKI students shows that the majority of the students want closer cooperation with one or more students. As many as 64 percent state that they probably or definitively want closer cooperation. Only 16 percent respond that they probably not or definitively not want closer cooperation. The verbal comments also show that many respondents want cooperation. Relatively many state that they need, want or miss cooperation and study-buddies. Some points out that it is difficult to contact other students, others want better tools to find partners. On the other hand, there are some respondents who state that they don't need cooperation. They think cooperation should be voluntary and state that they prefer to study without being dependant on others. The survey also shows that 71 percent of the respondents are positive or very positive to see each other's progress plans. Similarly 76 percent are positive or very positive to getting access to each other's zip codes.

Cooperative Assignments

Assignments are crucial means to support learning theories. An assignment should consist of a task and a direction. An assignment focusing on one task can easily support individual, cooperative or collaborative learning by varying the assignment directions. This is illustrated in the following example:

Assignment task: Explain the differences between individual learning, cooperative learning and collaborative learning.

Alternative assignment directions:

- Individual learning direction: Send your submission as e-mail to your teacher.

- Cooperative learning direction: Discuss the assignment with a colleague or a peer student. Write a short summary of the discussion and send it as e-mail to your teacher.
- Collaborative learning direction: Write a paper together with one or two other students and submit the paper as e-mail to your teacher.

Cooperative Assessment

Online assessment could be grouped in four categories (Paulsen 2003, page 68): self-assessment, computer assessment, tutor assessment and peer assessment. All categories could have a cooperative flavor if they are designed with cooperation in mind:

- *Computer based assessment* could have a cooperative flavor if students exchange or have access to statistics, results or information derived from all or some other students taking the tests.
- *Self-assessment* could be cooperative if students are encouraged to exchange self-assessments or may access some statistics or information from other students who have completed self-assessments.
- *Peer assessment* is cooperative if students are encouraged to voluntary assess each other's work.
- *Teacher assessment* could be cooperative if the students have access to some of the information the tutor provides or derives from assessing other students.

Portfolio assessment could support cooperative learning if the system allows students to access and comment on each other's portfolios.

Cooperative Gating (COG)

Gating is a technique that denies students access to information before they have completed all prerequisite task. The acronym COG – Cooperative Gating – has evolved as a result of writing this paper. It signals that students must meet a condition to get access to a cooperative resource. This could for example be used as a stimulus for motivating students to answer in-text questions. They are allowed to see what others have answered only if they provide an answer others may read.

Figure 9. Example of in-text question using cooperative gating

How would you explain cooperative gating?

After reading Morten Flate Paulsen's article,
I perceive that Gating means conditional access
to cooperative resources.

Paulsen elaborates on this in the article
Cooperative Freedom On page 45 in his book
Online Education and Learning Management Systems.
See www.studymentor.com for more information.

When you have written your answer in the text box above and pressed the submit button, you will have access to the three best answers submitted by the previous students. You need to grade each answer before you can access the next.

Submit your answer

So far, the best answers are provided
by David Bowie, Lou Reed, and Sting.

Cooperative Quality Control and Evaluation of the Provider

Evaluation and quality control is crucial but challenging in large-scale online education based on individual progress plans. Some of the challenges are related to the following questions:

- When should it be done?
- What should be evaluated?
- How should the results be presented?

In a cooperative learning environment, the findings and results should be available to the appropriate user groups so that they feel and understand that they are members of a larger learning community.

NKI has developed an evaluation tool in its LMS system. It was used for the first time in the fall of 2003. The system allows NKI to develop common forms of questionnaires and evaluation forms. Each form can be assigned to one or more user categories, e.g. teachers, students in one course or all students. A user may only respond once and all replies are anonymous. When a user responds, the evaluation database is updated and the user is granted access to a personal evaluation report. The reports that are generated from the database vary according to the user category:

- Students may see a report showing qualitative statistics of interest to students in their course
- Teachers may see the same report as the students with additional teacher information. The teacher information could come from certain parts of the questionnaire or from comparative data in other courses.
- Administrative staff may see comparative reports showing responses from all user groups and questionnaires. This means for example that one can compare responses on one questionnaire answered by students in all courses offered in the LMS system. This

could for example be used to find the teachers who receive the best evaluation or the courses that receive the worst evaluations.

Conclusions

Many online students seek individual freedom and flexibility. At the same time, many need or prefer access to a learning community. These aims are not easy to combine, but there are a number of means that can be implemented to support these aims. If this is handled well, it is possible to come up with a well-designed virtual cooperative learning environment.

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Peer-to-Peer: an Enabling Technology for Next-Generation E-learning

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Abstract In this paper, we explore new directions for future e-learning tools. Our idea is to use peer-to-peer technologies to create collaborative learning communities. We start by analyzing the limitations of current e-learning tools. Then, we present an overview of peer-to-peer technologies to show how they can be used for better e-learning tools. Finally, we propose a framework for collaborative communities based on enhanced peer-to-peer networks. This position paper presents initial results of our work and we continue to work on the detailed specification of the proposed framework and its prototype implementation.

1 Introduction

The advent of the Internet and the Web has enabled a rapid grow of information and communication technologies used in the learning process, typically referred to as "*e-learning*". We can distinguish between two main kinds of e-learning technologies. In the first one, traditional lectures given in a classroom are delivered to learners through "*on-line multimedia streaming*". Such process allows learning even if teachers and learners are at different places. A multimedia stream can also be recorded and replayed later to make learning possible at any time, thus enabling "*off-line*" delayed courses. Other material such as slides can augment the image and the sound of the lecture to form structured multimedia presentations in which different media are synchronized in time. Several tools support this kind of technology, e.g. products by RealNetworks [7] or the SMIL standard developed by W3C [11]. Still, multimedia streaming oriented e-learning remains focused on the traditional model of a lecturer transmitting knowledge to learners.

The second kind of e-learning technologies is more focused on teaching material and aims at providing rich learning content offered to learners through Web portals. A teacher creates a complex document composed of learning units (lesson, course, exercise, quiz) on which learners can work at any place or at any time. The advantage of this technology is its off-line nature—a learner can learn when it is well-timed and make progress at her own pace. However, in this process a learner sometimes requires some help from the teacher, which can be achieved via mail exchange, forum messages, chat, or more rarely via audio or video-conferences. Learning objects are usually documents with complex structure that require standardized formats for using and exchanging them (we can cite standards like SCORM [2] or IMS [5]). Searching for relevant content may be a problem so that usually a learning object includes some metadata for precise indexing. Several standards exists for specifying metadata such as Dublin Core [8] and RDF [12].

Even if a considerable amount of tools and products is largely available, e-learning has not yet gained wide popularity and it is not clear if it is beneficial for all actors: learners, teachers, and teaching institutions. In this paper, we will try to identify some reasons for this state and sketch some new directions to follow, if we want to make e-learning happen. Our idea is to explore how peer-to-peer technologies (P2P) can be used for e-learning and what they can bring to this domain.

2 Limitations of the current e-learning technologies

We have identified several problems with current technologies and tools for e-learning:

- any technology follows the traditional hierarchical learning model involving a teacher and a group of learners,
- in the case of on-line technologies, a teacher and a group of learners need to be present at the same time,
- learners in a group usually work in isolation without coordination or close communication,
- the cost of investment in e-learning may be prohibitive, for instance the professional video and audio equipment for multimedia distribution is expensive and requires highly qualified staff; running off-line e-learning portals relies on qualified personnel and requires constant maintenance,
- using complex learning objects and advanced communication tools is not easy for all learners, because it requires some level of computer literacy and initial instruction, which can be a barrier for large adoption.

In our view, we can overcome all these problems with a new approach based on peer-to-peer networking. We observe that existing e-learning tools have followed the development of the Internet and the Web, but widely deployed peer-to-peer tools have not been yet considered as a source of possible enhancements of e-learning technologies. We think that peer-to-peer technologies may

- enable wide and easy distribution of learning objects,
- change the traditional hierarchical teaching model into a flat one,

- support via a distributed learning object the formation of collaboration groups with learners having common objectives,
- provide an anchoring point for easy interactive communication between learners.

To better assess the possibilities of P2P technologies, we briefly introduce the principles of their operation.

3 Principles of peer-to-peer technologies

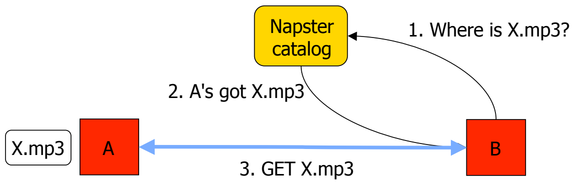

Fig. 1. Principle of Napster

In peer-to-peer technologies, communication follows a different model from the traditional client-server one widely used in current distributed systems [1]. In the client-server model, the roles of communicating entities are asymmetrical: a server waits for incoming connections or queries from a client and provides some service. A *peer* system may act as a client and a server depending on what operation it needs to perform, for example it can respond to a search query as if it were a server and forward it to other systems as if it were a client. At the beginning, peer-to-peer systems have appeared as technologies for sharing audio or video files. More recently, they also provide any kind of large scale distributed services: television broadcasting [6] or handling a directory of VoIP subscribers (e.g. Skype [3]).

The first peer-to-peer system designed for sharing MP3 files was Napster that provided a centralized catalog of files available on personal computers. Figure 1 shows the principle of its operation: when system B wants to find file X.mp3 held at system A, it queries the catalog that returns A as the holder of the file. Then, B directly contacts system A to request the file. The main drawback of this scheme is the centralized catalog of files on which depends correct operation of the system.

Gnutella proposed another way of operation, which is completely distributed. Every node in the Gnutella network knows several *peers*, e.g. system B knows systems C and D in Figure 2. When it receives a query for a file (operation 1), it checks whether it holds the file and forwards the query to all its peers, which

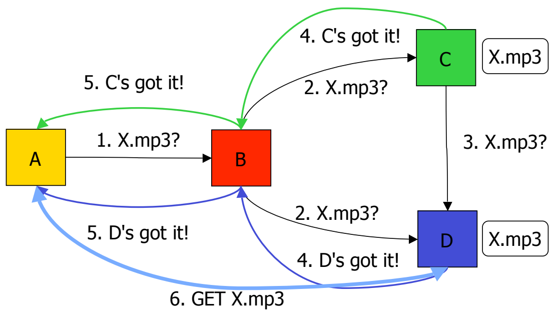

Fig. 2. Principle of Gnutella

is called *flooding* (operation 2-3). Nodes that hold the desired file, reply with a message that returns back on the path followed by the query (operation 4-5). The node at the origin of the query chooses one node and downloads the file. The system may increase the download performance if the node downloads different chunks of the same file from different nodes. One drawback of this scheme is related to flooding—the propagation of queries based on this principle in a large scale system may take a lot of time.

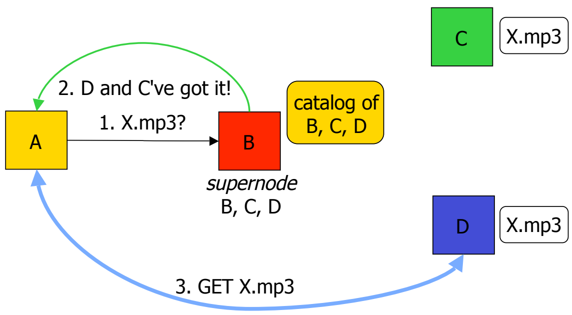

Fig. 3. Principle of FastTrack

FastTrack is a hybrid architecture in between Napster and Gnutella. Popular P2P systems such as Kazaa and Grokster are based on the Fast Track software library. In FastTrack, some nodes in the network play the role of *supernodes* that maintain parts of the catalog needed to find a file. This is the case of node B in Figure 3 that knows which files are held on nodes B, C, and D. When A tries to find a file, it sends a query to its supernode (operation 1) that looks up the catalog to find the holder. It then returns the placement of the file and A can download the desired file. In a large scale network, there are a lot of supernodes and a query is flooded to all of them to find the required file.

Many other P2P systems exist and their operation slightly differ according to what functionality they want to optimize. We can cite BitTorrent, Freenet, JXTA, and some research prototypes such as Chord, Pastry, CAN, OpenDHT.

From the point of view of e-learning systems, P2P technologies present some interesting features, but by now their application to this domain just begins. We will propose some new ideas on this subject in the next section.

4 Peer-to-peer technologies for e-learning

Some work has already pointed out the importance of applying P2P technologies to education. Edutella has proposed a peer-to-peer architecture for exchanging RDF-based metadata [9]. It builds upon Semantic Web techniques and the JXTA middleware. Its purpose is to make the reuse of globally distributed learning resources easier. Berman and Annexstein has considered P2P technologies as crucial in future educational systems [4]. In particular, they propose to integrate them in a new *personal knowledge management* paradigm, which is useful for students and educators in many activities encountered in everyday teaching, researching, and learning.

Our idea is to use P2P technologies for easy and large scale distribution of learning objects that will enable the creation of collaborative learning communities. A P2P network may provide easy access to educational resources without the need for third party Web servers, which often require considerable management and maintenance effort—P2P networks operate in an autonomous and spontaneous way with minimal management overhead. Moreover, users can use P2P systems almost without any initial training.

In current distance learning systems, educational resources are usually conceived for a single learner that works on her own, in most cases in isolation from other learners (however, some interaction between learners is usually provided via fora or chat). Imagine that we distribute an enhanced learning object through a P2P network to a group of learners. The enhancement consists of adding a means for anchoring a community of users interested in the content of a learning object: each learner that uses the object can easily communicate with other users or with the author/instructor related to the object. In such a dynamically formed community of learners, the learning process may become more efficient, because its members apply the principle of *"learning by teaching"*: the learners that understand different parts of the learning material can explain difficult matters to others. Usually it works well, because we start to understand a given problem sufficiently well, if we are able to explain it to somebody else. Thus, the whole group can make considerable progress even without referring to the author/instructor. In some cases though, more help will be needed and the learners can interact with the author/instructor.

To specify the details of a framework that operates along these lines, we need to address several issues. The first problem is related to a wide and easy distribution of learning objects. We have seen in the previous section that P2P technologies present many advantages with respect to this objective—they offer a search functionality in a large scale network of nodes and a possibility of efficiently download desired objects. However, we have also seen that to precisely identify relevant learning objects, we need to enhance learning objects with some metadata to support more advanced search functionalities, the feature addressed in the Edutella project. So, our learning objects need also to include metadata and the supporting P2P network has to use them for precise searching. We need also decide which format should be used for representing the contents of learning objects, we can think about SCORM or IMS, and integrate it with a suitable metadata standard.

Next issue concerns the formation of collaboration groups with learners having common objectives. In current P2P systems, there is no communication between users exchanging files. In our view, we need to enhance a learning object with a sort of a *"communication handle"* that will enable easy interactive communication between learners. This can be achieved by forming a communication overlay between involved nodes similar to what is done in recent VoIP networks such as Skype [3] or Gizmo [10], or TV distribution applications such as PPLive [6]. When an object appears on a node, it leaves a piece of information that will be used later for creating the audio or video communication overlay. At any time later on, a learner can contact other learners that use the object. Any other interested person such as an author or an instructor can be included in the overlay since its beginning. In this way, a learning object acts as a catalyst for a collaborative learning community. Still many other issues remain concerning the implementation of such communication overlay, for instance, how to leverage a considerable amount of existing tools and deployed VoIP or video distribution systems.

We believe that such a P2P learning network will contribute to changing the current teaching model: instead of a traditional hierarchy between the teacher and the learner, we will enable a much more egalitarian mode of operation, in which every person is able to learn and teach according to her needs and abilities.

5 Conclusion

This paper outlines some new directions for future e-learning tools. Our idea is to use peer-to-peer technologies to create collaborative learning communities. For precise searching, we plan to associate metadata with learning objects. In this way, learners will be able to search a peer-to-peer network for relevant learning objects. Moreover, we will enhance learning objects with communication handles to create a communication overlay between the learners interested in the common contents. At any time, a learner will be able to contact other learners that use the same learning object. The resulting collaborative space may change the traditional learning model into an egalitarian community enabling mutual teaching and learning. Although we are at the initial stage of our work and many open questions remain, we believe that such ideas are original and worth of exploring. We continue to work on the detailed specification of the proposed framework and its prototype implementation.

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Beyond the Classroom: International Collaboration

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Abstract

This paper discusses an e-communication project involving seven Universities in the UK and the USA. The project's aims are fourfold: to change modes of student communication (individual and group), to extend communication across cultural and national borders, to develop students' potential to think across such borders, and to develop students' ICT mediated interactional skills. It is argued that, as well as moving towards a borderless classroom, the project suggests a taxonomy of students' communication styles. The paper concludes that although the students involved in the project are studying criminology and criminal justice, the basic structure of the project is transferrable to other disciplines.

Changing Students and Changing Classrooms

As widely reported, universities are experiencing a significant change to teaching practices and the role of e-learning is central to this change (Koschmann, 1996, Web-based Education Commission, 2000). At the same time academic teachers face three inter-related pressures; firstly to improve course quality, secondly to use technology innovatively to go beyond the traditional lecture hall and classroom, and thirdly, to enhance student learning of high order skills such as critical thinking and deep understanding. Communication and information technology, e-learning and e-knowledge are becoming vital parts of the 'knowledge economy' of higher education, so how can e-learning address these pressures? Fox and MacKeogh (2003: 121) have challenged the view that e-learning will "ipso facto improve course quality", rather the pedagogic advantages lie in how e-learning is implemented. In that process, care has to be taken in educational design to ensure that teaching staff are not overloaded with extra work. Graduates are expected to be computer literate and it is impossible to develop these skills in our students through the traditional 'sage on the stage' approach. The use of communication and information technology offers the potential for more than the replication of the classroom, it allows the development of genuinely borderless classrooms. Giving students the opportunity to discuss issues is not enough, as anyone teaching within the social sciences and the humanities knows all too well. Salmon (2005:7) has suggested that "traditional teachers are surprised at how much learning can go on through structured online networking". With these considerations in mind, this paper reports on one e-communication project which examined these issues.

International Collaboration – Outlining the Project

The project began with a pilot in 2004, repeated in 2005. The pilot project involved email exchanges between students at Manchester Metropolitan University (MMU) and the University of West Florida (UWF), involving an average of 26 students per year (Jones et al., 2005). In 2006 the project was transported to a WebCT platform and expanded to involve 7 Universities in the UK & USA (the initiating partners

(MMU and UWF) plus the UK Universities of Brighton (UB) and Westminster (UW) and, in the USA, the Universities of North Carolina Wilmington (NCW), North Carolina Pembroke (NCP) and York College Pennsylvania (YCP).. MMU took the lead, designing and hosting the WebCT site and generally managing the challenges accompanying the greater scale of the 2006 project.

Students on this e-communication project were studying similar degree programmes, with a core focus on criminology and criminal justice, its organisational components and processes, and its legal and public policy contexts. Most academic staff involved in the project were experienced in developing e-learning and supporting students through the process. The project formed part of students' assessed work (except for students at Brighton who were participating voluntarily). The project was delivered over seven weeks between January and March 2006, to accommodate semester dates across all participating universities.

This e-communication discussion project aimed to enable students to interpret and understand contemporary policy and popular concerns around crime, with reference to an international dimension as well as from their own national perspective. Originally 375 students enrolled from across the seven institutions. The largest cohort was from the University of Westminster (103) and the smallest was from the University of Brighton (19).

Students were allocated to a small discussion group (average of five students per group) and were required to discuss three specific topics over six weeks (two weeks per topic). The WebCT site provided not only a space for the discussions but also a repository of supporting materials, including a FAQ list to which students could contribute.

The central aim of the project was to develop students' ability and confidence in communication. The group work aspect to this project aimed to help students who were less confident to engage with other group members in a reflective manner which they could manage at their own pace. It also aimed to enhance and develop students' independent learning skills and thus contribute to employability. Students were expected to carry out a range of epistemic tasks (Ohlsson, 1995; Salmon, 1998) including describing, explaining, defining, responding, challenging and evaluating. Salmon (2005: 5) has cautioned that "educators miss opportunities for working comfortably and effectively online because they assume that on-line co-operation and collaboration needs to follow similar patterns to classroom interaction". Although working on-line involves different organisation it is worth exploring whether the best aspects of group working can be achieved within online and collaborative learning platforms.

Participation in the E-Communication Project

Students who are new to on-line learning will be as anxious in using the technology as traditional 'freshers' on entering their first classroom. As educators we know that some students struggle with group work requiring collaborative learning and our aim is to develop a range of group work skills in traditional 'freshers' including sharing resources; challenging others'; explaining position statements; reflecting; re-evaluating; negotiating consensus and summarising. These characteristics of traditional group work interaction are a goal of the e-communication project and help to form analytical categories for evaluation.

As noted above, 375 students were initially enrolled for the relevant modules in the participating institutions. A majority of these students, 345 (92%), completed the project, Those who did not comprised two groups, The first comprised students who never accessed the WebCT site; this may have been because of changes to module choices (and almost half of this group were UW students who were allowed to change module choices even after the start of the semester). The second group of non-participants, identified by the tracking functionality of WebCT, were students who were reading postings from other students and accessing the resource materials, but then failing to contribute to their group's discussion. This is a small group 7 (2%) of the original enrolment, but nevertheless worth looking at further as part of a fuller evaluation of the project.[1]

One reason for students to participate is that participation is linked to assessment. Not surprisingly, students from the University of Brighton (who were participating voluntarily had the lowest rate of participation as 63% failed to meet the minimum criteria of two postings per week. This can be compared with the University of Westminster whose attrition rate was just less than 8%. However, most students registered for the modules in the project did participate. The next section identifies the factors that are considered to be important in enhancing participation;

Critical Factors

Familiarising Students with the Project

From a student perspective, it was important that, just as any new learning cohort needs time to get to know each other, the e-communication project was structured to include 'buddy time'. This was built in by means of a 'getting to know you' week (when the discussion groups were launched in late January) and the availability of a 'Student Coffee Bar' area of the message board. These aimed to achieve the following:

- practice in posting, reading and replying to messages
- recognition of the importance of using clear subject headings and the need to thread messages
- beginning to share information about a topic and respond to each other's messages

This period aimed to familiarise students with the use of message boards to prepare them for their assessed 'topic discussions'. The project was not completely successful in this aim. In particular, students were poor at threading message, with many in the `Coffee Bar' area simply starting new threads headed `Hey!', rather than responding to previous contributions.

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[1] A full evaluation of the project is currently being undertaken, supported by a grant from the Centre for Sociology, Anthropology and Politics in the UK.

Discussion Topics

It was important too that the topics set for discussion were relevant to the modules being taken by the students. Whilst all students were following courses related to Criminology and Criminal Justice, the actual modules varied in focus. Topics were carefully chosen to enable students to draw on learning across a range of modules and also to highlight issues which would bring out cultural differences between England & Wales and the USA; for example, the first topic (which proved the most popular with students) related to gun controls and their relationship to crime rates. The immediate relevance of the discussion topics encouraged student engagement and proved to be an innovative medium to give students real life experience in articulating their national `taken-for-granted' understandings and in building their confidence in expressing views.

Support for Staff

In addition to the provision for engaging students, the project made demands on staff and in particular the staff at the lead institution, MMU. The demands on staff particularly affected the key co-ordinator, since over 4,000 messages were generated during the 6 week period and students also used the WebCT system to pose questions expecting a quick answer. The WebCT area was used as a repository for relevant materials and web-links. A 'showcase' of exemplar messages was constructed at the end of each two week period and this seemed to have the effect of 'raising the standard' for subsequent topics. A generic student handbook was also provided which all participating staff could customise to suit their own needs. Apart from these central supports, in most participating institutions students were inducted in computer labs and had ongoing support in classrooms. Lectures and seminars were used to support the topics of the project. This new form of delivery and assessment needed clear mechanisms of support for both students and participating staff, who were also tasked with monitoring group discussions. There are two crucial factors here: the first is trust between the academics involved. The project's ability to deliver its goals in working together in the virtual environment of WebCT relies upon mutual trust in, for example, monitoring of discussion groups. It also, of course relies upon students' trust in our ability to make the project a success. The second crucial factor is that the success of this project relies very much on institutional support, from Heads of Department and quality assurance managers, for example, in the institutions concerned. Project teams must be prepared to act as ambassadors for new modes of teaching and learning.

Issues

One of the key challenges for staff involved in the project was in deciding when and how to intervene in student groups. The academic staff had agreed a policy of minimal intervention, not least in order to ensure 'tutor overload' was avoided (Fox and MacKeogh, 2003). However, most staff felt the need to intervene at least on a couple of occasions, particularly when students were posting messages after the two week period deadline or were not posting the required two messages per week.

The extent of staff intervention may not be that important. Shuell reminds us that "what the student does is actually more important in determining what is learned than what the teacher does" (Shuell, 1986: 429). In terms of what students do, two messages per week does not sound difficult but many students commented that posting a message was like having to write a mini essay. Hence they found the project very demanding and also had a sense that they were representing their university (and country). Staff involvement in monitoring is, however, important in terms of screening messages for unacceptable or offensive content, as well as tracking the number of postings made in order to identify who is not posting at all, who has not posted recently, who posted once but has not posted further and who is posting ‘too much’ (although no maximum number of postings was set).

Student Learning

Early analysis of the project suggests that students can be categorised as:

‘*Early Responders’*: these students who tended to post early, often being the first and, on occasion, without thinking their point through or without conducting any supportive reading.

`Reflective Responders’ who did not rush to post at the first opportunity but carried out background reading and developed their thoughts, posting only when ready. These students often refined their original position in subsequent postings and referenced evidence to support their position,

‘Smash and Grab Responders’. These were students who had read earlier responses, picked up on useful citations and strong arguments and came in late to make postings that on surface looked good but did not add a lot to the group discussion.

Early analysis has also noted a range of different styles and approaches taken by students in their messages. These include:

- *Challenges* characterised by disagreements with other group members and opinion forming in opposition to previous statements, dissociating the writer from one or all of the other group members. For example: “I find it amazing that you believe I don’t have the 'right' to call statement ignorant for not taking into consideration the harm caused by owning a gun but you both feel it is your 'right' to own a lethal weapon? Come on guys what causes more harm?” (Message 1598)
- *Confirmations*: characterised by agreement either without further substantive discussion or with superficial additions. Often merely repetition, these messages do not develop or elaborate previous ideas and are indications of the positive but uncritical way in which partners construct common knowledge. Students are identifying with other group members and building a group consensus.
- *Constructions:* initial messages may be challenged and counter-challenged, but the initial message is developed. Group partners engage critically but constructively with each other and elaboration is on the competition of ideas and not a competition between people. Reasoning is more visible in such discussions and students bring evidence to support their discussions

How to encourage `construction’ postings will be part of the challenge in the next phase of this project.

Conclusions and Next Steps

Within higher education globally, e-learning has been used as a way of increasing the reach of institutions to new potential students. While this is of clear interest to university management, educators need to look at how to increase "reach and richness … [and] the obvious means of adding richness is through some form of computer conferencing" (Weller, 2002: 43). New teaching strategies that focus on delivery outside of the classroom are breaking the "physical link between campus and student" (Hirsch, 2001) but we must ensure that in this process students do not lose the valuable relationships they have with each other and their tutors. This project creates a space for continuous feedback from students as well as providing an opportunity to widen academic research networks. The discussion topics emerged out of the participating academics' research interests and feed back into the involvement of students in the research process.

What can be claimed, even at this stage, is that the use of WebCT to bring students together across different universities represents a significant innovation in learning and teaching within criminology yet it is also transferable to other associated disciplines that hold the pedagogic desire to stimulate critical awareness, analytical thought and reflective practice.

In relation to next steps, the intention is to carry out a full evaluation, which will include, for example, analysis of student achievement in assessment as well as feedback on the quality of the learning experience. This evaluation will be used to develop and deliver the project again. Changes will be needed: for example, a change identified by academic participants is the inclusion of a practice discussion based on course content but which would not form part of the students' assessed work.

Russell's (1999) now famous 'The No Significant Difference Phenomenon' compared different modes of delivery; for example, online versus classroom. His conclusion was that the mode of delivery made no difference to student performance. It is the content and what we do with the medium that is important. Thinking creatively about how technology is used to enhance the student experience is the crucial point. E-communication projects can provide such enhancement to the student experience. Collaboration across institutions is not easy but can be tremendously rewarding for all concerned.

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An Integrated Learning System: the Experience of Università Telematica “Guglielmo Marconi”

Dott.ssa Ilaria Mascitti
Dott.ssa Federica Funghi

Introduction

The Università Telematica “Gugliemo Marconi” (hereafter UTGM), the first Italian Open University recognized by MIUR (the Italian Ministry of Education, University and Research) offers on line learning courses delivered through an integrated learning system consisting of an e-platform, a m-platform and a t-platform.

The UTGM has been developing and experimenting an innovative learning methodology since its establishment in 2004, merging e-learning, m-learning and t-learning solutions.

The choice to set up an integrated system represents the effective combination of different delivery channels, teaching models and learning styles, based on interactive and multimedia communication among all the subjects involved within the educational process.

The UTGM promotes a learning integrated system set up by the Virtual C@mpus e-learning platform, the m-learning platform and the interactive television t-C@mpus platform, with the aim to meet the different and various learning needs of the UTGM students and to offer different training paths based on a wide multimedia ICT solution.

1. UTGM Learning Integrated System

The need to set up and implement a flexible and integrated training model is due, in particular, to the UTGM target: most of all adults learners, workers and highly skilled people and lifelong learners.

Training processes and didactic materials addressed to adult people should consider the “andragogy” theories (Knowles) for a successful adult learning process focusing on adults’ typical learning styles and how they learn. The core principles of the andragogy theory state that in order to learn more effectively the adult needs to be involved actively in the training course. Therefore, training has to be deliberately structured for his/her real needs, and furthermore, has to be carried out in a collaborative way. The lifelong learner is viewed from different perspectives: as a student, an information seeker, a member of a community of practice, a problem solver. A lifelong learner usually undertakes all these roles and in the learning process constructs individual and personal knowledge.

Following these considerations, the UTGM highly believes that adult learners could easily create and manage their knowledge through an integrated system promoting a dynamic and flexible learning process characterised by problem solving, analysis, evaluation, creativity, inter-personal communication.

The blended solution promoted by the UTGM, focusing on a student-centred learning process, intends to fit the different training needs of the adult learners exploiting and taking advantage of the main benefits of the different learning processes (e-learning, m-learning and t-learning).

The training model promoted by the integrated system of the UTGM is characterised as follow:

- Active and constructive, since it helps the users to be responsible of their own training path;
- Collaborative and interactive, permitting communication among the learners;
- Dynamic and flexible, thanks to the converge of different platforms and media.

Let’s go further in depth each learning process promoted by the UTGM integrated learning system (Figure. 1 - The UTGM Integrated Learning System).

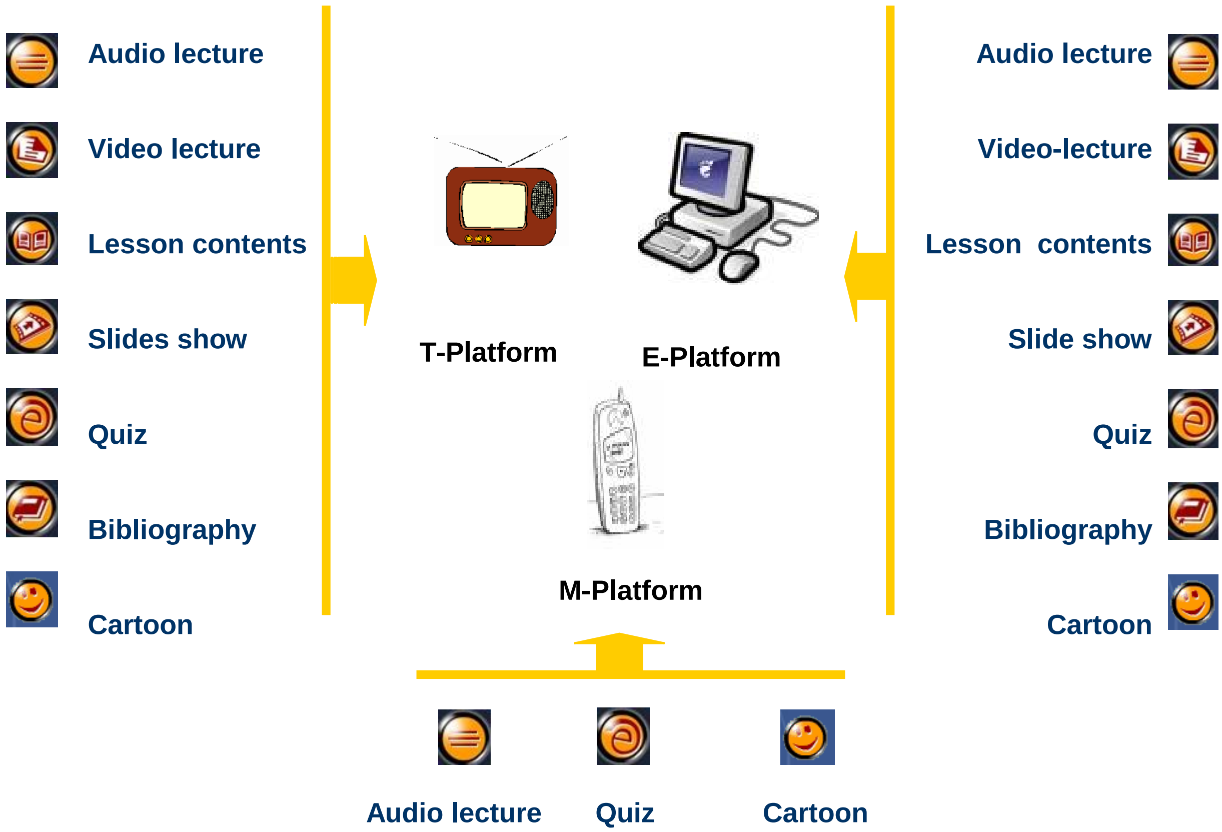

Figure 1. The UTGM integrated learning system

2. UTGM Virtual C@mpus e -platform

The UTGM Virtual C@mpus platform is a flexible and personalised Virtual Learning Centre (VCL), able to ensure an interactive learning process in a synchronous and asynchronous way. The e-platform, accessible through a personalised user id and password, promotes tailored and flexible training paths, fosters collaborative learning among the users, encourages interaction among the users by means of asychronic and synchronic interaction tools supervised by a tutor.
The UTGM e-platform allows to realize a flexible learning process answering the dynamic training needs of the adult learner who asks to be the protagonist, the "manager" of his own formative process, the active constructor of knowledge.
The UTGM e-platform consists of different scenarios:

- Administrative Services
- On-line courses
- Tutoring

2.1 Administrative Services

Through this section each student is allowed to enter a set of services to gain information on the different courses offered through the e-platform:

- Courses curricula
- Test and quizzes deadlines
- Virtual meeting appointments
- Institutional news
- Technical help

This section is a kind of virtual secretariat allowing the user to find out useful information without any time and space constraints.

2.2 On-line courses

The on-line course is made up by different Learning Objects. The audio/video lectures represent the focal point of the training path (Figure2. Audio / Video Lecture). The user who accesses the digitised video lectures, thanks to a user-friendly screen that displays commands (start, stop, forward, back), is be able to manage the lesson in a customized way.

Figure2. Audio / Video Lecture

A useful support is represented by the slides, synchronized to the video lesson which allows to synthesize the topics through key-words and by using images, patterns, diagrams and tables. An advantage of using synch slides consists in the possibility of guiding the user's attention.

The most important and most innovative features of the UTGM digitised video course are the following:

- the modularity of the contents that allows the students to access a specific level of the contents;
- the indexing of the subjects that promotes a "hyper textual learning"; in this way, indexing has the function of a "cognitive map" that shows the users the different didactic paths.

Hyper textual learning improves cognitive processing because it resembles the natural way of thinking of the human mind, since there exists a substantial analogy between the typical network of links of an hypertext and the working of the human mind, meant as a neural network. Hyper textual learning leads users in their dynamic exploration, presenting them a non linear knowledge, made up of interweaving and connections among links. For these reasons, hyper textual learning processes allow UTGM students to customize the training processes, to enrich and improve the meta-cognitive strategies, promoting active, constructive and interactive training path.

The following in-depth didactic documents support the audio/ video lectures:

- lesson content: in-depth text of the topics dealt with within the video lecture;
- slides: graphic supports to the lesson;
- animated cartoons: dynamic presentations synchronising images and dialogs showing virtual characters in different contexts;
- interactive exercise and tests: to practice the theory learned during the sessions;
- bibliography and links: selection of sources for an in-depth study of the topics dealt with during the lesson.

2.3 Tutoring

Online tutoring has a vital role in accompanying the students throughout the learning process, motivating and supporting him in different didactic activities.

In the framework of the UTGM integrated learning system a team of specialised tutors is set up with the aim to sustain student motivation, promote collaborative learning processes and make the study relevant to the individual learner needs, facilitating access to course content, involving the learner in training activities, discussions and decisions and generally catering for helpful web communication. Thanks to the use of "social software" he enables users to rendezvous, connect or collaborate and to form online communities.

The UTGM tutors act both as counsellors and didactic experts (Figure 3. On-Line Tutoring).

Figure 3. On-Line Tutoring

As a counsellor the online tutor adds the ‘human touch’ to the learning experience, by developing a relationship with his/her group of learners, motivating their progress and enabling learners to seek advice on any aspect of the course they have difficulty with. One of the difficulties of online learning is that participants feel isolated, for this reason the online tutor needs to become the central human contact point, reducing the impression that people are learning from a computer. With a more participative tutor, there are more opportunities to maintain a high level of motivation among learners. The tutor assures smooth course operations, improves adherence to policies and procedures, and enhances learner comfort level and retention. The tutor’s actions provide the framework for learning and reduce learner apprehensions related to course content and procedures.

As didactic expert the online tutor assists the UTGM students during the exploration of the different environments of the on-line course giving a constant evaluation of his didactic progress. He designs training scenarios and, by means of social software such as chat, e-mail, discussion forums, videochat, blogs, he is able to activate and structure collaborative learning sessions, to promote interaction among the different actors of the training process. The didactic tutor acts as a facilitator of the learning process enhancing cognitive outcomes related to course objectives and fostering community and collaboration among class participants. Because assessments are often a key motivator for online learners (people learn what they’re be tested on), the online tutor needs to offer continuous feedback and encourage people to complete assignments in a timely manner. An effective online tutor continually reinforces performance by providing rewards and recognition of achievements. Furthermore, the tutoring permits the rapid exchange and sharing of information, documents, and didactic material contributing to the overcoming of the barriers linked to the distance learning.

3. UTGM m-platform

M-learning represents the new frontier of distance training because it allows to transmit multimedia contents through the latest generation of mobile devices and to merge effectively two technologies - mobile and Internet - having already in common the slogan: “anytime, anywhere, anyhow”.

The concept of m-learning is certainly concerned with learner mobility, the learner in fact should be able to engage in educational activities without the constraints of having to do so in a tightly delimited physical location. O’Malley et al. (2003) have defined mobile learning as any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies.

Mobile learning has a range of attributes that might contribute to its definition: it can be in-your-hands, in-your-pocket, on-demand, on-the-move, just-in-time and just-in-place.

In this context, the UTGM m-courses foster a m-learning process as an “addendum to go” and, in combination with other forms of learning, support learning experiences which are collaborative, ubiquitous, accessible, and going beyond the boundaries of a classroom or a physical learning environment. Having access to the application anytime, anywhere increases daily attention to learning material, makes learning pervasive and certainly boosts the learner's motivation for lifelong learning.

The UTGM m-courses, delivered through the UTGM m-platform and specifically conceived and designed for PDA's and smart phones, encourage and promote ubiquitous and on-demand learning, thanks to the following learning scenarios:

- Administrative Services
- Didactic Pills
- Tutoring

3.1 Administrative Services

Through this section each student is allowed to enter a set of services to gain information on the course such as deadlines and virtual meeting appointments

3.2 Didactic Pills

Most of the UTGM students are workers who need a quick access to the learning contents and the optimisation of their learning process. Moreover they need to get short pieces of information in order to solve quickly practical problems. They need just-in-time information to be contextualised with the work activities. Multimedia learning objects delivered through the UTGM m-platform devices ensure the transfer of effective and application-oriented contents.

The training section of the UTGM m-learning platform hosts different kind of multimedia learning objects:

- audio-lessons, didactic pills built up by an audio explanation synchronised with a slide presentation;
- animated cartoons, dynamic presentations synchronising images and dialogs showing virtual characters in different contexts (Figure 4. Animated Cartoon);
- quizzes, close-answer questions to be filled in and sent to the tutor.

Figure 4. Animated Cartoon

3.3 Tutoring

The social software provided by the UTGM mobile platform are strongly collaborative, they promote learning through social interaction without attempting to replace any human-human interaction. The UTGM m-platform, providing students with different communication tools, allow them to interact and strengthen relationships every time and everywhere. In this way the UTGM students learn together, share the knowledge, the expertise and the know-how, have something in common, in other words they become a community.

The communication section supports the interaction among the students and the teachers/tutors thanks to use of the following instruments:

- forum, tool for asynchronous discussions moderated by the tutors;
- chat, tool allowing synchronous interaction among students and tutors;
- video-chat, tool allowing to virtually meet the course tutor and interact with him (Figure 5. Video Chat).

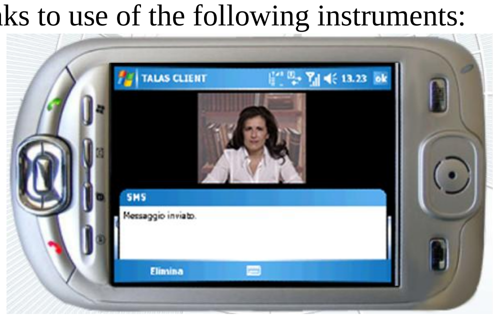

Figure 5. Video Chat

4. UTGM t-c@mpus

The third component of the integrated system is the t-platform promoting the use of the television in the learning process. The television is a very familiar instrument allowing to knock down any psychological barriers caused by the use of technologies in education. The keyboard is replaced by the user-friendly remote control and the PC is substituted by television easy to use also by not ICT literate people (Figure 6. UTGM t-Campus).
The t-learning promoted is a highly innovating solution: it concerns the use of the television as an instrument to deliver learning together with the e-platform and the m-platform.
Through the television, the student enters the t- C@mpus platform and benefits the different learning objects also available through the Virtual C@mpus Platform.

Figure 6. UTGM -Campus

In this context, the t-platform promotes a kind of learning process which is:

- hypertextual: thanks to the indexing of the lecture and thanks to the use of the remote control the students can easily stop, rewind, review, the teacher explanation planning in such a way his personal cognitive process;
- multimedia: thanks to the converge of different format of didactic material (audio, video, text, image) the students can activate and support different learning style. In this way is also fostered the users multiple intelligence (Gardner).

Conclusions

Each technological innovation implies important changes in our way of thinking and in the structure of our brain. Media allowing people to communicate influence our cognitive processes determining the development of new mental models. De Kerckhove speaks about brain frames, affirming that as we are shaping technologies, technologies are also shaping us, on the very neurological level, making us into very different kind of people.
In this framework, the UTGM integrated learning system considers the technologies as a mean to promote learning process and not the final end; the UTGM re-thinks to the pedagogical methodology in an “ecological approach” (Bateson) focusing on the users and not on the technology.
Based on the truism that learning is inherently social (Vygotsky), and that the individual mind is a part of an “ecology of mind systems” in constant interaction (Bateson), the UTGM learning system promotes effective learning processes based on interaction and collaboration.
In this way the birth of a learning community is ensured supported by synchronous and asynchronous communication allowing remote students to participate in a common learning experience. The word “Communication” and the word “Community” have the same Latin etymology *Communis*, which means common, sharing and community. This helps to understand the one-to-one and bi-directional link between “Communication” and “Community”.
The UTGM e-platform, the m-platform and the t-platform, providing users with different communication tools, allow them to interact and strengthen relationships every time and

everywhere. The UTGM users learn together, share the knowledge, the expertise and the know-how, have something in common, in other words they become a community.

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Integral Development of Distance Education System in Lithuania

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Abstract

Society is able to respond to nowadays challenge only if its education system is modern, adaptable and open to constant change and new ideas. Responding to the demands of a rapidly changing society inevitably involves harnessing advanced Information and Communication Technologies, to provide everyone with access to Lifelong Learning.

This paper presents research on creating the model of information system for blended learning delivery as one of means for integral development of DE system in Lithuania . ADDIE model- the systematic approach to the Analysis, Design, Development, Implementation, and Evaluation of learning materials and activities- has been used for instructional design these information system. ADDIE model helps to estimate learning processes and project tasks. It couse better design distance education information system. This system has been realised and applied in Vilnius Gediminas technical university (VGTU). DEIS is based on IBM Lotus technologies and is adapting and using for delivery joint Master degree program studies.

1. Introduction

Globalisation, the constantly increasing quantities of information, rapid change, segmentation of society – these are the challenges which considerably increase the importance of the social and cultural role of education. Society is able to respond to these challenges only if its education system is modern, adaptable and open to constant change and new ideas. Responding to the demands of a rapidly changing society inevitably involves harnessing advanced Information and Communication Technologies (ICT), to provide everyone with access to Lifelong Learning.

Over the last decade Lithuania's economy has experienced a period of especially rapid change, which was influenced by both internal and external factors, as are summarized above, together with other factors such as economic growth based on free market principles, substantial social differentiation and exclusion, negative demographic tendencies and Lithuania's integration into the economic, cultural and educational objectives and priorities of the European Union [12]

Modern universities and education institutions dealing with current circumstances should fully approach students and assure the potential for them to study, contribute up-to-date knowledge for everyone by all available means. In distance learning, much emphasis has been given to the pedagogical concepts of student-centered learning and student motivation, resulting in the design and delivery of high quality courses in higher education as well as more generally in resource-based education [5]. E-learning can help to prepare school-leavers for studies in university [2,3]. McVay Lynch [10] offers a systematic approach to the development of distance education based on online courses using the Web and refers to specific areas of student need for support and of faculty skills needed to develop course designs and curriculum.

The term **blended learning** is used to describe a solution that combines several different delivery methods, such as collaboration software, Web-based courses, and knowledge management practices [8]. Blended learning is also used to describe learning that mixes various event-based activities, including face-to-face classrooms, live e-learning, and self-paced learning. In courses that are using a virtual learning environment (VLE), some students like to work together, and some do not. The instructional design of collaborative learning in combination with ICT (Information Communication Technologies) proved to be more than feasible, and produced good learning results [4]. Under this system, the teacher could effectively evaluate student progress and also provide direct individual advice [11]. The opportunity given to the students in this course to choose between working collaboratively and working individually, in combination with face-to-face instruction, virtual instruction, and studying from written materials provided is highly appreciated by students [1,4]. Participatory e-learning can be defined as learning with systems that enable learners to produce part of the learning materials themselves [5,7].

The most widely used methodology for developing new training programs is called Instructional Systems Design (ISD). It is also known as Instructional Systems Design & Development (ISDD), the Systems Approach to Training (SAT), or just Instructional Design (ID). This approach provides a step-by-step system for the evaluation of students' needs, the design and development of training materials, and the evaluation of the effectiveness of the training intervention.

Instructional design (ID) is a conceptual model for developing instruction and typically includes analysis, design, development, implementation, and evaluation, i.e. ADDIE model [9].

The ADDIE model is an interactive instructional design process, where the results of the formative evaluation of each phase may lead the instructional designer back to any previous phase (Figure. 1). The end product of one phase is the starting product of the next phase.

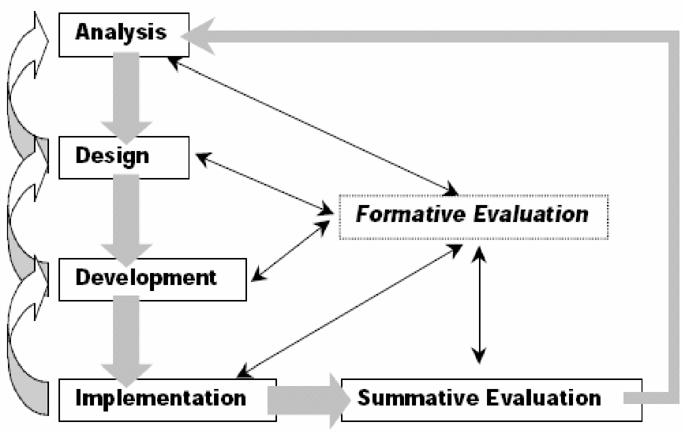

Figure. 1. Scheme of ADDIE model [9]

The paper presents information system that is able to realise the blended learning method and learning management processes. The system has been designed and implemented using ADDIE model at the Information Technologies Department of VGTU.

2. Meeting the Demand: Key Current Provisions of DE

An educated, competent workforce is the greatest asset of our nation and the most important prerequisite for successful economic growth and competitiveness. With the aim of ensuring a long-term economic and social welfare development strategy, it is especially important to break the chain of low academic achievement, unemployment and poverty. Concern for universal access to education as well as the quality of education and a high level of competency is therefore essential.

Thus education is particularly important in meeting these new development challenges. Although the social and cultural influence of education on national development is increasing, the education system in Lithuania is not yet fully able to prepare students and society as a whole for life and work in rapidly changing circumstances.

In order to ensure the greatest relevance of the qualifications of the workforce to the labour market and development of the national economy, Lithuania has prioritized human resource development and employment as key factors to meet these requirements. Education and training systems must adapt to the new society development realities where "lifelong learning is an essential policy for the development of citizenship, social cohesion and employment." [1]

Investment in lifelong learning (LLL) should improve the mobility, flexibility and skills of the workforce, making it capable of reacting to the changing demands in the labour market, promote social, economic and territorial cohesion as well as supporting the new lead sectors in the economy.

In Lithuania the LLL process is provided through universities, colleges, vocational schools, adult education centres and other relevant institutions. Thus the LLL system, using advanced technologies, should be established at all education levels – vocational, tertiary, etc.

Educational institutions need to support growing demand for on-line services by providing access to learning resources and increasing provision of new e-Learning opportunities. The technological complexity of various tools and services used in different institutions restricts development. This problem can be tackled by implementing international standards for learning technologies as well as by developing a single framework for integration of different learning applications and virtual learning environments into the Lithuanian Distance Education Network [13]. Compliance with agreed standards would allow interoperability of e-Learning applications and integration of the resources that are available, or will become available in the near future.

Many educational institutions are implementing information systems intended for planning of studies, curriculum development, publication of resources, education management, etc. In order to ensure value for money and interoperability of information systems, it will be necessary to co-ordinate development and procurement of publicly funded information systems intended for education management and planning.

Nowadays LieDM network consists of: 3 video conference studios, 7 video conference mini studios, 2 regional distance education centers, 21 distance education classrooms, 6 distance education internet access classrooms with 340 computerized work places, Phare 2000 project members and a professional video, audio and multimedia production studio.

The LieDM network joins almost all universities and colleges, and several vocational schools, as well. Studies in this network are based on modern ICT. The asynchronous internet-based learning and synchronous IP videoconferencing are blended during the learning process. Through the network, higher education schools in Lithuania exchange learning courses and share their experience.

The network is used to broadcast different events for society: lectures, seminars, conferences and meetings, learning materials delivery, etc. To enable any target point in the world as well as in Lithuania to connect to LieDM remote classess, LieDM network uses ISDN lines and another Lithuanian network LITNET (Lithuanian academic and research network).

3. Instructional System Design Using the Addie Model

Instructional design is the systematic approach to the Analysis, Design, Development, Implementation, and Evaluation of learning materials and activities.

Instructional design aims for a learner-centred rather than the traditional teacher-centred approach to instruction, so that effective learning can take place. This means that every component of the

[1] European Council Presidency Conclusions, Lisbon, 23-24 March 2000, paragraphs 5, 24 and 25, pp. 2 and 8; European Council Presidency Conclusions, Santa Maria da Feira, 19-20 June 2000, paragraph 33, p. 6.

instruction is governed by the learning outcomes, which have been determined after a thorough analysis of the learners' needs.

These phases sometimes overlap and can be interrelated; however, they provide a dynamic, flexible guideline for developing effective and efficient instruction, given in the Table 1.

ADDIE model has been used for project of e-learning information system at the Information Technologies Department of VGTU.

Table 1. Stages of ADDIE Model

Stages	Sample Tasks	Sample Output
Analysis: the process of defining what is to be learned.	o Needs assessment o Problem identification o Task analysis	o Learner profile o Description of constraints o Needs, Problem Statement o Task analysis
Design: the process of specifying how it is to be learned.	o Write objectives o Develop test items o Plan instruction o Identify resources	o Measurable objectives o Instructional strategy o Prototype specifications
Development: the process of authoring and producing the materials.	o Work with producers o Develop workbook, flowchart, program	o Storyboard o Script o Exercises Computer assisted instruction
Implementation: the process of installing the project in the real world context.	o Teacher training o Tryout	o Student comments, data
Evaluation: the process of determining the adequacy of the instruction.	o Record time data o Interpret test results o Survey graduates o Revise activities	o Recommendations o Project report o Revised prototype

4. Blended Learning- One of the Ways to Integral Development of DE System

E-learning is technology-enabled learning. There are many types of e-Learning technology, including the live virtual classroom. Once the different approaches to e-Learning and the various underlying technologies required to deliver are discussed, blended learning could be defined as:

- a combination of various networked technologies in a single learning package;
- a synthesis of various pedagogic methods that enables to achieve an optimal quality of learning process;
- a combination of various lecturing technologies (video cassettes, compact discs, internet material, etc.) together with direct lecturing by an instructor [14].

The integration of a virtual classroom into LMS has many advantages:

- opportunity is presented for provided blended learning;
- learning activities including both virtual classroom sessions and learning in a virtual classroom can be managed from a single location;

- learning activities includes virtual classroom sessions could be performed in a single location;
- information about learning activities is stored in a single location.

The blended learning method is valid by realising the coupling between virtual classroom and LMS technologies together with course management systems (CMS) Authoring Tool, LearningSpace, WebCT and others conforming to the SCORM standard. The layout of such architecture from a functional standpoint is presented in Figure. 2.

Blended learning has been chosen for design of the distance education information system because of its effectiveness [11].

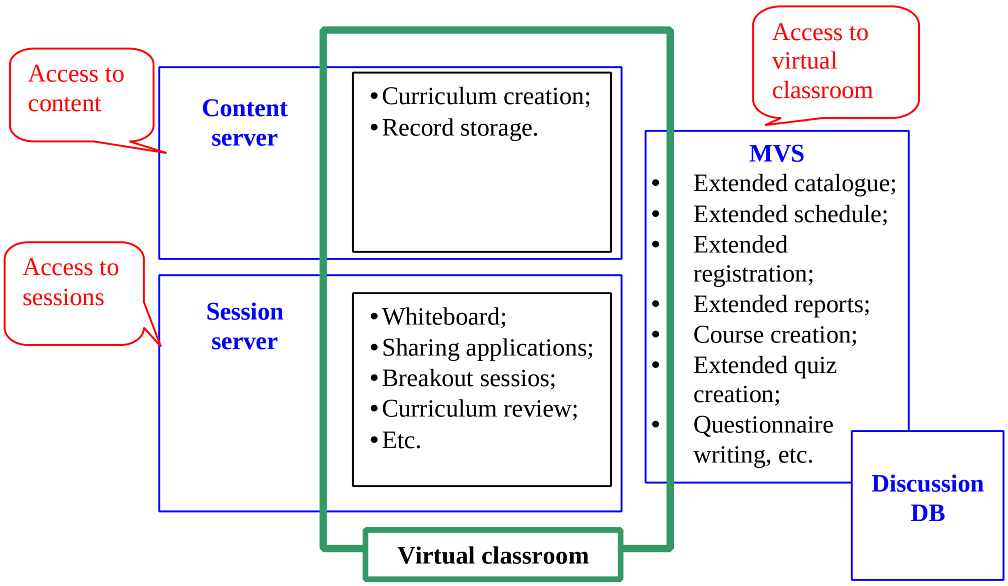

Figure. 2. The architecture of blended delivery model

5. The Blended Delivery Model of the Distance Education

The project of distance education information system (DEIS) on the basis of blended architecture is based on the completed instructional system design using the ADDIE model. Such a system has been implemented and tested for the distance education system at the Information Technologies Department of VGTU.

DEIS conform these requirements:

- the system must realise the blended learning form.
- the system must be flexible i.e. independent on component architecture, the number of users, and the changeable or scaleable number of servers, platform and software.
- the system must conform to HTML, LDAP to SCORM 1.2 standards.
- the system should be able integrate into other higher-level information systems.

A simplified conceptual structure of a blended distance education information system has been designed; it is presented in Figure. 3. Any VLE can serve as a course delivery server as long as it conforms to the SCORM 1.2 e-learning standard. Moreover, it is also planned to implement a knowledge management and search system (Lotus Discovery Server), which would enable users to find required information more quickly and precisely.

The designed system has been implemented and tested in the departmental information system. Its structure is presented in Figure. 4. This system realises the blended e-learning model.

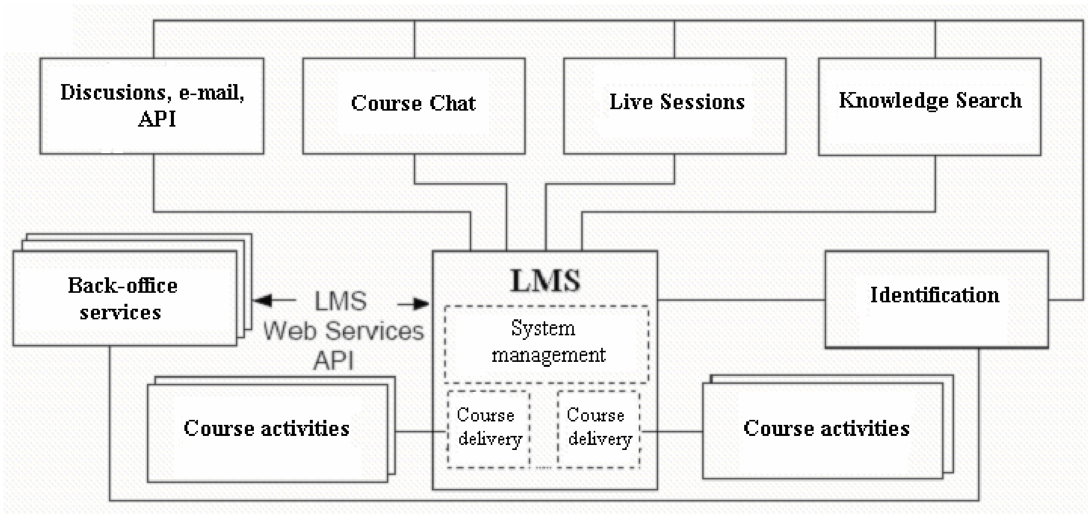

Figure. 3. The conceptual structure of a blended learning IS

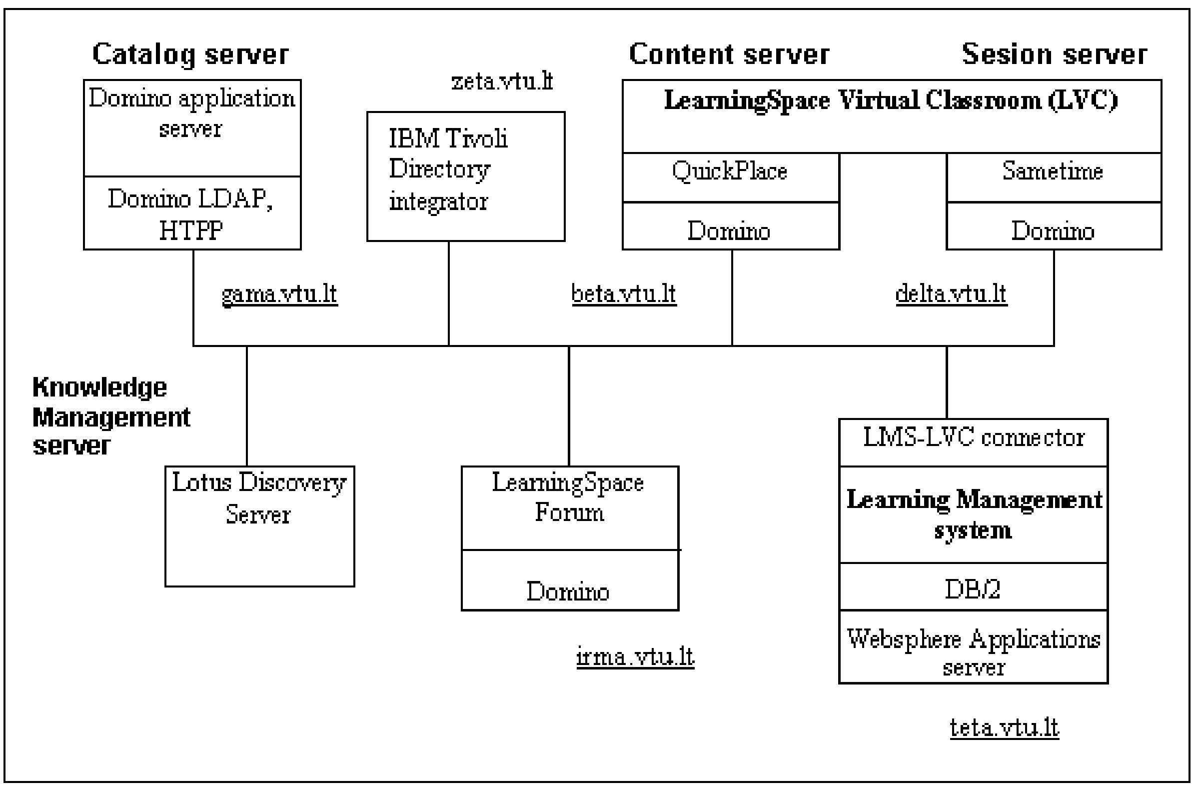

Figure. 4. The scheme of the blended learning information system at VGTU

This system is based on IBM Lotus technologies. Course authors can use the Authoring Tool (AT), an LMS components, or LearningSpace and other course creation tools, for creating course content. LMS guarantees the access to the courses created and imported into LMS, administers them, manages learning processes and stores all information related to learning processes. When instructors create course content with the AT, they are able connect course content to virtual classroom sessions as one of the activities. Thereby blended courses could be created that cover video lectures and asynchronous material.

Video lectures are created with the LearningSpace - Virtual Classroom server environment, course Internet interviews are based on the Sametime technology, and discussions are run on the basis of Domino technology.

Also, the Domino server stores various document libraries, such as various departmental organizational documents, theses and organizational documents for bachelor and master students, e-book library, news, schedules, a virtual employment exchange, etc. Content servers store course content files used via the LMS. Course files are connected via URL. Instaces of the WebSphere Application server on the basis of Java, XML, HTTP and other technologies are used. Thereby two different application servers that perform different functions are used in the distance education information system. This system could be used by students with mobile devices like PDA or smart phone [15].

Conclusions

The model of information system for integral development DE system in Lithuania has been designed and realised using ADDIE model that let exactly to estimate distance learning processes and all tasks of project.

DEIS is flexible, independent component architecture, number of users, changeable or scaleable number of servers, platforms and software because of it's conformity to the main standards of information technologies and e-learning.

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Involvement, institutional roles and design models in e-learning

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Abstract

Although a huge literature is available about the organizational, pedagogical and technological aspects of e-learning, very little is known about the activities that actual design teams carry out when setting up an e-learning course. This paper presents the results of a qualitative study which investigated the instructional design process of six teams involved in the development of an e-learning unit in two different institutions. The results indicate that although theoretical models inspire the design activity, teams tend to find their own way of doing design, and that each project has its own story. Differences between the team largely depend on variables in the institutional setting.

Introduction

The rapid development of e-learning technologies and the spread of technology-supported instructional activities in the most diverse settings has prompted both researchers and practitioners to produces a huge amount of literature about e-learning. Papers and books are available, which focus on the institutional, organizational, economic, pedagogical, psychological and, of course, technological aspects of e-learning. This literature – which continuously grows and opens up more and more challenging and stimulating perspectives – does not yet contain reflective studies on the practice of those actually bringing about the design, set-up and evaluation of e-learning courses, namely, e-learning design teams.

The largest part of e-learning projects involve an interdisciplinary team (Bates, 1999; Bates & Poole, 2003; Botturi, 2006). On the one hand, this implies team communication and management represent a large part of the instructional design activity (Cox & Osguthorpe, 2003; Liu, Gibby, Quiros & Demps, 2002): they should be included in the instructional designer's skill portfolio and be researched as such. On the other hand, the real actor in an e-learning project is the team, not the designer alone. For purposes of this study, a relevant question is" "How does the team behave with respect to an ID model?"

This perspective belongs to Instructional Design (ID), a discipline which, up to now, has been busier in defining prescriptive models than in exploring the practice (c.f. Dick, Carey & Carey, 2001; Morrison, Ross & Kemp, 2003; Willis, 2000). What does really happen in the practice of instructional design teams? What do they do, and how do they structure their activity? A recent literature review by Kenny, Zhang, Schwier & Campbell (2005) indicated that astonishingly, in a field that produced a plethora of more than a hundred theoretical models (Andrews & Godson, 1995), only 7 papers reported findings of empirical studies about the practice of instructional design, and only 3 case studies indicated the activities designers actually performed. By that review, it seems that ID models only inspire the practice, without confining it – they get adapted to each specific project and situation.

The goal of the study reported here is to contribute to the growing body of literature concerning the actual practice of instructional design in the e-learning domain focusing on two elements: the balance between personal involvement and institutional roles, and the relationship between design models and the design practice.

Context of the Study

This study investigated six eLearning design and development teams from the University of Lugano (USI, http://www.unisi.ch/) and three from the Open University of Catalunya (UOC, http://www.unisi.ch/). Both are young institutions, 10 years old in 2006, relatively small-sized, and both include e-learning as core part of their business. However, the institutional settings are largely different. The UOC is a distance university, it was "born with e-learning", and has developed a standard design process tailored to its needs and structure, including a precise definition of roles and responsibilities. On the other hand, the USI started e-learning activities only in year 2000, and as part of research projects: its way of designing – or better, the way its design teams design – is less structured and more dependent on the feature of each single project.

The teams involved in the study include 3 to 6 people, and are strongly interdisciplinary, with backgrounds varying from Physics to History, from Communication Sciences to Engineering. Team structure are different at USI (where each teams does both design *and* development) and at UOC (where teams design and a third party company develops). However, all teams include one or more Subject-Matter Expert(s) (SME) an instructional designer, and a project leader, who is often also a SME. At UOC project leaders are called *Profesor Responsible de Asignatura* (PRA), and instructional designers coordinators – I will use these labels throughout the text. At USI, teams also include a Web programmer and a graphic designer.

The projects on which teams were working cover different topics, from media history to architecture, including web usability and educational psychology. For a correct understanding of the results of the study, it is important to point out that all projects were successful in delivering results in time and on budget. The differences in communication and shared mental models identified later should not therefore be interpreted as bearing positive or negative effects, rather as different "ways of life" of different teams.

Finally, the teams in the two institutions declared to implement two different design models. At USI, the eLab fast-prototyping model, a model was developed in order to enhance team communication through fast prototyping in large eLearning projects in higher education (Botturi, Cantoni, Lepori & Tardini, in press). At UOC, the standard institutional design process (Sangrà, Girona, Guàrdia & Mas, 2004).

Method

For reasons of space, the research method is only briefly outlined in this paper. A full account is available in (Botturi, 2006 b).

This study followed an empirical method based on a combination of Social Network Analysis (Scott, 1991) and concept mapping (Novak & Gowin, 1984; Novak, n.d.). Sociograms, which are simple constructs from Social Network Analysis, allow capturing and describing social and team structures: they were used for providing a portrait of each team from the point of view of collaboration and communication. The use of concepts maps, originally developed for teaching and collaborative learning, has already been extended to knowledge management and social science research as a tool for the elicitation and representation of expert knowledge (e.g., Coffey, Hoffman, Cañas & Ford, 2002; Coffey, Eskridge, Sanchez, 2004), the development of group conceptual framework (Trochim, Cook & Setze, 1994), and for group evaluation and program planning (Trochim, 1989). The design of this study exploits concepts maps for capturing team members' perspectives and knowledge of the design and development process, further analyzing the data with a structured approach described below.

Data were collected through individual interviews conducted with all the team members involved in the six projects. Individual sociograms were then combined in order to create team sociograms. Concept maps were digitized according to specific guidelines, in order to make them comparable without loosing information. They were then used as Individually-Constructed Mental Models (ICMM) in the analysis process that followed the Analysis-Constructed Shared Mental Model method (AC-SMM; O'Connor & Johnson, 2004; Johnson & O'Connor, in press), that allows the generation of a concept map that represents the shared view of each team, or *team SMM*. In order to allow a more formal comparison, a specific *sharedness index* was calculated for each project team and group (staff and external authors). This number varies between 0 and 1 and expresses the degree of similarity of single ICMM to the SMM (the formula is available in Botturi, 2006 b). The SMM and the sharedness index were finally cross-read with process diagrams, interview data, and with sociograms. The concepts in ICMM were labelled according to five categories: events, phase/activity, design artefact, organizational, tool. The non-shared concepts were then analyzed and the information organized in "perspectives" according to the specific roles in the project.

The study delivered a number of interesting insights, partly reported in (Botturi, 2006 b). In this paper, I will focus on two key elements:

1. The tension between personal involvement and institutional roles, which is a features that definitely distinguishes e-learning design in a campus-based institution as the USI from a distance open university as the UOC
2. The relationship between design models and design practice, which on the contrary seems to follow the same dynamic in both settings.

Personal involvement and institutional roles

At the UOC, the results of the study indicate that each team is the product of the merge of two main views: that of UOC employees, which we will call *staff*, and that of external authors which work on a contract on single courses.
Interestingly, the sharedness index value can be decomposed considering separately these two main profiles: staff (in whatever role, it author, coordinator or designer) and external authors. Considering the staff as a single group, they have a sharedness index of 0,10; considering only coordinators (all belonging to the staff), it reaches 0.15; the external authors, considered as a single group, only reach 0.08, i.e., almost a half of the value of coordinators. These findings may indicate that:

1. In general, UOC staffs have a highly shared view of how courses are developed at UOC – this consequently indicates that the institutional model is actually interiorized – at least in some form and to a limited extent of detail, as discussed below – by the staff.
2. UOC staff behaves differently when they do not cover the coordinator role, e.g., when they serve as authors. This consequently indicates that the UOC model is developed "from the eye of the coordinator", and that it actually does not completely fit to author's needs (internal authors, that supposedly are familiar with the model as much as their colleagues, still sway from it).
3. External authors do not perceive the model, rather just "drop in" for certain phases or activities, according to their tasks. Moreover, they have very different views of how the process looks like.

This latter remark makes the role of the coordinator even more important, as it implies that one can take part into the process without seeing it, just accomplishing her/his duties, only if there is a solid structure and clear interactions. This leads to the formulation of an interesting research hypothesis:

> *Partial knowledge collaboration hypothesis*
> Given that there is a strong coordination and clear indications are provided, a team member can effectively work with the rest of the team even sharing only a minimal part of the process view. Based on this assumption, also those who possess a more extensive knowledge of the process may not activate it when they are assigned to roles that do not require it.

But what exactly distinguishes the view of staff members from that of external authors? Figure 1 shows the SMM for the two groups.

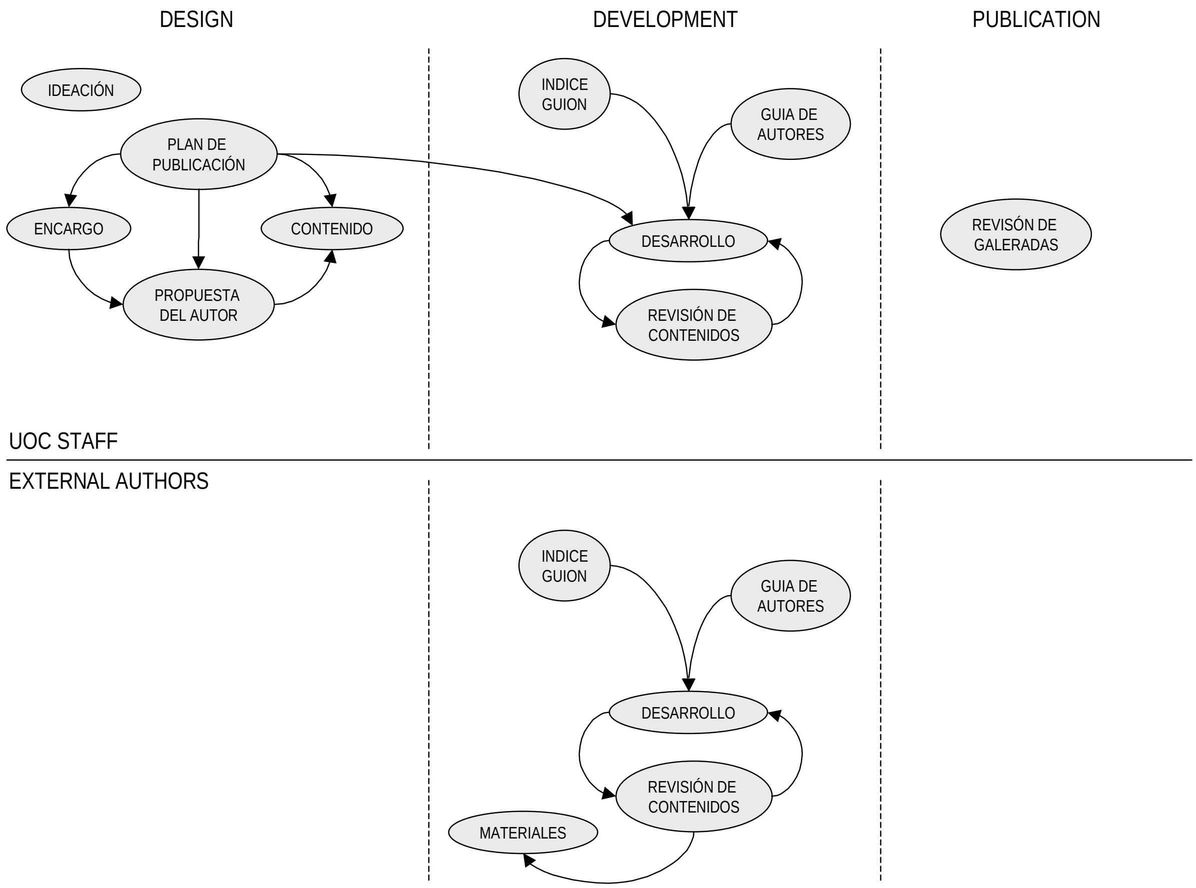

Figure 1. SMM for staff and external authors

The evidence shows that coordinators have a more complex view of the process, which includes phases that also internal authors do not see, especially concerning the setup of the project and the revision of web format maquettes in the publication phase. External authors share the central part of their view, i.e., only the portion related to development. They therefore experience a shorter process that ends with the finished materials. Notice that PRA and coordinators do not have a shared end-of-the-process node – actually, once the design and development are done, the course is just ready to start. This illustrates and reinforces the partial knowledge collaboration hypothesis.
In order to tackle the issue formulated in the research questions, the concepts in ICMMs and Team SMMs were labelled and color coded according to some basic types: event, phase, artefact, organization, and tool.
The ICMM in Figure 2 is shown with color labels for concept type (rendered in tones of grey).

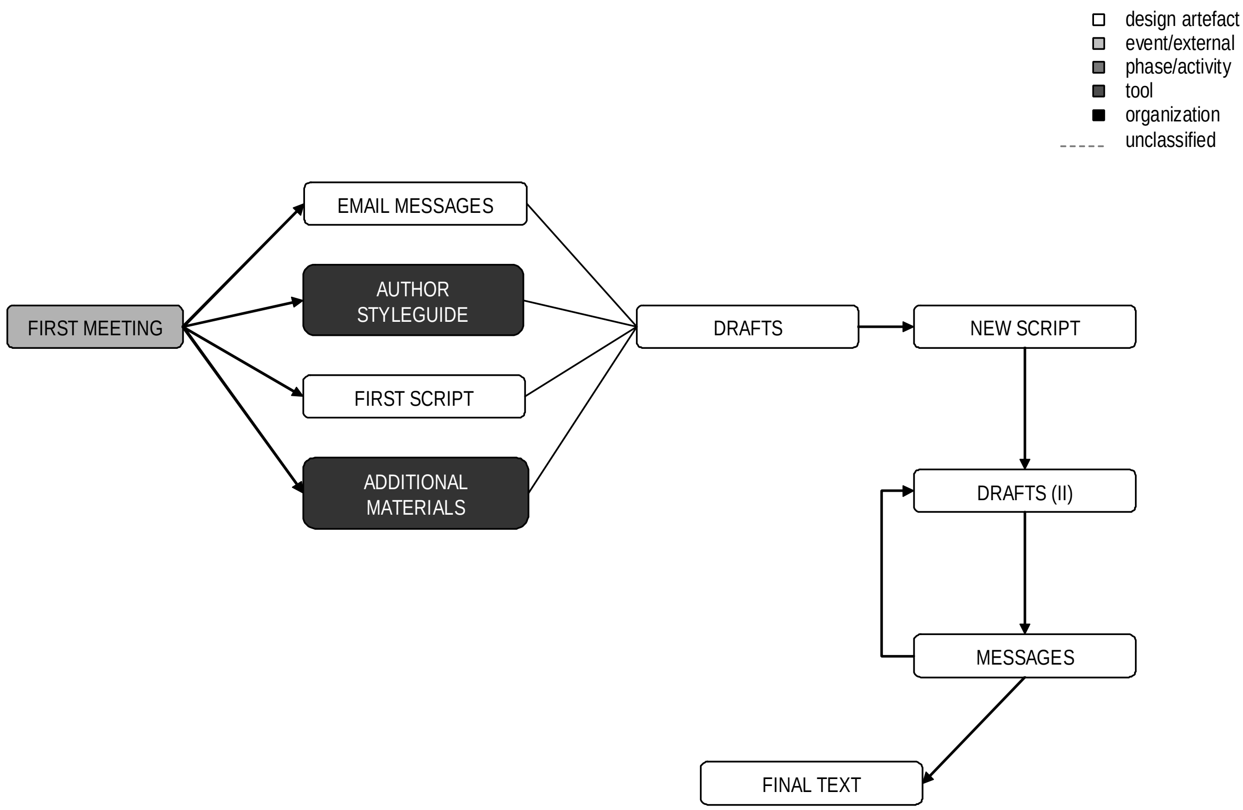

Figure 2. Sample of labelled ICMM

This analysis reveals that different roles perceive the process as formed by different elements: coordinators are focused on phases or organization items, PRA on phases, while external authors see artefacts, meetings and tools provided by the UOC (e.g., the UOC author style guide). The only phase always present for external authors is the development, i.e., the writing of the content. For example, external authors see revisions as messages within the development phase, while the staff see a proper revision phase. Once more, internal authors are mid-way: they still have a more artefact-oriented view than PRA and coordinators, but are nonetheless aware of phases. These findings allow the definition of the *Process vs. Product hypothesis*.

Process vs. Product hypothesis
In a well-defined design and development process, the perception of team members sticks to the task defined in their role: content related roles tend to see the process as the progressive creation and refinement of a product through tools and other intermediate artefacts, while coordination roles see it as a sequence of phases, in which artefacts and tools only play a part.

Interestingly, this latter hypothesis does not hold if we turn to the results at USI. A careful observation of labelled maps collected there generally reveals that people covering specific roles in project teams have similar individual perspectives. But the data at USI contained the ICMMs of the two persons that took part in two projects (one web programmer and one graphic designer) provide an interesting insight, which can be formulated as a second research hypothesis, which I call the *Extending view hypothesis*. These persons' views of the two projects they work in are profoundly different. For the project they are more involved, they have a view that includes all types of elements (artefacts, phases, events, etc.). For those in which they are less involved (they actually have a marginal participation, delimited to the technical task) their ICMM are much poorer and less varied, containing almost exclusively artefacts. The analysis of other ICMMs, and the cross-reading them with the information about the involvement in the project from interviews, confirmed that this is indeed a general trend: the individual perspective on the project depends not on the person only, but also on her/his degree of involvement, in a clearly traceable way, as follows:

> *Extending view hypothesis*
> For technical roles (instructional designer, web programmer, graphic designer), the individual view of the project depends on the degree of involvement in the project itself. People with low involvement will mainly see artefacts; people with average involvement will see artefacts and phases/activities; people with high involvement will see artefacts, phases/activity and events (both internal and external).

The data available seem to suggest that this extending view hypothesis holds in settings in which there is a loosely structured design process; The process vs. product hypothesis on the other hand better describes situations where there is a standard and well structured design process,

Design models and the practice

As already mentioned, both at the USI and at the UOC it is possible to identify an official design model that wants to represent their way of doing design. What is its actual value for the practice? This issue was investigated through observing team SMMs and the global SMM. We will take as example the eLab used at the USI, given that the dynamic at work is the same also at the UOC.
Theory says that the eLab model should describe the team's activities, so that the shared activities included in SMMs should bear some relationship to it. Following the AC-SMM methodology, I produced the global SMM of the USI (see Figure 3), representing the main concepts that surfaced in all teams. It contains 5 concepts (prototype, implementation, test, graphic design, and courseware structure) in a strongly interconnected network.

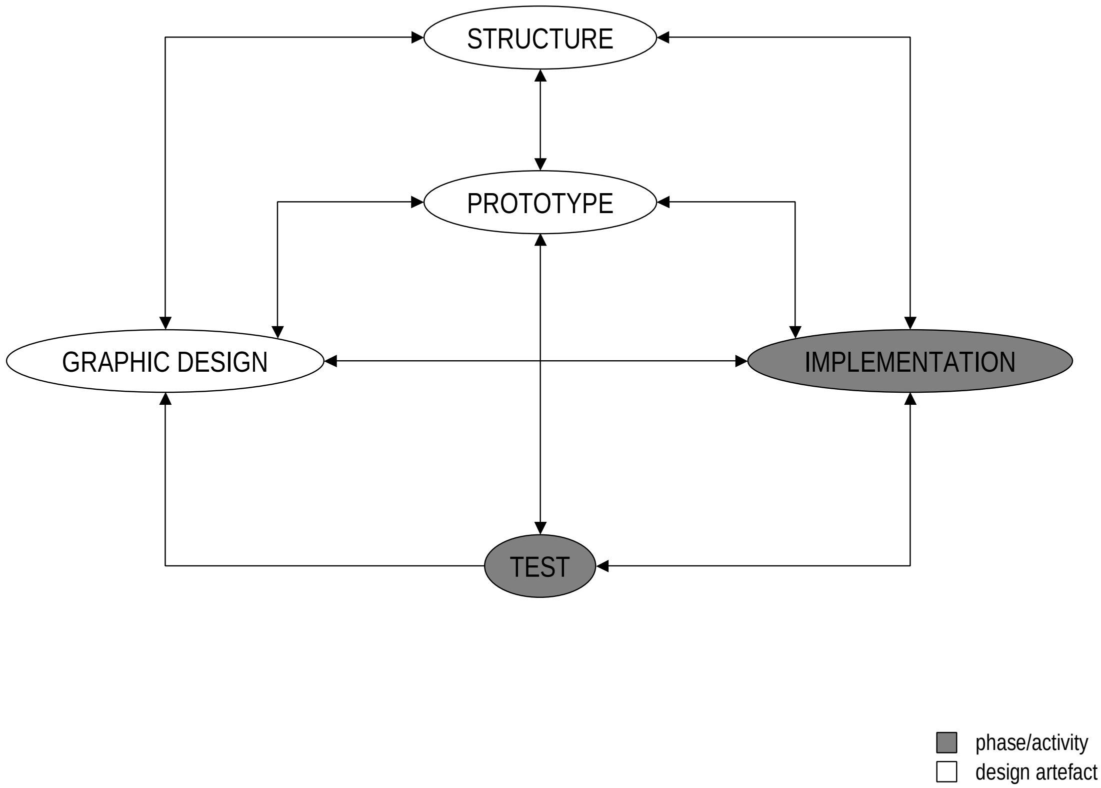

Figure 3 - Global SMM

According to the team SMM, the global SMM also contains only phases and artefacts, indicating that artefacts seem to be important to the team, even if ID models usually focus on phases only.
The diagrams show that there is a relation between the fast prototyping model and SMMs: the global SMM can be mapped to the eLab model, as shown in Figure 4. Moreover, team SMM include other phases (design, revision) and artefacts (scenario, survey) included in the eLab model. Non-shared activities such as assessment, technology selection, etc., are performed by individual members and are present in ICMMs.

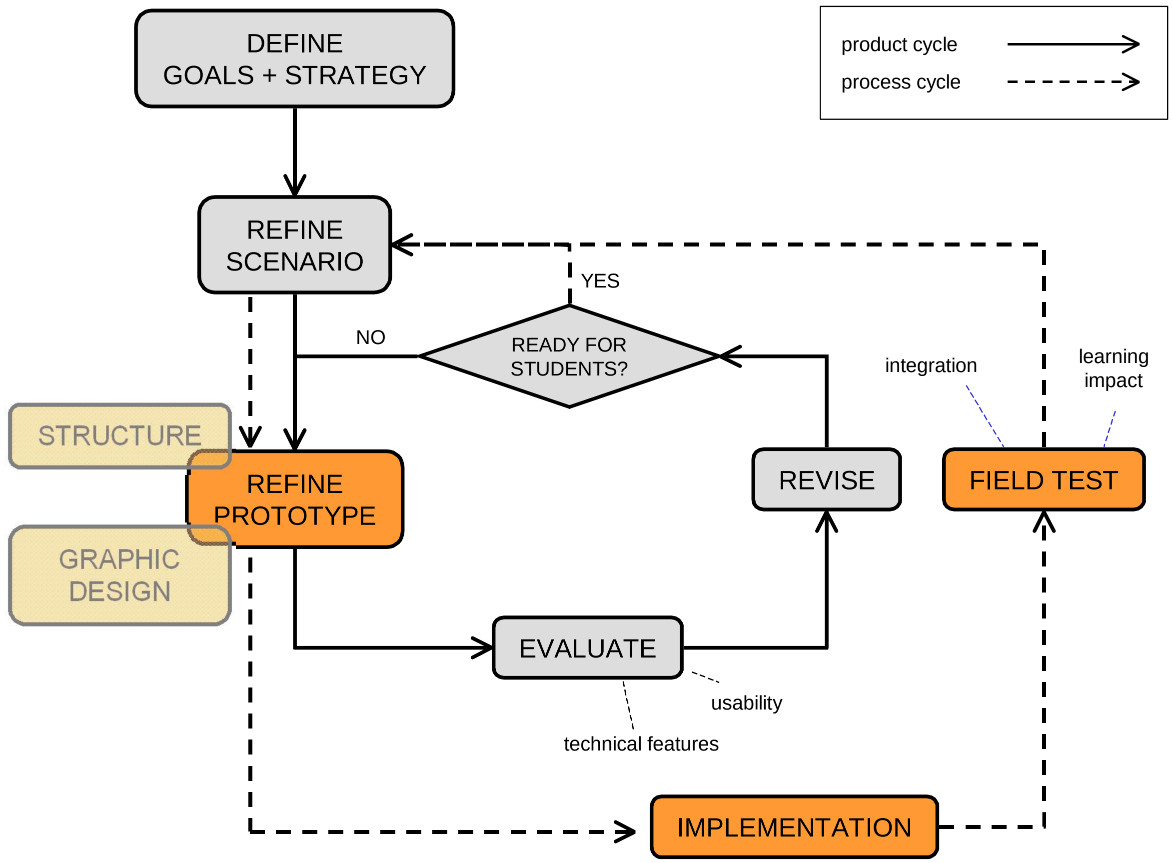

Figure 4 - Mapping of the global SMM on the eLab model

The same happens at the UOC: the global SMM includes *some* of the elements available in the "official model", and adds some more artifacts to it.
The distribution of individual and shared activities observed in this study could be generalized as a research hypothesis that I will call the *Treffpunkt Hypothesis* (from the German for "Meeting Point"), as follows:

> *Treffpunkt Hypothesis*
> Implementing an ID model for a project means (also) (a) implicitly or explicitly assigning specific activities to single members, to the whole group or simply skipping them if unnecessary; and (b) conceiving and implementing artefacts that support the activities and that allow sharing the results.

In short this means that the activities described in a theoretical design model are (implicitly) distributed to different roles, and that the process is made coherent by the development of shared artefacts that create a bridge between different activities and roles. Shared activities and artefact represent the meeting points of the team members, who would otherwise walk different paths. Probably, as reported by Kenny, Zhang, Schwier & Campbell (2005), it also means including other activities, such as project management.

Conclusions and Outlooks

This study developed an empirical method for the analysis of the actual design practice of teams involved in e-learning projects in two different institutional settings. The method was presented along with an in-depth focus on two main results. First, the results indicate that there is a different balance between personal involvement and institutional roles in the two settings, depending on how the design process is structured. Second, despite that difference the relationship between theoretical model and design practice seems to be similar in the two settings.

The study is limited in its scope, as it investigates two specific institutional settings. It is sensible to expect that there would be different results in another university, or in a corporate setting, in which social practices and relationships are different; the same is likely to happen with different types of projects, e.g., the development of instructional games, or in different geographical and cultural locations.

The goal of this study is to bring useful data for discussion and to formulate sensible research hypotheses for future work. Currently, we are carrying out a follow up of the study at the USI, in order to see how team communication and mental models evolve over time in the same design teams. The hope is that a better understanding of real practice of e-learning design teams provides insights and tools for a more effective and sensible management of the human factor in e-learning.

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Argumentation in Problem solving based online Debates as a way of achieving meaningful learning

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Title Argumentation in Problem solving based online Debates as a way of achieving meaningful learning.	***Títol*** La argumentació en Debats online basats en la resolució de problemes com a estratègia per aconseguir aprenentatge significatiu.
Author Manel Aguirre Open University of Catalonia Last revision: 2006/07/20	***Autor*** Manel Aguirre UOC Darrera revisió: 20/07/2006

Abstract

In this paper we describe an action research focused on online debates.

There are a set of actions that altogether engage a complete strategy to improve online debates design, implementation and evaluation. In this innovation we take ill-structured problems as a point of start, design a Debate Guide with the purpose of generate different problem spaces and promote dilemmas and controversial, real discussion We teach Toulmin argumentation model and use it to the structure the contributions and as a metalinguistics and metacognitive tool to refer to the debate development. This development is monitorized using threads, postit notes, marking colors, and moderation messages.

We describe a research design to better know how Educations students appreciate this kind of debate organization.

Preliminary results show a significant effect of the Debate in a conceptual change, and meaningful learning and a high valuation of the innovation. The results demand for the innovation dissemination and further research.

Resum

A aquest paper descrivim una investigació acció centrada en els debats online.

Hi ha una sèrie d'accions que en conjunt conformen una estratègia complerta orientada a la millora dels debats online tant en el seu disseny, implementació i avaluació. A aquesta innovació prenem els problemes poc estructurats com a punt d'arrencada, dissenyem una Guia del Debat amb l'objectiu de generar diferents espais de problema i promoure els dilemes i la controvèrsia, la discussió real, en definitiva. Ensenyem el model d'argumentació de Toulim i utilitzen la seva estructura per estructurar les contribucions icom a eina metalingüística i metacognitiva per referir-nos al desenvolupament del debat. Aquest desenvolupament és monitoritzat utilitzant fils de discussió, notes postit, marques de color i missatges de moderació.

Descrivim un disseny d'investigació orientat a conèixer millor com els estudiants de psicopedagogia aprecien aquesta organització del debat.

Els resultats preliminars mostren un efecte significatiu del debat en el canvi conceptual i aprenentatge significatiu i una alta valoració de la innovació. Els resultats exigeixen la disseminació dels resultats i major aprofundiment de la recerca.

Introduction

Nowadays we notice a steady spread of the practice on collaborative and cooperative teaching and learning through e-learning environments where learners work online using ICT.

In this paper we assume that meaningful learning should be one of the most important goals of schools and universities, that it has to be focused on solving everyday problems and that technology can help to achieve it.

Having this point of start not only we pretend to homage our admired professor David Jonassen, but to contextualize this small contribution between what Heather Kanuka would call the “Philosophy in practice”

Online debate activities multiply their presence at universities and school course planning. Computer- supported collaborative argumentation (CSCA) software proliferates. May we be starting to know some clues about the key to teaching and learning online?

This paper states that teaching to use argumentation in problem solving online debates is a powerful strategy to achieve meaningful learning, and even, conceptual change, in learners. We will try to demonstrate with our research that the dilemma problem solving using an explicit argumentation model in online debates is an effective and efficient teaching strategy if it is well designed and implemented. This strategy based on formal discussion on ill-structured

Introducció

Avui en dia observem que s’estén de manera constant la pràctica de l’ensenyament i aprenentatge col·laboratiu i cooperatiu en entorns d’elearning on els aprenents treballen a distància amb el suport de les TIC.

A aquest paper assumim que l’aprenentatge significatiu ha de ser un dels més importants objectius d’escoles i universitats, que s’ha de concentrar en la solució de problemes del dia a dia i que la tecnologia ha d’ajudar a aconseguir-lo.

Amb aquest punt de partença no només pretenem homenatjar el nostre admirat professor David Jonassen, sinó contextualitzar aquesta petita contribució entre el que Heather Kanuka anomenaria “Filosofia a la pràctica”.

Es multipliquen les activitats de debat online als programes d’universitats i centres d’ensenyament. Proliferen entorns i programari d’argumentació assistida per ordinador (CSCA). Potser comencem a tenir pistes de la clau de l’ensenyament i l’aprenentatge online?

Aquest paper defensa que l’ensenyament de l’argumentació en debats online basats en problemes és una potent estratègia per aconseguir aprenentatge significatiu i, fins i tot, canvi conceptual, en els aprenents. Intentarem demostrar a partir de la nostra recerca que la resolució de problemes tipus dilema mitjançant un model explícit d’argumentació materialitzada en debats online pot ser una estratègia d’ensenyament eficaç i eficient si es dissenya i

Problem? What problem? A problem is an unknown that is worth finding because of its social, cultural or intellectual value perception. Finding the unknown is the process of problem solving. In this research we can identify tree problems: the problem that the learner finds with the debate activity, the problem that the teacher-moderator attempts trying to achieve that every one of his students that meet at the debate virtual space learn a set of competences from an specific field of knowledge and the problem that for the scientific community interested on e-learning means better knowing this translucent box call learning and knowledge construction with activities and situations designed on purpose for teaching and learning.	***Problema? Quin problema?*** Un problema és quelcom desconegut que val la pena descobrir per la percepció del seu valor social, cultural o intel·lectual. Descobrir allò desconegut és el procés de resolució del problema. En aquesta investigació identifiquem tres problemes: el problema al qual l'aprenent es troba en voler realitzar l'activitat de debat, el problema que per al professor o moderador suposa intentar aconseguir que cada un dels seus estudiants que es troben a l'espai de debat virtual aprengui un conjunt de competències al voltant d'un camp específic del saber i el problema que suposa per a la comunitat universitària i científica interessada en l'e-learning entendre millor aquesta caixa translúcida que és el de l'aprenentatge i la construcció del coneixement a partir d'activitats i situacions dissenyades ad hoc per ensenyar i aprendre.

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How we focused some solutions

The way we have tried to focus the solutions is this:

Ask learner to argument instead of give opinion
--So ensure they can argument first.
--So teach the Toulmin Model of six elements of the argumentation

Facilitate ill structured problems that invite to take position and debate
--So built a Debate Guide that proposes problems and a way to discuss them in the debate space

Monitor the discussion process
--So use technical resources to draw the argumentation process: marking the argumentation elements structure, linking the discussion of this elements in a same thread, using post-it digital notes to moderate how this elements are being discussed or how the thread is developing

Change evaluation criteria as we are learning how to argument as well as the rest of the competences
-- So make it explicit at the same Guide

Ask the learners about the learning process
--So as to know if the new approach is worthwhile

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Com vam enfocar algunes solucions

La manera com vam intentar enfocar les solucions és la següent:

Demanar a l’aprenent a argumentar en comptes d’opinar
--Així que ens assegurem primer que saben argumentar
--Així que ensenyem el model de Toulmin d’argumentació en sis elements.

Facilitar problemes mal estructurats que convidin a prendre posició i debatre
-- Així que construïm una Guia del Debat que proposa problemes i la manera de discutir-los a l’espai de debat

Monitoritzar el procés de discussion
- Així que fem servir una sèrie de recursos tècnics que representen el procés d’argumentació: marcar l’estructura dels elements de l’argumentació, vincular la seva discussions a aquests elements en un mateix fil de discussió, utilitzar notes tipus post-it per moderar com aquests elements estan essent discutit o com el fil de discussió es desenvolupa.

Canviar els criteris d’avaluació ja que estem aprenent com argumentar a la vegada que la resta de competències
-- Així que els fem explícits a la mateixa Guia

Preguntar als aprenents sobre el procés d’aprenentatge
--Així podrem saber si la innovació val la pena

</td>
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Literature and state of the art review and decision making

Why teach argumentation?
It seems that not everybody learns spontaneously to argument and some secondary and undergraduate students show difficulties on argumentation (Cerbin, 1988, Silvestri, 1998, Jonassen, 1997)

Argumentation activities promote conceptual change and meaningful learning. (Hemmerich and Wiley, 2001; Wiley, J., & Voss, J. F., 1999). CM Conferences and CSCA tools can stimulate it. (Jonassen, 1997).

OUC first pilot experiences with students from different knowledge fields (Education, Psychology, Sociology, Business Intelligence) show interesting results as the learners explain.

Argumentation is a core competence in many professional areas. Lawyers, politicians, scientist, medical staff, and responsible of any technological process require to argument their decisions.

Why Toulmin's model?

Toulin's model (Toulmin, S., 1958; Toulmin, S. ; Rieke, R. ;Janik, A, 1979) has been found useful for text writing planning teaching (Rodríguez Bello 2004), for policy analysis

Revisió l'objecte d'estudi i presa de decisions

Per què ensenyar a argumentar?
Sembla que no tothom aprèn de manera espontània a argumentar i alguns estudiants de secundària o recent matriculats a la Universitat mostren dificultats en l'argumentació (Cerbin, 1988, Silvestri, 1998, Jonassen, 1997)

Les activitats d'argumentació promouen el canvi conceptuali l'aprenentatge significatiu . (Hemmerich and Wiley, 2001; Wiley, J., & Voss, J. F., 1999). Les discussions recolzades per ordinador i les eines CSCA poden estimular-la. (Jonassen, 1997)

Les primeres experiències pilot a la UOC amkb alumnes de diferents camps de coneixement (Psicopedagogia, Psicologia, Sociologia, Postgrau de Business Intelligence) mostren interessats resultats segons l'avaluació dels propis aprenents.

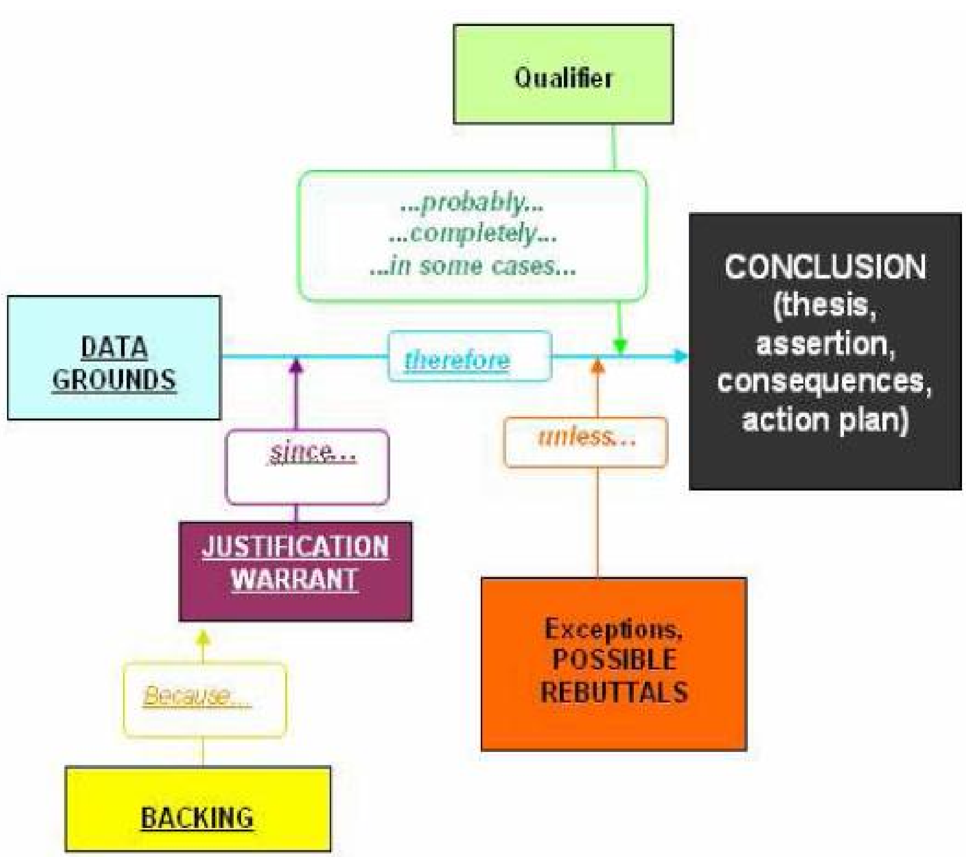
L'argumentació és una competència nuclear a moltes àrees professionals. Advocats, polítics, científics, personal mèdic i qualsevol responsable d'un procés tecnològic requereix argumentar les seves decisions.

Per què el model de Toulmin?

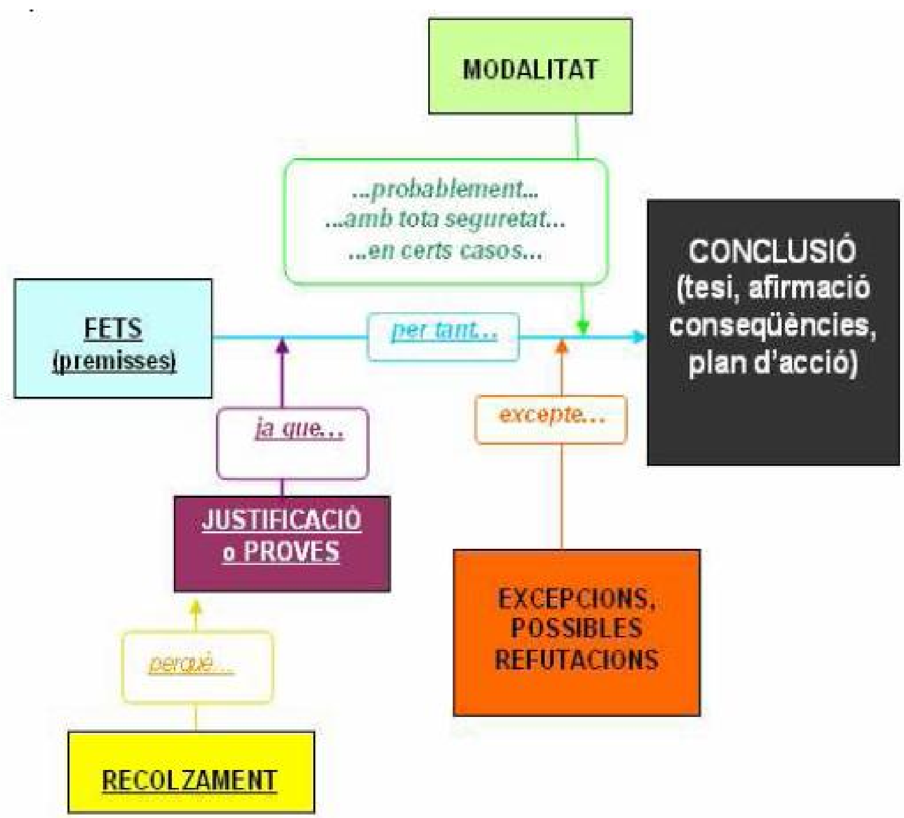
El model de Toulmin (Toulmin, S., 1958; Toulmin, S. ; Rieke, R. ;Janik, A, 1979) ha estat trobat útil per a ensenyar a planificar els textos escrits (Rodríguez Bello 2004), per anàlisi i raonament polític (Gasper 2000), per analitzar

Ill-structured problems we use to generate debates	***Problemes mal estructurats que fem servir per generar debats***
Case study. Knowledge Management in industrial and service organizations.	Estudi de cas. Gestió del Coneixement a una organització industrial i a una de serveis.
Dilemma: Minister decision: ICT in formal education: a subject or a transversal curriculum axis “Technolabour”: The experience of Robbie Davis-Floyd first labour: nature and identity or technocratic pact for protection?	Dilema: Decisió del Conseller: TIC a l’educació formal: una assignatura o un eix transversal del currículum. “Tecnopart”: L’experiència del primer part de la Robbie Davis-Floyd: naturalesa i identitat o pacte tecnocràtic per protecció?
Is the teacher an artist, a technician, a scientist or a technologist?	És el mestre un artista, un tècnic, un científic o un tecnòleg?

Toulmin model adaptation



Adaptació del Model de Toulmin



Research design	Disseny de la investigació
At the beginning of the semester (February 2006) we send a questionnaire to uninformal conference (that we call "fòrum") in three virtual classroom of the subject ICT and Education in Education Studies. For a description of our university see (Guitert and Romeu, 2006). To answer this pre-questionnaire was completely voluntary. Among 190 students only 77 replayed to this first questionnaire. Most of them (about 90%) were already education professionals in formal and not formal education organizations in Spain, most of them Catalonia. They answered about their perception of online debates and how they would describe the worst and the best online debate they had ever met.	A principis de semestre al febrer de 2006, vam enviar un qüestionari a la bústia informal que anomenem fòrum de tres aules virtuals de l'assignatura TIC i Educació als estudis de Psicopedagogia. Per a una descripció de la nostra universitat veieu (Guitert and Romeu, 2006). Contestar aquest preqüestionari va ser totalment voluntari. D'entre 190 estudiants, només 77 van contestar-lo. La majoria (al voltant del 90%) eren professionals de l'educació a organització d'educació formal i no formal d'Espanya, la majoria a Catalunya. Van contestar sobre la seva percepció dels debats online i com descriurien el pitjor i el millor debat virtual que mai han fet
Then, some weeks later, most of them in their own virtual classroom held a debate design, implemented and evaluated as it has been explained here.	Algunes setmanes després la majoria d'ells van participar a les seves pròpies aules a un debat dissenyat, implementat i avaluat tal i com ha estat explicat a aquest document.
Finally, three moths later, when all the continuous evaluating activities and exams were held, we send to the 77 students a post questionnaire to evaluate their performance and valuation. 35 students finally answered the second questionnaire Their answers are being analyzed in this moments and comparing them with classroom performance.	Finalment tres mesos després, quan totes les activitats d'avaluació continuada i exàmens van acabar, vam enviar als 77 estudiants un postqüestionari per avaluar el seu aprenentatge i valoració. 35 estudiants finalment van respondre aquest segon qüestionari. Les seves respostes s'estan analitzant en aquests moments contrastant-les amb els resultats d'aquests alumnes a l'aula.

What happened? The results are being analyzed in this moment and will be available in September at: http://www.xtec.net/~maguirre/results.doc Preliminary results show a significant effect of the Debate in a conceptual change, and meaningful learning and a high valuation of the innovation	***Què va passar?*** Els resultats estan essent analitzats en aquests moments i seran disponibles al setembre a: http://www.xtec.net/~maguirre/results.doc Els resultats preliminars mostren un efecte significatiu del debat en el canvi conceptual i aprenentatge significatiu i una alta valoració de la innovació.
Contribution, implications and further challenges This strategy of design, implementation and evaluation of online debates has shown a good acceptation and good learning results and has to be disseminated. On the other hand there are some implications of this method that has to be taken in to account. During the period of the debate the role of the teacher-moderator ha to be real active and has to read the participation not later than 24-48 hours later than they were sent so as to decide if it is necessary to give some kind of feedback at that time. In fact teacher-moderator role has been perceived as one of the most decisive factors of the debate success. Some path of research are opened: - Which kind of problems are the best to generate debates? - Which kind of feedback is best for each situation? - How can be easily drown the knowledge construction in the learning community that is discussing and building arguments? Can Toulmin's model be useful for that purpose?	***Contribucions, implicacions i nous reptes*** Aquesta estratègia de disseny, implementació i avaluació de debats online ha produït bona acceptació i bons resultats d'aprenentatge i ha de ser difosa. D'altra banda hi ha algunes implicacions d'aquesta metodologia que cal tenir en compte. Durant el període del debat el rol del professor- moderador ha de ser realment actiu i ha de llegir les participacions no més tard de 24-48 hores després que han estat enviades per tal de decidir si és necessari de donar algun tipus de feedback en aquell moment. De fet el paper del professor-moderador ha estat percebut com un dels factors més decisius d'èxit del debat. Algunes vies d'investigacions s'obren: - Quin tipus de problemes són els millors per generar debats? - Quin tipus de feedback és el millor per a cada situació? - Com pot ser fàcilment grafiada la construcció de coneixement a la comunitat d'aprenentatge que està construint argumentacions? Pot el model de Toulmin ser útil en aquest objectiu?

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Thank you.
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Case method in VTLE: an effective tool for improving learning design

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Abstract

This article presents a preliminary research on an instructional design perspective for the design of the case method as an integral part of pedagogy and technology. Key features and benefits to use this teaching and learning strategy in a VTLE (virtual teaching and learning environment) are identified, considering the requirements of the European Higher Education Area (EEES) for a competence-based curricula design. Implications of this findings into learning object approach to explore the possibilities of learning personalisation, reusability and interoperability trough IMS LD, are also analysed.

1. Introduction

The Bologna Process is leading universities to reach the European Higher Education Area. One of the requirements of this process is to develop competency-based curricula. The Tuning project stated that a competency is *"a dynamic combination of attributes —with respect to knowledge and its application, to attitudes and responsibilities— that describe the learning outcomes of an educational programme, or how learners are able to perform at the end of an educational process*." (González & Wagenaar, 2003).

This concept is similar to that propose by The International Board of Standards for Training, Performance and Instruction (IBSTPI) and used by Richey, Fields & Foxon (2001) to establish the core competencies for instructional design. They define the competence as *"…a knowledge, skill, or attitude that enables one to effectively perform the activities of a given occupation or function to the standards expected in employment"*.

The design of a competence-based curriculum demands to rethink programs and courses and stimulates the application of social-constructivist pedagogical approaches that are learner and community-centred. Chickering & Gamson (1987) –cited by Bonwell & Eison (1991)- literature research analysis suggests that "*students must do more than just listen: They must read, write, discuss, or be engaged in solving problems. Most important, to be actively involved, students must engage in such higher-order thinking tasks as analysis, synthesis, and evaluation. Within this context, it is proposed that strategies promoting active learning be defined as instructional activities involving students in doing things and thinking about what they are doing.*"

One of the teaching and learning methodologies that better could fit in this scenario is the case method.

2. The Case method as a theoretical framework

Case method has been used in Higher Education for a long time. This teaching and learning methodology was first implemented in 1871 by the Harvard Law School. Since then, the method has gained adopters from different academic disciplines like business, medicine, administration, social sciences, arts, engineering, agriculture, politics and social development. A case is a story that explains real or realistic events or problems "*so that the students experience the complexities, ambiguities, and uncertainties confronted by the original participants in the case… As they inhabit a case, students must tease out key components form the real messiness of contradictory and complicated information*[1]*.*"

In expert literature we find case-based learning, case study and case method as the most use terms to explain the case writing, teaching and learning. Kowalski (1995) differentiates between case study and case method as the former corresponds to a *general description of a situation while the latter has specific reference to using the case study as a teaching paradigm*.

For the purpose of our research we define the case-based learning as an instructional strategy that uses case study as a resource and the case method as the learning scenario description where learners and instructor interact.

Most professors using case study describe it as a descriptive document, delivered as a narrative that is based on a real situation or event. The case tries to facilitate a balanced relationship between the multidimensional representation of the context, its participants and the reality of the situation.

Smith (1999) enumerates the main features of a case: "*(1) a context-based, relevant and relatively realistic scenario; (2) a challenging but not too frustrating problem, task, or situation; (3) a somewhat open-ended problem or situation that requires careful formulation and listing of assumptions; (4) a problem or situation that motivates students to explore, investigate, and study; (5) a problem or situation that encourages or requires interaction among students, between students and faculty, between students and outside resources; and (6) a problem that requires addressing the integration of broader aspects, including technical, economic, social, ethical, and environmental.*"

Different types of case studies have been classified using different criteria. Hebert *et al.* (2004) elaborated a typology based on learning objectives summarizing the work of Van Stappen (1989), Guilbert & Ouellet (1997), Proulx (1994) and Martínez & Musitu (1995) distinguishing the methodological purposes they followed and some internal guidelines for teacher training like that Universitat Oberta de Catalunya which distinguishes between close (restricted answers) and open cases (multiple solutions) or the Instituto Tecnológico de Monterrey (TEC) focusing whether on the case subject, the realistic basis, the subjective/objective possibilities or the values it stands (DIDE, 2001).

Case method application usually goes on a common cycle (Lynn, 1999): individual reading and preparation, small-group discussion, a "plenary session" for discussion and individual reflections. Some variants explained by Romm & Mahler (1991), cited by Buffington & Harper (2001) include: individual processing centred on isolated student resolution, chronological or simultaneous group discussion where learners discuss in sub-units and then in a plenary session, and chronological or simultaneous group dramatization, similar to the previous, but with emphasis in role-playing.

3. Research approach

Although the case method has a long tradition and has been widely spread into the educational field, it has always been used in traditional classroom contexts. The whole references we have mentioned are always based on this face-to-face mode of approaching the case method. Much

[1] The ABCs of Case Teaching

less has been documented about the use of this method in virtual environments and online learning.

The Open University of Catalonia (UOC) is a virtual university; created in 1994, and currently with over 40.000 students, fully online. At this stage, UOC wants to develop all the programs through a competency-based curricula design. Learner-centred pedagogy is appropriate to this end, and case method could be a good response, despite the long and vast experience and literature refers predominantly to face-to-face classroom application. Consequently, the main aim of this research is to find out how case-based learning methodology should be applied to virtual environments by identifying key features to use this pedagogical strategy in these settings and which implications there are on case design, development and implementation.

4. Research methodology

Chosen research methodology has been qualitative, so we wanted to find out potentialities and concerns when developing and online interactive case-based learning. Given the fact that literature on research methodology states that qualitative research could be appropriate to elicit tacit knowledge and subjective understandings and interpretations and to deep in on little-known phenomena or innovative systems (Marshall & Rossman, 2006), we thought this was the most appropriate methodology for our study.

Nevertheless, a literature review on the case method has been the first step, in order to glance at the state of the art on the field. A data base on the review has been created to identify main elements describing: main and related concepts, underlying pedagogy, related learning strategies, advantages and disadvantages of is use, generic competencies enabled, typologies, guidelines for writing the case study and the teaching notes, teaching and learning methodology and experiences, classroom and online applications and implementations, developments in the learning object trend.

The methodology has been completed by several semi-structured interviews, in order to know how faculty who is using the case method in their teaching consider and interactive case-based methodology should be developed and which features are the most important ones. We did that because open interviews provide us mechanisms to develop new elaborations, explanations, meanings and ideas (Patton, 1987:11).

Interviews were applied to professors from different disciplines (educational sciences, Information technologies, industrial engineering and labour and social sciences) from two different universities that use the case method into their online or face-to-face teaching.

Also a questionnaire was built to collect data about the rationale under the decision of using the case method into teaching, and document the case study design process and the teaching practice.

5. Results

5.1. Considerations from previous research

A prototype of the interactive case-based learning has been developed considering a number of issues we found as key elements in the literature review: to simulate real-world complexity, to use multiple media in the presentations, to use hyperlink/hypertext navigation features (Kovalchick, Hrabe, Julian, and Kinzie (1999); to provide to the students complete information, expert modelling and challenges to be solved; to promote active learning by simulation models and ask students to take control and responsibility (Semrau, Fitzgerald & Riedel, 2001) and to gather information, identify issues, create solutions, receive feedback, and gain experience through problem solving (Koh & Branch, 2004).

5.2. Characteristics of the prototype

Taking into account these considerations, we developed a prototype including these features:

- Design process of writing the case study and the teaching notes.
- Development process of producing the raw data.
- Technology Implementation process of integration into a Learning Management System (LMS)..
- Pedagogical implementation process of teaching and learning.

Independently of case complexity or objectives, we focused on the kind of interaction to propose a generic model that could support any type of case. This effort is guided by the research objective to build a basic structure that express the case teaching-learning scenario together with the possibility of reuse and personalisation. In this sense we aim the creation of a high-level case model that can be run in a LMS, support any kind of case complexity or objectives and let us introduce some variables for case personalisation. We understand the personalisation at two different levels (Mor & al., 2005), different itineraries and problem statement according to course objectives.

Designing learning is a complex process and many models have been outlined to guide and support the task. We have addressed the case approach as an instructional design matter. We find appropriate to adopt a concept of instructional system design (ISD) defined as "*an organized procedure that includes the steps of analyzing, designing, developing, implementing, and evaluating instruction*" (Seels & Richey, 1994), a pertinent and complete perspective that let us understand the case approach as a whole and integrated process. In other words, we are interpreting the case approach from the ADDIE[2] generic process, since the analysis for arguing in favour of its use till the evaluation for the improving of the learning.

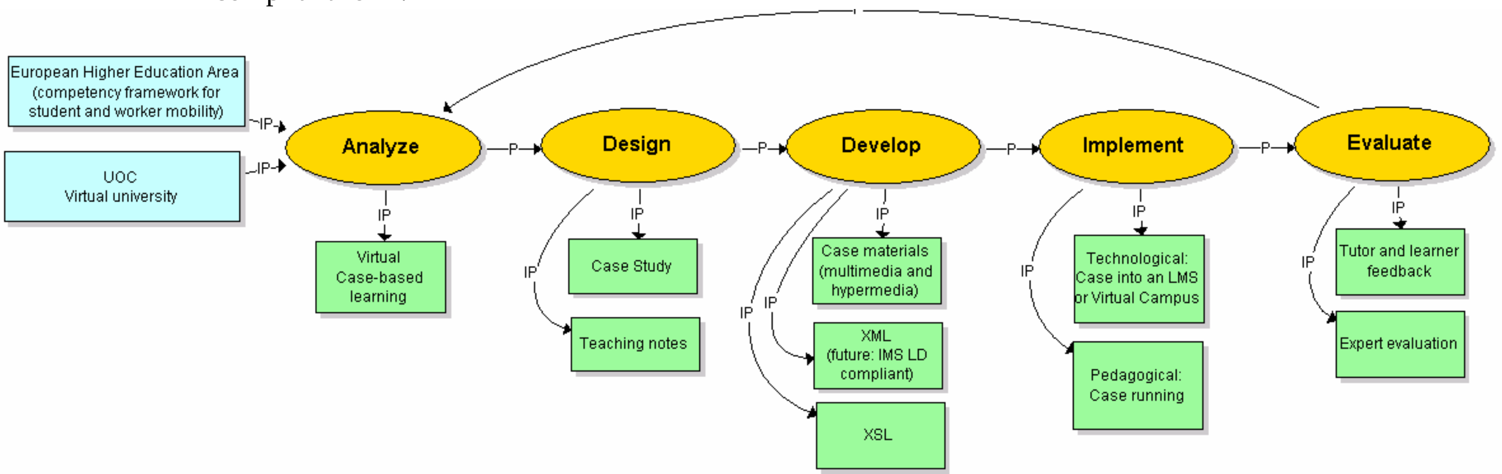
This techno-pedagogical point of view pursues the creation of a coherent process for a better accommodation and integration of design, development and implementation tasks based on a common background of coherent and shared principles for designers, developers and tutors.

From the *Analysis-phase* we have been able to find the arguments for virtual case-based learning adoption, from the *Design-phase* we have overpass the idea of just writing cases to the designing of multimedia and hypermedia case studies supporting personalization and also including the teaching notes as additional information for case pedagogical implementation (running); from the *Develop-phase* we have included the rich media learning material and we have added the requirement of developing from a learning object approach for interoperability and reusability together with the standardization of a customizable front end; from the *Implement-phase* we have differentiated the technical aspects of case integration into a LMS from the teaching-learning moment; and finally from the *Evaluate-phase* we pretend in our next research to proceed to a complete validation of our holistic case approach.

Our aim is to establish a generic case structure to guide the writing of the case study and the teaching strategy. The teaching notes will include teacher and learner roles descriptions. The common case high level structure will be respected for the technical programming and implementation of the case into the learning management system. An in-house UOC XML language will describe the case main components that through a style sheet in XLS will give the front end of the case to both teacher and learner, giving access to multimedia and

[2] ADDIE: Analysis, Design, Development, Implementation and Evaluation. See at: http://www.e-learningguru.com/articles/art2_1.htm

hypermedia content and communication tools for discussions. We also include an exercise to develop the case study in an Instructional Management System Learning Design (IMS LD)3 compliant form.

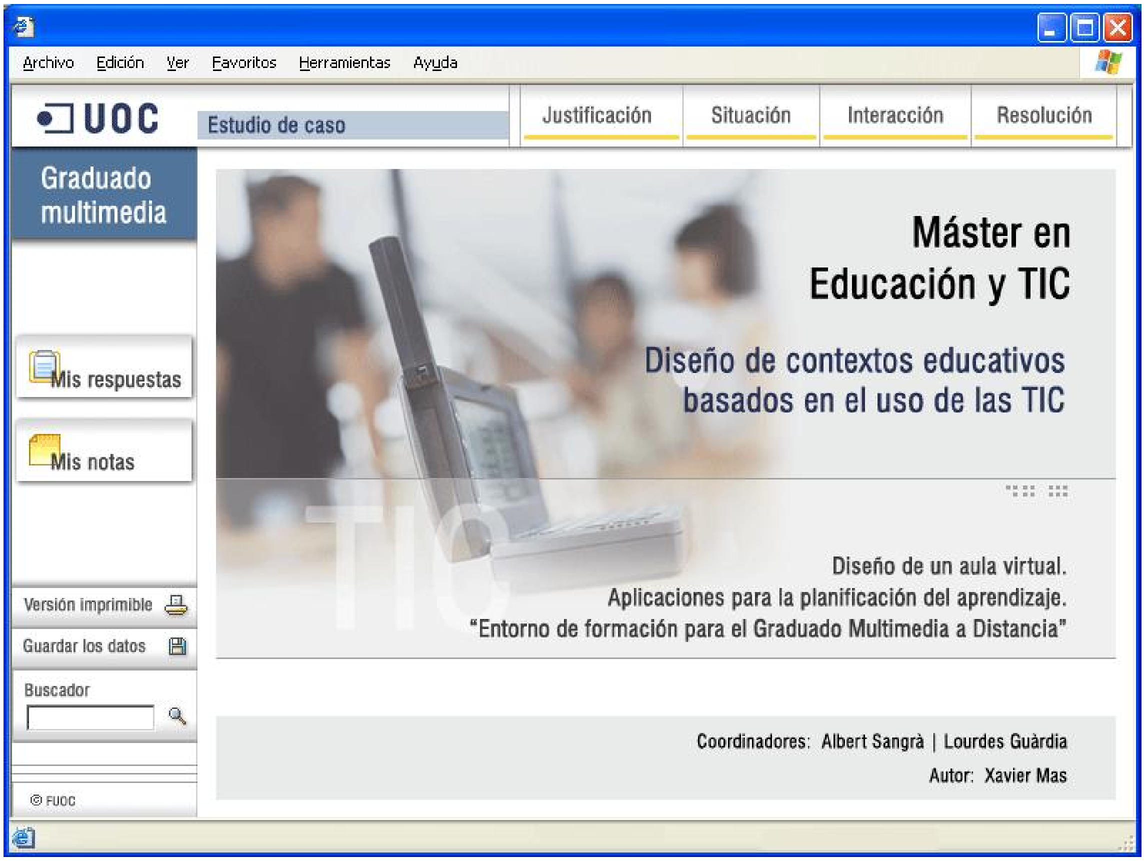


population particularities and the main and secondary characters.

The interaction component goes deeper into the problem by segmenting it into subunits. The learner, instead of being introduced to the case with all the information, has to participate in some individual and/or collective activities and answer some specific questions that will let him gather more information as a way to build a more complete portrait of the situation.

The last one, resolution, is based on the fact that several professional dilemmas will be generated (Mostert & Sudzina, 1996). Through the previous sections the learner was able to gather enough information and comprehensiveness as to be able to succeed the new challenge.

[3] http://www.imsproject.org/learningdesign/index.html



Snapshot of prototype for cases to be implemented at the Máster en Educación y TIC (e-learning) at UOC.

From the faculty interviews, a number of items also were highlighted in order to take them into consideration when developing the final version of an interactive case study:
Use of an interactive case-based methodology influences in a positive way on student's satisfaction -especially on course methodological issues- because it leads to a perception of a more practice-based learning approach.
It also makes knowledge of individual learning progress easier.
Learning application, critical analysis, comparing situations and settings and making decisions are very relevant kind of objectives that could be achieved through the use of case-based methodology.
Faculty support to design and implement interactive case studies is critical. Instructional designer' tasks, expertise on teaching methodologies and other guidelines should be integrated when defining a model for elaborating this methodology.

6. Conclusions and further research possibilities

Interactive case-based learning is an appropriate educational methodology that responds to two main actual institutional requirements: the development of competence-based curricula harmonized with the European Higher Education Area and the adoption of a socio-constructivist teaching and learning approach adapted to virtual environments.
The case approach in virtual environments facilitates hyperlinked multimedia information consulting, synchronous and asynchronous debate and knowledge sharing, personalized and continuous teaching support, individualized learning itineraries, high realistic simulations and collaborative learning.

Faculty using this learning methodology consider there is a need of having tools to facilitate interactive case-based studies design and implementation. Also guidelines to take the whole profit of its possibilities are strongly required from them.
The adoption of an interactive case-based learning holistic approach accelerates the case design, development and implementation process, although ensuring quality all along the action course, reducing the distance between design and programming, allowing communicability between multiple actors and facilitating personalisation, reusability and interoperability of cases.
This perspective demands the creation of a series of manuals to assure coherence and respect of principles guiding different processes executed by different actors. In this sense we need to develop a handbook for competence-based learning design through case studies for teachers. Provision of a technical handbook for the creation of learning specification compliant case structures and front end style sheets is also needed.
A first prototype of a case study that put into practice the design and development phases of our model has been developed and tested. To proceed to the evaluation of the technical and pedagogical implementation of our test case study should be the next step in this work.
The second part of this research will be to ask the students to test the prototype to know which benefits they perceive when using it as a learning strategy and also to ask faculty about its use and benefits in terms of teaching strategy.

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Narrative, Game and Knowledge:
the Digital Initiative in Action in *Golpe de gracia*

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Introduction: *Golpe de gracia's* pathways

In order to better understand the reach and importance of the hypermedia narrative known as *Golpe de gracia* (Colombia, 2006, http://www.javeriana.edu.co/golpedegracia)*,* we must resort to two topographic images. That is, we must accept the fact that *Golpe de gracia* is both (and at the same time) the end of a path of research and the start of a new road.

In fact, *Golpe de gracia* is the crowning of a process that starts with the sighting of some peculiar processes of contemporary literary texts (*see* Rodríguez, 1994)[1], passes then through the systematization of post-modern Colombian narrative (*see* Rodríguez, 2000)[2], carries on with the question of creating a theoretical framework to better understand hyperfiction[3] (its theory, practice, and teaching) of which the main products are the academic hypertext, *El relato digital* (the digital tale), and the hypermedia narrative, *Gabriella Infinita*)), to finish with the development and publication of a new type of work designed on the premises of going beyond the first step or exercise herein mentioned.[4]

Still, the issuing of *Golpe de gracia* has brought on new challenges. One of them being the need to consolidate the relationship between narrative and game, more specifically, between hypermedia narratives and videogames[5], in such way that

[1] Specifically, the exercise of meta-fiction, understood as a characteristic of post-modern narrative.

[2] In fact, the book *Posmodernidad, literatura y otras yerbas* can be considered the final report of the research sponsored by Universidad Javeriana under the title: *Perverso oficio del furor. Mapa de la narrativa posmoderna colombiana*

[3] Both works by Rodríguez (2002) constitute the body of my PhD thesis and can also be considered the results of the research sponsored by Universidad Javeriana under the title *Relato digital y cibercultura* (for *El relato digital see* http://www.javeriana.edu.co/relato_digital and for *Gabriella Infinita see http://www.javeriana.edu.co/gabriella_infinita*).

[4] The "problems" of *Gabriella Infinita*, as we'll see further on, derive from the fact that hypermedia is the result of the adaptation of a novel to a new medium (*see* Rodríguez, 2003), as opposed to *Golpe de Gracia*, which was created from scratch as a way of narrating "digitally".

the narrative hypermedia goes beyond sheer entertainment to become a truly aesthetic interactive *oeuvre*. Another challenge is the need to consolidate as well the implementation of the narrative-game couple into the learning and knowledge acquiring process[6]. Finally, we have the challenge of developing an assembly platform constituted by digital pieces capable of providing teachers with aids which in turn enable them to create small works as a result of hypermedia narratives and videogame crossings which help support the relevant learning goals (matter that we will develop farther on).[7]

The need for a Cyberculture

The second suggested topographic image to help understand the horizon and scope of *Golpe de gracia*, is perhaps that of a fork on the road. In fact, once *El relato digital* was finished, one of the first conclusions reached was the need to assert the birth of a new narrative genre: hyperfiction (also known as hypermedial fiction or digital narrative (*see* Rodríguez, 2001)). Still, the difficulties found in order for hyperfiction to constitute itself as a proper new art form have also been mentioned, and among them perhaps the main one was the lack of a sufficient body of both work and audiences, that is, the absence of a socially significant number of both oeuvre and hyperfiction users. And this question is not only a technical or aesthetic issue but a cultural one. In order for hyperfiction to become a proper art form and activity, several cultural factors must converge, among them one which is absolutely crucial is the creation of what could be called a

[5] See the same problem as stated in the chapter titled: *"Apague ese play y póngase a leer: nuevas formas de leer y de escribir"* in my book: *Trece motivos para hablar de Cibercultura* (2004). For a digital version in wiki see: http://es.wikibooks.org/wiki/Cibercultura#Apague_ese_play_y_p.C3.B3ngase_a_leer:_nuevas_formas_de_leer_y_de_escribir

[6] An important precedent work in Colombia is: *"Literatura y juegos de rol: una propuesta didáctica basada en el minicuento*" by Henry González et al (2006)

[7] On the possible ways to approach this last challenge there is a concrete precedent: the platform created at Universidad Javeriana as a result of the research project: *"Desarrollo de documentos de hipermedia interactiva para sistemas de soporte al aprendizaje distribuido, fase II*" known as "Plantilla AVA (Ambiente Virtual de Aprendizaje)", of which the author of this paper was a member. *Golpe de gracia* can also be considered a result of the same research project.

cyberculture ("*cultura de lo cyber*", in Spanish)[8], aspect which goes beyond the mere promotion of both the theory and practice of hyperfiction proper and demands not only studying cyberculture but the establishment of concrete agendas to take action.

Thus, still waiting for the convergence of these two paths or roads (on the one hand, that which opens to the use of digital narrative literally "applied" to the acquisition of knowledge, and on the other, that which derives from the study and promotion of cyberculture), herein I present the main characteristics behind the development and final showing of *Golpe de gracia*.

Brief summary of the piece

Golpe de gracia is an interactive multimedia piece arranged for Internet (hypermedia) that combines text, illustration, audio, modeling, animation, and programming, whereby the story of a character which undergoes a "near death" experience is told; this particular situation is also used as a metaphor for the present cultural transition we are all going through.

The multimedia comprises three "narrative worlds": *Cadáver exquisito*, *Línea mortal* and *Muerte digital* ((Exquisite Corpse, Mortal Line, and Digital Death, respectively) and four "deepening rooms" (games, reading texts, study, and construction). The work offers several different degrees of interaction that go from taking decisions in order to follow the routes, all the way up to the collective construction of the text, on the way participating in several interactive games.

Golpe de gracia is also an awareness or sensitizing mechanism devised as an educational and communicative strategy that attempts the collective building up of knowledge. In this last sense, each of the multimedia's worlds promote such build up by articulating its own stage-interface by offering the development of one or

[8] I use the term "lo cyber" to group together all the phenomena which we could consider a result of cyberculture or culture derived from the extensive use of the ICNT

several possible actions, the different strategies to promote forward the interaction and the game, and a sort of "encyclopedic" environment which eases the process of contextualizing and in depth search among the several topics and issues peculiar to the actual tale or narrative[9].

It is worth saying though, that this strategy does no affect at all the aesthetic character of the piece. Rather, it boosts and enhances its functions: from the sheer entertainment it offers to the educational-epistemological function including the possibility for debate and inter-communication.

What is that 'thing' which *Golpe de gracia* surpasses?

As already said, *Golpe de gracia* is a piece designed from scratch in order to overcome the difficulties and omissions of what use to be the first hypermedial attempt: i.e. *Gabriella Infinita*. Based on Stuart Moultroph's suggestion of the need to verify the laws of the medium (*see* Moultrhop, 1997), and in order to establish what is exactly that which, when compared with *Gabriella Infinita*, *Golpe de gracia* in fact surpasses or transcends, we might try to answer the following four questions:

What does *Golpe de gracia reinforce or strengthen*?

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[9] Thus, for example, in the first world of the tale the sensitization is guaranteed in as far as the user follows the route "completely", that is, after having opted for all the alternatives, thus:

1. Alter observing and witnessing the visits, the user recognizes the offered "dramatic" situation (ill will against a character) and decides to intervene by writing his / her own reproach. In reward, the user can now gain access to the context of the relationship character-visitor (the novel's chapter entitled: "*Coordenadas imprevistas de la muerte")*
2. Once the user has finished the routes of the visits to the four characters, he / she must recognize a second level of relationship (in this case: contemporary authoritarian patterns). Thus, the user can now gain access to a game: "*El cadáver exquisito*", alter which he / she can carry on with his / her journey.
3. Once the user has recognized or identified the world (its characteristics, demands, suggestions) an has intervened (by choosing, playing, etc.), he her is prepared to go in depth; to do so, several essay type texts on subjects such as old age, illness and sickness, and authority that foster opinion and interchange are offered.

Now, in fact, only having gone through all the three worlds guarantees that the user has been sensitized or become aware of the topic and prepares him / her for the collective acquisition of knowledge.

To begin with, *Golpe de gracia* reinforces the interactive nature of the hypermedial work by including videogames, blog, wiki documents, and other strategies to foster collective action (i.e. the *Exquisite Corpse* game), objects which were no where to be seen in *Gabriella*. Second, it reinforces the functionality of multiple morphology by including its own sound track on top of the animation, the modeling of characters, and the programmed data bases. Finally, it reinforces the collective construction or building up of the object by articulating and coordinating a wide ad hoc team of developers, musicians, programmers, illustrators, etc.

What makes *Golpe de gracia* obsolete?

Mainly, the text's strong links to the development of the narrative. As we said above, *Gabriella Infinita* is no more than the adaptation of a text to the hypermedia format, thus making the meaning and sense of the narrative only possible by actually reading (at least partially) the text t(the novel). Even if *Gabriella Infinita* obviously goes beyond the simple condition of a hypertext illustrated, it still depends too much on the text itself in order to develop the narrative. In *Golpe de gracia*, the narrative is digital in a stricter way: it depends on the digital morphologies (animations, videogames, interfaces) and on the hypertextual layout of the piece. Of course the novel also exists (*El infierno de Amaury*, in the reading room)[10], but the latter occupies a different space and function, besides being autonomous vis-à-vis the digital narrative even if it still plays a complementary double-way role: that of complementing the digital narrative and being complemented by the latter.

What is that which *Golpe de gracia* recovers?

An improved scenario for writing. That is, the fact that by attempting to find a way of exhibiting in one and the same medium two narrative types as different as digital and literary narratives are, we might perhaps achieve or find precisely such

[10] In the reading room the user will find the novel *El infierno de Amaury* in two formats: in pdf to print the book and in the format "chapters in windows" to read in Internet. It is also possible to find any specific page of the novel at: http://www.javeriana.edu.co/ceantic/infiernodeamaury/

enhanced scenario for writing. In actual fact, in *Golpe de gracia* a “space of coesxistence” is achieved, in other words, two different formats are articulated without the need for either of them to compromise none of their essential functions. Moreover, it is perhaps even possible for us to speak of a new third space being opened which we could in turn call the space of the “novel to be read via Internet”, which will not only benefit the possibilities of the reader (multimedia, novel, videogame, novel for Internet, etc.) but also the different spaces for writing to take place (collaborative narrative, blogs, wikis), all under one and only one discursive framework.

What is that which *Golpe de gracia* takes to its limits?

To start with, multiformity is understood as the well-known narrative scattering or wandering tendency so frequent in the creative process of a novel. For Janet Murray (1997), this condition, which can be so stressful and overwhelming for the conventional novelist, will only be an opportunity for the digital narrator. Murray calls “multiform stories” those accounts which undergo or “suffer” the aforementioned condition. Thus, any particular story can be told by means of one or six different narrators, multiplying the story’s voices, perspectives, tales, or resources, unfolding many times its protagonists; thus, any story could perfectly have two ways out: either it imposes itself a not ‘wandering’ or ‘scattered’ format (the novel, for example) or it gives free rein to its own natural dispersion. This second possibility is only efficiently feasible or viable by opting for a change of medium: it is necessary to go from the literary medium, based on the linear format of the book, to the electronic digital medium structured upon a hypertextual format[11].

The hypertext is a system of electronic writing which organizes data in non linear ways, based rather on “net” structures, that is, structures constituted by nodes and

[11] We must not forget that the hypermedia *Gabriella Infinita* came to be due to a similar difficulty. As far as canonical literature is concerned, *Gabriella Infinita* (lpublished in 1994) was a fragmented store lacking any sort of explicit articulation with an uncomfortable discursive heterogeneity too demanding for the reader. Its narrative climax only took place when I found the hypertextual format.

links. The hypertext format and its structures are ideal to give account of multiform stories. In fact, the problems inherent to multiple narrative perspectives or to a multiplicity of characters will find their best possible solution in this format.

But, it has to be said, the hypertext demands a logic and aesthetic which go beyond the simple possibility of hosting a combination of narratives. It both demands and promotes interactivity, that is, the reader's participation through the medium. Moreover, the medium makes easier a multiple morphology: it is not only words or the narrative structures which now can be digitized, but a good array of other materials such as image, sound, animation, so that the decision of formatting a story in hypertext really leads to a technical and aesthetic vision very different and distant from that demanded by literary technique and aesthetics: the digital aesthetic. Some authors prefer to call "hypermedia" those digital media or settings which include resources different to the written word. Thus, the hypermedia models would be defined based on three basic components: that they work or function upon (and by means of) hypertext (i.e. non linear writing-reading); that they incorporate multimedia (i.e. use, apart from text, different morphologies of communication such as animation, audio, video, etc.); and finally, that they require interactivity (thus the capacity of the user to execute the system on his own). If we add connectivity to the whole thing, that is, the possibility to act and communicate on-line, we really have here a very different and powerful way of narrating.

That is why *Golpe de gracia* is, really and actually (we might just as well repeat it) a multiform, interactive, connective, and multimedial narrative which offers multiple and non linear routes, demands both interactivity and participation from the user, gives him / her the chance to intervene, connects him / her with a wider context and offers him / her the possibility to create or build up a text which can be both personal and collective.

Further on, *Golpe de gracia* takes to its limits the problem of 'superficiality'. One of the most common criticisms against digital narratives is its purported and inevitable superficiality. But, to begin with, the mere concept of deepness or depth is relative. If by depth we understand the exercise of actually interpreting the underlying meanings of a narrative text, then certainly the literary medium, and more to the point, the novel's format, is by far the most developed object so far created to reach such depth. But, the fact that the digital narrative or story does not offer the conditions for hermeneutics, that fact does not make it a superficial product or object in itself. On the contrary, its high participative demands and above all its encyclopedic nature (i.e. its capacity to connect with and into a wider context), give the digital narrative a good degree of depth, except that this depth is not achieved through the thorough search for the resources of the story proper (zapping) but rather through examining, searching for, and constructing or building up the context. It is therefore not a case of performing a semantic closure, of finding a final sense in the work, but rather a question of developing an extensive interconnectivity.

Golpe de gracia offers four different strategies to go in depth in order to compensate for the so called "interface's pragmatics"[12] (too much emphasis on the navigational activities to the detriment of the users acquisition of content). One of them is the invitation to participate in interactive activities beyond the sheer exploration of mutimedia resources (games room). Yet another is the chance to get to know the literary format of the story (reading room). The user is also asked, by means of the documentation which has been gathered in order to develop the story in its different stages of creation, to make his / her contribution to the issues related to the development of the story. Contrary to what is usually the case in literature, where the documentation of the creative process and around the sources of the piece is either concealed or feigned, in the digital narrative it is exposed, and in this particular case, in two ways: 1) by openly displaying it as a piece to be commented

[12] Several authors warn about the inherent superficiality of all digital modes of expression. It is frequently said that the "digital empire" puts too much emphasis on relationships and circulation to the detriment of 'content acquisition' and that the sheer pragmatics of the interface counteracts the possibility of deep aesthetics in such a way that "the supposed content ends being less important than the mechanical operations" of navigating and co-extending the text.

on (study room: weblog), and 2) by making it available for its transformation and further collective construction (construction room: wikibooks).

What's still missing: Research, products, and sub-products hoped for

A possible continuation of the process so far presented has been planned, our eyes set on reaching and overcoming the several challenges mentioned in the introduction to this paper roughly sketching the paths so far taken in order to produce *Golpe de gracia*. Such continuation should focus on four different areas:

1. To broaden the scope of the theoretical-practical research

While developing our hypermedia several thoughts and reflections came up which we duly registered in questionnaire form. Answering them coherently and articulately could very well lead to a new research project which would involve more thorough examination of the following issues:

- Developing a multimedia grammar: examining the relationship between representational systems and systems of perceptual presentation[13]
- Exploring new possible scenarios for written texts[14]
- Examining different interaction contracts[15]
- Examining relationships such as: narrative and games; games and knowledge; narrative and game-knowledge
- Finding methodologies to better design, develop, and produce learning virtual objects. To do this, the following work is a must: to systematize design's problems and solutions studying different ways of conforming and coordinating development teams, and finally

[13] I am here following David J. Bolter (2000), who suggests the need to examine the relationship image-word from the perspective of the pertinent representational and perceptual systems.

[14] In the aforementioned sense: to give the reader-user genuine hypermedia alternatives and boost the written scenarios.

[15] I am here following Carlos Scolari (2005), who asserts that all interfaces must satisfy both semiological and cognitive conditions in such a way that the contract between designer and user is clearly established.

proposing strategies for the production and financing or funding projects of this scope

2. Field assessment of the project (*Golpe de gracia* as a virtual object for learning)

As we have seen, *Golpe de gracia* accrues two main characteristics which make it a likely virtual object to be used in the process of learning: its narrative dimension, at both a multimedia (worlds) and literary (novel) levels plus its ‘deepening’ exercises (rooms). The first dimension plays an important sensitizing role vis-à-vis many different topics and most particularly in what concerns cyberculture in general. The exercises which invite in depth searching suggest the possibility of creating academic type activities such as careful reading, commentary of essays, and group or collaborative writing. Still, it has to be said that *Golpe de gracia’s* teaching-learning potential can only blossom in as far as the hypermedia is placed in the midst of a proper educational environment, that is, with the necessary navigation pointers, in depth search workshops, and periodical assessments among others. This learning environment does not necessarily have to be virtual in nature, but it does need to supply the necessary elements to guarantee the educational use of hypermedia. What we have in mind is to offer *Golpe de gracia*, in experimental mode, as a learning tool in several and different educational university (subject courses)[16] scenarios, measuring, assessing, and controlling variables such as: friendly accessibility, navigational and comprehension difficulties, good (or bad) use of available resources, bearing on understanding, etc.

3. Extrapolating (hypermedia’s) functions

Both the theoretical and practical research as well as the assessment of *Golpe de gracia’s* educational ‘virtues’ should focus on confirming and establishing that the relationship between narrative and game, and particularly between hypermedia

[16] In fact, *Golpe de Gracia* is now being used at Universidad Javeriana in subject matters such as: “New Technologies”, “Interactive Objects Design”, “XXI Century Written Texts” and “Narrative Workshop”. Hypermedia is as well subject of study in the MA “*Golpe de gracia*, narrative and communication”.

narrative and video game, can in actual fact lead to a relevant and wide application in the processes of learning and knowledge acquisition as was stated herein in our introduction. Once the latter has been achieved, the research must then lead to the design of a matrix which combines narrative and videogame structures with 'deepening' strategies whose goal is to have concrete learning effects. An interesting example of these possibilities is what, at this stage, actually happens in *Golpe de gracia's* third world: "Muerte digital (Digital Death)". This world, structured following the model of the detective story, not only answers in narrative terms the dramatic question, Who attempted against Amaury and why? but also is a role-play game that "teaches" journalistic inquiry and writing methods. We believe that different narrative-game combinations can be thought of, following this method, in order to generate or produce the acquisition of skills and knowledge in different fields.[17]

4. Research, design, and production of a platform.

From the financial point of view, *Golpe de gracia* is an expensive object and many of its constitutive elements are perhaps redundant. Still, the experience accumulated while developing it has been bearing fruits lately in more than one way. We have acquired a knowledge from which we have been capitalizing on, for example, by putting in use the training received by the team that developed *Golpe* in designing and creating other similar pieces, and also by offering workshops and other academic exercises to some University students. Nevertheless, we would really like to produce much more pieces of this type. Therefore, considering the importance that financial matters have, we have been thinking on developing two simultaneous activities. One, the design and development of more modest or simpler pieces of narrative-game couples and 'deepening' strategies following the results of our research conserving its basic structure: the idea of sensitizing the user by means of the narrative-game couple and the creation of reading, research, and writing spaces for in depth activities. The other task will consist in the

[17] Gonzalez' (2006) study, for example, uses role-play to foster in children and youngsters the skill to read and write small-short stories.

implementation of an author's tool design to enable teachers to assemble and combine the aforementioned pieces (to be produced gradually) in such a way that they can be used as virtual learning objects in wide fields of study and knowledge.

As products of this projected stage we would (or should) have the corresponding results of all the research work (theoretical and practical, field practices, and extrapolations) plus the assembly platform and the digital piece combinations focused on the relationship narrative-game-knowledge.

Conclusion

Thanks to *Golpe de gracia*, its process and possible projections, we have found a strategy which combines digital aesthetics, videogame, and teaching with enormous possible uses. The two main difficulties to overcome in the immediate future are: first, the proper configuration of cyberculture agendas in the sense we have here stated, and secondly, the consolidation of a strategic alliance that fosters the projection of the possibilities herein envisaged, alliance which should include research and development groups capable of producing well supported, relevant pieces and an efficient assembly platform to enable games, digital narratives, and in depth knowledge-learning pieces.

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Virtual Laboratory: the E-learning Tool Supporting Distance Learning

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1. Introduction

Recent developments in the area of Information and Communication Technology (ICT) have a great influence on various techniques of education. E-learning, based on the implementation of computer engineering, multimedia and Internet technology has become of a great importance. In the behaviouristic model of education a computer and the Internet were considered as a „blackboard" with higher functionality. In the constructive model computer and Internet play a role of the cognitive tools. How to implement the modern ICT tools in education? – that is still a topical question.

Taking the assumption that education should not be separated from our professional and family life, led many societies to develop and provide new systems of **distance learning**. The advantage of distance learning over a traditional model of education is its flexibility. That model of education and its modern tools are directed to the needs of individuals. It enables self-managing learning, saves time and ensures cost savings, including travel and accommodation costs. The education is home-based what guarantees friendly and comfortable learning conditions.

2. The modern tools of education

In a traditional model of education, based on a direct (face-to-face) contact between student and teacher, a *textbook* plays a role of supplementary *self-learning* tool. New developments in the area of ICT have enriched a traditional classroom with the new electronic tools, improved learning quality in both residential universities and geographically-dispersed learning groups. Of all the technical innovations, the Internet has become an indispensable tool in introduction of the new technology to education, and its growing impact on the future of the educational model is inevitable.

Computer and Internet enable:

- access to didactic materials stored on web sites and CD-ROMs,
- e-mail correspondence,
- on-line meetings,
- discussion with lecturers and other students,
- solving tasks and problems,
- writing reports and projects, etc.,
- simulation of experiments,
- remote access to real experiments.

One of the most important factors in a new concept of education is still a kind of a *textbook*. Thanks to the new ICT tools, the new version of *textbook* is much more flexible and creative than previous one. Usually this kind of book is known as an "electronic book: e-book".

The didactic materials of the particular courses can be prepared by professors and experienced lecturers in the form of electronic lectures in different, acceptable formats and stored on CD-ROM. Certainly, the same content should be placed on the web sites, available throughout the Internet. The electronic books have the advantage of presenting the whole material of a single subject in one CD. The cost of multiplying it is relatively low. Creation of the material can be done with the Dynamic HTML format (HTML: Cascading Style Sheets, Java Script and FrontPage tools). Because of nearly "unlimited" space, besides traditional educational content it can include:

- Auxiliary software,
- Set of publications and „source readings",
- Addresses and links to other knowledge sources: e-libraries, archives, collections,
- Questions/answers and tests,
- Audio and video comments,
- Animations,
- Simulations of experiments.

The tools which can be implemented in the creation of an e-book, can be divided into four categories:

Traditional tools:

- Texts,
- Fonts: bold, italic, color etc.,
- Equations,
- Drawings,
- Photos,
- Background color, texture.

Multimedia tools:

- Text comments,
- Audio comments,
- Video comments,
- Animation of drawings,
- Animation of presentations.

Advanced tools:

- Generators of tests,
- Simulated experiments,

Addition tools compatible to HTML

- Java Aplets,
- FLASH Modules.

Java programming language plays a very spacial role in preparing multimedia applications. It is a very useful tool in writing network applications. Java program can be run under any operating system. Java applets can be introduced into an HTML text of any e-book. They can it improve and "make alive". Simply, Java is able to enriched multimedia content of web sites throughout the animations, advanced graphic, sound and images with no any need for introducing additional applications available throughout the WWW browser. A very complex program can be distributed throughout the Internet with no necessity of knowing what kind of operating system is used by the user. An example of Java applet simulating a cooperation between three instruments is presented in Figure. 1[7].

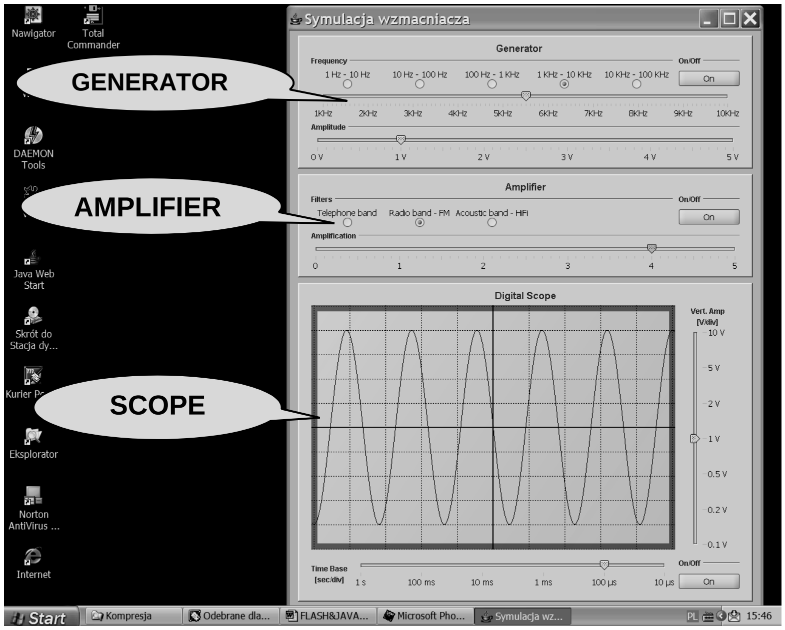

Figure 1. The set of cooperating instruments prepared as a Java applet

These instruments create a measurement system enabling an investigation of the amplifier frequency response. The amplifier frequency band can be switched from “telephone” (3.4kHz) throughout “radio FM” (12.5kHz) to acoustic Hi-Fi (20kHz). The frequency response can be investigated manually – what is certainly intentional.

The second, special tool in the area of animations destined to web sites, is (Macromedia) **FLASH**. It generates small capacity files, acceptable by the all web sites browsers. The FLASH format, with “`.swf`” extension, is based on the vector graphic, where instead of keeping information about each image pixel, like in *bitmap*, there are used mathematical formulas describing shape, colour and layout of the all objects. Thanks to that, the created file has smaller capacity and even complex animations are lauded to the browser in a very fast way. The implementation of FLASH animation is a very simple process, available to everyone. An example of a Flash module is presented in Figure.2 [7].

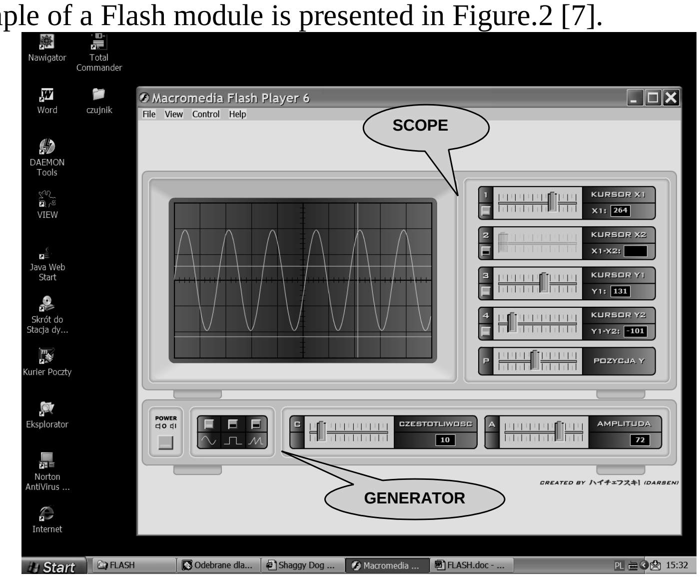

Figure 2. An example of the FLASH animation module

The module includes two instruments: function generator (on the bottom) and scope (on the top). They are connected together. The output signal from generator can be observed on the scope display. What can be seen in both cases is a modernistic form of instrument front panels – like from fairyland. They both have been prepared by students, that's the reason.

Certainly, it's possible to create front panels, which can precisely reflect the real ones. The next example (Figure.3.) presents a cooperation between two real instruments (function generator Agilent 33120A and digital multimeter Agilent 34401A) [7]. This a Windows application prepared under LabWindows/CVI (National Instruments) environment.

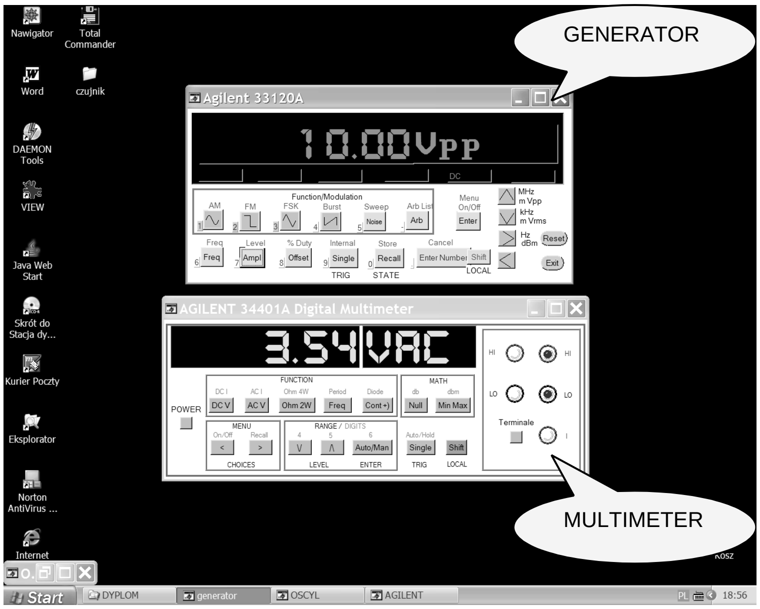

Figure 3. The front panels of real instruments:
function generator (Agilent 33120A) and multimeter (Agilent 34401A).

Simulations described above are strongly connected to the idea of a **Virtual Instrument**. In order to construct a Virtual Instrument there is necessary to combine the hardware and software elements which should perform the data acquisition and control, data processing and data presentation in a different way to take maximum advantage of the PC.

The most concise definition of Virtual Instrument is created by National Instruments:

> *"A layer of software and/or hardware added to a general-purpose computer in such a fashion that users can interact with the computer as thought it were their own custom-designed traditional electronic instrument."*

Virtual Instruments replaced the expensive and complex *Intelligent Instruments,* which established a meaningful part of didactic laboratories. This has simplified the process of their designing and modernization. The virtual front panel, as a kind Graphical User Interface, which reflect real instrument front panel, enables the potential user to operate a new instrument quite intuitively. There is possible to modify measurement procedures by changing only software modules, without changing any hardware elements. It allows a flexible, modern and simple conducting of experiment procedures. Interfacing the Virtual Instrument with a Local Area Network is a very simple task. The only requirement is to install a network interface board and to assign a proper IP number to the computer. The network protocol, being a part of the most tool software libraries, enables to build the client-server applications in a very easy way.

Recent developments in the area of the Internet technology has also led to the introduction of Measurement & Control Systems, which are distributed in a computer network (Distributed Systems) and constitutes a basis for building a **Virtual Laboratory**. This model of laboratory first of all denotes a *remote access to real laboratory*, from any place and in any time. This idea brings a number of benefits, of which the most important is an effective use of laboratory equipment. Virtual Laboratory will enable the students to conduct experiments in spite of the fact that instruments are placed in laboratories distributed in different universities or all over the country. Figure 1 shows the proposal of Virtual Laboratory structure, selected by the authors.

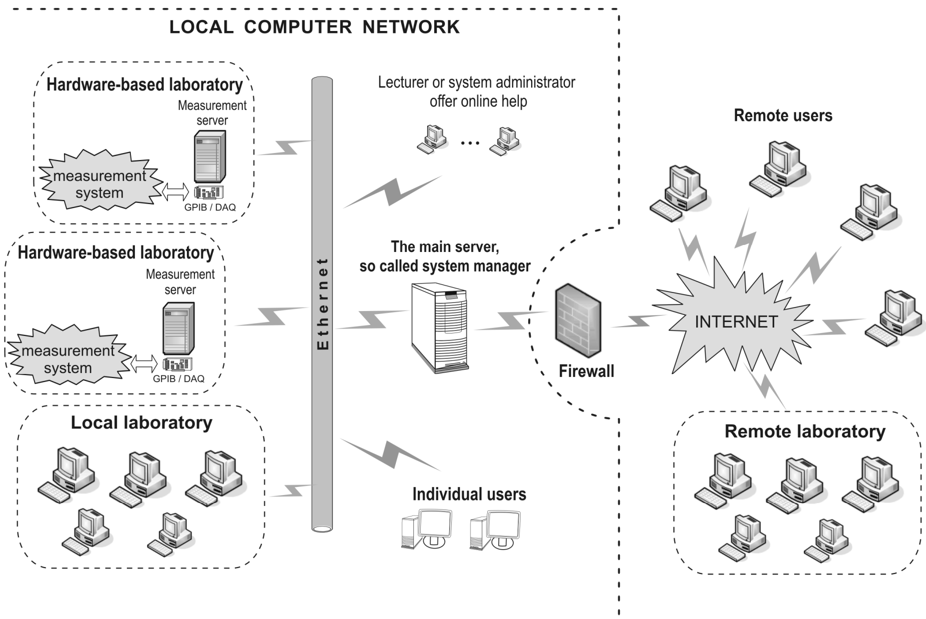

Figure 4. Proposed Virtual Laboratory structure

The proposed structure of Virtual Laboratory can be described by features that are, in general, assigned to all distributed systems. These features involve:

- - sharing of mass storage to archive/back up data, which is delivered from different points,
- - sharing of software resource that are installed in a network,
- - functional integration of distributed measurement resources;
- - open access, concurrency and calibration;
- - fault tolerance.

A fundamental problem constitutes a way of adjusting functions that are accessible in the program of a Virtual Laboratory. In other words, it is important that the student can understand the essence of events that take place in an investigated object, and familiarize with measurement systems and techniques. This should be done without limiting the number of accessible instruments of a given measurement set. Moreover, the student should have a chance to freely configure a measurement system, and even build a faulty circuit and solve a problem on the basis of 'trial and error' method. More experienced and skilled students will be given more freedom in conducting their experiments.

Another important feature of the Virtual Laboratory is to give an access to the experiment in the off-line mode. This could allow the user to learn, understand and partially solve problems that he might encounter in on-line mode or even in practice. The system should enable to design and store the configuration of measurement unit and/or the software, which can be used in the future, in on-line mode. This would minimize the time amount needed for conducting experiments with a remote access to real instruments. Yet another useful function of a Virtual Laboratory is a full simulation of all experiments. Simulation modules can be prepared in the form accessible throughout the Internet or even attached to the e-book.

3. System Architecture

To the key elements of the designed System Architecture belong: the main server, so called *system manager* and measurement server. The software is based on Microsoft Windows 2003 Server and Windows XP Professional. The system has a modular structure, which can be configured in a very simple way. The basic task of the software is to facilitate and control the communication between Virtual Laboratory and its users and to ensure access to resources (systems and/or instruments). In other words, the software manages both the resources, and its users. The proposed structure defines two types of users. The first type constitutes users grouped in a local and/or remote laboratories (traditional computer laboratory). This group of students is placed in one of the university laboratory room and conducts tasks together with their tutor. To the second group belong individual, distributed users with an access to a given resources of Virtual Laboratory. When faced with problems, questions or need of consulting someone, students are automatically connected to the tutor or system administrator by especially designed communicator/messenger or an external application that enable transfer of sound and/or video data.

The proposed architecture of Virtual Laboratory requires a presence of one managing server that is equipped with WWW server and database server, compatible with SQL. To make the structure more versatile there have been used an Internet Information Server that is equipped with PHP language units. To ensure better fault tolerance it is necessary to create a 'mirror' server that could take over the tasks of the main server in a case of any breakdown.
The System Manager should [8]:

- synchronize and control all system operations,
- guide system users to proper measurements servers,
- assign to the users an access to particular instruments,
- assign to the users an access to selected investigated objects,
- enable access to simulation mode of given measurement systems,
- enable an 'off-line' operation,
- offer a full simulation mode,
- synchronise data with a "mirror" server.
- supply instructions, manuals and documentation about conducted experiments.

The user of Virtual Laboratory is expected to have an access to a computer and the Internet. Then, with the help of a browser, the user can freely access the Internet site and using a mouse and paddles of the desktop the user can control the system and observe results of experiments. The available ways of accessing instruments/units by a remote user are shown in Figure. 5 [8].

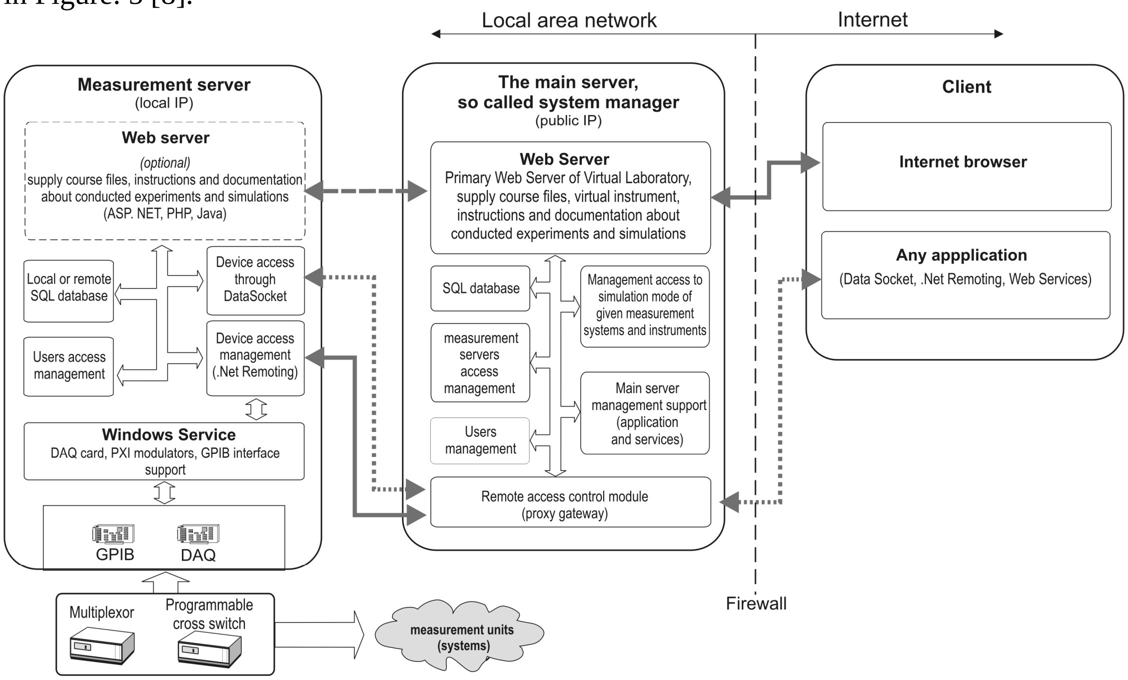

Figure 5. Virtual Laboratory data flow diagram

The continuous line ended with arrows show the way of how the user can access the laboratory with a help of WWW browser. The Virtual Laboratory software enables also access to instruments/resources with the implementation of such tools like: DataSockets, NetRemoting or WebServices (a dotted line). Advanced users are given an opportunity to build extended Windows applications that are created under such environments like: LabWindows/CVI, LabVIEW, Measurement Studio or Soft Wire.

Another important part of the system is the Measurements Server. It is equipped with GPIB interface (connecting standalone instruments) or DAQ board (Figure.6). Server software should enable the user to do on-demand measurements and/or the measurements, which take place in a “gentle” time. The on-demand measurement is based on question-answer principle.

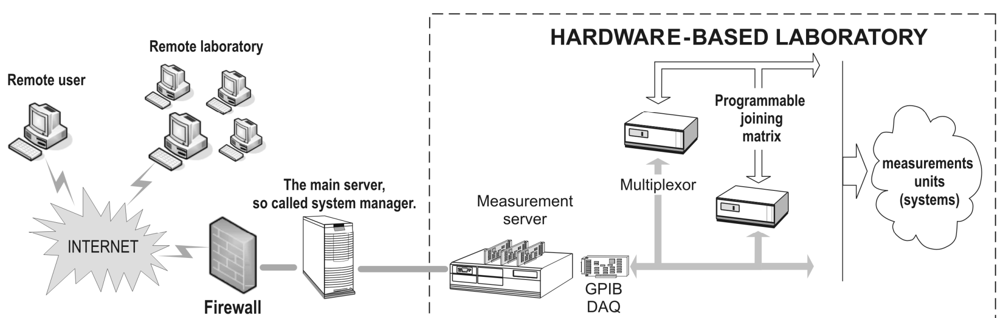

Figure 6. Hardware-based Laboratory Structure

The user itself, let us say *remote user* defines configuration and functions of the measurement circuit/system and then sends a “demand” (a request) to execute the measurement cycle and to give back the obtained results. While conducting the measurement & control process, the user interacts with the Virtual Instruments, like in a case of operating the real ones.

The *remote user* can change configuration of measurement circuit with the help of programmable switching matrix and/or multiplexer and a managing software. This enables to complete a few or more different measurements structures. The circuit configuration can be stay individual for each user and can be read-in at the moment the user is assigned to the system. The Measurements Server can be equipped with a WWW server that facilitates functionality and relieves system manager from such functions like measurement system simulation or laboratory documentation storing. Advanced users are given an opportunity to build their own virtual instruments, install them into the measurement server and test with real instruments.

4. Conclusions

Introduction of Measurement Instrument into a distributed system placed in the Internet allows creation of the advanced and flexible systems that can be used for conducting experiments and support learning processes. Nevertheless, one has to bear in mind, that neither modern simulation techniques nor remote access to laboratory (Virtual Laboratory) does not eliminate necessity of conducting real experiments in real laboratories with the implementation of real instruments. Practical experiments play an important role in the process of gaining knowledge in the field of modern, complex technologies that are conducted on the basis of ‘trial and error’ method. This is of great importance whenever complex events cannot be described with the use of mathematical calculations. Experimental studies of physical events or objects with the use of measurements instruments help students to understand easily measurement procedures and measurement system structures. Thus, Virtual Laboratory, placed in the Internet, should be treated as a very attractive tool supporting all modes of education. Remote access to real laboratories assures rational managing of an expensive and unique measurement equipment. In other words, it facilitates integration of measurement resources.

It is predicted that, in the nearest future, *virtual reality* techniques will develop so far that the Internet browser will be equipped with 3D graphics. The user will have an impression that he is inside a real but fantastic laboratory where all instruments and investigated objects will look like real ones or even better. The user may be even tempted to touch them.

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An introduction to Accessible Lifelong Learning (ALL) - a strategy for research and development uniting accessible technology, services, and e-learning infrastructure

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A Paper for

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Abstract

The EU IST eInclusion funded project EU4ALL (European Unified Approach for Accessible Lifelong Learning) will start in October 2006. This paper introduces the project and the issues it seeks to address, outlines the research that has gone into the definition of the project and sets out its research agenda over its 4 year lifetime.

This paper outlines the background research in the following areas:

- The educational, policy and demographic context
- Accessibility for disabled people
- User modelling
- Learning technology standards and specifications
- Adaptive Learning Systems

Introduction

The EU IST eInclusion funded project EU4ALL (European Unified Approach for Accessible Lifelong Learning) runs for 4 years from October 2006. This is a major project with an overall funding of € 7.4 million and 13 partners across Europe. The EU4ALL project addresses systemic issues in providing access for disabled learners to Life-Long-Learning particularly where this is mediated by technology. Where such technology is inappropriately introduced with insufficient support, disabled people face further exclusion from the interlinked worlds of education and work. The project is focused on distance learning, principally at the Higher Education level.

The EU4ALL project sets forward the concept of Accessible Lifelong Learning (ALL) uniting 3 key strategies:

1. That the technology that mediates lifelong learning does so accommodating the diversity of ways people interact with technology and the content and services it delivers
2. That this technology is used to bring specialist support services to disabled learners

3. By providing support services and technical infrastructure that enable staff of educational institutions to offer their teaching and services in a way that is accessible to disabled learners.

The aim of EU4ALL is to improve the efficiency and efficacy of implementing these strategies by developing an open service architecture for ALL. To achieve a wide impact the approach taken is not to develop a single EU4ALL system but a standards based framework that facilitates the integration of the approach with a wide range of e-learning systems. The services and the standard-based framework will be validated at a large scale and at a European level with the involvement of students and other relevant stakeholders.

The role of technology in life-long-learning

The Lifelong Learning paradigm recognises that, in a knowledge based economy, education and work are integrated throughout people's lives. All citizens need ongoing access to learning to enable them to work. Technology is playing an increasing role in mediating this learning. This can be in the form of courses delivered wholly online or where computer based resources are used to supplement face-to-face teaching (*blended learning*). Technology has particular potential benefits in the life-long-learning context including:

- Facilitating the integration of study and work-based experience
- Enabling study at the time and place that best suits the student
- The use of ePortfolios to build up evidence of learning in different contexts
- Facilitating communication with peers and tutors that are geographically distributed.

Accessibility - issues for disabled learners and educational establishments

If the benefits of technology in life-long-learning are to be extended to disabled learners then the technology must be implemented in a way that it is useable by them. *Accessibility* is a term that has particular meanings in different contexts; here it refers to design qualities that endeavour to make web resources available to all by ensuring that they do not create unnecessary barriers; however the user may interact with their computer. Virtually anyone, irrespective of any disability, can be enabled to interact effectively with a computer. Some people with disabilities use methods other than the conventional monitor, keyboard and mouse, some require special tools, usually referred to as *assistive technology*, and some need the way content is presented to them by the computer to be appropriate to their needs (for example in terms of font sizes and/or colour contrast).

There are well established design principles for accessibility in web or software design and electronic content [1]. These promote compatibility with assistive technology and ensure that different ways of interacting with the computer can be accommodated.

Disabled learners need to be given access to any assistive technology they might need and given support in learning to use it and/or their computer environment effectively.

However provided this is done the onus is on the educational provider not to put unnecessary barriers in their way because of the way they implement their online education.

Background research that underpins EU4ALL

A number of key areas of research undertaken in developing the project proposal are outlined below and their significance in the rationale for the project highlighted.

The educational, policy and demographic context

Today universities enable disabled students to study at the higher education level in all subject areas. Distance learning reduces the barriers for some disabled people as, for example, there is no need to be physically present in a place that might be difficult to access for those with mobility impairments. Social and educational policies are being developed in recent years in favour of reaching an equality of opportunities for students with disabilities and legal instruments created to ensure these are put in place (e.g. the Disability Discrimination Act Part 4 and its associated Code of Practice [2] in the UK).

Virtually all universities in Europe now have policy statements about inclusive learning. The OECD published a report [3] in 2004 that describes practices in OECD countries that address the needs of students with disabilities. It makes clear that educational policy is of great importance in the achievement of social justice and inclusion for people with disabilities. However, there is a great diversity in practice and legislation here. (See also: What is a Just Educational System? [4]).

It can be difficult to get accurate data on the demographics of disability, some people do not wish to be identified in this way and there are variations in how data is collected. However in 1994 it was estimated that there were 50 million disabled people in Europe. Although highly fragmented and including some very low-income groups this is a significant market opportunity for education and educational support services. Across European the elderly are an increasing proportion of the general population. The Life-Long-Learning paradigm asserts that the older population will make increasing demands for education.

The 2004 statistics for numbers of students declaring different disabilities at the Open University in the UK is given in the table below:

Category	Number of Students	% disabled students
Sight	1125	11%
Hearing	832	8%
Mobility	3549	35%
Manual Skills	2195	22%
Speech	388	4%
Dyslexia	1908	19%
Mental Health	2508	25%
Personal Care	798	8%
Fatigue/Pain	4814	48%
Other	2463	24%

Note – Many students declare more than one disability and the above figures represent 10,083 individuals registered for study with the OU at the end of 2004. This represented 5.25% of the total student population whereas the prevalence of disability in the general population is in the range 10-15%.

Accessibility - access for disabled people

There has been work endeavouring to ensure that content presented on the WWW was accessible to disabled people since its early days. This led to the establishment of the Web Accessibility Initiative (WAI) within W3C and the publication of their Web Content Accessibility Guidelines (WCAG 1.0) in 1999 [5]. Version 2.0 of these guidelines is near completion at the time of writing and is publicly available [6]. These guidelines principally represent a *universal access* approach to accessibility. Thus they set forward guidelines that endeavour to make a web resource as accessible to as wide a range of people as possible. Another approach is one of providing people to appropriate resources to their needs; this is often referred to as *personalisation*. This paper does not go into the relative merits of the two approaches but simply states that the EU4ALL project will bring both together to achieve widespread accessibility to online learning resources and support services.

User modelling

If automated responses to the accessibility needs of individual students are to be made then the system needs have information about each individual, (including records on their needs, preferences, learning styles, etc.). It is further maintained that if the system monitors dynamically information on their computer interactions and their requests (e.g., for content, services, learning activities, etc.) it can adapt to offer optimally accessible resources to learners. In these approaches an effective way of modelling the user in terms of their access requirements is required. It should be noted that this is not about labelling or modelling of their disability. What is required is a functional approach that models the students' needs and preferences with respect to the nature of the interface and resources it mediates.

Such user models contain information that has to be stored and be accessible by different components of the e-learning platform. There already exist specifications and standards to facilitate the definition of these models. For example the IMS[1] AccLIP [7], which is currently being further developed as an international standard within ISO [8] (see next section). User models have to maintain an explicit and dynamic representation of the user. They represent the system's understanding of a user, and this can consists both of known facts (such as information declared by the user) and inferred beliefs based on previous interactions. Moreover, to build these models various mechanisms can be applied including machine learning techniques.

Learning technology standards and specifications

As already stated, the approach to be taken by the project is not to develop a single EU4ALL system but a standards based framework that facilitates the integration of the approach with a wide range of e-learning systems. To this end one of the ongoing research strands of the project is to review the international standards context. This section briefly gives some highlights from this field that directly impinge on the project. It is not exhaustive.

[1] IMS Global Learning Consortium Inc. See: http://www.imsglobal.org/

Standards for accessibility metadata are important for accessibility approaches outlined in the previous section. The figure below gives an overview of the system behaviours that become possible given the interaction between user profile data (part of the user model) that reflects a user's needs and preferences in their interaction with the computer and content metadata describing accessibility properties of a computer mediated resource. Both of these are defined in the IMS AccessForAll Specifications [9] which is a strong candidate for adoption in the project's work. These specifications are currently being adopted within an ISO standard under development in that organisation's committee know as JTC1 SC34 [8]. There has also been work towards profiling the AccessForAll metadata to the IEEE LOM - Learning Object Metadata standard [10] and the Dublin Core (DCMI) metadata set [11].

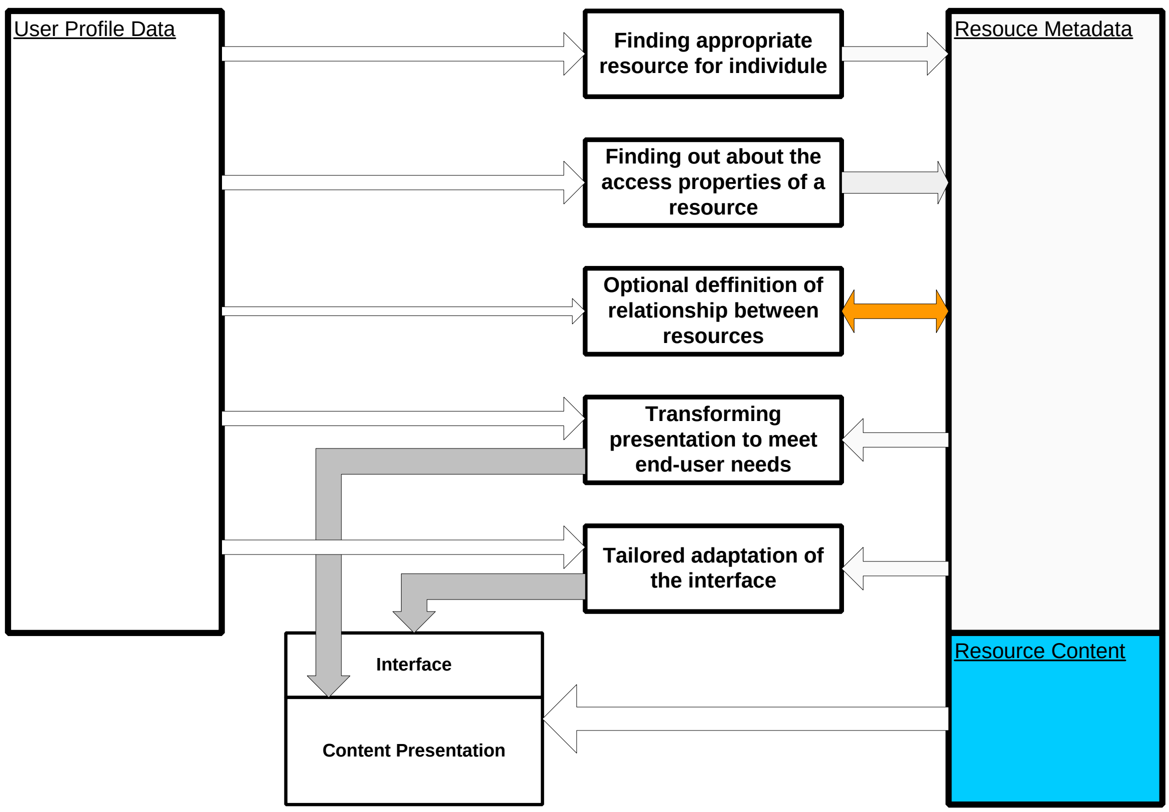

Figure 1. Behaviours diagram - user profile and content metadata for accessibility

Other areas of eLearning standards that are important in the project's work are briefly described here:

Learning Object Metadata is that information about a computer mediated learning resource. The key published standard here is the IEEE LOM [10]. However other metadata standards such as the Dublin Core Metadata Initiative [12] and application profiles of both of these are relevant in some contexts.

Content Packaging [13] is an IMS[2] specification that focuses on defining interoperability between systems that wish to import, export, aggregate, and disaggregate packages of content. This content includes, but is not exclusively limited to, learning content. Content Packaging has implications for accessibility in the delivery of e-learning because it impinges on the delivery of alternative content for some people with a disability who do not find the primary resource accessible.

Learning Design [14] is a further IMS specification. It supports the use of a wide range of pedagogies in online learning by enabling instructional designers to specify flexible, and if needed complex, paths for an e-learning system to offer, in a conditional way, to students. It provides a generic and flexible language designed to enable many different pedagogies to be expressed. The language was originally developed at the Open University of the Netherlands (OUNL). Learning Design has implications for accessibility because it concerns the path a student takes through a set of learning resources and if that student has a disability and is unable to use some resource or resources within the set this affects the conditional paths they need to be offered. Further Learning Design is seen as a strong candidate for implementing the Adaptive Learning Systems approach envisaged in the EU4ALL project (see next section).

In educational communities across the world the idea that everyone should have an electronic portfolio, *ePortfolio*, of evidence of their learning, is catching on. The IMS ePortfolio Specification [15] was released in July 2005. Interoperability standards in ePortfolios are important because to be used as envisaged ePortfolios must be able to store diverse forms of evidence of learning originating within and outside the organisation that hosts them. Further they need to be able to selectively publish evidence or pass metadata on or the evidence itself to various other systems. It may also be necessary to transfer a whole ePortfolio from one host system to another. Accessibility in ePortfolios is a specific research topic within EU4ALL.

Adaptive Learning Systems

The main goal of an adaptive learning system is to provide the user with materials, services, communication channels, contacts, etc. adapted to their own needs. To solve this problem they apply different forms of user models. In particular, they consider user, usage and environment data [16]. There are two approaches for developing these models. The first applies predefined rules for situations that arise in the course of student's interaction, which entails knowledge of the situations beforehand [17]. The second is to learn user models from the data collected from users' interactions. To this several machine learning techniques are then applied [18].

Adaptive learning systems should ideally provide different types of adaptations depending on the user's role (learner, tutor, author etc.). Some experimental e-learning systems have implemented this approach and limited functionality of this sort has been included in a few products but none of these to date have done so in a way that is cognisant of the different interaction needs of disabled learners. This will be the unique contribution of the EU4ALL project.

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[2] IMS Global Learning Consortium Inc. See: http://www.imsglobal.org/

Research Agenda EU4ALL

The core of this paper has concentrated on the background research that went into the definition of the EU4ALL project. This section briefly outlines the research and development agenda of the project that will build on this background towards the realisation of the standards based framework for accessible life-long-learning that is the project's ultimate goal. The EU4ALL is dived into a series of sub-projects (SPs) the research and development agenda is outlined here against these.

SP1 – Definition of User Requirements and Services

The main objectives of SP1 are to define the users' requirements and the services to be developed. Another objective is to define ontologies the services and users of the EU4ALL architecture. The research thus will include:

- User requirements capture for adult learners with special needs and other users of the architecture
- Analysis of current services for adult learners with special needs and other users of the EU4ALL architecture
- Specification of functional user requirements
- Research into socio-economic, political and legal considerations

SP2 – Open and Accessible Services Architecture

The objective of SP2 is to design an architecture of services that takes into account all services (open) and that adapts them to the user profile (model) to support the Life-Long-Learning paradigm in higher education institutions. Thus this will provide accessible services for people with special needs. The research and development towards this will include:

- Establishing the technological infrastructure baseline
- Open architecture design
- Development of open architecture services
- Integration of the service architecture

SP3 – Universal Access to e-Learning

The objective of this sub-project is to define the accessibility components that will need to be integrated with the work of SP2, SP4 and SP5. The constituent research areas are:

- User Modelling
- Device Modelling and Adaptive Interfaces
- Content Personalisation
- Accessibility components integration and validation

SP4 – Learning Objects and Metadata

This sub-project deals with the research related to learning content, learning activities, and the way to tag them with metadata to support the desired systems functionality and so that they are searchable and retrievable. The research areas include:

- Background research on relevant standards and specifications
- A review of existing and emerging eLearning systems (LCMS and VLEs)
- Standards implications for EU4ALL functional specifications
- Learning Objects Metadata Repositories (LOMR)

SP5 – Learning Support and Guidance

SP5 principally researches the human aspects of the learning process, both in providing learner support and guidance, and support for tutors and learning designers, etc. The project's work on accessibility in eAssessment and ePortfolios is also located here. The research areas are:

- Pedagogical Guidelines
- Psychological Support
- E-tutor Guidance
- Accessible ePortfolios and assessment

SP6 – Integration, Validation, Evaluation, Demonstration

The objectives of this sub-project are to integrate all services developed in SP2, SP3, SP4 and SP5 and to design, conduct and analyse the validation, evaluation and demonstration of the EU4ALL service architecture and the prototypes and services developed within the project. The activities are organised into these areas:

- Service components integration
- Validation and evaluation methodologies and plans
- Users training for validation and evaluation
- Validation & evaluation of service architecture & services
- Demonstration

SP7 – Dissemination, Community Building, Standards, Training and Exploitation

The main objective of this sub-project is to ensure that results are known, disseminated, and used (if not commercially exploited). Much of this work is not thus research as such however the standards related work includes the implementation and evaluations of prototypes to provide input into the standardisation process. This is specifically important as specifications and standards are fundamental for the hoped for up-take of the EU4ALL approach and framework.

SP8 – Project Coordination

There is no research in this sub-project it is just shown here for completeness. It includes all the project management, quality assessment, scientific and technological supervision activity in the project.

Conclusion

The EU4ALL project is an ambitious one that seeks to make a widespread impact on the delivery of life-long-learning by providing an open, standard-based, reusable and extensible architecture of services and a reference framework that supports doing so in a way that is accessible to learners with all kinds of disabilities. This paper has given an account of the key areas of research in the diverse areas of knowledge that impinge on this approach. This in effect defines the state-of-the-art in many of the areas that underpin the project's work. The research agenda of the project has been outlined. The project is not due to finish until September 2010. It will probably be only in the last year of the project that it will be possible to truly assess the degree to which it has reached its research and development objectives. However the consortium sets voyage hopefully.

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Finding a New Lens: What "New Science" Theories Can Offer for Distance Education Research

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Abstract

This paper explores implications of "new science" theories (Wheatley, 1999) for distance education research. Chaos theory, quantum theory, network theory, and field theory, for example, in conjunction with theories of learning and cognition, suggest a new perspective. While the advantages of a systems approach have been acknowledged by many writers, their holistic view has tended to be positivistic. In contrast, the discoveries of physicists are revealing much about systems behavior in a probabilistic universe, and their work is having an influence on research in the social sciences. The student can be viewed as a learning system, and a group of students can represent a learning network. This system, or network, exhibits the basic characteristics of any living system: (a) is part of a larger context; (b) is nonlinear and dynamic; and (c) tends to organization among its interacting components, seeking to be self-regulating and self-correcting within its environments. The theories of psychologists such as Piaget, Brunner, and Vygotsky, and learning theorists such as Gagné are examined in conjunction with theories from the new science to offer insight to learning system behaviors and help answer questions such as: (a) why don't specific course design, teaching strategies, and delivery techniques always elicit the same learning outcomes; (b) how can students be motivated to achieve higher levels of critical thinking; and (c) how can we recognize and respond best to varieties of learning system states? Key aspects of new science theories are examined in relation to the distance education environment to suggest a framework for research to find the best combinations of system elements and conditions, to identify and eliminate learning system inhibitors and to locate new sources of energy to motivate students to achieve higher learning performance.

Introduction

Why does a photographer carry multiple lenses? Why is an electron microscope needed in addition to the traditional microscope? And why are there different telescopes to explore the sky? It is because a single instrument cannot enable us to comprehend fully the subjects of our inquiries. Online distance education and e-learning (ODE) can benefit from the availability of different lenses, also. The purpose of this paper is to explore the implications of "new science" theories (Wheatley, 1999) for ODE research. The direction suggested here is intended to complement rather than compete with other proposals; hopefully, it will lead to the development of an additional lens through which we can view and understand ODE.

Authors such as Garrison and Anderson (2003) emphasize the importance of empirically based research frameworks, but generalizable results can be difficult to achieve. Researchers are challenged by the need to control sufficient variables to explain and/or predict behavior in complex situations. Further, how can the findings of studies in one area be integrated with those of a related area? Nicolis and Prigogine (1989) suggest a way to comprehend complexity: "Understanding what is going on around us is equivalent to building models and confronting them with observations" (p. 217). A learning system model built on the foundations of general system, "new science," learning, and cognition theories may offer a useful framework for research. Exploring how this model might be created, we will examine briefly: (a) general systems theory; (b) "new science" theories; and (c) theories of learning and cognition in relation to a view of the student as a learning system. Finally, implications for areas of research will be presented.

General Systems Theory

Ludwig von Bertalanffy (1968), creator of general system theory, defined a system as: “a set of elements standing in interrelations” (p. 55). From this basic definition he derived a variety of system characteristics.

Open vs. closed. An open system is “a system in exchange of matter with its environment, presenting import and export, building-up and breaking-down of its material components” (von Bertalanffy, 1968, p. 141). Energy for an open system comes from its environment and enables it to maintain operation and to reorganize and adapt for survival. The closed system tends to expend its energy, and having no new input, moves towards immobility. Its final state is determined by the starting conditions, whereas the open system may achieve the same final state from different beginnings and in different ways.

Organic vs. inorganic. Organic systems have the characteristics of a living thing. Organic or living systems are also open systems.

Linear vs. dynamic. Linear systems are composed of processes that begin with “step 1” and continue through the final step in which the system goal is met. Dynamic systems do not function based on a pre-defined sequence but can adapt and respond to conditions encountered as the system operates. Feedback mechanisms enable the dynamic system to monitor its state and determine what actions should be taken next.

These three contrasts suggest important considerations for both the environment in which a learner pursues knowledge and the ways in which the student as a learning system might respond to that environment. Additional considerations emerge from von Bertalanffy's (1968) list of system characteristics, particularly:

Wholeness says the whole is more than the sum of its parts, and the evaluation of a part in isolation does not yield the same result as evaluating it in its total system context. A change in any part of a system has an effect on the whole.

Self-regulation means that the system functioning as a unified whole will tend to achieve a new balance in reaction to a disturbance. Internal feedback mechanisms provide the information necessary for determining appropriate reactions.

Centralization in the learning context applies to the social structures in which learning takes place. Each course with its instructor and learners may see the emergence of organizers within the system with certain individuals taking some type of leadership position.

Hierarchical order is characteristic of reality as a whole. Systems in general function as subsystems within their larger context and can experience the impacts of events and influences that occur throughout the entire structure.

Finality may be seen in terms of fitness for a certain purpose or dynamic direction of processes in which goals appear to direct current behavior toward a future state. Future goals may not be static, but may evolve as a system modifies its behavior in response to feedback mechanisms.

While Laszlo (1996) echoes many of von Bertalanaffy's (1968) concepts, he concentrates on the relationships and interconnections among the parts within a system's structure. Attention to responsibilities, information flows, and interdependencies are all critical elements.

"New Science" Theories

The "new science" theories are enhancing our understanding of systems. The advantages of a systems approach have been acknowledged by many writers, but their holistic view has tended to be positivistic. In contrast, discoveries by physicists are revealing much about systems behavior in a probabilistic universe, and their work is influencing research in the social sciences (Smith, 1998; Wheatley, 1999). They are replacing Newtonian era views in which our universe was seen as a machine comprehensible by an analysis of its individual parts. Newtonians also saw the clockwork universe as subject to the decay of entropy. This mechanistic and positivistic view prevailed in some groups of psychologists as behaviorism and psychoanalysis saw the individual as someone who could be conditioned to exhibit desired behaviors. It has taken time for the work of physical scientists to find its way into the study of organizations, social science, and education, but the insights provided by the "new science" has led to a dramatic shift in thinking about systems. This view sees many systems as having organic properties, filled with energy and able to self-organize, self-regulate, and adapt for survival.

Three theories have been acknowledged as major components of the scientific revolutions of the twentieth century: relativity, quantum theory, and chaos theory (You, 1993). Of the three, chaos theory may have had the greatest impact across disciplines. The following summary of these and field theory notes just a few of the relevant points for ODE.

Quantum theory may defy explanation (McEvoy & Zarate, 1996), but Wheatley (1999) mentions important concepts. "In the quantum world, relationship is the key determiner of everything. Subatomic particles come into form and are observed only as they are in relationship to something else. They do not exist as independent 'things'" (p. 11). Quantum events are probabilities rather than certainties, and the observer cannot gather data without influencing the thing observed. These aspects of the quantum world carry over into the realm of human systems. For ODE, the suggestion is that relationships play a key role in determining what occurs, and relationships among system components must be viewed collectively as well as in separate sets (e.g., learner-tutor interactions).

Chaos theory emerged in reaction to the disorder seen in nature, whose erratic and unpredictable phenomena cannot be explained by the mechanistic Newtonian perspective (You, 1993). Gleick (1987) proclaims "Where chaos begins, classical science stops" (p. 3). You refer to Hayles regarding two main concepts of chaos theory: (a) there is order hidden within chaotic systems; and (b) chaos precedes order as a system tries to reorganize and achieve a dynamic equilibrium. Chaotic systems are sensitive to initial conditions and can have different outcomes depending on even slight variations in their beginning states. Finally, what appears to be unrelated events may be recurrent behaviors in a system if enough observations are made.

Network theory attempts to explain how networks grow, form patterns, and affect collective behavior across the network. It answers one of its founders, Watts (2003), who asks: "How is it that assembling a large collection of components into a *system* results in something altogether different from just a disassociated collection of components" (p. 24)? Network theory is also concerned with communication among nodes, including the social interaction and information flows across human networks.

Field theory examines influences of forces on specific areas. There are several field theories in the physical sciences, but what is most relevant here is Wheatley's (1999) comment: "in all of these theories, fields are unseen forces, invisible influences in space that become apparent through their effects" (p. 51). She uses the concepts of field theory to examine influences within social structures and effects on group behavior.
The next step in exploring the relevance of "new science" theories for ODE research is to see how they apply to individual learners and relate to theories of cognition and learning.

The Student as a Learning System

The online student can be viewed as a learning system, and a group of students can represent a learning network. This system, or network, exhibits the basic characteristics of any living system: (a) is part of a larger context; (b) is nonlinear and dynamic; and (c) tends to organization among its interacting components, seeking to be self-regulating and self-correcting within its environments. From this vantage point, the work of psychologists and that of physical science theorists come together.

Five key aspects of the student learning system follow: the first three relate primarily to learning and the fourth and fifth relate more to instruction.

1. The student learning system as part of a larger context

Several theories emphasize the importance of seeing the learner in the context of his/her environment. Context affects development and is significant for any learner's quest for meaning in his/her learning experiences. Piaget's assumption that cognition is an interaction between heredity and environment (interactionism) (Driscoll, 2000) is consistent with this aspect of a systems view. Another perspective that looks at the organism in relation to its environment is found in behavioral psychology, which examines the effects of environmental variables on the observable behavior of the organism (Driscoll, 2000). The theory of situated cognition offers a third view. It emphasizes the importance of relationships among communities of student learning systems, described within the theory as communities of practice (Driscoll, 2000). All persons involved may be transformed by the interactions with one another and the world they live in.

2. The student as a living system that is nonlinear and dynamic

Principles of behavior management identified by Skinner and others (Driscoll, 2000) suggest that an organism can be programmed through linear events to exhibit targeted behaviors. While programming may be one way in which organisms develop particular behaviors, other processes can affect behavior, also. Cognitive information processing theory suggests that a learner responds dynamically to sensory input from his/her environment (Driscoll, 2000). In the first stage of information processing, sensory memory, the learner responds to whatever stimulus attracts the most attention. A sensory input may be transferred to short-term (working) memory, but could easily be replaced by a subsequent event that is considered more important or relevant. Processing could go the other way if what is in short-term memory triggers pattern recognition from long term memory to link to prior knowledge. Alternatively, the lack of a recognizable pattern might trigger efforts to create a new schema to organize the new information. Meaningful learning and schema theory also support the notion that the student learning system is nonlinear and dynamic. While learners may use schema to organize the information they have about their environment and guide their actions, they do so dynamically, responding to events as they occur and processing information according to perceived need (Driscoll, 2000).

3. The tendency of living systems to organization among their interacting components and to be self-regulating and self-correcting within their environments

Piaget's interpretivism view of cognition is consistent with the characteristic of living systems to be internally self-organizing and self-regulating and self-correcting within their environments. The description of equilibration as the master developmental process sounds very much like the behavior of living systems undergoing reorganization. As a process of development, equilibration represents a child's transition from one stage to another as s/he becomes aware of anomalies in his/her experience and resolves them by discoveries that provide a better explanation of reality (Driscoll, 2000). A similar picture is offered by meaningful learning and schema theorists. The ongoing development of schemata is a process of accretion of new information, tuning the schema to resolve inconsistencies produced by new experiences, and restructuring to add entirely new schemata to replace or significantly revise old ones (Driscoll, 2000). Bruner's work has features relating to the behavior of living systems. His concept of discovery learning includes the concepts of self-direction and intentionality in making sense of the world by testing hypotheses and reorganizing mental models (Driscoll, 2000). The concept of cognitive strategies also supports the picture of learners guiding their own cognitive behaviors (Gagné, Wager, Golas, & Keller, 2005).

These first three elements present a picture of the student learning system as a naturally occurring phenomenon. The next two elements address the function of instruction. The first function of instruction is to create cognitive dissonance in the learner. The second is to support the learner's resolution of that dissonance. Cognitive dissonance can be viewed as a continuum. At one end of the continuum, the learner perceives a gap between current knowledge and the knowledge to be acquired. The target learning objectives may be very clear, and the means of acquiring the knowledge may be easily recognizable. At the other end of the spectrum, the learner perceives that his/her current knowledge is insufficient—for example, it cannot be used to explain observations or solve problems. However, the target may not be specifically stated, and the pathway to understanding may be unclear. At this end of the spectrum, the learner experiences chaos
.

4. Creating cognitive dissonance (chaos) in the student learning system

The third principle of Piagetian theorists relates directly to the role of the instructional system as a creator of chaos in the student learning system. It states that instructional strategies should be adopted that make children aware of conflicts and inconsistencies in their thinking (Driscoll, 2000). While this principle refers to childhood development, a similar concept can be seen in adult learning theories. Keller's (2006) ARCS model describes a way to create cognitive dissonance. Sparking learners' curiosity by illustrating a contrast between their current thinking and the learning goal can gain attention through cognitive dissonance, perhaps expressed as a mystery for them to solve. Cognitive dissonance can also be achieved through many of the established models of teaching and learning, including constructivist conditions for learning. Embedding learning in complex, realistic, and relevant environments can create a tension between what the learner knows and the unknown solution to the problem presented (Driscoll, 2000). Berlyne (1960) has explored the relationship between conceptual conflict and epistemic curiosity and found a positive relationship between the two.

5. Supporting reorganization and restabilization in the self-organizing student learning system

To support reorganization and restabilization, instruction should be designed so that student learning systems are not thrown so far into chaos that they are frustrated in their attempts to regain equilibrium. Vygotsky's zone of proximal development emphasizes this principle by stressing that the gap between what a learner is capable of and what s/he will be asked to do should not exceed what s/he can achieve with learning support (Driscoll, 2000). Keller's (2006) ARCS model of motivation offers ways to support the return to equilibrium. For example, enhancing relevance can encourage learners to pursue learning objectives and incorporate new material into their mental constructs. Building confidence can support their expectations that they can achieve equilibrium. Generating satisfaction in regaining equilibrium can support the stabilization of the reorganized student learning system.

Relating new knowledge to prior experience is a key concept in severeal learning theories and is an important feature of instruction's role to support reorganization and restabilization of the student learning system. Gagné's nine events of instruction include this activity which provides a point of reference for the equilibrium-seeking learner (Gagné, et al., 2005). Stabilization is also supported by others of the nine events, particularly eliciting performance, providing feedback, and enhancing retention and transfer. Reorganization and restabilization are critical for the student learning system. Without this return to equilibrium, the learner has no starting point for the next bout with chaos. A return to equilibrium does not indicate the return to a former state of knowledge. Equilibrium here refers to the learning system achieving a sense of balance between old knowledge and new information. Ideally, continued bouts of chaos and equilibrium would move the learner in an upwards spiral of knowledge acquisition and lead to higher-order thinking. Wheatley (1999) has found that the natural tendency for systems to regain equilibrium is a strong force that can be relied on, assuming that appropriate conditions are present, the keyword in an instructional setting being *appropriate*.

Conclusion

The perspective of the online student as a learning system and the potential insights to be derived from "new science" theories have been briefly introduced. Figure 1 presents a simplified view of the student learning system in larger system contexts and the starting points for investigating "new science" theory applications.

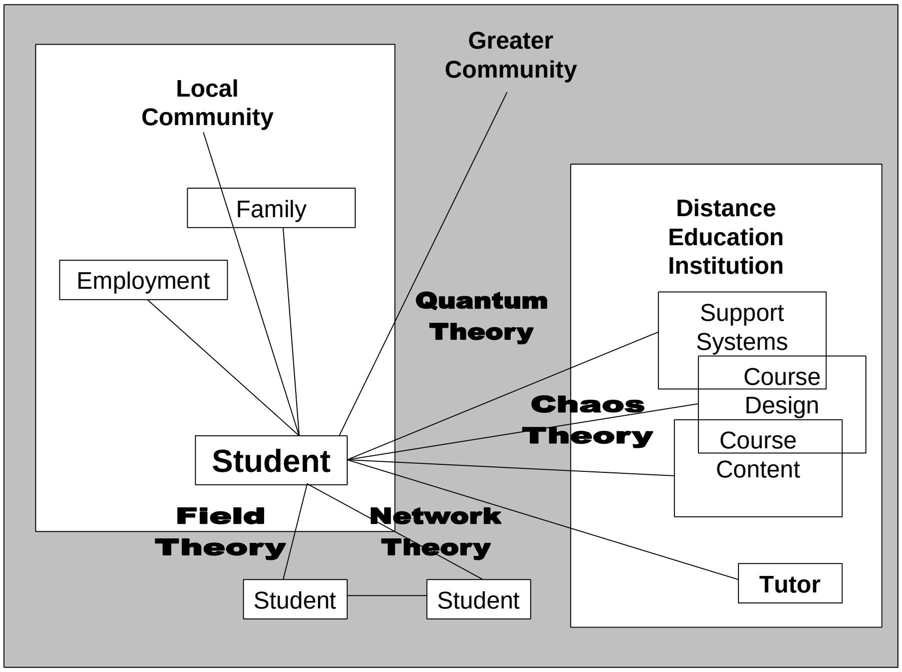

Figure 1. A simplified view of student learning system contexts

To summarize a few of the implications of this view for ODE, researchers can consider the following:

- Students learn within a hierarchy of systems. Both adult and younger ODE learners are closely linked to contexts such as community, employment, and family in addition to their learning institution and a network of fellow learners. These contexts suggests that learner backgrounds, support needs, time constraints, and communication issues will be varied and require accommodation in course design and delivery.
- A change in one part of the system affects the entire system at some level. This suggests that changes in course design and pedagogical strategies may have unexpected consequences in other parts of the environment.
- The subject of any instruction is not isolated from a larger realm of knowledge and skills and the contexts in which they will be applied; both learning and evaluation increase in relevance as this larger context is incorporated in the learning experience.
- As ODE systems move towards openness, the opportunities for gaining energy and authenticity from their contexts increases.

- Flexible (non-linear) ODE systems suggests instructional designs that permit achievement of final states from different beginnings and in different ways, with sequencing based on feedback mechanisms that help determine next steps.
- The dynamics of group interaction among learners and tutors should be considered beyond the basics of collaborative learning. Awareness of influences exerted by leaders and how information flows across networks can lead to improved communication designs and reduction in the distance perceived by many ODE learners.
- Instructional designers may find ways to energize course designs by taking advantage of the natural tendencies of living systems to self-regulate, self-organize, and strive for a new equilibrium in response to chaotic events.

Combined with current research frameworks, this approach may provide insights to learning outcome variations and ways to recognize and respond best to different learning system states. It may help researchers identify and eliminate learning system inhibitors and locate new sources of energy to motivate students to greater learning performance.

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Developing and E-Learning Research Culture in a Polytechnic Teaching Institution

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British Columbia Institute of Technology

The British Columbia Institute of Technology (BCIT) has embarked on an ambitious multi-million dollar e-learning project called the Technology- Enabled Knowledge Initiative (TEK). The main goal of the initiative is to use e-learning technology to change and improve teaching at the institution (Beers, 2007). It is part of a larger transition to e-learning that is occurring in the postsecondary sector around the world (Bullen & Janes, 2007). This project is also helping to stimulate the development of an e-learning research program and a research culture at an institution that has historically made teaching its primary goal. This presentation will examine the issues associated with developing a research agenda in an institution that does not have a research tradition and it will outline the emerging research themes.

The Technology Enabled Knowledge Initiative (TEK)

The TEK Initiative has four foundational goals:

1. To increase collaboration and connectivity

This is being achieved by providing authenticated, robust, and secure anywhere/anytime/anything access to BCIT’s intranet, extranet, and the Web. In addition, TEK fully facilitates online information sharing, collaboration, and knowledge building in a global context.

2. To develop smart learning spaces

Achieving this goal will ensure that instructors have easy access to the educational technologies that they need to teach on campus or at a distance. E-learning technologies are being deployed to facilitate best teaching and learning practices across all BCIT campuses.

3. To implement best teaching practices

TEK provides BCIT educators with the services, resources, and programs to enable them to use e-learning technologies effectively. It identifies and responds to the barriers as perceived by faculty, monitoring faculty feedback regarding measures implemented. It identifies and communicates student perspectives on effective and creative use of technology in teaching.

4. To advance the applied research agenda of the Institute

TEK provides the infrastructure, security, and capacity to engage its students, and faculty in applied research. TEK delivers the tools to create repositories to capture, store, index, mine, preserve, and redistribute data. It establishes the network capacity to transfer high volumes of data reliably and securely and fully facilitates online information sharing, collaboration, and knowledge-building in a global context.

In a bottom-up and top-down strategic planning process (Bates, 2000), these goals emerged from focus group studies conducted over the previous two years, involving students, faculty, staff, deans, directors, administrators, program heads from the technologies, and chief instructors from the trades.

These foundation goals align with Bates' (2000) recommendations for a model strategic technology plan, which he believes should nest within a wider plan for teaching and learning, cover both technology infrastructure and teaching with technology, and provide a concrete, detailed vision statement.

The TEK Initiative has directly involved faculty in a participatory design process because they are principle users of the educational and tools that TEK will produce. Participatory design is an approach to computer-based systems planning that advocates active involvement of users throughout the design process (Bannon, 1995; Fischer & Giaccardi, 2005; Gould, 1995). It views user involvement as crucial, since users are experts in the work practice supported by these technologies and will ultimately be the ones creating new practices in response to these technologies. Participatory design is collaborative, iterative and it is designed to improve the quality of work life of the users (Blomberg & Henderson , 1990).

Action Research

To support the iterative and quality improvement dimensions of the participatory design process the TEK Initiative includes an Action Research program. This modest research program has two main goals:

1. To encourage faculty to reflect on their teaching and thus engage in continuous improvement by researching their own practice and the implementation of e-learning technologies and innovative teaching approaches.

2. To sow the seeds of a research culture in an institution that does not have a research tradition.

In the first year of the Action Research Program, three projects were initiated and in the second year (2006) a further four research projects will be supported.

An E-Learning Research Agenda

The Action Research program is part of a broader initiative to cultivate an applied research culture at BCIT. A key part of this initiative involves developing an e-learning research agenda and responsibility for this rests with the Learning and Teaching Centre (LTC). The LTC is dedicated to enhancing the quality of education at BCIT and serves the faculty, staff, and students with a wide range of services and resources, including educational research, curriculum development, instructional design and consultation, distributed learning, media production, document production, and audio-visual services. The Centre has a staff of 66, including instructional development consultants, technical advisors, multimedia developers, video producers, writers and editors, illustrators, media technicians, and support staff. In the TEK Initiative, the LTC provides educational leadership, project management, and front-end technical support for faculty and students.

In November of 2005 a research committee was appointed and work is now underway on developing an e-learning research agenda. The overarching theme that will guide the research activity of the Learning and Teaching Centre is diffusion of innovation. Building on the work or Rogers (1995) and his theory of the diffusion of innovation, faculty members in the learning and teaching centre will be undertaking a number of studies that will examine different aspects of e-learning implementation as diffusion of innovation. Much of the literature that builds on Rogers' theory tends to focus on adoption of innovation as an individual process. While this is a critical component of the innovation adoption process, the critical role of the institution and the organizational issues that come to bear in the diffusion of innovations are often overlooked or given inadequate consideration by researchers. Rogers suggests that there are five stages in the individual's decision making process related to innovations: knowledge, persuasion, decision, implementation and confirmation. He further suggests that there are five factors that affect the ultimate decision to adopt or not adopt: the relative advantage, the compatibility, the complexity, the trialability and the observability of the innovation. However educators working in institutions do not make these decisions in isolation from their institutional contexts. How their institutions are organized, the kind of support structures that are in place, the vision of the organization, and the value that is placed on educational innovation all have an impact on individual decision making. An often overlooked component of Roger's diffusion of innovation theory is his model for innovation process in organizations. He suggests there are two stages (Initiation and Implementation) that are broken down into five steps: Agenda setting, Matching, Redefining/Restructuring, Clarifying, Routinizing. The emerging e-learning research agenda at BCIT will study how educational innovations that the TEK initiative has launched have diffused across the institution. Rogers' individual and organizational models for diffusion will be used to inform the research.

Issues

Cultivating a research culture in an institution that does not have a research tradition is a daunting task. A number of issues must be addressed at different levels. Fortunately, research has been identified as a key priority in the institutional strategic plan and it has strong support from the senior administration. The Dean of the Learning and Teaching Centre is also on record as supporting the development of an e-learning research agenda. However, there are significant barriers that must be overcome at the school and department level for research to flourish. The Learning & Teaching Centre is well-positioned to move ahead with its e-learning research agenda because it has a cadre of experienced educational researchers and it has considerable flexibility in how workload is assigned to its non-teaching faculty members who are Instructional Development Consultants. In effect, research can be included as part of the workload of the IDC.

However at the School level, the development of discipline-specific research is facing greater challenges. Most teaching faculty at BCIT were not hired for their research expertise. Few have doctoral degrees and fewer have research experience. The collective agreements for faculty make no provision for research as part of workload. Furthermore, the trades instructors have a particularly onerous teaching workload that involves 30 hours of class time per week.

Funding for research in a non-university educational institutions is also major problem. In Canada the two major research funding agencies are federally-controlled and their funds are only available to post-secondary institutions who are member of the Association of Universities and Colleges of Canada (AUCC). BCIT is not a member of AUCC is not eligible for membership.

Conclusion

The TEK initiative is helping to sow the seeds of a research culture at BCIT. It is helping to stimulate the development of an e-learning research agenda in the Learning & Teaching Centre and, to a lesser degree, it is helping to motivate the Schools to develop their own discipline-specific research agendas. There remain, however, a number of significant issues that must be addressed if a strong research culture is to take root. These include the recruiting of new faculty with research expertise, training existing faculty to undertake research, revising collective agreements so that research can become part of teaching faculty workload. And finally, it means looking for creative solution to the research funding dilemma which sees BCIT being excluded from research funding opportunities because it is not a member of the AUCC.

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Proposal for EDEN Research Meeting, October 2006

Theme #1: Research into institutional Planning, Management, and Quality Development for Online distance Education and e-learning.

E-Learning and the 'Tipping-Point'

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Recent data and headlines in the United States indicate a growing acceptance of online higher education, as well as increasing enrollments. According to the annual national survey conducted by the Sloan Foundation the proportion of students taking at least one online course grew by l8% or more each fall since 2002.(Allen and Seaman, 2005). Newpapers have also taken note of this phenomenon. The business oriented Wall Street Journal recently wrote that "Online …enrollment soars as quality improves…"(Golden,p B1) citing examples of these increases, especially at public institutions such as the University of Pennsylvania and the University Of Massachussetts. The Washington Post headline "Online Degree Programs Take Off" (Romano,p A6) pointed out that the number of students taking online courses has grown from 1.98 million in 2003 to 2.35 million in 2004, accounting for about 7% of higher education today. One powerful barrier in the USA to this growth has just been eliminated: the Congress no longer requires that colleges must offer half of their courses face-to-face to receive federal student financial aid. Thus, the prediction that one of every ten students in the USA will be enrolled in an online degree by 2008, seems plausible. (Golden, p B1).

These developments suggest a growth that will continue to increase at faster rates than in the past, expanding exponentially. This pathway is reminiscent of the trajectory in which a critical mass is reached and one more event alters the equilibrium, tipping the existing balance, significantly changing the environment. The point at which this occurs is called the "*tipping point*." (Gladwell, 2000)[1]

As universities increase their e-learning opportunities, and non-traditional students in particular continue to enroll in greater numbers, we may be witnessing the 'tipping' of higher education in favor of e-learning courses and programs instead of the traditional face-to-face classes—reaching an educational 'tipping point'.

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[1] Gladwell discusses 'tipping point' developments in business with respect to products (shoes, IPod), crime statistics, health, law, education. Malcolm Gladwell, The Tipping Point (2000).

NOTE: there is a similar concept in physics, dealing with critical mass and change, called *nucleation and growth*. See Nucleation and Growth Project, McGill University--
http://www.physics.mcgill.ca/~grant/Projects/Nucleation.html

The purpose of this paper is to propose that the '*tipping point'* concept is an important framework from which to examine current developments in e-learning; to suggest several indicators of such a trend; to discuss the implications and consequences for higher education; and, to engage colleagues in an intense discussion about these ideas.

The Tipping Point concept

> tipping point :"*once the beliefs and energies of a critical mass of people are engaged, conversion to a new idea will spread…bringing about fundamental change…*"
>
> (W.Chan Kim and Renee Maubourgne, Tipping Point Leadership.)

The '*tipping point'* concept has its roots in the health field, particularly epidemiology, where diseases spread by small changes that reproduce themselves and expand in geometric progression, growing bigger until they reach a 'critical mass'. Thereafter, any additional change alters the equilibrium and tips the system so that the disease becomes an epidemic. The spread of the AIDS virus as it affected more and more people, reaching a critical mass so that the epidemiological balance 'tipped' resulting in an epidemic, is an example.

The '*tipping point*' has been used in the legal field, in the United States. In the l960s and l970s, lawyers fighting racial discrimination in housing, argued cases alleging that 'white-flight' was organized by realtors. Attorneys argued that the 'tipping point..seems to be the point beyond which it becomes increasingly difficult to maintain an integrated pattern of living." (Hellerstein p. 534). That point could be numerically identified: when a mixed race neighborhood reached 40% minority, the neighborhood 'tipped' and became non- white. (Navasky, 1960). The same figure has been used to discuss the "impending demographic tipping point" represented by the forthcoming demographic changes in the United States, in which the population will be dominated by minorities. (Delgado, 2003). This numerical 'tipping point' was also observed in some co-ed programs in the l970s. The data showed that once the number of women in a class reached 38%, the class became predominantly female.[2] Notice that the number is close to the housing figure noted by Navasky, and is less than a 51% majority.

The question in law or education is the same as in the case of epidemics: what is the critical mass beyond which one more event or incident would alter the equilibrium, resulting in a significantly changed environment? The housing cases of the l960s offer an explanation still applicable today: the tipping point is the proportion "beyond which one more minority group member [would] cause…[majority] group exodus." (Navasky, p 35.)

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[2] This study examined education in prisons. Indeed, I confess it was my dissertation (more than twenty years ago) that dealt with the 'tipping point' phenomenon as it applied to co-ed and all women's education in prisons. I found that 38% women was sufficient to tip the balance from male dominated to female dominated, particularly in male oriented courses, such as math or welding. There was similar data about the introduction of men into formerly women's colleges, although I did not use it.--CS

Moreover, a key feature of the *tipping point* phenomenon is that it is possible for a numerical minority to control the environment, i.e., 40% minorities in a neighborhood; 38% women in class. Ergo, it is not necessary for an institution to have more than 50% e-learning for the educational environment to reach a critical mass, or ‘tip’ in favor of e-learning.

Tipping Point Indicators in Higher Education

Since the proposal is that e-learning developments can be examined by using the *tipping point* concept, how might an institution determine that it is on a trajectory that could reach a critical mass, possibly ‘tipping’?

Three indicators offer guidance: institutional e-learning enrollments , faculty involvement and institutional infrastructure. The first two are quantifiable, such that we can examine trends over time, or even a movement towards a critical mass. Many of the components of the third, infrastructure, are identifiable—but do not at present appear to be quantifiable.

For purposes of this discussion, enrollments represents the number of times a student took online classes (i.e., 1 student in 3 e-learning classes = 3 enrollments). Faculty reflects the number of unique faculty teaching online courses. Infrastructure represents those services that support the e-learning venture such as electronic library resources, technology support, course management systems, student services.

Three United States universities with varying amounts of e-learning are the basis for examination of the indicators: the University of Illinois/Springfield and the University of Maryland University College are public institutions funded partly by state taxes and partly by tuition; Lesley University is a small private college. All three were early adopters of technology integrated learning, having first initiated at least one online course between l996-1998.

E-learning Enrollments and Faculty:

The University of Illinois/Springfield (UIS) has approximately 4760 students (fall 2006), most of them working adults, and 14 online degrees. Moreover, while face-to-face enrollments have been decreasing, online enrollments have been increasing annually. UIS began offering e-learning courses in l996. By 2004, one of every three students took at least one online class each semester, and one of six took only online classes. Since the online enrollments are growing, this area represents the focus of university’s future investments. (http://online.uis.edu/info)

UIS: Online Enrollments and faculty involvement 2000-2005 (calendar year data)

Year	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
enrollments	2,066	3,017	3,988	5,105	6,643	7768
Online % of all redits	d.k	11.5%	13.8%	19%	24% (fall %)	26.5%
Faculty #	d.k.	d.k.	d.k.	83 (fall only)	110 (fall only)	125 (fall only)

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The University of Maryland University College (UMUC), the largest school in the Maryland system, has approximately 83, 850 students worldwide and offers 12 online degrees (in 26 fields) as of FY06. UMUC students have always been the adult (non-traditional) population since its founding in the late l940s to provide education to the US military in the US and overseas. UMUC's first online course was in 1997; by fy 06, the proportion of online enrollments reached 81% (of the stateside based population)and 59% of worldwide students. (www.umuc.edu/ip).

UMUC: Online Enrollments and faculty 2001-2006 (fiscal year stateside/USA based--data)

Year	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
E-Enrollments	50,301	72,126	87,565	97,144	111,511	119,391
% of all enrollments	51%	63%	71%	74%	78%	81%
Faculty #*	604	812	910	1,099	1,324	1,397

*UMUC faculty data is based on faculty teaching at least one online, confirmed and non cancelled course/section. Data courtesy of the Office of Institutional Planning & Research.
http://www.umuc.edu

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Lesley University

Lesley University is a small private college in Cambridge, Mass. with a national dominance in teacher education, as well as programs in arts, environment, and human services. Of its total population of 12, 344 students, most are graduate students 9,557 (77%). As a result of its Technology in Education master's degree, Lesley began teaching electronically in the mid-l980s; this program went online in l997. At present there are two fully online degree programs (plus several hybrid programs and individual online courses), all education orientated at the master's level. The data below is from the first and largest program: Technology in Education.(http://www.lesley.edu)

Lesley University: Online Enrollments and faculty, Technology in Education Program, 2004-2006 Fiscal year data

Year	**2004**	**2005**	**2006**
E-enrollments	880	949	1001
% of all Lesley U enrollments	6.8%	7.3%	8.8%
# faculty*	27	29	32

* some faculty teach more than one online course per year

In all of these universities, we can see that number of e-learning enrollments are increasing each year, as are the faculty. Much more specific data about faculty is needed before we can surmise that both enrollment and faculty indicators are moving in tandem, with sufficient strength to support each other. At UMUC, the online enrollments reached its 'tipping point' in 2003 ,with 43% online enrollments using Navasky's formulation.

Infrastructure

E-learning cannot survive, or grow, without ongoing, effective electronic/online infrastructure support. This would include an effective learning management system (e.g., rare down time), technical support 24/7, e-library resources, student services, faculty training and development, etc. The infrastructure indicator is part of an organizational system upon which both student enrollment and faculty depend. Continual student enrollment involves satisfaction, retention and eventual completion; obtaining and retaining sufficient faculty requires that they be comfortable with technology-based learning, keep up with resources, are savvy enough to be on the alert for the new wave of plagiarism and more. Given the promise that online education allows learning to occur without limitations of time or place, infrastructure is the keystone to assure that this happens.

As a key factor in the potential for increasing e-learning or even maintaining existing levels, infrastructure support offers a critical feedback loop about the effectiveness of the system. If technology support services are not available 24/7 or the assistance is poor, for example, then students may complain, opt out of a course or go elsewhere; faculty may decline to teach certain courses online. All three--infrastructure, student enrollments and faculty involvement—are inextricably linked as indicators of an institution's movement on the e-learning path.

Quantifying this indicator remains a challenge, and may not be possible or necessary for analysing an institution's developments. What aspects would be measured?: the number of services (advisement, library databases and e-books, help desk, IT support, book purchases, faculty access)? the extent of support (24/7 or workday)? types of services (e-chat, telephone, email, video)? user access (online learners only, online faculty, everyone)? Using a systems perspective with respect to the infrastructure may be the most appropriate way to assess how well it supports the faculty and students, and thus the e-learning enterprise.

Challenges

Even if the data reveals that an institution is moving at an exponential pace—all indicators are go!—what is the value of this knowledge? What are the potential consequences, challenges that must be recognized and addressed?

First, given the symbiotic relationship of the three indicators, it appears that they must move together—upwards—if the institution is getting increasing enrollments or desires it. Whether the relative strength of each indicator must be equal is unclear at this moment. However, if one of these indicators is much stronger than the others, the institution may be in for trouble. For example, increasing e-learning enrollments without an appropriately supportive infrastructure can lead to disaster, e.g.,poor or limited technology assistance can infuriate students and faculty; books that arrive several weeks into the semester may result in student withdrawals; faculty who are untrained or poorly prepared for online teaching can result in dissatisfaction. At the same time, having a strong infrastructure without sufficient student enrollments can be very costly. Similarly, having many willing and well prepared faculty without sufficient student enrollments or technology support, can led to disillusionment and later difficulties in faculty recruitment for e-learning. Attention to the movement of the indicators can serve as a warning to be prepared before the indicators are too far out of synch.

As a corollary, it becomes important to recognize when this trend is NOT what is desired, and take clear steps to halt an unintended move towards a strong e-learning institution. This would allow the leadership to make cuts or changes in the indicators which are supporting the unwanted direction.

Second, knowing that upward moving indicators suggest a movement towards an e-learning dominated institution, what would an institution that has “tipped” look like? Could we determine the ‘educational *tipping point*’--the proportion beyond which ‘one more’ online enrollment/course or instructor would result in face-to-face class ‘flight’ and dominance by e-learning (to paraphrase V. Navasky)–and be prepared?

Finally, how could such an educational transformation occur? what leadership might be needed to move towards a *tipping point*? The determination to support e-learning in the higher education community and engage the varied parties in the change, can mean leadership akin to that needed in private, public and non-profit organizations which desire significant change or turnaround. Kim and Maubourne, who have written about “tipping point leadership” argue that such leaders must clearly signal the need for change, focus initial resources on critical areas where payoff is most likely, identify and motivate key people who can influence others, and curb the influence of perpetual critics

(Kim and Maubourgne). The three universities noted above, for which e-learning is clearly a major endeavor, are good candidates for research that examines ‘how’ this has happened and what roles and strategies were undertaken by key members and their supporters that enabled the transformation to begin and develop, facilitating the “*magic moment when ideas, trends and social behviors cross a critical threshold and ‘take’, causing a tidal wave of far reaching effect.*” (Tyrell, 2004).

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Making the Difference in E-Learning: Towards Competence Development and E-Irritation

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1. Introduction: Moving From a Technological to a Pedagogical Innovation

Since the declaration of the "no significant difference phenomenon" (Russel 1999) the question how e-learning[1] can make a difference compared to non "e" learning has changed its meaning. Has the focus in Russell's work been the comparison between e-learning/ distance education and traditional/ face-to-face educational settings, today it is widely accepted that this was a comparison between apples and oranges because media do not only change the educational organisation but also demand for a changed pedagogy and carry meaning itself.[2] The focus in todays e-learning research has changed. To compare if e-learning or traditional learning is more effective/ efficient is not considered any longer seriously.

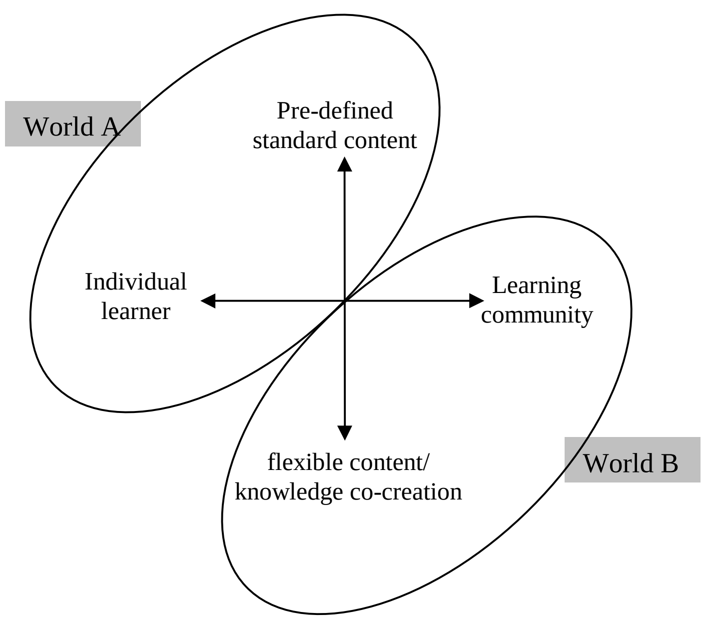

Figure. 1: E-Learning Worlds (Schulmeister 2005)

The focus in the discussion about how e-learning can make a difference moved from e-learning as a *technological innovation* to e-learning as a *pedagogical innovation* and today has arrived at a discussion about the strategic level how e-learning can make a difference through stimulating a new learning and organisational culture. E-learning demands for a "total system" approach (Garrison 2004), including economical questions of sustainability and business models, pedagogical and technological questions as well as organisational and cultural questions. However, in the heart of todays discussion about e-learning is the pedagogical

[1] E-learning in this article is defined in a broad sense as making connections among persons and resources through communication technologies for learning-related purposes (Collis 1996: 17).

[2] Most experimental comparisons of learning/ teaching methods do not result into significant differences, respectively the few significant results are contradicting. A well known meta-analysis was entitles "The no significant difference phenomenon" in which over 300 empirical studies were compared and which resulted into the title of his work (Russel 1999).

design because it is clear that e-learning will in the long run only have success if it manages to show an educational added value and to make use of its pedagogical innovation potential (Kerres 2001, S. 89, Seufert/ Euler 2005).

This view is also supported by Schulmeister (2005, S. 487). He differentiates two worlds of e-learning between which there are gradual intermediate levels (Figure. 1). In e-learning *World A* the students are learning with pre-defined content whereas in e-learning *World B* the students are creating knowledge in a collaborative way within a learning community.

To make the difference means to realise the full potential of e-learning as a pedagogical innovation. In this article it is suggested that this means to use technology to create learning opportunities which are suited to equip the individual with <u>competences</u> rather than with subject matter knowledge. It is clear that todays challenge in education lies in the stimulation and support of competence development: For higher education the Bologna process clearly stresses a stronger focus on competence development (Bologna 1999; Tuning 2004). The results of the European project „Tuning“ (Tuning 2004), for example, show that the competences which should be acquired by students in the future can be described consensually. Competences instead of qualifications, employability[3] instead of inflexible job profiles are clearly put in the foreground in future higher education (for a comprehensive discussion of the terms "Employability", "Key Competencies" and "academic quality" see Kohler 2004). This is challenging teaching and learning organisation, especially under the conditions of a stronger introduction of information and communication technologies in teaching and learning processes in higher education. The higher education arena thus faces a challenge: How can e-learning make a difference and support the development of competences?

The article focuses on the sector of e-learning in higher education and suggests that todays challenges in e-learning in higher education lie in the development of competencies. Chapter 2 defines concepts and gives background for the field of competence development. In chapter 3 the challenges of achieving competence development through e-learning are outlined. Chapter 4 suggests a shift from a distributive to a collaborative mode of e-learning and introduces Computer Supported Collaborative Learning (CSCL) as a way to facilitate competence development. To underline the fundamental differences in both approaches (distributive vs. collaborative) the debate of CSCL as an emerging paradigm is referred to. The shift from e-learning in a distributive way to e-learning in a collaborative way is proposed as a concept which makes the difference. Chapter 5 summarises the main aspect of the paper and concludes that more research on individual competence development processes through e-learning is needed.

2. Competences: Terminology and Theoretical Background

The concept of 'competence' is a manifold and divers defined concept. Within the scientific debate different theoretical meanings of competence can be identified. A definition of Franz Weinert (Weinert 1999, S. 44) shows the different components which are interpreted in a divers range of ways: „Competence is a roughly specialized system of abilities, proficiencies, or individual dispositions to learn something successfully, to do something successfully, or to reach a specific goal. This can be applied to an individual, a group of individuals, or an institution.“ He elaborates that competence is a system of *dispositions* which are the

[3] Employability is about having the capability to gain initial employment, maintain employment and obtain new employment if required. In simple terms, employability is about being capable of getting and keeping fulfilling work. More comprehensively, employability is the capability to move self-sufficiently within the labour market to realise potential through sustainable employment. For the individual, employability depends on the knowledge, skills and attitudes they possess, the way they use those assets and present them to employers and the context (eg personal circumstances and labour market environment) within which they seek work.

prerequisites for meaningful activities and which are influenced through practical experience and learning processes (ibid.).

According to Weinert (1999) nine distinct approaches to define the concept of competences are presently discussed in relevant research literature: (1) Competence as a general cognitive ability, (2) as specialised cognitive ability, (3) the competence-performance model, (4) the modified competence-performance model, (5) objective and subjective self concepts, (6) motivational activity tendencies, (7) the action competence, (8) the model of core-competencies, and finally (9) the concept of meta-competences. Weinert states that it does not make sense to seek integration of these approaches because then they would loose their power of differentiation.

In the following the concept of *action competence* is chosen for the further elaboration. It is defined as the ability of self organisation in a specific educational or professional context (Weinert 1999). One important assumption in this model is that competencies can be learnt and developed through practical activity. The necessity of an active, self-organised learning process is stress, and competences can not be taught through a purely instructional approach. Educational theories like the constructivist approach support the development of competencies because they emphasize learners own activity and social interaction, a connection of individual and collective activity which has a central position in the concept.

On basis of this general characterisation of the action competence Erpenbeck and Heyse developed a typology of four core competences for an acting individual: (1) Special- or subject matter-, (2) methodological-, (3) social-, and (4) personal competences (fig. 2). These core competences are not distinct categories but rather interdependent dimensions of individual action competence (Erpenbeck/ Heyse 1999, 156 ff.). Van der Blij (2002) adds to that *knowledge*, *skills* and *attitudes*: “Competence is defined as the ability to act within a given context in a responsible and adequate way, while integrating complex knowledge, skills and attitudes”. It expresses that the application of competences always has to take part in a specific situation, and that these actions are influence through *knowledge*, *skills* and *attitudes*. Attitudes in turn are shaped through values, motives and experiences of a person. Competences become visible through an individuals’ *performance* of an action as a response to a specific situational context (Erpenbeck 2005, 218): “Competences are grounded in knowledge, are constituted through values, are dispositioned through skills, are consolidated through experiences, and are realised on basis of will.” (translated from Erpenbeck/ Heyse 1999, 162).

Figure 2 is visualising the described elements of competence. In the centre there is a learning process. Through learning knowledge, skills and attitudes are acquired. They form the basis for the development of competencies. All four elements of action competence are interlinked. Together they lay grounds for action which becomes manifest through performance in a specific situation. Competences are enabling individuals to react in uncertain contexts to non-foreseeable challenges with non-routine and complex actions.

Erpenbeck (1997) emphasizes the aspect that competences are dispositions for an action – i.e. they become visible and manifest only if they are “realised” in an action. They are thus not directly ‘visible’ or can easily be assessed by conventional methods (written test, oral exam, multiple choice questionnaire, etc.). He relates back to Chomsky’s (1965) thoughts according to which competences are shown in performances. Competences are therefore only visible when used (Erpenbeck/Rosenstiel 2003, XXIX). Action and competence are therefore inseparable connected: Competence leads to action – and action results in competence.

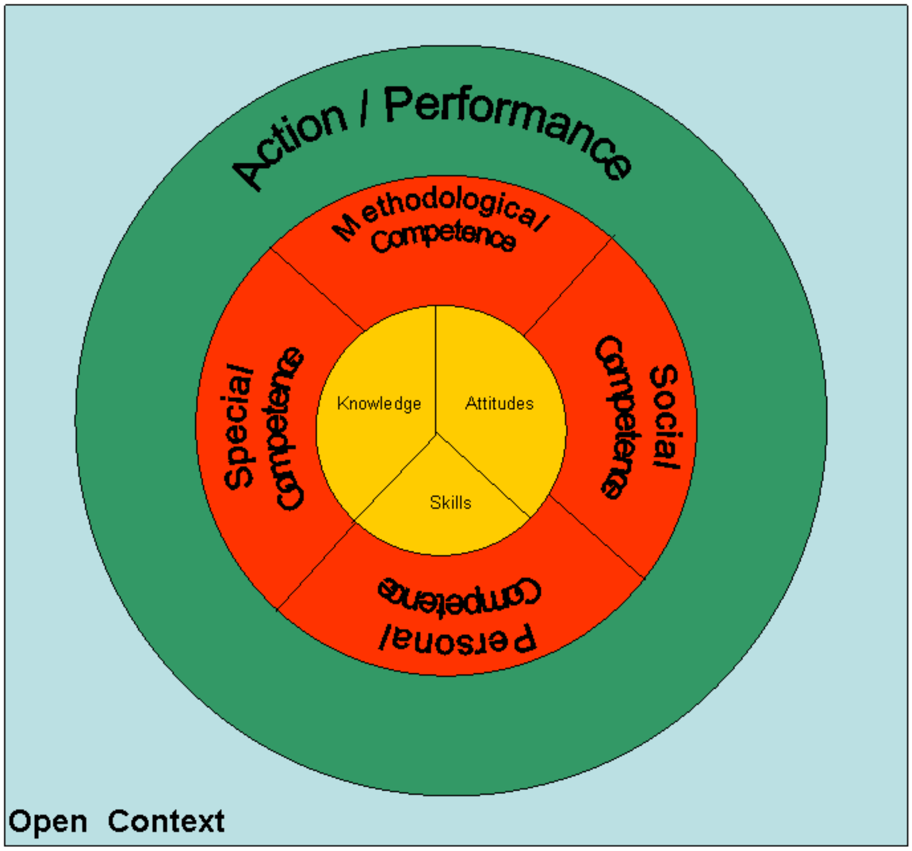

Figure. 2. Action Competence (adapted from Ehlers, Lazarz, Schneckenberg 2006)

3. Competence Development through E-Learning

Although in recent research a potential for the development of action competence through e-learning could be identified (Stieler-Lorenz/Krause 2003), the development of action competences through e-learning is at the same time viewed critical (Erpenbeck 2005, 231). Still most of the e-learning environments in higher education are following the paradigm of *distribution* rather then *collaboration* and in doing so merely facilitate the logistics of learning material supply (OECD 2005).[4] These kinds of learning environments have their strength especially in the support of infomration and presentation which support the gain of methodological and subject matter knowledge and job-related qualifications (ibid.). Modern employability, on the other hand, demands job-related action competence and stresses apart from special/ subject matter competences also personal, activity related and socio-communicative competences which are routed in rules, values and norms. If and how technology enhanced learning environments can be used for the development of such action competences is – especially in relation to the above described contradiction – still open and subject to the theme debated in this article.

One hint how e-learning has to be organised can be taken from North's step-by-step concept of competence development. Figure 3 represents an adaptation of the knowledge concept of North (2005) by Wildt (2006). It shows that competence development builds on practical application, motivation and the ability to assess actions against existing standards (to find out if the action was suitable).

[4] Privateer (1999 in Garrison D. 2004: p. 77) says that digital technologies (eLearning) require radically new and different notions of pedagogy. It makes little sense for academia to continue a tradition of learning significantly at odds with technologies that are currently altering how humans learn and interact with each other in new learning communities.

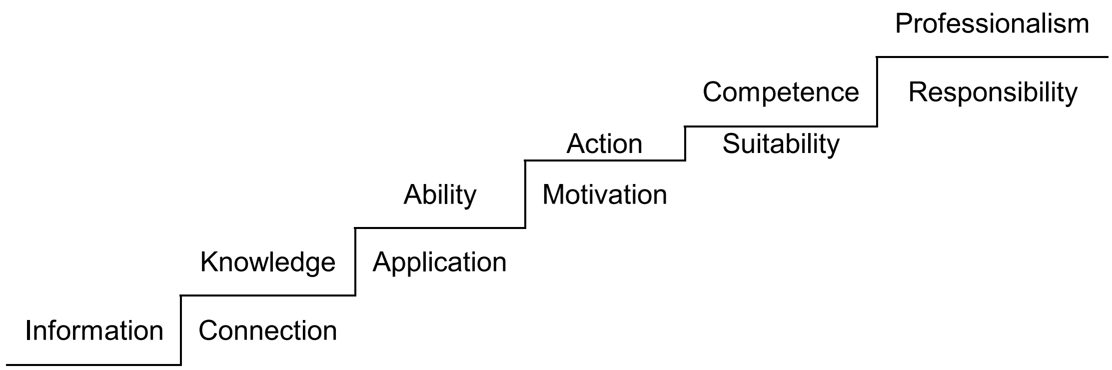

Figure. 3: Steps to professional competence (translated from Wildt 2006)

The concept shows the interrelation between knowledge, skills and action. In the first step information are connected and on the second step they are applied and result in abilities. This is transformed in activity through motivation and will. Competence, however, demands for evaluation if the performed activity is suitable in a given context. For this, an individual needs standards (to assess what is suitable in the specific context) – they then lead beyond the concept of competence to professionalism. Wildt includes here also the responsibility towards clients and society. Especially the last three steps activity, competence and professionalism are seen by Erpenbeck as difficult to be realised through e-learning.

Erpenbeck (2005) puts forth that e-learning has great difficulties in creating experience related and value oriented learning opportunities, a problem which can only be solved in relation to the problem of interiorisation. Interiorisation – or incorporation/ internalisation – of new values is the result of acting in uncertain, challenging, non-routine and complex contexts. As a result of being urged to act in such learning contexts, learners start to question their own values and pre-assumptions. Values which are serving as structuring elements for every activity are then *labialised* in such contexts. Having successfully coped with such a situation, the Interiorisation of new values takes place. In case of successful rule-, value- and norm interiorisation e-learning can become a full scale alternative to competence based face-to-face learning environments in which not only subject mater knowledge can be distributed but also action competence acquired, and experiences made and expertise learnt (Erpenbeck/Heyse 1997). E-learning can then make the difference. Interiorisation thus means the acquisition of rules, values and norms under the influence of individual emotions and motivations.

The interiorisation process represents the greatest challenge for every e-learning environment if it wants to be competence oriented. It requires *social interaction*, *conflicts* and *irritation*, *problem solving* and a high degree of authenticity in every learning situation.

Learners have to interact in *problem oriented* scenarios in groups, and confront their own values, solutions and situations with those of other individuals and groups. Collaboration, labialisation and irritation are therefore the basis for competence oriented e-learning (Erpenbeck 2005). As it is suggested in the headline of this article e-irritation is a necessary component in order to foster the process of labialisation and stimulate the development of competences.

The consequences are clear: In order to stimulate potentials for competence development and initiate labialisation and Interiorisation processes, e-learning environments have to follow a clear problem oriented, authentic and collaborative didactical design. The development of action competence can – in this sense – be supported through learning environments which are designed according to the principles of situated learning and cognition (Mandl/Krause 2001). The next chapter is suggesting the model of Computer Supported Collaborative Learning (CSCL). It is argued that it can make the difference because it carries a strong potential for action competence development.

4. From Distribution to Collaboration

4.1 Shifting the E-Learning Mode to Collaboration

However, the shift from a distributive mode of e-learning to a collaborative mode of e-learning, from a knowledge transfer model to a competence development approach, opens not only the opportunity to make the difference but also poses great challenges to the planning, organisation and provision of e-learning. Many forms of e-learning, especially those who use e-learning in a "distributive" mode, can hardly help students to develop competencies. This is especially true for personal, socio-communicative and action related competencies. The ever growing demand for a competence oriented educational process and the use of e-learning models which hardly are made to stimulate competence development can be seen as a *basic contradiction* in the field e-learning, since its introduction: On the one hand the use of e-learning in higher education is growing and growing, on the other hand many of the presently implemented models of e-learning are often unable to support the development of individual competencies because they use e-learning in a mere distributive model to facilitate the logistics of e-learning material transfer.

CSCL is a social and interactive form of learning which follows the objective to support the development of different competences. It is based on a learning process in which an individual learns together with others in mutual exchange of a topic, a task or to solve a problem in order to acquire the same but also different objectives. In the CSCL concept the described necessary characteristics for the development of action competence are supported: *social interaction*, *conflicts, irritation*, and *problem solving.* The concept follows a constructivist learning theoretical approaches. From this point of view, learning is a self-organised process which necessitates an active knowledge construction process, which in turn is influenced by pre-knowledge, experiences and attitudes of the learner (Mandl/Krause 2001, 4). In addition to that, the constructivism opens a second perspective on knowledge: „to acquire knowledge", „to share knowledge" or „to solve problems self-guided" (Arnold/Schüßler 1998, 78). In this sense it is important that for competence development, learning situations are created in which self-organised, learner oriented, situative, emotional, social and communicative learning is supported (Mandl/Krause 2001; Zawacki-Richter 2004, 262). To change the e-learning mode from a distributive mode of "learning material supply logistics" to a mode of CSCL, creates greater opportunities for learners to develop competencies in authentic learning situations and social interaction (Zawacki-Richter 2004, 263).

Table 1. Characteristics of the Distributive and Collaborative E-Learning Model

Characteristics \ e-learning model	Distribution Model	Collaboration Model
Goal of teaching/ learning	Knowledge, Qualification	Competence
Knowledge is	Stored, Processed	Constructed
Paradigm	Reproduction, Problem solving, Understanding Remember	Reflection[5], to invent new experience active social practice
Technology use	Presentation, Distribution, Information	Collaboration, Communication
Learners mode of involvement	Acquisition Metaphor	Participation Metaphor
Teacher is	Authority or Tutor	Coach, Player
Teacher activity	Teaching Helping Demonstrating	Collaboration, interaction oriented practical experiences
Interaction type	Transfer model	Communication, Exchange (Interaction) model
Assessment Type	Knowledge Reproduction Test, Multiple Choice	Performance, Skill application, Evidence based assessment, e-portfolio

Shifting the mode in e-learning makes a difference. It helps to use e-learning to support the development of competences and leads to changes in at least three ways:

- First it enables e-learning to not just replicate what is going on in traditional university classrooms settings but to use technology to enhance the existing learning opportunities by creating new forms of access and by connecting people and resources in form of collaborative networks.
- Secondly it has an individual dimension which addresses the needs of individuals to develop competencies for taking part in an emerging learning society. Support of competence development is the first means of empowering learners to become self-guided and self-organised individuals which enter into the necessary learning processes themselves.
- Thirdly it has an organisation dimension. Educational organisations need to change and to open their rigid traditions of time-pattern oriented, and hierarchically structured knowledge transfer if they want to enter into a knowledge co-construction process with their learners. E-Portfolio instead of multiple choice test and collaborative, learner led design of curriculum and learning process instead of pre-defined distributed knowledge cubes.

4.2 CSCL – A new Paradigm to Support Competence Development?

The debate about CSCL as a new paradigm underlines that CSCL is indeed a different mode of e-learning. It goes back to Timothy Koschmann, who in 1996 published the book with the title: "CSCL – Theory and Practice of a new Emerging Paradigm". He argued that the change

[5] Reflection on learning is a common thread going through most learning perspectives or theories to some degree. Dewey recognised it as far back as 1916, while Cowan (1998) sees reflection as a necessary pedagogical method and Kolb (1984) includes it in his experiential learning cycle (in Mayes T. 2004).

of the instructional models in the area of information and communication technology can be labelled a paradigm shift in the sense of Kuhn (Kuhn 1976)[6]. He analysed that with CSCL the focus now lies on the group cognition rather than on the individual development – and that this point of view is incommensurable to the traditional, more individual view, and by that fulfils Kuhn's conditions for a new paradigm (Kuhn 1976).

The same thought was later taken up by Sfard (1998), who formulated the incompatibility of the two paradigms in two metaphors: the acquisition-metaphor (AM) and the participation-metaphor (PM). The AM is views learning as a transfer of knowledge to the individual. The empirical research in this paradigm focuses therefore especially on the change of mental models of individuals. The PM localises the learning process rather in the intersubjective-, social- and group processes. Empirical research therefore focuses on participation patterns in the group process. Sfard, however, does not identify a paradigm shift but views both metaphors equally.

In his work "Computer Support for Collaborative Knowledge Building" (2002) Gerry Stahl states that a paradigm shift from a rather individualistic to a more group oriented cognition has not (yet) taken place. To strong are the culturally transported individualistic views – in the western cultures – which express already in Descartes "cogito ergo sum". However, Stahl strongly recommends to reinforce CSCL research with a strong group- and participation oriented scope. John W. Maxwell from the University of British Columbia published 2002 as well an article in which he doubts the emergence of a new paradigm. He argues that the condition of incommensurability has not (yet) been met and one learning paradigm has not overcome the other one. Maxwell also identifies a change but analyses this from a pragmatic perspective as different types of the same genre who all have the same justification to exist and develop – just like Kerres & de Witt (2003) within their *pragmatic approach* to media didactics.

In our view it should not be the goal to identify the one and only fitting and suitable paradigm for learning or teaching. We believe that a "one-size-fits-all" approach for e-learning and CSCL doesn't exist, neither for didactical design nor for empirical research. The core question then is, under which conditions individuals can learn successfully with media. The aim has to be to describe the process of creating learning environments in order to reach certain defined objectives, and do so – in CSCL – in a collaborative way. Kerres & de Witt (2003) are clearly emphasizing that the search for the one and only correct approach has so far hindered the didactical evolvements in e-learning rather than promoted it.

5. Summary and Conclusion

The article describes that the current challenge for e-learning in higher education is to support competence development. This poses great challenges to e-learning in higher education because the way it has been used in any cases so far are not designed to support competence development but rather facilitate mere knowledge transfer. Two different modes of e-learning organisation are differentiated and described: the distributive and the collaborative e-learning mode. It is argued that the collaborative mode stimulates more potentials for development than the distributive mode. Therefore computer supported collaborative learning (CSCL) is described and suggested as a way to support competence development in e-learning. To

[6] The term of a scientific paradigm relates according to Kuhn to a "general explanation pattern or to generally accepted theories, (…) which are steering at the same the future research direction" (translated from Kuhn 1962, 1967 in Schultze in Kriz et al 1994: 289)[6]. According to Kuhn in a normal science everything is concentrated to solve problems in the frame of the existing paradigm which is in turn enlarged and refined. Questions relating to the basis of assumptions were usually not posed and also problem which only occur outside of the paradigm were not seen. Through this effect no new theories and developments were developed within the paradigm. Only through emerging irritation or disturbances which lead to a reduced problem solving capacity of an existing paradigm , new approaches and paradigms were developed.

underline the differences between CSCL and the distributive mode of e-learning the debate about CSCL as a new emerging paradigm is referred to.
The article shows the conceptual connections between CSCL and competence development and suggests the collaborative mode of e-learning as a model to stimulate competence development in higher education. However, not enough research has been done in this field – especially not enough empirical evidence has been acquired to shows how individuals develop competences through collaborative processes in e-learning, and how teachers can facilitate this process. The individual competence development process within a collaborative learning environment between the different actors, like teachers and other learners, should therefore be subject to further analysis. The shift from distributive to collaborative e-learning is not only a question of pedagogical design but also of organisational processes – a culture of sharing and collaboration within an organisation therefore has to be facilitated along with its introduction.

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Evaluation of investigation competencies using ePortfolio

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Summary

The challenges that distance evaluation encompasses is a topic that requires, on one hand, to evolve according to the new trends and also to renew the evaluative processes promoting new practices. In this sense, this demand turns more imperative when competences, competence-based learning and the need to carry out the evaluation of this learning appear within the formative scenario.

The Open University of Cataluña (UOC) has begun to work within this new reality promoting new practices. A very concrete example of this effort is the evaluation of competences using the e-portfolio. To meet this objective a profound and consistent process have been developed in the last few years with the purpose of making this tool a reality and provide for the opportunity to use it with a group of students in an attempt to study its strengths and limitations keeping in mind the final goal of offering this experience and its product to the university educational community.

Keywords

e-porfolio, learning on line, distance evaluation, evaluation of competences, metacognition.

Introduction

Two years ago the Open University of Cataluña has been working on research that supports the present experience: a competence-based learning evaluation project using e-portfolio. Along the process of research, efforts have been made from the theoretical/practical point of view to design and implement an e-portfolio within the context of teaching and virtual learning. Concretely this work aims to expose the experience during the months from February to June of the present year in a pilot test of the e-portfolio in a subject from the doctorate Society of Information and the knowledge of our university. More specifically the e portfolio was used to evaluate the investigation competences in a group of 27 students.

1. E-porfolio

Today in the educational environment emerges a proposal that is being considered more each day among faculty members. We are speaking of the e-portfolio as a competences consolidation and complex abilities evaluation instrument. The use of the e-portfolio as an instrument of learning and evaluation is very extended within the framework of some disciplines, considering that its inclusion is progressive and with diverse purposes, according to Barberà (2005). Seeking to encourage this experience it is very important to approach its conceptualization and its structuring as well.

In a more essential definition from an educational base, as expressed by Barret and Carney (2005), the educational e-portfolio is the collection of works and evidences chosen, reflected upon and presented by the students to support and show their progress in their learning process. Based on this premise the critical component of the educational e-portfolio is "the students, reflections" facing the tasks that have been proposed to show their degree of achievement and determine their learning.

If we agree that an evaluation is a process that selects, collects, analyzes, interprets and uses information that fosters decision making, we know that inside a vocational training these decisions must be focused on learning and the development of competences in the students. The relation among competence, learning and evaluation is at the very center of the possible scenario making it indispensable that the experiences of evaluation complement, in our best understanding, two necessary requirements: to evaluate competences and to be beneficial on the learning process (Smoked, 2005).

Concerning its structure, in our case, it has been used as a competence- based learning evaluation instrument within a virtual setting. From this perspective, the set of essential components and phases to be contemplated in its design are:

1.1. Components of the e portfolio

- The competences that are those capacities in terms of objectives to be achieved on the part of the students. In our case the competences of investigation worked and evaluated, in the present pilot test have been 5 and they have been described in different levels of achievement in the final rubric.

- We will consider as evidence a document that the student selects, reflects upon and presents in the e-portfolio, keeping in mind some established and explicit criteria, that shows progress in the learning process, or the acquirement of a competence. It is important to mention that evidences may include different formats (written, audio, video...)

- The rubric can be described as a matrix of the different levels of development, which enables the monitoring and evaluation of the student.

1.2. Phases

Among the different stages or phases that should be contemplated in the developing of an e-portfolio is possible to identify the following:

- Collection of evidence
- Selection of the most suitable evidence to the competences worked.
- Reflection on the evidences chosen and the degree of relation to the acquisition of the competence
- Publication of the products in the individual e-portfolio, accompanied by the elements that support the process.

2. The tool

The pilot test on the effectiveness of the e-portfolio described here was inserted in the doctoral course "Virtual Contexts of Learning" of the Open University of Cataluña and linked within the environment of formation to a tab identified as “portfolio”. The students and consultant professors of the course have access to the different parts of the tool from this tab. Among the divisions we have:

2.1. Presentation

In this section the student, as first step, must include a recent photograph to allow him or her to be identified before the classmates and the course faculty. Then publish a slogan to express his or her philosophy, whether it is from a professional or more personal point of view, this part includes a presentation of the more essential personal characteristics to foster a more personal approach to the peers and faculty. To conclude this section, two more aspects should be completed: the outstanding works to be exposed before the rest of the group and evidence of relevant work experience.

2.2. Competences

The five competences worked with the doctoral students of the course previously mentioned have been included. The course is mainly taught in Spanish and the competences are all linked to the process of research. In this section a definition of each one of the competences, the models or examples of evidence proposed to orient the personal work, and the specific rubric for the assessment of the evidence have been provided. It fits to mention that each rubric has been discussed with the students in an attempt to initially familiarize them with the tool and its fundamental components in a virtual workshop carried out before beginning the course. We will speak briefly about this workshop further on.

2.3. Monitoring

In this section of the e-portfolio it is possible to identify the availability of the monitoring process of the faculty consultant that has taken place during the development of the course. In this space the portfolios of all the students are included, providing access to the professor consultant to see their publications of evidences on the competences worked along the semester and to assess opportunely the process. In other words, the level of progress shown.

It is important to emphasize that our goal has been to develop the pilot test with the technological tools available at the university and that it has been implemented in the platform and within the environment of formation mentioned previously at the Open University of Cataluña (UOC).

3. The Virtual Workshop

To develop the pilot test of the e-portfolio adequately a Virtual Workshop was carried out with the purpose of familiarizing the students with two essential components: the tool and its operation and the evaluation of learning linked to competences, in this case of investigation. Before giving the workshop, a theoretical type reading document containing the conceptualization and purpose of the e-portfolio as tool of learning and evaluation was distributed. The workshop takes place in a period of 2 weeks, time in which one of the consulting teachers successfully met the objectives initially established. It is also important to indicate that access to the virtual workshop for the students has been provided throughout the course with the purpose of facilitating doubts or problems solving whether consulting the interventions of the classmates and the teacher in the space of workshop or sending a message directly to the consultant in charge.

A second element of central importance about this point is that during the virtual workshop the students received instructions they needed to be familiarized with the tool and in more than case worked with some of them in synchronous modality to help them be successful in the task assigned. One of these assignments had been developing the opening section of the portfolio of each student, for which the teacher has designed her own to be used as illustrative reference of the action and product expected.

4. The forums of competence: an experience of collaborative and individual learning

In this space for learning of the competences of the investigation process a total of 5 forums have been implemented, one for each competence worked. It is interesting to comment that the learning process began after the Virtual Workshop and parting from the forum linked to the Problem phase that proposed a situation related to a virtual learning setting and the presence of the TIC in the process. The intention was that students analyzed the information provided to identify the different components of the problem and expose with clarity a comprehension of the problem stated. The forums were:

- Forum 1: Problem
- Forum 2: Hypothesis
- Forum 3: Exploration
- Forum 4: Exchange
- Forum 5: Integration

The forums have been guided by one of the consulting teachers with the purpose of connecting the learning experiences of the students with the competence worked in the space of forum. Each forum has facilitated a direct and close monitoring process to foster the attainment of the goals and to provide for clarifying doubts if any. It has also provided the necessary feedback from the consulting teacher responsible for the forums and the other classmates.

In the forums there was also the opportunity for reflective discussion about issues related to the competence worked at the moment. At the end of each forum there was a global agreement phase among the participants for future forums that would allow the group to move forward in the learning process. One of these experiences for example has been the development of threads of discussion and productivity based on three basic axes linked to the proposed problematic situation: planning, development and evaluation.

It results interesting that basically the forums for problem, hypothesis and integration have been mostly carried out in an individual basis, but collaborative processes had taken place in the Exploration and Exchange forums where participants must have arrived to a common database around the problem initially proposed and arrived to a consensus by the end of the forum.

5. The evidences: process and feedback

When a student starts working with the e-portfolio he should have an adequate compression of the task, what is expected, the formal aspect of its delivery and have the opportunity to propose it to the group of classmates to exchange experiences. This has implied:

- Having a clear definition of the competence that was been evaluated and what was included in a part of the e-portfolio.

- Announce with opportunity and relevance to the students the types of possible evidence to be presented and the formality in the publication inside the portfolio.

- Present the process and the instrument to be used for the assessment of the products of the students: the rubric.

- Promote the exchange of products to improve and optimize their progress.

- Provide effective and pertinent feedback on the students' effort.

- Indicate in advance that the evidence to be published responds to the structure requested and that the different accompanying components are included to facilitate a better understanding of the progress of the student, among them they emphasize:

- A comprehensive presentation about the evidence published

- The identification of the content of the evidence (video, audio, text written, image)

- Justification of the importance of the evidence to support the degree of achievement of the competence worked.

- Metacognitive reflection about the learning process related with the competence. It is also recommended to develop a process of compression and deep reflection, on the part of the students, so all the actions and metacognitive reflections that are included support and consolidate the evidence presented. (It would be a problem that efforts that lack comprehension of the process that has experienced by the student would be submitted, given that each evidence should be selected and supported on crucial issues like: why do you consider that this is the best evidence, how has this contributed to the learning proposed and to the attainment of a determined competence).

Summarizing, in this section we recommend that the student in order to show the level of achievement in a competence should contribute with a comprehensive and extensive product of the whole experience with the competence worked. That is, that the student's outcome is a serious reflection supported by their learning and the experiences that have enabled the process.

In other words it is a matter of fostering metacognitive requests of the process as well as the product. Guide them to reflect about how they have developed the evidences with the requested components, the progress reached and the aspects remaining to complete the assigned task. Therefore, when providing feedback it should be a more qualitative contribution, depending on what the electronic portfolio would allow.

Conclusions

One of the first conclusions that we have arrived to is that the initial stage of the virtual workshop, in this pilot experience, has been fundamental because the students were prepared and familiarized with the approach and the procedure to work with the e-portfolio as well as the type of products expected as samples of progress in the mastering of the competences involved.

A second conclusion is linked to how the teachers of the course in this pilot experience should evaluate the complexity it encompasses and how time consuming it can be. We are facing an evaluation experience different from the traditional way, and even more if it is oriented towards the attainment of competences as it is our case because it implies new roles of the students and the professors. We understand that the instructions provided to the students about what is expected from them are vital in this type of setting.

A third conclusion is that the feedback provided to the students was oriented to consolidate learning therefore, they have been praised for their accomplishments and encouraged to reflect on what have not yet been achieved. Based on this premise it is pertinent to remember that we were working in according to the system of evaluation of the Open University of Cataluña (UOC) that is centered in two strategic points: the Formative and Continuous Evaluation. Consequently the feedback has been framed in promoting and values such institutional guidelines at the moment of the evaluation.

A last conclusion is that this pilot experience has made us (the professors) work from an understanding and appraisal approach of the efforts of the student, directly geared to emphasize an evaluation that promotes an improvement of their learning. That is why we consider that it is essential to facilitate experiences and opportunities so that learning can be consolidated adequately.

We wish to make some proposals in the possibility that this experience may be emulated. One of them is regarding the definition of guidelines and criteria of performance in advance on the part of the professor and the opportunity to arrive to a consensus with the student opportunely. That is, that both parts know the terms in which the learning will happen, how the monitoring will be done, the type of accompaniment that will be given and which aspects will be emphasize by the professor in the development of the student’s portfolio.

A second recommendation is geared to point out that we were in a virtual modality. Therefore, the procedure to comment on the progress, provide some examples to foster new challenges and the way to talk about those aspects still in process should be very clear so that the student understand what we have intended to communicate.

We shouldn't forget that students always expect of our evaluation: understanding of the work carried out and assessment that include qualification, the possibility for improvement and the opportunity to find new ways of optimizing the learning experience in an immediate future.

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Research into Online Distance Education and Learning
Making the Difference
Fourth EDEN Research Workshop

Paper submission for Theme 2: Research into innovative online teaching, learning and knowledge building

Learning to feel: Education, affective outcomes and the use of online teaching and learning

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Abstract
Research employing an experimental design pilot tested two delivery platforms, WebCT and Elluminate*Live*, for the generation of affective learning outcomes in the workplace. Ten different organizations across Western Canada asked their call centre/help desk staff to participate in an online course on customer service. One hundred and one participants were randomly assigned to two types of online delivery software. Course delivery observations suggested greater engagement and more interaction among participants in the WebCT group. Exam scores did show a higher mean for the WebCT group, but differences between means were not statistically significant.

Introduction
We know that the education enterprise consumes massive amounts of public and private money in the Western world and has a mandate to sustain the continuous reconstruction of the socioeconomic system in which it exists. Westernized education systems are designed to enhance the competitiveness of nations and the self-fulfillment of citizens (Egan, 1997) and have a requirement of universality – that is all must participate in a sanctioned, accredited education program, for a least some portion of one's formative years.

Central to the implementation of education programs is the engagement of participants in the knowledge, skills and socially accepted behaviors commonly shared by general members of the society in which the system exists. From this common knowledge base and accepted forms of human action, other social forms emerge and are continually reconstructed; for example, participation in community activities, workplace behavior, and family structures.

Structures related to human social behavior fall under the domain of affective outcomes in education: While student cognitive development is an essential outcome of schooling, it is argued that interpretations of quality and effectiveness in education that do not include affective outcomes are inadequate as measures of desirable schooling outcomes (Leonard, Bourke & Schofield, 2004).

As early as the 1890s, education philosophers called for education to go beyond the three "R's," suggesting that teachers go beyond knowledge based and cognitive development to the moral and emotional development of students. Little in the curriculum changed beyond the increased awareness of teachers regarding the importance of their role and models and 'agents of socialization' for the children in their care. Later the movement against teaching values in public education systems emerged: 1960s to present day. It could be argued that the approach advocated for earlier has never been more appropriate than in our current climate of rapid economic restructuring, globalization, and increasing technological sophistication. Affective outcomes are back on the table as critical outcomes in the education system.

Background Information

In less formal learning settings, affective outcomes like attitudes, values, motivation, discipline, and thinking and communication skills are effectively learned through a process called *socialization*. The socialization process occurs when agents of socialization (parents, teachers, peers, significant others, mass media*)* provide models, examples, suggestions and context for appropriate social development (Shaffir & Turowetz, 1983). Evidence of socially appropriate attitudes is observed and measured in current curriculum but not taught. Instead, affective outcomes are expected to occur through informal learning, the school based socialization process. This type of development is supported through social interaction, defined as mutual or reciprocal action with 'others' in a social environment.

What mechanisms then will foster affective outcomes in education that occurs in virtual space, or online, where there is less opportunity for informal engagement? Previous studies suggest that teaching and learning with technology has a small, positive, non-significant ($p > .05$) effect on students' affective outcomes when compared to traditional instruction. (Waxman, Lin & Michko, 2003). Moving facilitation strategies generally to online learning environments requires careful translation of key requirements; this careful translation is problematic for affective outcomes, previously absent from teaching plans or course objectives

Previous studies suggest that teaching and learning with technology has a small, positive, non-significant ($p > .05$) effect on students' affective outcomes when compared to traditional instruction. Considering the requirement for interpersonal dialogue as part of required learning activities for soft skills, interaction opportunities are paramount. The most notable distinction between types of interaction in online environments is that of synchronous (at the same time, in real time) vs. asynchronous (separately, at different times) engagement with other participants in the online learning activity.

However, in reference to affective outcomes, the socialization process is likely influenced by what Moore (1993) called 'transactional distance.' The type of dialogue and the amount and nature of structure characterize distance education. The combination of these factors yields a level of transactional distance; high structure and low dialogue yield remote transactional distance and low structure and high dialogue yield close transactional distance. It is hypothesized that the juggling of structure and dialogue to manage transactional distance results in levels of learner autonomy and, in turn, improved course completion. The impact on learning outcomes of close versus remote transactional distance is unclear; given the nature of affective learning, close transactional distance may be desired.

Differences between synchronous and asynchronous interaction have to do with the time available for response. Synchronous interaction of any kind requires high engagement with faster processing and response time. Conversely, "the use of asynchronous learning requires planning, structure" (Garrison, 2003, p. 10), both requiring additional time and thought. The properties of engagement, reflection and time invested all lead to learning outcomes, suggesting that asynchronous environments may foster more salient affective learning outcomes.

In our exploration we discovered two critical realities that solidified our decision to study affective outcomes in online learning.

1) There is a shortage of soft skills in the Canadian workplace (McLeod 2000).
2) Clark (2005), studying the same shortage in the UK, identified that there is little evidence of the wherewithal and effectiveness of online education in the generation of affective outcomes.

The rather lacidasical approach to fostering affective outcomes in public education has contributed to a major skills shortage in the workplace. Human Resource and Skill Development Canada identified for example, that employees in call centre/help desk environments must be able to handle not only the technological aspects of their job, but a variety of customer queries in an appropriate manner, using good 'soft skills' (MacLeod, 2000). Soft skills include: self-awareness, analytical thinking, leadership skills, team-building skills, flexibility, the ability to communicate effectively, creativity, problem-solving skills, listening skills, diplomacy and change-readiness. Training in these content areas spans the cognitive and affective learning domains.

Methods

The distinction between audio and text-based online interaction is the central point of comparison for this study. The indelible characteristic of the written word adds an intensity and thought pattern different from audio conversation. It is suggested that this difference adds to reflection, amount of cognition (Garrison, Anderson & Archer, 2000), and, in turn, the embedding of new learning (Wahlberg, 1988). "Written communication in an online context provides for a systematic approach to constructing meaning, particularly in difficult and ill-defined content areas" (Garrison, 2003, p. 10). Work in the affective domain, as a difficult and ill-conceived subject area, may benefit from the reflection and time invested in text-based communication environments.

The study employed a two-group, quasi-experimental design, with variation of the treatment variable, *type of online interaction*. Two platforms were chosen, one based on synchronous communication (Elluminate*Live*) and the other Web-based delivery with asynchronous conferencing, after peer reviewed discussion and validation of characteristics in the platforms. A course in customer service, with multiple required affective outcomes, acted as the education intervention. Participant outcomes were measured with a pre/post self-administered soft-skill self evaluation (see Appendix A) and a content-based examination.

Estimates of soft skills competency was evaluated in a self-test before training, to establish an entering baseline. This self-assessment, also in the pilot stage, was completed the week prior to training via an e-mail request. Nine soft skill concepts, as identified by MacLeod (2000) were each given two items. Each item offers a statement regarding participant behavior, to which they responded on a Likert scale about the frequency of his/her own behavior.

The treatment variable, or course, was designed with reference to the generation of affective outcomes for online environments. Four modules, with three topics in each module, made up the structural shell of the course. Each topic followed the same instructional pattern: introduction, objectives, personal objectives, content presentation, demonstration, application, and personal reflection.

Facilitation support for affective outcomes was offered by ensuring the following events were part of the learning experience. A high touch learning environment was created in both WebCT and Elluminate*Live*. High touch learning environments include facilitation that is learner-centered, with demonstrable validation and, where possible, accommodation of student needs and objectives. Baker (2003) identified that "instructor immediacy [i.e., teaching presence] was more predictive of affective and cognitive learning" than "whether students felt close to each other" (p. 1); facilitator immediacy in reference to requests and feedback was a critical facilitation goal. This was accomplished online through timely response to postings, e-mails, telephone calls and questions asked in synchronous discussions. Facilitator identification of standards, requirements, customer service models and exemplary customer service models provided external reference for individual actions. Self-awareness exercises, reflection opportunities, practice requirements and application exercises were embedded in the instructional design.

At course completion, a final exam was provided via email for Elluminate*Live* participants. WebCT participants took the final exam online. The final exam was made up of multiple choice and short answer questions regarding appropriate responses, possible courses of action, and attitudes toward customers. Desired soft skills were embedded in correct answers on the final exam questions.

Finally, data was collected from students in the form of a course evaluation. The course evaluation questions were housed on Zoomerang.™ Participants were sent the url for the evaluation site just after completion of the final exam.

Findings

Two notable qualitative differences were identified by the facilitators across treatment groups. Elluminate*Live* attendance was highly variable and access to content, provided to students in a digital repository, was technologically challenging and hindered Access to course material for the first week. However, engagement in weekly classes was high among those who participated and enthusiasm for the learning platform was notable. The WebCT group members were heavily involved in the course and used the multiple learning opportunities on the site: content support; text, audio, video material; asynchronous threaded discussion; synchronous chat; group work and learner presentations – all available around the clock, seven days a week.

Three data points were used to assess differences across the two groups in relationship to skill and knowledge regarding soft skills in the workplace. First, the difference between means on the soft skill assessment tool (Cleveland-Innes & Ally, 2004) on the pre-test at time one (beginning of course) and the post-test at time two (end of course) were measured for each group. Reliability appraisal for the instrument yielded an acceptable Cronbach's Alpha of .7011. The mean score allowed us to determine which groups realized more change in soft skill assessment, by comparing the mean scores across groups.

In the self-assessment pre-test, there was no significant difference between entering soft-skill competency. This is the case for each individual item in the test, and aggregate data for each group. In this situation, no significant difference is the desired situation. Participants in both groups entered the experiment with roughly equivalent competencies.

However, no significant differences were found between treatment groups in the self-assessment scores from time one to time two. The difference between pre and post test means were very similar (WebCT, n=56, 4.25; Elluminate*Live*, n=45, 3.9) yielding a very small, statistically insignificant difference across groups. This suggests that the two platforms were equally effective in the increase in soft skill competency.

Final exam scores, however, did indicate significant differences across groups. Results of final exam scores are reported in Table 1 below.

Table 1. Final exam scores

Group	N	Exam Mean	Standard Deviation
WebCT	56	87.6	10.42
Elluminate*Live*	45	79.3	13.91

Significance was set at p = .10 as acceptable for use with this pilot data. The difference between group means has a numerical score of 8.3 and a test of significance at p = .069. Variation among exam scores was greater among the Elluminate*Live* group exam scores.

The third set of data was collected through the course evaluation. Response rate for the evaluation was 96%. Differences in the response to the online course, offering the same content and learning exercises, were notable on some questions. Table 2. outlines mean responses to evaluation questions across treatment groups.

Table 2. Evaluation question responses

Question	WebCT	% Agree or Strongly Agree	ElluminateLive
I am satisfied with what I learned	25%		54%
The content of course was relevant to work	40%		72%
The content was interesting to me	26%		73%
This course met my expectations	15%		36%
Would recommend this course to others	50%		73%

Discussion

Results of the pilot studies suggest that, under the conditions of asynchronous, text-based interaction participants realize greater affective learning gains than those engaged in synchronous, primarily audio interaction (Elluminate*Live).* However, these gains were identified in an exam measuring cognitive awareness and knowledge about the appropriate use of affect in customer service situations. This is not a measure of attitudinal change; attitudinal change was not substantively or statistically significant according to self-assessment scores.

Of particular interest is the disparity in perception of participants taking the same program, with the same content and learning exercises, delivered in different learning management structures. Less than half (40%) WebCT students felt the content was relevant to work, but 72% of Elluminate*Live* students did. The pattern of high agreement for those in Elluminate*Live* was consistent on all questions. Notable is the pattern among the responses; half the WebCT students said they would recommend the course, but only 15% felt the course met expectations.

It seems reasonable to suggest that the Elluminate*Live* participants were generally more satisfied with the course experience, indicating in greater numbers that they would recommend the course to other (73%), the content was relevant (72%),

The concept of transactional distance may help explain why this experience was different across platforms. Both groups engaged with the same content, engaging in the same assignments and learning exercises. The difference between had to do with access to the written material for the course. WebCT students had material available online, while Elluminate*Live* students had to access course guides through a separate site. Differences in type of interaction led to closer transactional distance in Elluminate*Live* and more remote transactions in WebCT. In facilitation support for affective outcomes -the presence of emotional and psychological safety, opportunity for interaction, the observation of demonstration of new and appropriate models of behavior, activities that promote self-awareness, activities that promote self-reflection and the opportunity for application of new behavior – two would be supported by close transactional distance.

Emotional and psychological safety requires predictable and known elements in the activity, including the other people involved. Affective change is best fostered by a socialization process; the more interaction, the better.

Conclusions

Results from this initial study of online learning and affective outcomes are inconclusive in relation to the comparison of delivery outcomes, but certainly hopeful in terms of working toward soft skills and affective gains using online delivery. Both groups performed well on the exam testing knowledge of appropriate affect in customer service environments. The soft skill assessment showed some gain from time one to time two, although minimal and with little difference in gain between the two groups.

Most interesting is the affect shown by participants about the course itself. Those in the Elluminate*Live* group demonstrated a more positive response to the course than those in WebCT. Participants were randomly assigned to different platforms, were in the same occupation and working for the same or similar organizations. There are no systematic differences we can identify between groups that may account for the different response to the course.

There may have been differences in the sense of community felt across groups, with the Elluminate*Live* group feeling more connected through the challenges they experienced together. There is a relationship between social presence, cognition and affective outcomes in the online environment. According to Garrison, Anderson and Archer (2000) social presence is defined as "the ability of participants in the community of inquiry to project their personal characteristics into the community, thereby presenting themselves to other participants as 'real people.'" The "primary importance" of social presence "is its function as a support for cognitive presence." Most importantly for this discussion "when there are affective goals for the educational process…then social presence is a direct contributor to the success of the educational experience." (p. 4).

Future research

This study will be replicated to continue assessment of affective outcomes in online learning environments. Adjustments will be made to shore up any differences that may affect outcomes. The facilitator will be consistent across platforms. Access to material for Elluminate*Live* participants will be improved and self-test reviews will be created at the end of each module. Asynchronous interaction in WebCT will be measured to evaluate the amount of time participants engaged with others in the course; facilitation will work to equalize the amount of interaction with the hours spent interacting through Elluminate*Live*.

Online delivery in Elluminate*Live* and WebCT may have differences that impact delivery beyond the differences of synchronous vs. asynchronous communication. Synchronous interaction in Elluminate*Live* is primarily audio, not text-based. Audio interaction does not require the same level of reflection or thoughtful message construction that text-based communication does. This may have significant impact on learning outcomes (Wagner, 1998). Secondly, WebCT offers flexible interaction, giving students the opportunity to interact for as long as they like, whenever they like. In the generation of affective learning outcomes, this may critical. Further research needs to test this, and other, key premises about the generation of affective learning outcomes in online learning environments.

According to Southwell (2000), education incorporating appropriate curricula in the areas of personal development, values education, interpersonal relationship skills, environmental, and peace studies are key to ensuring the development of globalization and internationalization required in the 21st century. This study and others like it will ensure that, as online learning is adopted, the appropriate outcomes and delivery for those outcomes will be identified.

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Appendix A.

		Always	Often	Occasionally	Seldom	Never
1.	**I use a model of problem resolution or trouble-shooting when reviewing caller information.**	5	4	3	2	1
2.	**I seek to understand customer expectations through careful listening.**	5	4	3	2	1
3.	**I reflect on my behavior as I proceed through the call.**	5	4	3	2	1
4.	**I look for multiple responses to caller requests.**	5	4	3	2	1
5.	**I adjust my method and response according to customer needs.**	5	4	3	2	1
6.	**I demonstrate frustration at time during the call process.**	1	2	3	4	5
7.	**I uniformly follow the same call process for each call.**	1	2	3	4	5
8.	**I recognize my strengths and weaknesses in serving customers.**	5	4	3	2	1
9.	**I thoroughly review information presented to me.**	5	4	3	2	1
10.	**I have no opportunity to change company procedure or policy to better support customers.**	1	2	3	4	5
11.	**I clarify that callers have understood what I have said.**	5	4	3	2	1
12.	**I represent my company in positive terms.**	5	4	3	2	1
13.	**I understand the problem solving process.**	5	4	3	2	1
14.	**I divide complex problems into workable, understandable units.**	5	4	3	2	1
15.	**I take problems that can be**	5	4	3	2	1

	solved organizationally to the appropriate people.					
16.	**I present my ideas in a way this is understandable to others.**	5	4	3	2	1
17.	**I see caller's concerns as an opportunity to problem solve.**	5	4	3	2	1
18.	**I put myself in the 'shoes of the other' when listening to a caller's concern.**	5	4	3	2	1
19.	**I identify cause and effect relations in my approach to problems.**	5	4	3	2	1
20.	**I consider my audience when crafting a message to another person.**	5	4	3	2	1
21.	**I initiative to resolve complex problems, even when they fall outside my job description.**	5	4	3	2	1
22.	**I process information quickly and have no need to verify my understanding when listening.**	1	2	3	4	5
23.	**I brainstorm possible solutions with new ideas and insight.**	5	4	3	2	1
24.	**I speak with respect about others when conversing with customers.**	5	4	3	2	1
25.	**I accept changes in policy and procedure as a normal part of the work experience.**	5	4	3	2	1
26.	**I take note of others' responses to my behavior.**	5	4	3	2	1
27.	**I learn and adjust to required changes in my work life.**	5	4	3	2	1

Profcasting: a pilot study and a model for integrating podcasts into online learning

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Abstract

The use of 'podcasts' is filtering into higher education from entertainment and information. We describe a recent pilot study of integrating weekly podcasts in a UK University. We ran a pilot with 30 students to establish the key issues. Students' learning supported by specially produced podcasts, which we call 'profcasts', differs from their learning through structured campus or e-learning processes alone. We propose a model for integrating podcasts within blended learning environments for testing with larger numbers of staff, students and disciplines.

Introduction

Podcasting and MP3 players are new to education, yet widely used by students for entertainment. Our interest is in digital audio files loaded onto students' own mobile devices, especially MP3 players such as iPods, that offer platforms for a variety of services. In the UK, widespread penetration of broadband internet connections, increasing personal ownership of MP3 players and freely available and easy-to-use software and internet tools all work in favour of greater use of 'personal broadcasting' for content delivery and student engagement (EDUCAUSE, 2006). UK academics have at least 20 podcasting experiments running already. We feel that research-based pedagogical models are urgently needed for academics to use in supporting and enhancing students' motivation and learning through podcasting, or, as we call it, 'profcasting'.

Literature review

There are few studies of the impact on student learning of the newer learning technologies (Littlejohn, 2004). Published studies of podcasting in education describe only small projects: they offer positive but informal accounts of user satisfaction. Issues in integrating podcasting into formal higher education and with Virtual Learning Environments (VLEs) await examination. Chan and Lee's (2005) pilot study of podcasts for 28 Australian undergraduates shows that informal short audio clips help address students' anxieties and concerns about the course and assessment, while Clark and Walsh (2004) suggest that podcasts offer a flexible medium, with portability and social acceptance of use in public settings. Chinnery (2006) uses podcasts to bring an authentic cultural experience to students' learning of foreign languages.

To date, the core medium in podcasting is audio, not new to education. Durbridge (1984) identified audio's educational advantages as its ability to influence cognition through clarity of instructions, and to influence emotional aspects of learning by conveying immediacy and a connection with the teacher (see also Bates, 1981; Laaser, 1986; Power, 1990; and Kates, 1998). Tutor-initiated audio embedded into email messages yielded increased student participation in group activities, and added a sense of online community and satisfaction with the overall learning experience (Woods and Keeler, 2001).

Evaluation of learners' engagement in large scale mobile learning experiments ('MOBILearn'; JISC, 2005) has drawn researchers' attention to unique experiences that these environments can offer. Taylor et al (forthcoming, 2006), McAndrew, Taylor and Clow (forthcoming, 2006) and Scanlon, Jones and Waycott (2005) emphasise that the capabilities of mobile devices combined with their advantages to a learner on the move can create opportunities for learning activities impossible in conventional learning environments or through other learning technologies.

The pilot profcasting study

Our pilot study was within a research project entitled Informal Mobile Podcasting and Learning Adaptation (IMPALA, www.impala.ac.uk). Impala ultimately will deliver a testable and transferable pedagogical model of podcasting for student learning in HE.

The study took place at the University of Leicester in 2006, over one semester of 12 study weeks in an undergraduate module in Electrical Engineering called Optical Fibre Communication Systems. Thirty 2nd and 3rd year campus-based students studied the module online, using Blackboard VLE. The professor began weekly podcasts to supplement his online teaching through updated information and guidance on the weekly activities, and to motivate his students by incorporating relevant news items and a fun item such as a joke. The podcasts complemented e-tivities (structured online group activities) based on Salmon's (2000, 2002) 5-stage scaffolding model by providing summaries and further guidance to students. Each podcast appeared on the VLE at the beginning of the study week, for 9 consecutive weeks.

The podcast format was:

1. an introductory news item
2. the main content section typically referring and extending this week's work and referring to last week's
3. lighter weight but fibre optics related items, e.g., a joke at the end, or rap.

The impact of the profcasting was studied. Six students were interviewed and 24 completed an end-of-semester questionnaire administered through the VLE. Content analysis of threaded discussions on Blackboard also contributed to our analysis.

Access to profcasts

Most students indicated they owned or had access to at least one MP3 player or other suitable playback facility (see Table 1). The varying degree of size, portability and ease with which MP3 files can be accessed can have a bearing on potential use of learning material as MP3 files by students.

Table 1. Students' access to MP3 players (N=24)

None	2
An iPod	3
A mobile phone	4
An MP3 player	3
An iPod, an MP3 player and a mobile	1
A laptop	6
An iPod and a laptop	2
An MP3 player and a laptop	1
An MP3 player, a mobile and a laptop	2

Pattern and location of listening

Most students (58%) listened to 6 or more podcasts; 32% had listened to the podcasts on the first or second day (the content was more relevant if they listened early in the week). Most said they listened while not engaged with any other learning activities; this demonstrated the podcasts' potential to reach students on the move.

Most (55%) listened to podcasts off campus, indicating potential for making academic content available for listening beyond the formal institution. Of the 16 who accessed podcasts on the university campus, 5 used a wireless network.

Of the 21 students who indicated that they had listened to podcasts regularly, 20% said they saved to an MP3 player and 28% to their laptop, to listen later. The reasons for not downloading varied: one had a technical difficulty; 4 said that listening once was adequate, and 8 students pointed out they could access the module and podcasts anytime anywhere. Only 3 students said they preferred to use their MP3 players for music only; possibly space as the key issue and/or reluctance to upgrade.

How did profcasts help student learning?

The questionnaire asked students to select the most important aspect of learning through profcasts (Table 2).

Table 2. The most important aspect of learning through profcasts

The aspect	No. of students responding
Podcasts provided a good introduction to online learning material	6
Podcasts helped me to organise my weekly learning activities	3
Podcasts helped me to stay focused on the course	3
Podcasts were informal	3
Podcasts helped me use my time effectively	1
Podcasts helped me to understand more about e-tivities	1
Podcasts provided a summary of e-tivities	1
Podcasts helped to stimulate my interest in the subject	1
Podcasts were motivational	1
Podcasts helped with assessed work (assignments, exams)	1
I didn't listen to any	3
Total	24

Organising learning and studying

Students reported how podcasts helped them to organise their weekly learning activities. One student said podcasts 'gave focus for the week's work.' Through podcasts he identified which sections to concentrate on in on-line lectures during that week.

Advice on the time needed for each section helped students studying online, as identified by a second student:

> *First I went to the group discussion and I saw what was going on. And I went straight to the [online] lecture because we are supposed to finish learning unit 2 before next week for the test. So my target is to finish it. The professor said we should dedicate 6 hours a week to reading. So Saturdays and Sundays and I do them as long as it takes.*

A third student pointed out how podcasts have helped one of his peers:

> *it was really helpful to him because … the stuff that he couldn't understand he got off the podcast before he went back to his notes to study them.*

Podcasts also persuaded students to log on to the module regularly, almost like tuning into a weekly radio programme.

> *By being a weekly thing it gets you to log on just out of interest. Because of the format of it, it's intriguing to see what jokes are going to come up this week!*

Positive attitudes towards the professor

Students gave their initial reactions to the profcasts, from which they gained a positive picture of their professor, whom they met only occasionally face to face. Such emotional engagement is beneficial for student learning.

> *I told to myself that this is a great professor. Some stuff he tells us on there, for example he talks about the activities of the week, from the newspapers, which is great, I enjoy that. … . And the joke at the end and then there is a competition on the joke!*

Sense of informality in learning

Some students highlighted a sense of informality that podcasts bring to their online learning. One student said that podcasts are:

> *… more informal, different, not serious, sitting down with a pen ready to take notes and not worrying about missing an important point.*

The informality was brought about by adding current news (about fibre optics) and humour to the podcasts. It stimulated students' interest in fibre optics: one student commented that adding a news item helped them to look at the subject from a different perspective.

> *… it is not just restricted to optical fibres you do get to hear about stuff that is going on around you.*

Support for independent and online learning

Most students said that learning online requires particular skills and they had to be disciplined about logging into the module regularly to carry out the required learning activities. As one student put it: 'it is one kind of skill to get on with online work and testing and learning online.'

Another student described acquiring such skills:

> *I am new to it so it took me quite a while to get about it. … . I started off only two weeks before the assignment and then I realised that I cannot do that; I have to be clear on the schedule. My first assignment was done very haphazardly.*

Judging by the experience of students who listened to them, podcasts can provide structure and be an organisational tool for online learners. Podcasts can motivate them, too.

Deeper engagement with learning material and a deeper understanding

Our pilot study students were used to learning from online lectures (10-15 minute audio files with text and visuals, all on the same screen) in Electrical Engineering. They accessed online lecturers from a university computer, a wireless-enabled laptop or a computer at their residence. Their experience of online lectures enabled them to see benefits of having lecturers as podcasts:

> *… the best thing about it is that you have the ability to keep repeating your lectures and every time you listen to a lecture you get another piece of detail that you didn't get the first time round, which is a great way really.*

Being able to listen to a lecture again and testing his understanding of the subject matter was helpful, according to another student:

> *I listen [to an online lecture] about three times … . Fist time I go over it … I will be doing a quiz. After the quiz if I didn't get something right … the feed back says 'go back to that unit', so I go through it [again] and if I have time I try as much as possible to revise… . It gives me the flexibility. … So by the time I have finished the lecture I have actually really understood the lecture.*

This student said he spent about an hour studying a 10-minute online lecture.

Flexibility for young people's mobile life style

Two students talked about the flexibility, if lectures were to be made available as podcasts, because their life-style involves much travelling and involvement in outdoor activities. For them the availability of learning material as downloadable audio files would enable them to learn on the move. One said:

> *… it is mobile. If I need to travel, [e.g..] to go somewhere for the weekend, and I wanted to revise, that won't stop me going wherever I want to go. I am with a society involved in outdoor activities, so I can load some of it and listen to it when I am hiking. It makes a bit of a change.*

> *… whenever I am on the move, on the bus or anywhere I [can] play it instead of playing the music. … if I am really behind or really need to catch up … . I travel a lot so I can still travel and learn at the same time.*

The second student illustrated how he could benefit by having his learning material available as audio files, especially before his exams that were scheduled soon after Christmas holidays:

> *… during the break I normally go back home (overseas) and I travel a lot every week and I carry my books and my computers, all the learning materials. It would be good if [when I am away] I can take the lectures on my phone or the MP3. …. . Most of the time I travel alone and I drive alone and I get tired of the music so it will be silent. So it will be good if I have that sort of thing.*

Podcasts can make online lectures available: this aspect will be investigated further in IMPALA.

Moving from entertainment to learning

One student felt that although he was willing to use his device for learning as well as entertainment that he needed to be in a static place for the first time of listening so as to be able to take notes. He doubted he could walk and listen *effectively*! A second student said his attention is focused differently when listening to music and to formal educational material.

Music, for this student, is something played in the background when he is engaged in other work.

The mode of listening to educational material should be different:

> *So it's better if I can actually sit down and have it as work as opposed to kind of multi-tasking with it.*

This was an astute comment which recognised that integration of podcasts with other activities and resources in the online course is important.

These two students' views illustrate the difficulty of switching to using for learning a music player designed for entertainment. While students appreciated the flexibility offered by the device to access and use learning material while they are mobile, their perception of academic material as different from music has a bearing on the eventual use. For both students academic material requires serious engagement such as taking notes, not easy on the move.

The podcast design enabled some students to listen to them while doing something else that didn't require much focus and attention. However, one student pointed out that he still prefers 'to sit down and listen to it and move on to the lectures.'

Students commented on the length of academic material in podcasts: most preferred not more than 10 minutes. They pointed out the length of a music track as a comparison, but one student looked at the different purpose of academic material, saying that in listening to it:

> *… you are trying to absorb information, [it is] like a lecture so it's different from music. With music you are seated down and you are enjoying it, so the same beat for a long time would bore you. But [a lecture as a podcast], you are not listening to the same beat. You listen to different material every other time.*

A second student identified a further distinction between music and academic material on an MP3 player. Music tracks, each of about 4-5 minutes, change frequently:

> *… the lectures are different, it is a lot of information. When you listen to the podcasts you want to listen to the main points, you want to write them down.*

Concluding remarks and guidelines for a proposed Profcasting model

Our case study highlighted how profcasting contributed to student learning: supporting organisational aspects of learning; developing positive attitudes towards the lecturer, bringing in an informality and fun to formal learning; helping with independent learning; enabling deep engagement with learning material; enabling access while being mobile. The study also emphasised that listening to educational material is different from listening for entertainment; therefore, podcasts must be integrated with other learning activities.

We propose that profcasts are:

1 integrated into online courses with strong links to other activities and resources, especially if they encourage active learning and/or collaboration with others

2 recorded fresh each week and include up to date news and feedback

3 partly reusable and recyclable by some sections not being dependent on news or feedback from that week

4 downloadable onto any mobile device offering MP3 playback as well as tethered computers

5 follow a ‘radio magazine’ style rather than a lecture

Based on our findings we propose an early model for profcasting (Table 3).

Table 3. A proposed model for profcasting:

1	2	3	4	5
Introduction	**News**	**Feedback**	**Feedforward**	**Fun finish**
1 minute	2-3 minutes	2-3 minutes	2-3 minutes	2-3 minutes
Welcome, introduction to speaker(s) Brief encouragement to listen by looking ahead, link to work this week, assessment	Mention of course-related or applied issues ‘in the news this week’	Brief feedback from the work last week, congratulations on achievements, comments on assignments, pointers to help	Reminder of work this week, linking to other aspects of the online work	Related joke, rap, song, story or other humour

IMPALA will test this model across a much wider range of students and disciplines. We invite readers to experiment and report back on the IMPALA blog at http://www2.le.ac.uk/projects/impala.

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Implementing live technologies to online teaching: An institutional perspective

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Introduction and aim of paper

Like many universities worldwide, University of Maryland University College (UMUC) offers online programs mainly using asynchronous text-based technologies for course delivery. The implementation of the asynchronous technology in learning events means that interaction between instructor and students occurs intermittently with a time delay and does not take place simultaneously. In asynchronous learning settings, students and instructors are separated by place and by time. The asynchronous delivery mode provides flexibility and convenience for both teachers and learners as they allow participation at any time and from any device that has an Internet access (Bates & Poole, 2003). As an example, in the fully and exclusively online Master of Distance Education (MDE) program at UMUC, students expressed satisfaction with the use of the asynchronous delivery mode. One testimonial includes: "The autonomy comes in our ability to sign on at midnight or Saturday afternoon and be able to continue in our dialogue on our terms within the given structure.." (Bernath & Rubin, 2003:40)

Nonetheless, the drawback of the asynchronous format is that it prevents students and instructors from collaborating synchronously, e.g. in real-time. Distant students report feelings of isolation and loneliness in purely asynchronous online study settings due to the lack of immediate social interactions typically found in face-to-face instructional settings (Kurtz & Friedman, 1999). The inclusion of synchronous instruction as part of a holistic online learning environment helps to mitigate this condition while creating a greatly enhanced teaching and learning experience through active engagement and spontaneous exchanges (Stacey, 2003; Agosti et al, 2006).

Though the synchronous mode of delivery requires all participants to log on at the same time, it allows immediate feedback and response time that contribute to the creation of a sense of community between class members (Bates & Poole, 2003; Mabrito, 2006). Duckworth (2001) refers to the term "live e-learning" (p.1) to describe the use of Internet technologies to "provide synchronous lessons between an instructor and a group of learners" (p.1). This is, therefore, an interactive real-time experience, which might include text-based discussions, audio, video, document and/or application sharing.

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Considering UMUC's mission of focusing on the educational needs of the nontraditional student (UMUC's Mission, 2006) one may argue that providing more media alternatives for better effective distance education courses for a wider range of students supports the institutional mission and goals (Moore & Kearsley, 2005). Hybridization of the asynchronous UMUC's Learning Management System – WebTycho – with synchronous multimedia (text, audio and video) technologies might serve well this purpose.

There are a variety of online synchronous technologies available today for instructional purpose, including online chat, simple shared whiteboards and fully integrated synchronous learning systems. One common theme when analyzing and comparing these technologies is the tradeoff between the provision of high-touch interaction and the easiness of use. The decision of which synchronous system to use should be based on more than its technical capabilities alone. Organizational considerations, audience characteristics, instructional goals, and purchase and maintenance costs, all play a critical role in determining a best-fit synchronous learning solution. The system should be intuitive enough for users to become productive with little or no training (Porto, 2006). Moreover, some will argue that the live technology should focus on the learner to create the most compelling experience for the learner (Dalal, 2003)

In this paper we will analyze UMUC's process of incorporating synchronous (real-time) with asynchronous technologies by applying the SECTIONS model. This model, developed by Bates & Poole (2003), serves as a decision-making guide on whether to introduce a new technology to a distance education program/university. The SECTIONS acronym stands for **S**tudents, **E**ase of use and Reliability, **C**osts, **T**eaching and learning, **I**nteractivity, **O**rganizational issues, **N**ovelty and **S**peed.
We will give special attention to the challenges of integrating technologies within an institution that provides online education to non-traditional adult learners, while keeping its operations scalable and cost-effective.

Applying the SECTIONS model

Students

According to Bates & Poole (2003), at least three issues related to students need to be considered when choosing media and technology: student demographics, access, and differences in how students learn

UMUC students can be characterized in a similar way for both graduate and undergraduate studies, and online students also show the same profile as students taking face-to-face classes. Most students are between 25 and 44 years of age. Close to 80 percent of them work full-time during the time they are in the program. UMUC enrolls more than 30 percent of African Americans. This is a number superior than that of “any other public, four-year institution in Maryland, including the historically black colleges in Maryland” (Self-study, 2006, p.26). Two-thirds of UMUC’s students “are married or have been married and more than half of them have children” (p.26). These traits confirm that UMUC’s student population can be clearly identified as non-traditional.

Historically, UMUC has always focused on the non-traditional student. The methods used to succeed in this mission have changed through time, and the profile of the targeted group of students has evolved. Nonetheless, the university has "steadfastly remained anchored in serving nontraditional students with quality programs independent from time and space" (Self-study, 2006, p.12). Through distance education, UMUC has been committed to enhance accessibility, maintain affordability and serve a diverse and dispersed student body. Technology is an integral and essential component in responding effectively and efficiently to these commitments.

In regard to access, all students in the online programs at UMUC are required to have a computer with Internet access, which could be used for live meetings as well. Most of the live technologies do, however, require the use of microphone and headset, which are not expensive, but students have to purchase them. Furthermore, though students may be taking live online courses from anywhere in the world, some of them may have difficulty to log in at a pre schedule time. The live event can be recorded for asynchronous use when it is convenient for the student.

The live technology combined with the asynchronous technology can also support differences in learning style by offering a wide range of learner activities. The live technology can give instructors and students the opportunity to hear each other (audio learning) and in some cases they can see each other and hold real-time presentations (visual learning).

Ease of use and Reliability

According to Bates & Poole (2003), the use of technology in teaching is generally a means, not an end. Therefore, it is important that students and teachers not spend a great deal of time on learning how to use educational technologies or on making the technologies work. Also, the reliability and robustness of technology are critical.

It is assumed that all students of the online programs at UMUC have a basic computer literacy that would be sufficient for operating the live application. But, it may be slightly more difficult for faculty and students to install and set up the live application package. Also, for part of the users (mainly faculty) some effort will be needed to operate the technology, even if its interface is friendly and flexible. Thus, we suggest that UMUC will offer orientation sessions and technical support for faculty and students. As it will be discussed further in the paper, several units in UMUC are already taking part in this effort to provide training. Technical support will be provided through outsourcing.

Moore and Kearsley (2005) warn that one of the dangers of emerging technologies, such as live technologies, is competing media formats. Before choosing a live application it should be well tested so it will not cause any technical problem during integration within WebTycho.

Costs

According to Bates & Poole (2003), a proper understanding and analysis of costs is essential for making sensible decisions about the use of technology in education. Cost studies show that that both modes of online teaching (synchronous and asynchronous) are expensive to develop and operate. In some cases more expensive than the conventional face-to-face mode (Huelsmann, 2000; Huelsmann, 2003; Rumble: 2004).

With any live application there are associated costs that must be carefully considered including purchasing software and equipment, developing course materials and payrolls of instructors. To address this issue UMUC needs to seek an application that serves easy deployment and scalability for future needs, e.g., simplifying operations, espousing appropriate common standards, etc.

Drivers of cost include production and delivery of the live sessions combined with the number of students participating in the live event. Although production costs are independent of the number of the participants, additional instructors and technical help-desk might be needed when the number of students increases. For the current implementation at UMUC, considering 75 concurrent users, around thirty thousand dollars represent hardware and initial hosting one time cost. Sixty thousand dollars are spent in software maintenance and third party technical support (training to faculty will be provided by UMUC). Then, on a continuous basis there are recurrent costs for a full year of hosting (considering 75 concurrent users), which comes to a total of another thirty thousand dollars. This costing framework serves as an example of costs that are incurred in setting up such a system. Many variations might be available in terms of the business model that is selected by each institution. Hosting can be done with third party equipment and maintained through outsourcing. Training can be done through distinct companies or in-house. Technical support, with all its different aspects, can also be done in-house or outsourced. The choice will depend on the availability of certain resources in-house and the prices offered by third-party organizations.

In this case, UMUC is still in its initial implementation phase, and has chosen to use external companies to maintain and provide technical support. It is possible that after some use and the viability of integrating this kind of technology with the current LMS (WebTycho) in use, the options will change and become more scalable.

Teaching and learning

According to Bates & Poole (2003), while considering the teaching and learning methods there is a need to consider the aspects that are related to the content and the skills to be developed by the learner.

The asynchronous mode of delivery currently used at UMUC is relatively sufficient for the transmission of information and knowledge, analyzing and applying knowledge, as well as for the use of the collaborative methods. The live application can serve as a supplement (or add-on) to these teaching and learning strategies. For example, the audio component can serve the oral spontaneous dialogue and presentation skills of students. Also, the live application permits visual representation of key points, complex learning content and information for retention and recall. The immediacy of these technologies provides an enormous potential for problem solving and immediate feedback to students on their understanding and progress.

Additionally, the live event helps to simulate the social process and the creation of community of learners. This can be achieved through a suitable instructional design that emphasizes learner-centered methods, utilizing connections and active involvement of the participants.

One import feature that most live applications offer is the ability to record the live session for later use, on demand. The recorded session becomes an asynchronous learning material that serves the hybrid learning process.

Interactivity

It is agreed that interaction is crucial for effective learning. Moore and Kearsley (2005) identified three types of interactions essential for an effective learning process: learner-content, student-instructor and student-student. According to Bates & Poole (2003), one of the main questions that need to be asked when selecting technology is how can technology enable scarce teaching resources to be best used, and be best supported by less scarce resources with respect to increasing the amount and quality of learner interaction?

According to Downes (2005), interaction in e-learning not only promotes human contact, it provides human content. It gives people not only the opportunity to communicate but also to help each other. And it creates a deep layer of learning content that no developer could ever hope to create. Stepenshon (2001), as cited by Mabrito (2006), argues that the asynchronous mode of learning might make it harder for students in creating the types of classroom communities that foster interaction, On the other hand, Frank, Kurtz, & Levin (2002) found in their research that synchronous technology makes it easy to provide key active learning elements especially in engaging students directly in live sessions; and providing immediate assessment and feedback. Though time constraints are placed on participants in live sessions and thus they have less time (compared to asynchronous sessions) to reflect before they actively participate, students tend to prefer the synchronous sessions mainly due to the immediate feedback they get from each other (Mabrito, 2006).

However, it is important to emphasize that live technology alone cannot ensure effective interaction. The instructor must carefully balance planning with the spontaneity needed to adapt to students' learning needs and interests (Siantz & Pugh, n.d.).

Organizational issues

According to Bates & Poole (2003), this is a major topic. The presence or absence of organizational support and supervision for different technologies are key factors in technology choice and implementation. (Brindley et al, 2004).

One of the current focuses in the technology strategic planning at UMUC is to increase scalability of both administrative and academic technology systems. Since technology cannot be sustained on its own, to respond adequately to the growing demand, UMUC also needs to be able to attract and retain qualified staff for services that must be "available 24 hours a day independent of time and place" (Self-study, 2006, p.13).

The organizational structure of the institution clearly reflects the importance that technology holds in relation to its mission and goals. Technology management is an integral component of the institution's leadership. The Office of Information

Technology is headed by a Vice President of Information Technology, who is a member of the president's cabinet and a partner in determining worldwide university needs, goals, and objectives. This office has developed a strategic plan that closely aligns with the university strategic plan.

The VP of Information Technology chairs an IT advisory committee, composed of members from all administrative and academic units. This committee has the role of discussing technology initiatives and making decisions on projects and schedules. Technology management is a major component of all pedagogical activities within UMUC.

UMUC has dealt with experimentation and adoption of new technologies by keeping current with educational technology advancement through constant systematic experimentation, while keeping is operations scalable and cost-effective. This experimentation process can be described in phases, where initially smaller groups of stakeholders take part is small scale trials, assessing step by step the advantages, disadvantages and challenges of the specific technology under consideration. Later on in the process, experimentation becomes more structured, cost is carefully analyzed and more stakeholders are involved in providing the necessary input to build the correct supporting framework. More importantly, this process is founded on current strategic plans, thus, intrinsically tied to the institution's mission. Different units in the organization support such process, namely: the Center of Teaching and Learning, which provides the necessary training to instructors at a distance; the Center for Instructional Support, which provides operational instructor support for any distance education initiative, including the look into the future for new technologies and their use within the institution. In the case of the new live technologies being used, some of the technical support will be provided by outside manufacturers responsible for the equipment and software.

Novelty

According to Bates & Poole (2003), this is the least important criterion, but one that nevertheless should be taken into consideration. In order to be effective, learning must attract and maintain learners' attention and audio may be more motivating than print alone (Fahy, 2004). Live audio over IP might be considered 'novel' but more importantly it may increase motivation and involvement of the students.

Speed

According to Bates & Poole (2003), one of the main questions that need to be asked when selecting technology is: how easy is it to make changes and how quickly can changes be made with this technology?

The implementation of live technology can be relatively fast. Once the live instructional design model is chosen, training the instructors to prepare learning materials and plan the live interactions will not take much time. Changing and updating the teaching materials is considered to be the same as in the asynchronous mode of delivery. For this particular aspect, the synchronous mode does not have any advantage over the asynchronous mode of delivery

Further Research

Studies on online teaching suggest that this is a fruitful area of inquiry. There are still many intriguing issues relate to the SECTION model that needs to be analyzed. For example, how can UMUC 'convince' its faculty and students on the need of the synchronous mode within the teaching-learning process? What kind of pedagogical strategies the synchronous mode can serve? What is the best mix of technologies to use in the delivery process? What kind of Return of Investments approach suits for the cost calculations? And many more questions.

Insolating the choice of technology from its compounding variables is an artificial and pointless analysis. In the real world of operating complex organizations like UMUC we have to deal with such complexity. We hope that this SECTIONS model based paper, have evoked new questions and opened new directions for future research.

Conclusion

Today, high quality, affordable live technologies are emerging to make distance education potentially more personalized and interactive. The addition of a synchronous instruction capability to establish an accessible, inclusive, blended learning medium optimizes existing asynchronous course content and creates a sound foundation for active learning by combining the best of both media in a learner-centered online instructional environment (Porto, 2006).

Though live technologies, unlike asynchronous technologies, require students to attend class at particular times, well-planned and also spontaneous sessions can help overcome the isolation students often feel in purely asynchronous courses and foster a sense of community amongst students. For students who can not attend the live event the recorded can serve as an asynchronous substitute.

As shown in this paper, in reviewing live technology, the SECTION model is helpful for decision makers in coming to strategic and tactical decisions. But, live online initiatives do not stop at the technology's selection and implementation; rather, this is only the beginning. UMUC must create an atmosphere that fosters live online interaction, launch programs that promote usage, and clearly communicate its benefits. Developing suitable strategies at the top level and at every level within the university will help to ensure a successful technologies' hybridization.

Finally, Al Bejcek, the Director of NetG, when asked in an audio interview to give a snapshot of where their current products and services are, said: "One of the things that I think is really different for us is our Live Virtual Learning, which really makes a virtual classroom feel and seen like you're sitting in a live classroom via the web….We make it interesting, we really engaged the learner. It's not just sitting, reading or looking at pages…It's the closest thing to going to a live class that can get to without actually having to go." (LMS CEO Interview, 2006) In a counterpart testimonial, a UMUC student, when asked what s/he would do as the first act as President with respect to the use of technology in Distance Education, answered by saying: "[…] I would keep WebTycho but try to incorporate synchronous aspects into the program itself and work out some of the bugs. I would also give each student a web camera (they are so cheap now!) to use for this purpose. It would bring a bit of the F2F class into DE." (OMDE 603 conference, 2006).

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The Development of Personal Learning Environments

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Abstract

This paper will describe how Ericsson is moving towards offering personal learning environments to students, via Instructor-led Training, eLearning and Mobile Learning.

A personal learning environment is defined as a learning environment in which learning material can be accessed on multiple devices with common tracking and reporting functionality and with the minimum of reuse of material.

This paper will discuss how Ericsson is using a Learning Management System and a Learning Content Management System to deliver training on multiple devices.

1. Content Delivery

In the traditional model, elearning students access course content on a PC via any variety of web browsers. As a result, traditional software development processes were used to create eLearning course content, testing for a number of platforms and web browsers. This would often lead to multiple deliveries of a course; for example, course content developed and tested in Internet Explorer would often have to be adapted to run in Netscape or Firefox browsers, due to their differing implementations of the DOM (Document Object Model). This then created a problem for content developers; specific versions of courses were created, stored and deployed across the various platforms, with detection carried out on the fly.

Many content developers created content entirely in Flash or Authorware to deal with this issue; however this was not ideal for some training situations. For example, many companies lock down their IT infrastructure to prevent plugins being run, or network speed is not sufficient to allow students to access such media rich content.

This problem also extends to newer methods of training. If a content developer wanted to create training material for a PDA, for example, it was necessary to once again create specific content for that device.

All of this resulted in content developers offering vast amounts of relatively stand-alone content, which was device specific and in some cases browser / platform specific; reusability was relatively rare and once training was required on a new technology the development cycle would start again. As a result a new model is needed; one that guarantees reusability and ubiquity of training material, regardless of device or platform.

2. Market Situation

There is a wide range of devices available to today's students. In the traditional model, e-learning students access course content on a PC via a number of web browsers. However a large number of people are using mobile phones, smart phones, PDAs, and devices like the Blackberry and even portable games consoles with web browsing capabilities.

To give an example of the market that exists right now, we can look at the mobile phone. Ericsson announced in July 2005 that ownership of mobile devices had reached 2 billion for the first time. They forecast that ownership would reach 3 billion as early as 2010. This is for a world population of just over 6 billion.

In research published in 2004 on audience characteristics the British Broadcasting Corporation(http://www.bbc.co.uk/commissioning/marketresearch/audiencegroup2.shtml) stated that respondents in the 16-24 age group ranked ownership of a mobile phone as a 'necessity'. The 16-24 age bracket is precisely the age bracket of students at universities, institutes of technology and higher and further education colleges. Penetration of mobile devices in Ireland, France, Norway, Hungary and all other European countries is in the high 90% range and is fast approaching 100% as the following statistics show:

Country	Mobile Phone Penetration
Austria	103%
Belgium	88%
Cyprus	107%
Czech Republic	111%
Denmark	101%
Estonia	96%
Finland	102%
France	79%
Germany	91%
Greece	100%
Hungary	92%
Ireland	101%
Italy	111%
Latvia	96%
Lithuania	96%
Luxembourg	107%
Malta	107%
Netherlands	102%
Norway	106%
Poland	71%
Portugal	99%
Slovak Republic	85%
Slovenia	44%
Spain	94%
Sweden	113%
UK	108%

Data sources: WCIS (World Cellular Information Service) and Ovum.
Valid at end of December 2005

A mobile device in this paper is considered to have the following characteristics:

- Can be used wirelessly
- Can be used standing with minimal effort
- Is small enough to be held in one hand

This definition rules out a laptop with wireless connectivity, not to say that is not a mobile device as such, but it is not mobile in the way that we have to design for it. In our definition it is the mobility and the use of the device when mobile that is key. For this paper the definition and guidelines are for mobile phones, smart phones, PDA's or other mobile devices capable of displaying html or xhtml on screen.

The barriers that previously hindered training delivery on mobile devices, such as network speed and handset capabilities have been overcome; the mobile handset has caught up with the PDA in terms of its computing power and media capabilities. This also means that traditional telephony is no longer the only use of these devices.

A good example of the changing role of the mobile device is shown by the example of CyWorld in South Korea. This social networking site allows people to create their own webpages and share contact lists and information, rather like MySpace. The difference with CyWorld is that it takes place almost entirely on mobile devices - users update their webpages on their mobile phones, and can integrate their online contact lists with their phone contact lists. At the time of writing some 92% of South Koreans in their twenties have a page on CyWorld, bringing in about *22 billion* monthly page impressions. The service launched in China in April 2006 and as of June 25th 2006 had one million users in that country – all accessing CyWorld through mobile devices.

One can assume, therefore that every potential student has at the very least a mobile device of some sort; the vast majority have mobile devices and access to the internet through a PC or laptop. The challenge for the content developer is to make content available to these students, regardless of what device they choose to access it with.

Students expectation is that content should be available to view on all of these devices, correctly formatted and fast to download. In this market, the traditional content development model will not suffice; a content developer now faces the scenario of having to develop for multiple devices and platforms – everything from the traditional OS / web browser combination to Symbian and Windows Mobile on smart phones, or J2ME content on mobile phones.

3. The Ericsson Training Situation

Ericsson is involved in the provision of training programs and learning solutions, and currently offers more than 500 course titles in different functional areas or job-categories, covering different competence levels ranging from basic to advanced.

The delivery methods Ericsson offer include:

- Instructor-led training, or Classroom training
- Elearning
- Simulations, delivered as streaming videos
- Online services including certification, scheduling, training reports etc
- Remote access training, where a customer trains on Ericsson equipment without having to leave their own country
- Virtual Classroom Training using online collaboration tools
- Blended Training solutions, where various types of training can be grouped; for example using elearning courses as a prerequisite to sitting instructor led courses

Blended Training involves a multi-faceted approach, using multiple types of training products, delivery and systems support. It begins with the development process; balancing the knowledge and skills requirements, appropriate training methodology and suitable delivery methods resulting in a mixed or blended training approach.

The challenge, then, is to be able to deploy all of this course material in a logical and professional way and to ensure that the quality and the relevance of the training content are paramount at all times. As much of the Ericsson training portfolio is highly technical, constant revisions and updates of course material are carried out. There is also a great deal of reuse of content, particularly for course material with gives an overview of a topic; the same text that is used in a classroom setting to describe a GSM network can be reused in an elearning course.

As a result, it is vitally important for all content to be correctly described in whatever storage system is being used. In this case Ericsson uses a Learning Management System (LMS) to store and describe all content being delivered to customers.

4. The Learning Management System (LMS)

A Learning Management System (or LMS) is a software package that enables the management and delivery of learning content and resources to students. Most LMS systems are web-based to facilitate "anytime, anywhere" access to learning content and administration. At a minimum, the LMS usually allows for student registration, the delivery and tracking of courses and content, and testing.

The LMS used by Ericsson is used for:

- Booking and scheduling of students, classrooms, instructors; etc
- Storing evaluations
- Storing assessments

- Generating reports on every aspect of the training delivery

The Education organization within Ericsson currently employs more than 500 employees, located in 27 Education Centers across the globe. The LMS is the system underpinning all training deliveries from these centers to Ericsson's customers worldwide.

5. The Learning Content Management System (LCMS)

A LCMS allows the user to create and author courses. The LCMS facilitates the collaboration of several different authors on any given course. In addition, the components that make up a course can be centralized and shared across multiple courses.

In Ericsson's case, the LCMS used is a separate product from the LMS. This tool allows developers to bundle *learning objects* together to create a course; a learning object is defined as any training-related content stored in the system. For example, a learning object can be a single image depicting a network diagram, or could equally represent an entire module of a course.

SCORM is used to tag training content in the LCMS; this applies equally to elearning and instructor-led training. For example, any Instructor-led (ILT) course has associated slides and student text books that need to be tagged and stored. It is also used to structure metadata and modules for reuse.

The metadata that is applied to content must be highly structured and clearly laid out. For example, each content area is tagged, within that individual modules are tagged, and so on down to individual elements such as an assessment, diagram, audio file and so on.

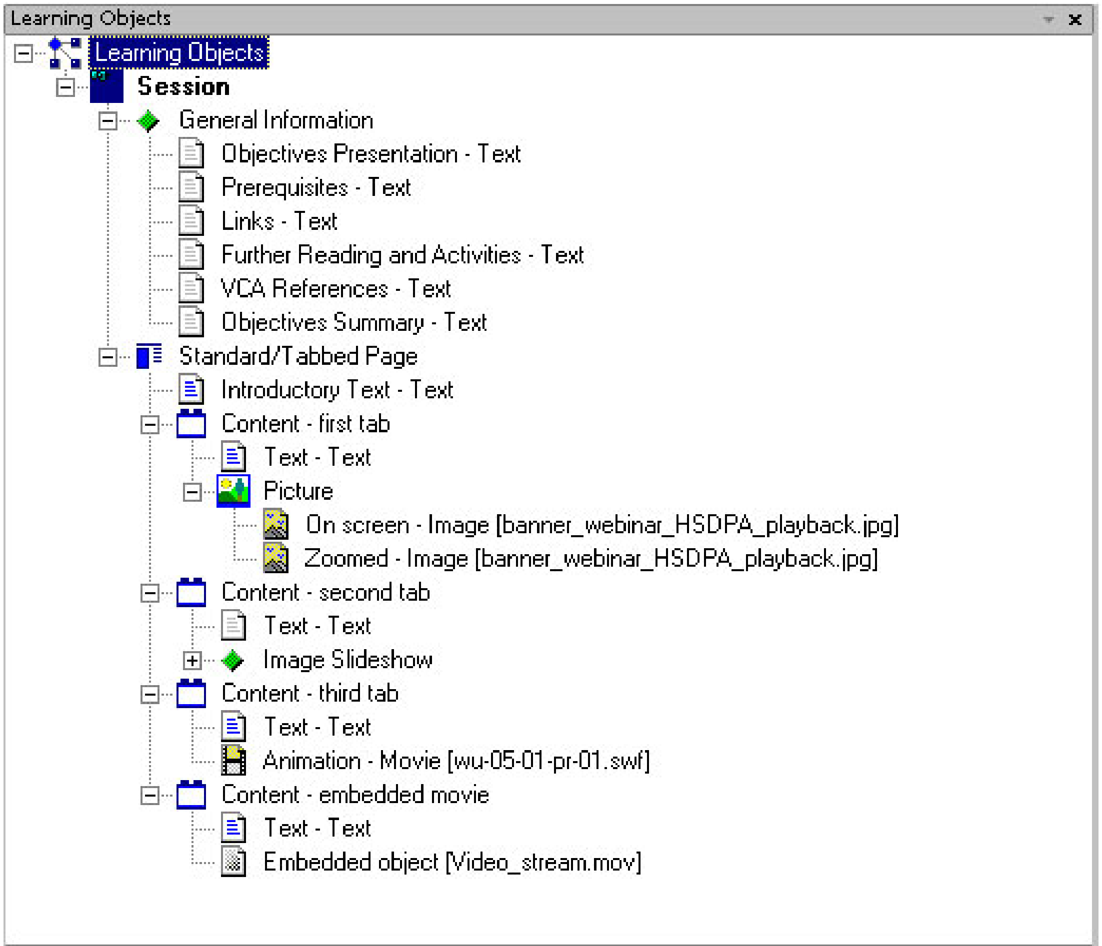

Figure 1. A course outline in the LCMS

To allow for the use or multiple devices a number of templates are applied to the training content; for example for a mobile phone, a J2MEE template can be applied that will package the content in such a way that it can be downloaded and used in the same way one would download a game or ringtone.

6. Creating Course Content

In the LCMS, correctly tagged content is identified and grouped according to the needs of the audience at hand. A course developer bundles all of the resources in the system into a session which is then itself edited to insert metadata describing various aspects of the delivery.

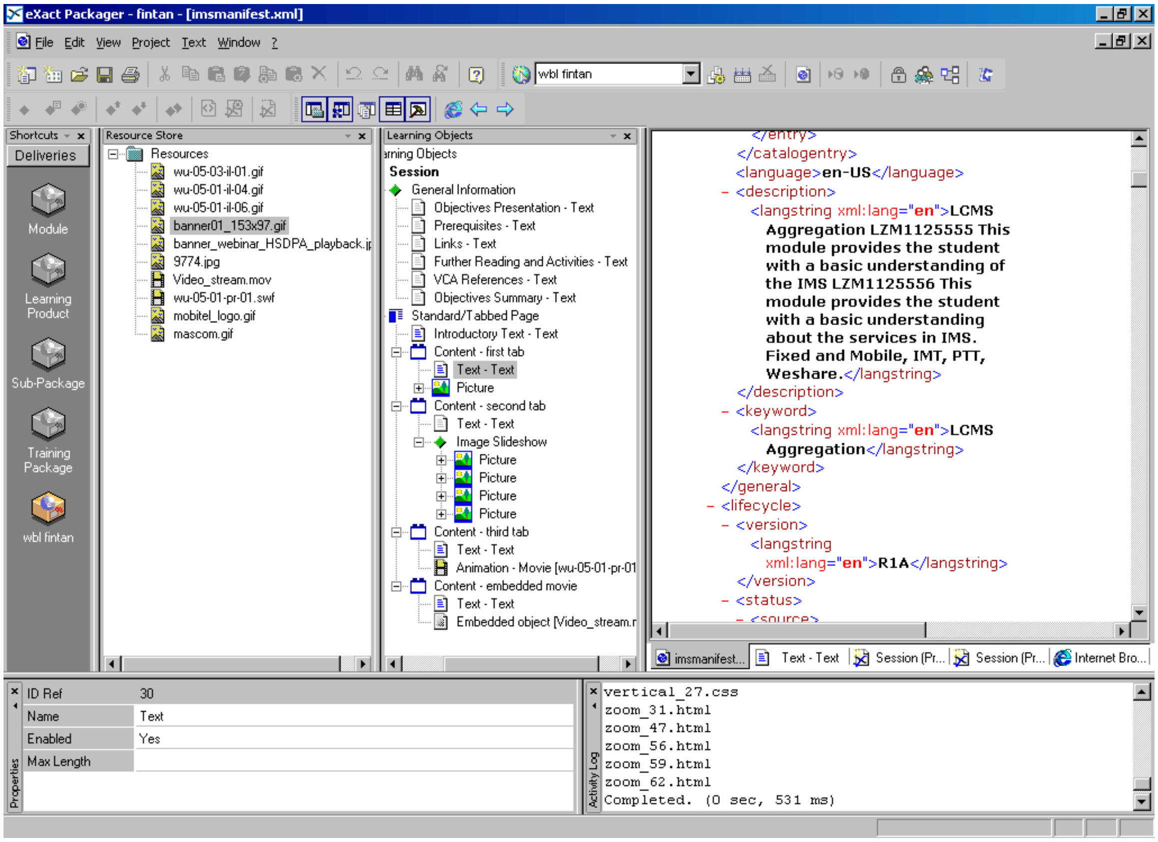

Figure 2. Course development in the LCMS

This metadata can include information about the subject area, the target audience, learning objectives and so on. It is also possible to add metadata for each individual element in the session – this is useful for example where you need to describe an individual animation or graphic in more detail. The level of tracking of the session is also set at this point; individual files can be tracked if required.

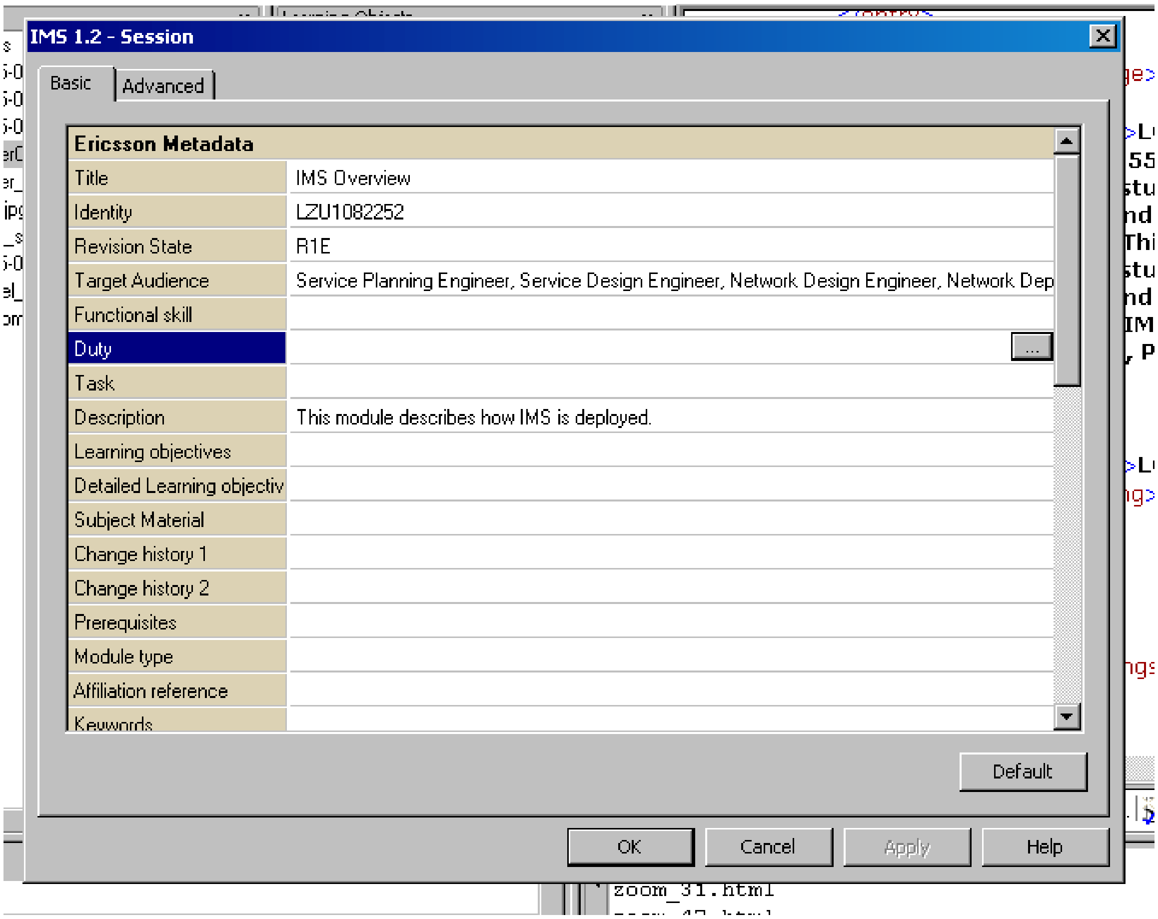

Figure 3. Entering metadata

7. Deploying Content to Different Devices

Once the content has been laid out and tagged correctly, it then must be packaged for the target device in question. The aim is to use the same content regardless of the device. For example, a module of a elearning course incorporating video, animation, text and an assessment should equally be deliverable on a smart phone running Symbian and an Opera browser.

Templates are applied to the content to output the deliverables for the target device. In this example, the elearning version comprises:

- HTML
- Flash

Whereas the version of the same course for the mobile device comprises:

- Flashlite or Java

The same content is available to the student regardless of whether he uses a PC and Web Browser, or accesses the material on his Smart Phone. It is also possible to deploy content on a PDA, or Blackberry in this way.

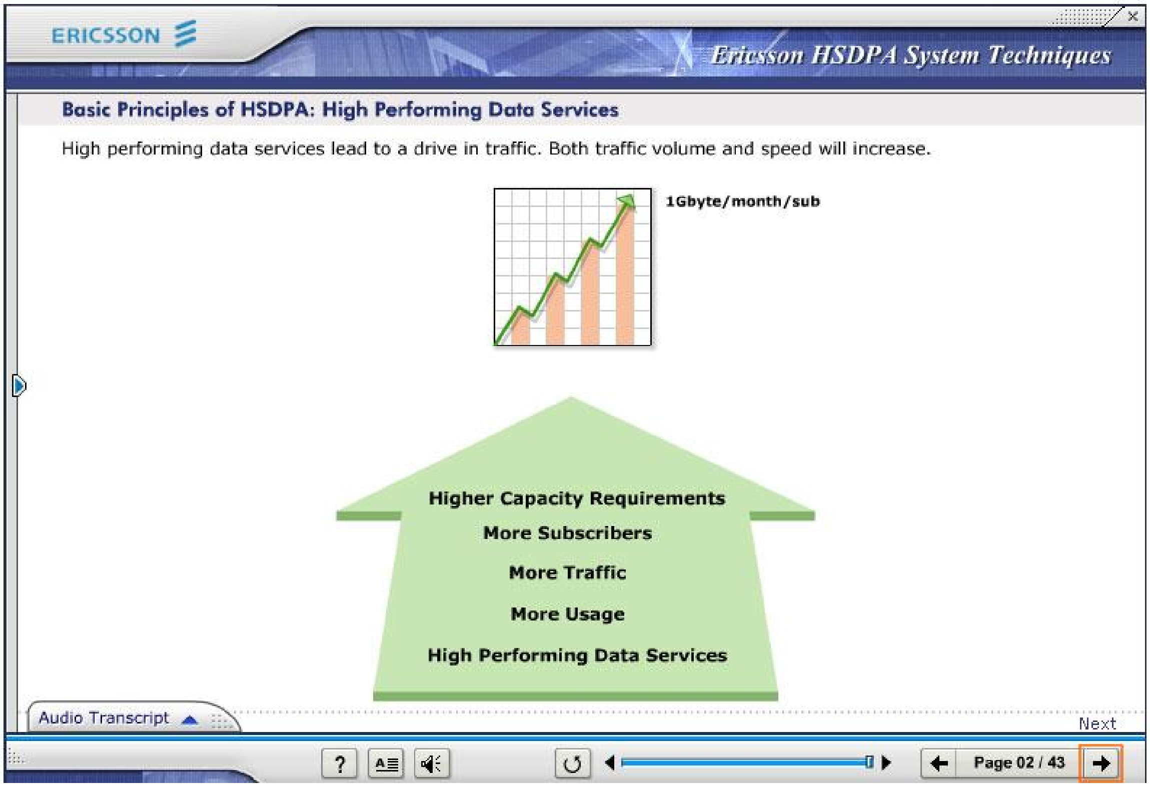

Figure 4. An elearning course on HSDPA running in the web browser

Figure 5.A course on HSDPA running on a smart phone

Figure 6. A video running on a PDA

8. Reusability of Content

The main advantage of developing in this manner is the reusability of the training content. The way this is achieved is by the correct use of Metadata to tag content.

Metadata is infinitely flexible in terms of what it can describe; the content developer must tag content in a logical and structured way. For example, we may want to build a course consisting of to take the learning objectives from page one of a student textbook, along with the first diagram and the summary text at the end of a chapter. To correctly extract these bits of data, they would need to be individually tagged and pulled out of the system to be packaged by the LCMS.

To illustrate this, let us consider a student textbook used in a classroom delivery. These books can often run to hundreds of pages, with the training spread across several days. For obvious reasons, this is not appropriate for elearning or mobile learning deliveries; we need to take some well-defined subset of this material to deploy to these devices.

This leads to an obvious problem; when you are dealing with hundreds of pages of content, you will not realistically be able to tag everything at that low level. Rather it will be categorized by page or topic and so on.

To overcome this limitation, it is necessary to tag learning objects within their media types, i.e. within an instructor-led course we should mark certain sub-elements as being suitable for mobile learning, or elearning for example. Then we just extract those parts which are relevant for our delivery.

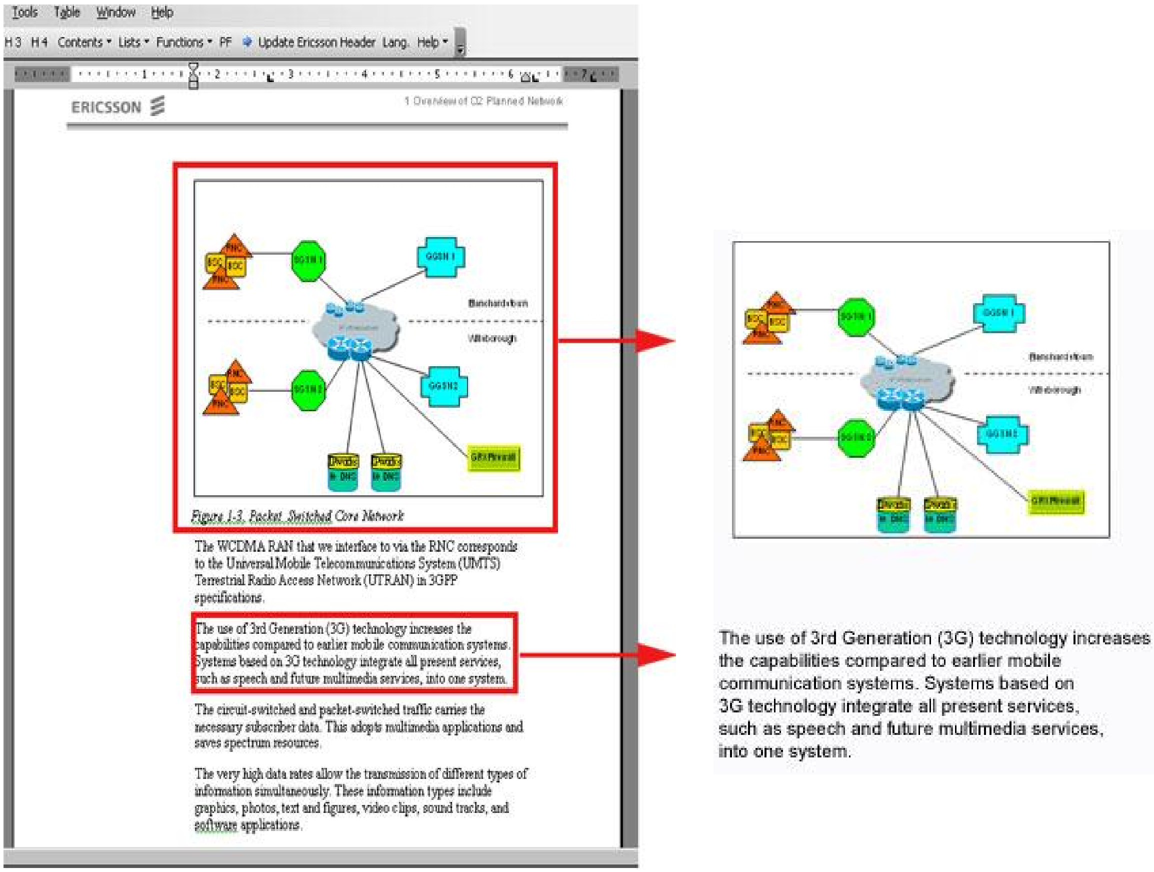

Figure 7. Extract elements from a ILT textbook

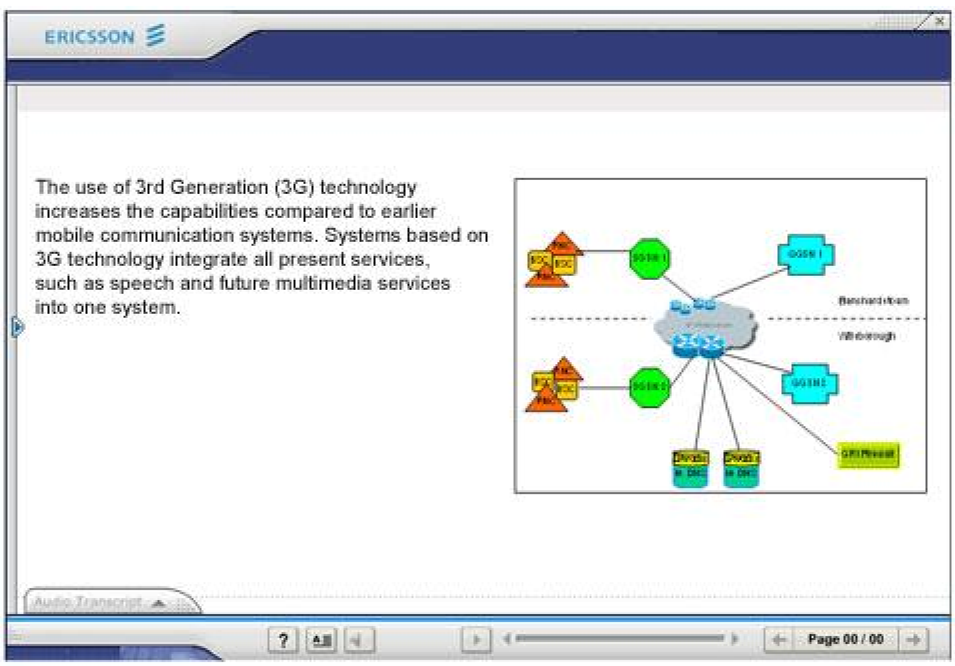

Figure 8. Insert elements into elearning template

Using this system of tagging, a single ILT course can be "mined" to provide content for an elearning course, a mlearning course and so on. It will still be necessary to write some elements specifically for these delivery types, for example some complex images would need to be scaled down or redesigned altogether to be legible on a mobile device.

9. Student Delivery

Once a library of course content is available, the next challenge is providing a central point of access for students, again independent of the device they are using.

In terms of traditional elearning and ILT, Ericsson maintains extranet sites with our customers on which all training material is made available to students. This material is generated from the LMS, along with course schedules, evaluation tools, student reports and so on. Each student can be tracked by the system to allow for correct assessment and scheduling. In this scenario students can also access a mobile portal allowing them to download content onto their mobile devices.

In terms of mobile learning, much research has been done into using SMS / MMS as a student support tool for exam reminders, to counter drop out, and so on. It is also possible to use SMS and MMS services to deliver content to a designated user; take the example of a student who is enrolled for an overview course but it off site with just a mobile phone. An SMS or MMS can be sent to that student with a link to the course content, which he can then download to his phone. Similarly the student can be provided with a common short code (i.e. "send a text to 5175") if they wanted to access the material without it being pushed to their phone.

So in the scenario outlined above, a group of students would access all their training through a common extranet site managed by their employer and the training provider;

- Instructor-led training is scheduled and tracked online
- eLearning is taken through this site is the usual way
- Students download course material directly to their mobile device from the site or
- Students off-site can request that course material be sent directly to their mobile device, or can have it sent to them automatically.

Conclusion

References

[1] CyWorld (http://www.theregister.co.uk/2006/06/23/cyworld_comes_to_germany/)

[2] SCORM (http://en.wikipedia.org/wiki/SCORM)

[3] Mobile Learning: The Next Generation of Learning (http://learning.ericsson.net/mlearning2)

COLLABORATIVE E-LEARNING IN INTERNATIONAL UNIVERSITY-BUSINESS PROJECTS

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Information about the authors can be found in the reference section

Abstract:

Research in e-learning often focuses on learning environments where students and professors interact. Less emphasis has been placed on extended learning environments, where universities and business collaborate. Still, such learning environments are likely to gain increasing interest and importance in the forthcoming years. This trend is visible also in the new generation EU educational programmes focusing on Lifelong Learning and on innovative methods for training students and the workforce.

This paper analyses the student's learning process in an industry-university collaboration project supported by the European Commission, the INTERN project. The project partners shared a common vision of integrating internationalisation, the use of ICTs and close links with business life in traditional pedagogical settings. The project is therefore strongly rooted in the integrated contexts of education – virtual training – business. The pedagogical model developed for the project is presented and its implications on the student's learning process are analysed. Some further research areas related to industry-university collaboration are also suggested.

Definitions:

Collaborative learning: when learners work in groups on the same task simultaneously, thinking together over demands and tackling complexities. Collaboration is seen as the act of shared creation and/or discovery. Within the context of electronic communication, collaborative learning can take place without members being physically in the same location. www.unesco.org/education/educprog/lwf/doc/portfolio/definitions.htm

Communities of practice: groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise by interacting on an ongoing basis (Wenger & McDermott & Snyder, 2002).

Explicit and tacit knowledge: *Explicit* knowledge is the familiar codified form that is transmittable in formal, systematic language. *Tacit* knowledge is the component of knowledge that is normally not reportable since it is deeply rooted in action and involvement in a specific context (Raelin, 1997).

Lifelong Learning: All learning activity undertaken throughout life, with the aim of improving knowledge, skills and competence, within a personal, civic, social and/or employment-related perspective (European Comission, 2006).

The term *university* is here used for all types of higher education institutions.

1. Introduction

In today's society, knowledge is largely seen as a key to competitiveness. This is especially true in Europe because they are facing hard competition from giants such as the USA and Japan. EU has therefore taken on the ambitious initiative to put Europe in the number one position as a Knowledge Society (European Commission, 2005). But how does knowledge develop and how is innovation created? Most researchers agree that human resources are crucial for competitiveness and growth. And several authors argue that knowledge development takes place within 'communities of interaction' that can cross intra- and inter-organizational levels and boundaries (e.g. Nonaka and Takeuchi, 1995; Nonaka, Umemoto, and Sasaki, 1998). In these communities, the combination of tacit and explicit knowledge is generally seen to lead to dynamic knowledge creation and timely development of new products and services.

Several reasons also speak in favour of closer cooperation between business and university such as

- rising global competitiveness
- increasing need for innovation in products and processes
- lower R & D expenditure
- technological transfer opportunities

(Elmuti & Abele & Nicolosi, 2005),
Still, rather few businesses cooperate with universities for R&D and innovations – e.g. a study in Britain reports that only 16 per cent of business use universities to initiate innovative measures (Kitson, 2004). There can be several reasons for limited collaboration –e.g. lack of information regarding the type of service that universities can offer, time constraints, and a perceived gap between theory and practice.

Technological progress and networking structures have increased the possibilities for cooperation between business and universities. This paper describes a collaborative e-learning project where the student's learning process is due to a collaborative partnership between universities and businesses. First, the project's context and the pedagogical model developed for the project will be described. Thereafter, the pros and cons of the model will be discussed, and some suggestions for further research in collaborative learning will be given.

2. The INTERN project

The INTERN project was conducted in a comprehensive Community of Practice, where higher education institutes (HEIs) and companies interacted within an ICT-supported environment. INTERN represented a new form of interactive business learning, where the HEIs extended its reach beyond the campus to organizations and workplaces. Cross-border and cross-cultural communication between students, faculty, and companies took place.

The basic idea of INTERN was to enable students to participate in Virtual Internships for international companies. At the beginning of the project, the project's management group defined the concept of Virtual Internships as follows (Intern management group, 2002 a):

A Virtual Internship involves the use of an Information and Communication Technology supported environment, where students interact with each other, and companies, independent of time and space and across traditional geographical boundaries. In this environment, effective communications are created between students, faculty and company representatives, in order to carry out a specific and meaningful work-based activity that fits within the student's compulsory educational curriculum.

The HEIs taking part in INTERN are all experienced business schools, who used the INTERN project to test the Virtual Internship approach and to gather information about how such Internships might be improved in the future. The HEIs taking part were Tietgen Business College, Denmark, Arcada Polytechnic, Finland, Buskerud University College, Norway, and Institut de Formation International (IFI), France. The INTERN partners agreed to provide an environment for the students where they could work together to solve problems and carry out work for companies based in other European countries. During INTERN four Virtual Internships were organised:

A. An assignment led by Buskerud University College for a Norwegian SME, **Tronrud Engineering,** to research markets, exhibitions and fairs for one of their products in other countries. This Internship took place from September until December 2001 and involved students in Denmark, Norway and Finland.
B. An assignment led by Arcada Polytechnic for **ICL Invia**, which is a Nordic service provider and operator of advanced information systems. The objective of this Virtual Internship that ran from September until December 2001 was to investigate the use of Information Technology in Customer Relationship Management (CRM) for hotel chains and hotel marketing chains in Finland and Norway and involved students from Finland and Norway.
C. An assignment led by Tietgen for the Danish **DFDS Transportation Group,** who wanted to carry out a logistic survey of track and trace systems in Finland. This Internship ran from September until December 2001 and involved students in Finland.
D. As assignment led by IFI for a French company, **Kremlin, Inc**. a leading manufacturer of finishing equipment. The task was to find out more about the Danish market and the potential market for spray equipment. This Internship ran from January until May 2002 and involved students in Denmark and France.

A total number of 51 students participated in the project, from first to third year students. They studied marketing (51.0%), English (17.6%), accounting (13.7%), tourism administration (11.8%), business administration (2.0%) or took part in technical programs (2.0%).

The INTERN project was followed by an evaluation team that was led by an external evaluator. All the stakeholders of the project (students, teachers, co-ordinators and companies) were asked to make an evaluation. Here, focus is on the student's learning process, where the evaluation comprised both theoretical learning (e.g. understanding of different business processes like marketing and product sale) and practical learning (e.g. project management, conducting market surveys and using ICTs as a tool for communication). The added value from using ICTs in the learning process was also evaluated (INTERN management group, 2002 b).

2.1. The pedagogical model

The pedagogical model developed for the INTERN project was inspired by research in knowledge management and pedagogy (e.g. Nonaka and Takeuchi, 1995; Nonaka, Umemoto, and Sasaki, 1998, Raelin, 1997, Markus 1994, Markus & Soh,1993). The basic ideas of the student's learning process in the model can be expressed in three hypotheses:

Hypothesis 1: The key to new learning in university-industry collaboration is the integration between theory and practice.

Hypothesis 2: Students' learning increases through real-world problem solving.

Hypothesis 3: Information and communication technology supports learning in international networks.

Based upon these hypotheses, and on previous research, a pedagogical e-learning model was developed for the project. In the model, theory was used as a mode of learning in combination with action in practice. *"Work-based learning, then, must blend theory and action. Theory makes sense only through practice and practice makes sense only through reflection as enhanced by theory"* (Raelin 1997, p. 564). Examining real-life cases in the light of scientific theories, and theories in the light of practical experiences, has also been shown to foster the development of tacit knowledge (Slotte & Tynjälä, 2003, Raelin, 1997). But sometimes, it can be hard for the HEIs to provide learning tasks based upon theoretical knowledge for use in practical situations (Slotte & Tynjälä, 2003). In INTERN, this problem was solved since the learning tasks were directly provided by the companies participating in the project.

ICTs are generally regarded valuable for promoting networking and collaborative learning. Still, information system researchers have observed that impacts from ICTs require "appropriate" use, and "inappropriate use" may prevent positive impacts (Markus, 1994, Soh & Markus 1995). In INTERN, the requirement of "appropriate use" has been considered in the e-pedagogical model developed. The ICT infrastructure was designed in the most user-friendly and cost-efficient manner possible, suggesting tools for implementing cross-border collaboration and knowledge sharing.

The pedagogical model (Figure 1) is called INTERN, after the project, and it shows how different learning processes operate through the interplay between theory and practice, and between tacit and explicit knowledge. The student's learning process was planned as a cycle progressing from conceptualization – experimentation – experience- reflection. For each phase of the learning process, ICT-tools were suggested and extensively applied in the various stages of the project to facilitate communication and knowledge sharing.

	Explicit knowledge	Tacit knowledge
Theory	**CONCEPTUALIZATION** • Planning of project • Creating a theoretical basis for the pilot project in terms of the topic studied ICT-tools: • audio conference • videoconference • use of electronic databases • web-search	**EXPERIMENTATION** • Broadening the understanding of theories used in individual pilot project ICT-tools: • discussions on project's web-site • studying previous cases distributed on the Internet • group-discussions using web-cams
Practice	**REFLECTION** • Students analyse practical results of their research • Students report findings to partner companies and to students in other countries • Company representatives and students evaluate their learning experience ICT-tools: • videoconference • web-based questionnaire including software applications for analysing results	**EXPERIENCE** • Assignments to students in own country and abroad • Practical basis laid by company representatives, sharing their tacit knowledge • Students perform research according to the assignment ICT-tools: • videoconference • discussions on project´s web-site • group discussions with web-cams

Figure 1: THE INTERN MODEL

(Intern management group, 2002 c)

A. Conceptualization

The student's learning process in the virtual internship started by theoretical lectures in the specific academic fields studied. Theoretical conceptualizations, provided by the faculty, gave the students the means to tackle the forthcoming assignments in different organizational and cultural contexts. Conceptualization thereby provided the students with a common theoretical frame for the forthcoming comparative studies. ICT-tools were utilized in different forms, as suggested in the model.

B. Experimentation

In the experimentation stage of the learning process, the theoretical concepts in the individual pilot projects were elaborated upon. Students learning was enhanced e.g. from studying previous cases in their specific discipline. Web-discussions and cases solved on the project's web-site allowed for further theoretical discussions and modelling between project participants situated in different countries.

B. Experience

First-hand knowledge from practical business life was thereafter introduced into the project, when company representatives shared their tacit knowledge with the students. At this stage the students collected data and gained practical experience through the assignments given to them by the company. Students learned both from the contact persons in the firms and through their own research contributions. The students' learning process was enhanced by problem-solving in practice.

C. Reflection

In the reflection stage, students reported their findings to the company representatives, often through videoconferencing. Thereby, representatives from both the business and academic sector evaluated the students' project results. It was possible for students to reflect critically on theoretical concepts and their practical relevance, as well as to compare alternative ways of solving the same practical problems.

The learning process (A - D) thereafter continued in a learning cycle, as the students could utilize the knowledge and experience gained in the project in other courses and assignments. Along with specific academic knowledge, students also gained experience of working in a multicultural environment in an academic as well as in a business context. The INTERN project was therefore well in-line with the current trend in international business, where multicultural teamworking result from networking, different partnering agreements or joint ventures. Multicultural teams can be home or overseas based, and the virtual element is often present (Edwards & Rees, 2006).

2. 2. Experience of implementing the model

How did the collaborative learning in the INTERN project support the students' learning process? The results of the project will now be analyzed against the three hypotheses presented above.

Hypothesis 1: The key to new learning in university-industry collaboration is the integration between theory and practice.

A special challenge in education is to create the vital link between academic theory and practical application. The students reported the following experience regarding integration of theory and practice:

1. The role of the teacher/facilitator was stressed. A successful Virtual Internship was seen to require the coordination of theory and practice by a competent facilitator. The facilitator could illustrate problems in the learning team/situation so that participants could learn by themselves and from each other. According to the students, the best support was given by the internal supervisors and by the members in the local group.
2. Collaboration between universities and companies require agreements on a variety of pedagogical and practical aspects. E.g. time restrictions and tutoring tasks on behalf of company representatives need to be clarified in due time before the project starts. In INTERN, the students' were sometimes disappointed at the companies support and feedback. Real commitment is needed from both university and industry.

3. The international environment in the university-industry collaboration was highly inspiring. In the assignments, students worked with companies and students located in other countries, and the multinational atmosphere was the most motivating factor in the project (78.4% agreed).

The multicultural environment also presented additional challenges for joint problem-solving and combination of theory and practice. E.g. assignments given by a company in another country were sometimes unclear to the students – the gap between theory provided by the university and the companies' expectations did not always meet. Cross-cultural differences in organizational behavior could be an explanation. Furthermore, company representatives seldom have pedagogical background, which further underlines the importance of communication with the teacher/facilitator.

Hypothesis 2: Students' learning increases through real-world problem solving.

The aim of INTERN was to link the learning content to an authentic challenge in the workplace. In the evaluation, learning through real-world problem solving in Virtual Internships was compared with traditional class-room situations.

The learning process was especially successful in the following areas, as reported by the students:

1. Knowledge in business administration. The Virtual Internships started by theoretical introduction, followed by practical assignments, where the students gathered new practical knowledge about different areas of business. 70.6% of the students regarded the practical work a very motivating factor.
2. Knowledge in project management. More than half (62.8%) of the students had learnt a lot about how to plan and work in a project because of their participation in this virtual internship.
3. Communication skills. Using virtual internships instead of normal classroom teaching was considered an effective way of learning to communicate in a foreign language (82.3% agreed) and to learn about cross-cultural communication (81.1% agreed).
4. Reflective thinking. The cooperation between HEIs and business was reported to increase reflective thinking by 58.9% of the students.

The students gained new knowledge by active participation in the Virtual Internships. But some groups reported an uneven distribution of activity, which was negative both for learning and motivation. These groups may have been too large.

Hypothesis 3: Information and communication technology supports learning in international networks

During the project, the various IT-tools listed in figure 1 were extensively applied for communication between students, teachers, and company representatives. The students reported the following experience of using ICTs:

1. The ICT-based virtual internships clearly represented a new way of studying. 78.6% of the students had never used such a comprehensive E-learning environment before. The project fostered new IT-skills, and the students could soon master the new technology well.
2. The students were more motivated by the actual tasks than by the ICTs. Technologies were basically regarded facilitators, and the virtual element itself was not a high motivating factor. However, it is worth remembering that the highly motivating international atmosphere reported earlier was made possible through the use of ICTs.
3. The occasional problems in network connections were minor obstacles to the smooth and frequent communication among partners and their effective participation in the project in general.

During the project, the overall level of IT skills of the participants increased. Some groups used a broader range of the tools recommended than others. The choice of IT-tools was influenced by the equipment in the home institution and by the type of assignment provided. Some tools also required additional training - e.g. mastering the videoconferencing equipment and its pedagogical requirements.

3. Conclusion

Industry-university collaboration offers fruitful possibilities for Lifelong Learning and professional development. Experience from the INTERN project also suggests that the student's learning process in enhanced by international work-based problem solving supported by ICTs.

The main challenge in collaborative learning seems to be the integration of theory and practice – a demanding task both for university and business. Good industry-university relationships and appropriate pedagogical support for the student's learning process can support the integration. To learn more about these critical areas, the following research topics are suggested regarding collaborative industry-university networks:

Industry-university relationships	Student's learning process
• Network building and trust development processes • Knowledge sharing mechanisms • Facilitator's/tutor's role for knowledge development • Network economics and financing	• Integration of tacit and explicit knowledge • New technologies' role for accelerating the learning process • Learning in multicultural cross-border teams

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Conditions for eLearning projects' implementation
The project manager view

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Abstract
Recent national impulse and consolidation programs, aimed at promoting eLearning experiences in higher education, have shown a lack of eLearning projects' implementation success criteria. In fact, many criteria have been proposed, but mainly based on case studies or just qualitative analysis (when not only on simple personal experiences and/or hypotheses).
In the paper, a list of 18 relevant factors is distilled from the relevant literature; these items have been tested with a panel of 99 project managers working in the framework of three different national programs, in the Netherlands (SURF Foundation), in Sweden (Net university) and in Switzerland (Swiss Virtual Campus).
Results were further refined through 11 in-depth interviews.
The output is a ranked list of 16 factors, which can help project managers to run their eLearning implementation activities, as well as policy makers and evaluators to address the most relevant issues in this critical process.

Keywords
eLearning implementation, national eLearning programs, eLearning project management

Introduction
Many national programs have been started and conducted to foster the adoption of ICT (Information and Communication Technologies) in higher education, and to integrate eLearning in order to improve academic teaching (Guri-Rosenblit, 2001; Bates, 1999).
In many cases, single professors, or groups of professors, who applied to receive grants, did not have any previous experience in eLearning (both at the teaching as well as at the managing level), this resulted often in a process by trial and error, in which project managers "built the boat while staying in the water".
To support professors in this approach and transition to eLearning, for instance, the Swiss Virtual Campus (http://www.virtualcampus.ch) funded a mandate, whose goal was to develop guidelines for eLearning project managers, to be diffused through a manual easy to understand and to implement (Lepori, Cantoni, Rezzonico, 2005). This research has showed how important it is for eLearning implementation, that some elements/criteria are taken into account and presents, otherwise the project risks to fail, or to waste important resources.
Unfortunately, an analysis of the relevant literature showed that many criteria had been listed and proposed, but without an extensive empirical basis – they were based mainly on case studies – and without a ranking of them.

This research has started in order to fill that gap.
To better focus it, only higher education eLearning projects were considered, and only those belonging to national programs. Selected programs were the Swiss one, already mentioned, and those of the Nederland (SURF Foundation: http://www.surf.nl) and of Sweden (Net University: http://www.netuniverstiy.se), with similar characteristics, and whose data were more easily accessible.
Moreover, only a specific segment of an eLearning project has been considered: the one covering from planning up to the development of all course materials including also – if present – the first test with users, but excluding the actual delivery. This is due to the fact that many projects in those programs have not yet reached that point, and because some factors could be important in this phase while loosing their importance afterwards, and vice-versa.
This research was started in order to answer the question: *What are the elements that affect the implementation of an eLearning project in higher education (in specific national programs)?*

Research structure and methodology

The research has been performed in three different steps: through i) a literature research, ii) a questionnaire and iii) interviews.

i) *Literature research.* The literature research offered a first list of 18 success elements for eLeaning implementation. To do so, twelve publications were selected, which discuss success criteria for the implementation of ICT in education; selected literature covers the period 1996-2005, and reflects indirectly international research involving different typologies of courses in a period of time of more than 50 years.

Hereafter the list of selected publications: Olcott (1996), Ely (1999), Carr-Chellman & Duchastel (2000), Soong, Chuan Chan, Chau Chau & Fong Loh (2001), Goodyear, Salmon, Spector, Steeples & Tickner (2001), Collis & Moonen (2001), Care & Scanlan (2001), Hutchins (2003), Eppler & Mickeler (2003), Levy (2003), Anderson & Elloumi (2004) and SURF Foundation & Open University (2005).

ii) *Questionnaire.* A questionnaire was then compiled, in order to test if project managers agreed on those elements as being relevant to assure eLearning implementation, and to rank them according to their level of agreement. All the elements distilled in the literature were tested through a Likert scale (see Annex I).

The questionnaire, online, was submitted to project managers of all active courses in the Swiss Virtual Campus (79), and in the SURF Foundation (44). For the 3,000 courses of the Net University, only 1,103 addresses of project managers were collected and contacted, hence addressing a group of 1,226 project managers. The questionnaire was online in June 2005, and 99 answers were received (8% of the addressees); divided as follows: Swiss Virtual Campus: 29 (36.7%), SURF Foundation: 12 (27.3%) and Net University: 58 (5.3% of the addresses, 1.9 of the total).

iii) *Interviews.* The questionnaire was paralleled by semi-structured interviews with project managers involved in eLearning projects conducted in the framework of the selected national programs (3 for SURF, 4 for Swiss Virtual Campus and 4 for Net University).

Results

The literature research helped in compiling a list of 18 elements, organized in 7 macro-areas. Table I presents them in random order.

Macro area	Element	Reference
Interdisciplinary team	*Importance of inderdisciplinarity* It is important to have an interdisciplinary team for an online implementation. The team should be composed by: Subject matter expert / Researcher / Instructional Designer / Web Developer / Graphic Designer / Technologist / Administrator / Tutor / Quality controller. *Remedy to team Workload* It is important to take into account the different workload required from faculty members for eLearning activities (for example with an *ad hoc* contract). *Clear and strong leadership* *Team motivation* *Importance of computer and internet skills for project members not strictly involved in technical implementation*	• Anderson; Elloumi, 2004 • Care; Scanlan, 2001 • Tickner, 2001 • Ely,1999 • Eppler; Mickeler, 2003 • Goodyar; Salmon; Spector; Steeples; • Soong; Chuan Chan; Fong Loh; 2001 • SURF and Open University, 2005
Collaboration	*Team collaboration* *Collaboration among different Universities*	• Care; Scanlan, 2001 • Olcott, 1996 • Soong; Chuan Chan; Fong Loh, 2001

Macro area	Element	Reference
Educational issues	*Team persuasion of eLearning added value* It is important that the project team is convinced that eLearning activities provide an added value in the learning experience. *Eclectic teaching methodology* For a successful implementation it is important that the team does not follow a single teaching methodology.	• Anderson; Elloumi, 2004 • Anderson; Fathi; Elloumi, 2004 • Carr-Chelleman; Duchastel, 2000 • Chickering; Stephen, 1996 • Chickering; Gamson, 1987 • Eppler; Mickeler, 2003 • Fox; Helford, 1999 • Graham; Cagiltay; Lim; Craner; Duffy, 2001 • Hutchins, 2003 • Murphy; Walzer; Webb, 2001 • Soong; Chuan Chan; Fong Loh, 2001
Resources	*Clear and realistic definition of implementation costs (before the implementation starts)* *Flexibility to invest free time (mainly the first time people are involved in an eLearning project)*	• Anderson; Elloumi, 2004 • Ely,1999 • Eppler; Mickeler, 2003 • Goodyar; Salmon; Spector; Steeples; Tickner, 2001 • Olcott, 1996 • Soong; Chuan Chan; Fong Loh, 2001

Macro area	Element	Reference
Institution	*Importance of institutional support* Institutional support concerns above all: budget / technical help / specific staff training / infrastructures / course integration in a curriculum. *Involvement of top management of the institution (both academic and non academic)* *Clear institutional policy about eLearning* *Clear copyright policy*	• Care; Scanlan, 2001 • Collis; Moonen, 2001 • Ely,1999 • Eppler; Mickeler, 2003 • Levy, 2003 • Olcott, 1996 • SURF and Open University, 2005
Quality	*Explicit system of quality control* *Feedback from the students also during the implementation phase*	• Carr-Chelleman; Duchastel, 2000 • Goodyar; Salmon; Spector; Steeples; Tickner, 2001 • SURF and Open University, 2005
Communication	*Exploitation of synchronous and asynchronous communications*	• Anderson; Fathi; Elloumi, 2004 • Carr-Chelleman; Duchastel, 2000 • Chickering; Stephen, 1996 • Chickering; Gamson, 1987 • Fox; Helford, 1999Hutchins, 2003 • Graham; Cagiltay; Lim; Craner; Duffy, 2001 • SURF and Open University, 2005

Table I: elements required to ensure eLearning projects implementation.

The above factors have been checked through the questionnaire and the interviews, in order to understand if project managers consider them relevant for project implementation and, if yes, at which extent. Table II presents the ranked list of factors.

Rank	Element	Mean value / standard deviation [comments]
1	Team motivation	2.12 / 0.8
2	Feedback from the students also during the implementation phase	2.06 / 0.96
3	Importance of institutional support	2.03 / 1.05
4	Team collaboration	1.93 / 1
5	Clear and realistic definition of implementation costs (before the implementation starts)	1.91 / 1.05
6	Team persuasion of eLearning added value. It is important that the project team is convinced that eLearning activities provide an added value in the learning experience.	1.83 / 1.37
7	Importance of computer and internet skills for project members not strictly involved in technical implementation	1.82 / 1.36
8	Remedy to team workload	1.81 / 1.06
9	Clear copyright policy	1.65 / 1.3
10	Clear and strong leadership	1.64 / 1.21
11	Involvement of top management of the institution (both academic and non academic)	1.51 / 1.54
12	Explicit system of quality control	1.50 / 1.09
13	Clear institutional policy about eLearning	1.36 / 1.15
14	Importance of inderdisciplinarity Hereafter the various roles, in order of importance: subject matter expert / tutor / technologist / administrator / instructional designer / web developer / quality controller. The roles of researcher and graphic designer are not considered significant.	1.28 / 1.6
[15-16]	Flexibility to invest free time (mainly the first time people are involved in an eLearning project) Eclectic teaching methodology	Due to a problem in the questionnaire, these elements could not be validated, by interviews were unanimous in considering them important.

Table II: ranked list of elements required to ensure eLearning projects implementation.

Only factors resulted positive to ZTest (hypothesis test) were considered relevant.
The factors “Collaboration among different universities” and “Exploitation of synchronous and asynchronous communications” were not confirmed. About the first, project managers reported that collaboration frequently implies a lot of troubles and a

lost of time. The second one was considered too general, more depending on the subject taught, and more concerned with the delivery phase.
The answers coming from the single three national programs were compared. While in general this ranked list well represents all of them, some differences can be identified, showing both a wide consensus among eLearning project managers as well as specific context-related approaches.
Three factors, in particular, have different importance depending on the considered program.

- Importance of interdisciplinarity. Data present positive values for both SURF and Swiss Virtual Campus. In Net University usually the subject matter expert covers also all other roles. In fact, the decision to participate in the Net University program is completely bottom-up, and the professor has to manage alone every implementation phase. This is due to lack of money, lack of appropriate team inside the university and lack of institutionalization of eLearning in the universities.
- Universities collaboration. This factor was not considered enough relevant to be listed in the final list. Anyway, interviews of SURF and Swiss Virtual Campus projects show quite positive results. In fact, collaboration among different academic institutions was a pre-requisite in those programs, while it was absent in the Net University (among Swedish universities a strong competition was reported).
- Institutional policy about eLearning. SURF projects reported a lower value compared to the other two programs. These data are confirmed also by other studies. A study on ICT in Dutch higher education (Collis and van der Wende, 2002) argued that its implementation is an evolutionary process, and that few revolutions have happened so far. Change is slow, and not radical. Almost all universities are experimenting with eLearning, most of them “do not expect revolutionary change as a result from or related to the use of ICT” (Collis and Van der Wende 2002: 7) and they mostly use ICT to improve existing teaching activities, rather than to replace them or to access new educational markets through distance learning.

Conclusions and further research

The paper has studied the conditions affecting eLearning project implementation in universities, ending up with a ranked list of 16 relevant factors.
These factors can be useful for project manager, in order to guide their activities, selection and organization of their team, as well as to select and prioritize activities and aspects to control and evaluate.
The same list can be used also by policy makers, in order to promote better conditions for projects to be effective and efficient, and to improve selection criteria.
Further research is required in order to extend the analysis to other countries and to include also the post-implementation phases.
While the first list of elements has been compiled from research literature, their selection and ranking has been done only adopting the project managers’ point of view, hence becoming a sort of measure of their maturity in the field. It seems then to be important to complement – and compare – these results with other viewpoints, namely those of

university administrators, and students. These further perspectives will further help to design a more comprehensive picture of eLearning projects in the university, and to improve eLearning sustainability.

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Annex I - Questionnaire

For most of the following statements indicate the extent to which you agree with the statement: please give a score from -3 to +3 where:

-3= Not at all
-2= Really better not
-1= Better not
0= Indifferent
1= Nice to have
2= Very important to have
3= Must have
#= Don't know

If a question requires another type of answer it will be indicated.

1 Interdisciplinary team

1a. It is important to have an interdisciplinary team for an online implementation.

- ☐ -3= Not at all
- ☐ -2= Really better not
- ☐ -1= Better not
- ☐ 0= Indifferent
- ☐ 1= Nice to have
- ☐ 2= Very important to have
- ☐ 3= Must have
- ☐ # = Don't know

1b. Rank from -3 to 3 the importance of the following roles during the implementation phase. -3 is the less important (not at all), 3 is the most important (must have). The symbol # = I don't know

Subject matter expert	
Researcher (produces new knowledge relevant to the content area)	☐ -3
Instructional Designer (helps to create or adapt instructional	☐ -2
resources)	☐ -1
Web Developer (designs and creates the course web pages)	☐ 0
Graphic Designer (gives the course's unique look and feel)	☐ 1
Technologist (helps making technological choices. He is also	☐ 2
responsible for program functionality)	☐ 3
Administrator (is concerned with issues of learner registration)	☐ #
Tutor (facilitates contents and the range of online activities)	
Quality controller (tests the course developed)	

1c. It is important to take into consideration the different workload required from faculty members for eLearning activities (for example with an *ad hoc* contract).

- ☐ -3= Not at all
- ☐ -2= Really better not
- ☐ -1= Better not
- ☐ 0= Indifferent
- ☐ 1= Nice to have
- ☐ 2= Very important to have
- ☐ 3= Must have
- ☐ # = Don't know

1d. In an eLearning project it is important to have a clear and strong leadership.

- ☐ -3= Not at all
- ☐ -2= Really better not
- ☐ -1= Better not

- ☐ 0= Indifferent
- ☐ 1= Nice to have
- ☐ 2= Very important to have
- ☐ 3= Must have
- ☐ # = Don't know

1dA. Please, indicate why.

____

1e. "Team's motivation" is important for the success of the implementation of an online course.

- ☐ -3= Not at all
- ☐ -2= Really better not
- ☐ -1= Better not
- ☐ 0= Indifferent
- ☐ 1= Nice to have
- ☐ 2= Very important to have
- ☐ 3= Must have
- ☐ # = Don't know

1eA. Please, indicate why.

____

1f. How important are computer and Internet skills for the following project members (not strictly related with technical implementation)?
-3 is the less important (not at all), 3 is the most important (must have). The symbol # = I don't know
(If you think that one of these roles is not essential, don't mark anything).

	☐ -3
Subject matter expert	☐ -2
Tutor	☐ -1
Researcher	☐ 0
Administrator	☐ 1
Quality controller	☐ 2
	☐ 3
	☐ #

2 Collaboration

For the success of the online implementation:

2a. It is important that all team members collaborate along the implementation phase.

- ☐ -3= Not at all

- -2= Really better not
- -1= Better not
- 0= Indifferent
- 1= Nice to have
- 2= Very important to have
- 3= Must have
- # = Don't know

2b. It is important to have collaborations among different universities.

- -3= Not at all
- -2= Really better not
- -1= Better not
- 0= Indifferent
- 1= Nice to have
- 2= Very important to have
- 3= Must have
- # = Don't know

2bA. Please, indicate why.

____

3 Educational issues

For the success of the online implementation:

3a. It is important that the project team is convinced that eLearning activities provide an added value in the learning experience.

- -3= Not at all
- -2= Really better not
- -1= Better not
- 0= Indifferent
- 1= Nice to have
- 2= Very important to have
- 3= Must have
- # = Don't know

3b. For a successful implementation it is important that the team follows a specific teaching methodology.

- -3= Not at all
- -2= Really better not
- -1= Better not
- 0= Indifferent
- 1= Nice to have
- 2= Very important to have
- 3= Must have
- # = Don't know

3bA. Please, indicate why.

____

4 Communication

4a. In every eLearning course it is important that both kinds of communication are exploited (synchronous/asynchronous).

- ☐ -3= Not at all
- ☐ -2= Really better not
- ☐ -1= Better not
- ☐ 0= Indifferent
- ☐ 1= Nice to have
- ☐ 2= Very important to have
- ☐ 3= Must have
- ☐ # = Don't know

4aA. Please, indicate why.

____

5 Resources

5a. It is important to have a clear and realistic definition of implementation costs before the implementation starts.

- ☐ -3= Not at all
- ☐ -2= Really better not
- ☐ -1= Better not
- ☐ 0= Indifferent
- ☐ 1= Nice to have
- ☐ 2= Very important to have
- ☐ 3= Must have
- ☐ # = Don't know

5aA. Please, provide comments.

____

5b. The first time that you worked for an online course, during the period needed to acquire eLearning specific skills to implement the course, do/did you contribute also with your free time?

- ☐ Yes
- ☐ No
- ☐ Can't say

5bA. If yes, for how long?

- ☐ Less than 1 month
- ☐ Between 1-3 months
- ☐ Between 3-6 months

- ☐ More than 6 months

5bB. In that period, can you quantify the hours average per week?

- ☐ Less than 2 hours per week
- ☐ Between 2-4 hours per week
- ☐ Between 4-6 hours per week
- ☐ More than 6 hours per week

6 Environment – Institution

6a. Rank from -3 to 3 the importance of the following institutional supports. -3 is the less important (not at all), 3 is the most important (must have). The simbol # = I don't know

	☐ -3
Budget	☐ -2
Technical help	☐ -1
Specific staff training	☐ 0
Infrastructures	☐ 1
Course integration in a curriculum	☐ 2
	☐ 3
	☐ #

6b. For a successful implementation it is important to involve the top management of the institution (academic and not academic) in the eLearning project development.

- ☐ -3= Not at all
- ☐ -2= Really better not
- ☐ -1= Better not
- ☐ 0= Indifferent
- ☐ 1= Nice to have
- ☐ 2= Very important to have
- ☐ 3= Must have
- ☐ # = Don't know

6bA. Please, indicate why.

____

6c. For a successful implementation it is important to have a clear institutional policy about eLearning.

- ☐ -3= Not at all
- ☐ -2= Really better not
- ☐ -1= Better not
- ☐ 0= Indifferent
- ☐ 1= Nice to have

- ☐ 2= Very important to have
- ☐ 3= Must have
- ☐ # = Don't know

6cA. Please, indicate why.

____

6d. For a successful implementation, it is important to have a clear copyright policy.

- ☐ -3= Not at all
- ☐ -2= Really better not
- ☐ -1= Better not
- ☐ 0= Indifferent
- ☐ 1= Nice to have
- ☐ 2= Very important to have
- ☐ 3= Must have
- ☐ # = Don't know

6e. The responsible for a clear copyright policy should be:

- ☐ The institution
- ☐ The project team
- ☐ The national program
- ☐ Other ______________________________

6eA. Please, indicate why.

____

7 Quality

7a. For the successful implementation it is important to have an explicit system of quality control.

- ☐ -3= Not at all
- ☐ -2= Really better not
- ☐ -1= Better not
- ☐ 0= Indifferent
- ☐ 1= Nice to have
- ☐ 2= Very important to have
- ☐ 3= Must have
- ☐ # = Don't know

7aA. Please, indicate why.

____

7b. The responsible of the quality control should be:

- ☐ The institution
- ☐ The national program

- ☐ The project team
- ☐ Other ____________________________________

7bA. Please, indicate why.

____

7c. It is important to have a feedback from the students before the implementation phase ends (first phase test).

- ☐ -3= Not at all
- ☐ -2= Really better not
- ☐ -1= Better not
- ☐ 0= Indifferent
- ☐ 1= Nice to have
- ☐ 2= Very important to have
- ☐ 3= Must have
- ☐ # = Don't know

7cA. Please, indicate why.

____

8 Further comments

8a. Please, provide your general comments.

____

9 Personal profile

*(the questions with * are optional)*

9a. Which of the following best describe(s) you:

- ☐ Project manager
- ☐ Subject matter expert
- ☐ Researcher
- ☐ Tutor
- ☐ Instructional Designer
- ☐ Web developer
- ☐ Graphic Designer
- ☐ Technologist
- ☐ Quality Controller
- ☐ Administrator
- ☐ Other ____________________________________

9b. Are you

- ☐ Male
- ☐ Female

9c. Age

- ☐ Younger than 30
- ☐ 31 - 39
- ☐ 40 - 49
- ☐ Older than 50

9d. In which of the following national programs are you involved?
- ☐ Swiss virtual campus
- ☐ SURF Foundation
- ☐ Net University

9e. Is your project in its delivery phase right now?
- ☐ Yes
- ☐ No

9eA. If no, in which phase of project development are you?
- ☐ Just at the beginning (project specifications)
- ☐ During the realization/production
- ☐ First test and assessment
- ☐ Just finished the implementation phase
- ☐ Other ___________________________________

9f. Name of the project you are involved with*

____

9g. If you want to receive a copy of the report of the results of the tests, please write your e-mail.*

____

Proteus e-learning
Multiple learning arenas in evolution

The Helios consortium

Abstract

For long time the evolution of industrial society has been represented in terms of growing functional differentiation among different social spheres. This approach is no longer sufficient to depict the evolution of e-Learning.

It is probably more suitable, instead of focusing on unidirectional laws of evolution, take a descriptive and inductive approach and attempt to insulate and spot “coherent areas” of e-learning or e-learning territories, not necessarily corresponding to traditional approaches to functional differentiation.

This is probably a more suitable approach to capture a protean phenomenon such e-Learning

Full version

In Greek mythology, Proteus is the son of Poseidon. He can foretell the future, but first you have to catch him. This can be tricky as he changes into all possible forms. Hence the word 'protean', with the general meaning of "versatile", "mutable", "capable of assuming many forms": [1]

It can be argued that the evolution of e-learning over recent years mirror its “protean” nature. And it is difficult to foresee in a univocal way its evolution as it is taking many different forms in different contexts.

For long time social scientists as Durkheim conceptualised the continued development of industrial society in terms of growing functional differentiation among different social spheres[2]. According to this paradigm, the more a social phenomenon is developing, the more it moves from an undifferentiated nature to its differentiation into different social spheres or systems (for instance the economic or the political sphere) assuming different functions in each of these.

Following this theoretical approach, it might be indeed true the evolution of e-learning over recent years has corresponded to its functional differentiation. Certainly e-learning is different, for instance, in different learning systems and sub-systems (vocational training, corporate, education…).

However, a purely functionalist approach is not sufficient to seize the poliedricity of e-learning in the complex society[3]

Among the several criticisms that have been raised to the functionalist approach[4], one is definitely central for e-learning: it is not possible to assume that the only cleavages of evolution for e-L are to be associated purely with functional differentiation in social sub systems.

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[1] See Proteus in http://www.wikipedia.org/ and

http://www.godchecker.com/pantheon/greek-mythology.php?deity=PROTEUS

[2] Durkheim 1893 *The Division of Labor in Society,*

[3] N:Luhmann,1995 *Social systems*. Stanford University Press, Stanford, CA

[4] Lewis A. Coser, Masters of Sociological Thought: Ideas in Historical and Social Context, 2nd Ed., Fort Worth: Harcourt Brace Jovanovich, Inc., 1977

Many other possible cleavages are emerging. Not only a rich debate, several cases of practice and a growing literature have enhanced (and at the same time threatened) the concept of e-Learning by associating it to more established modes of learning, giving origin to the so-called ‘blended’ learning approach, but also varying application fields of e-Learning (e.g. sectors, purposes, target groups) have contributed to a growing articulation of e-Learning. Moreover, these developments take place in a context where technology enables an increasing number of scenarios of use. Finally, country specific e-learning developments certainly can be identified.[5]

So how to catch proteus e-learning in contemporary societies?
It is probably more suitable, instead of focusing on unidirectional laws of evolution, take a descriptive and inductive approach and attempt to insulate and spot “coherent areas” of e-learning or e-learning territories, not necessarily corresponding to traditional segmentations related to the functional differentiation paradigm.

The Helios consortium[6] has attempted to escape over-simplistic views of e-Learning differentiation by developing the so-called map of e-Learning Territories (see Figure 1 below)[7]. Some of the e-Learning territories are already in the consolidation phase, while others are currently emerging. Some are clustered according to their purpose, some other according to the education/ training sector in which they are mainly observable, other can be considered “transversal”. All of them imply different visions and perceptions of e-Learning, sometimes with rather permeable boundaries, but also with clear “identity” elements that provide analytical ground for differentiation.

[5] L-Change cons

[6] HELIOS consortium, (2005) Evolving e-learning The Helios yearly report 2005-2006 http://www.education-observatories.net/helios/reports/

[7] One of the first definitions of e-learning as a "large and unexplored territory has been formulated by Gilly Salmon in her Keynote presentation "Future learning encounters" at EUROCALL 2002 Jyvaskyla Finland, 14-17 August 2002 http://www.solki.jyu.fi/eurocall2002/eurocallencounters.pdf

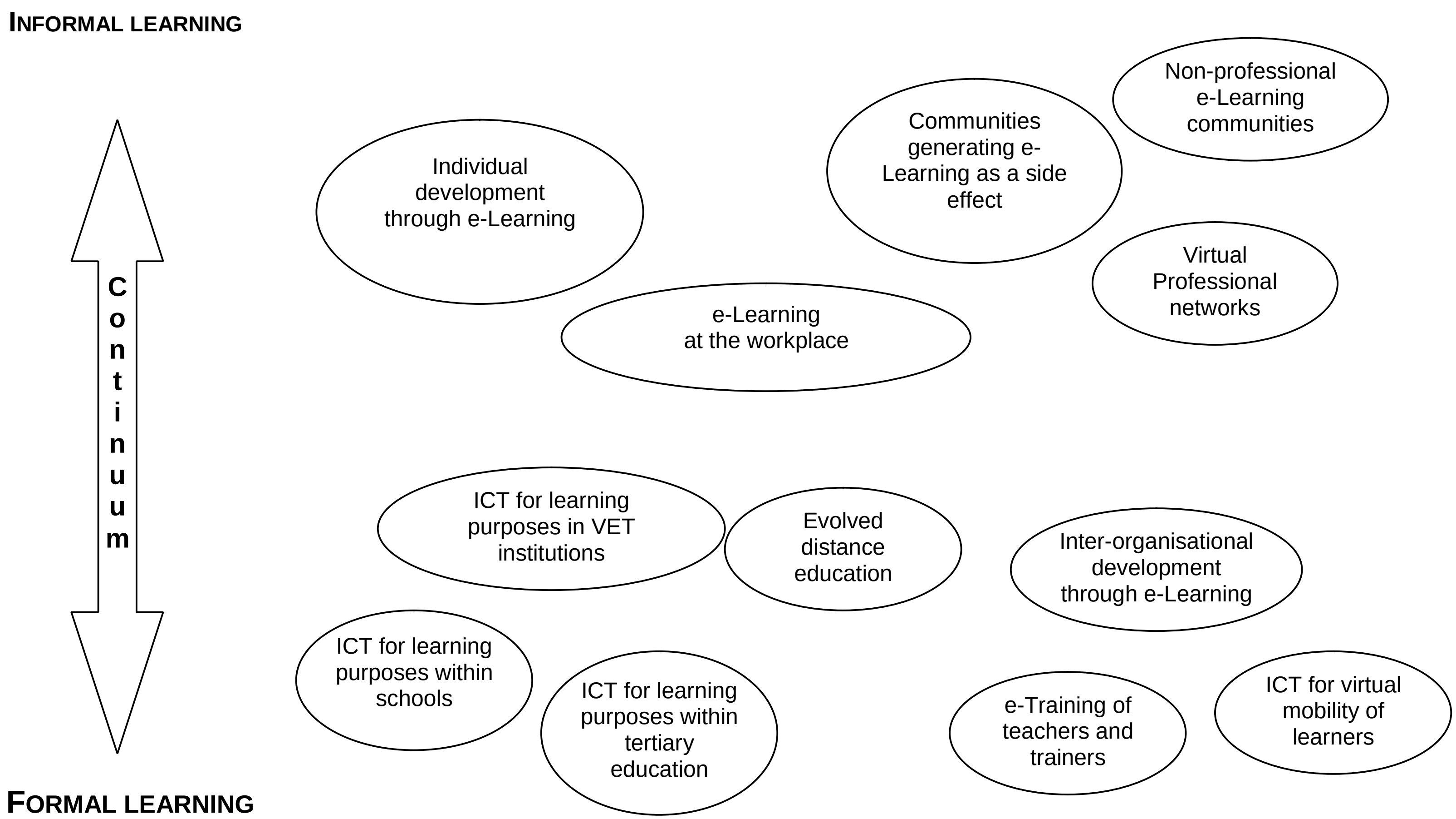

Figure 1. Formal non formal and informal e-Learning territories

All the emerging and consolidated territories of e-Learning can be represented graphically according to their position in a continuum ranging from **formal learning** to **informal** and encompassing also **non formal learning**[8].

Some of the territories reflect the traditional articulation of learning systems into sectors and their physiognomy is influenced, but not "turned upside down" by e-Learning. In these contexts, such as "ICT for learning purposes within schools" or vocational training, despite the introduction of e-Learning (indeed with a varying degree of implementation) the vast majority of learning initiatives occurs in a context that is organised and structured in a substantially formal and "traditional" way. On the other hand, in such territories as "non professional e-Learning communities" or in those "communities generating e-Learning as a side effect", e-Learning is usually not organised or structured (in terms of objectives, time or learning support), nor necessarily fully intentional from the learner's perspective. Moreover, especially in the territories in which informal e-Learning prevails, online services look more and more centred on their users, or even co-built with users, also thanks to the emergence of open source software and contents[9]. Blogs, communities and fora that work are those created by individuals or groups thereof and not imposed from the top.

Another discriminating *cleavage* which can be useful for mapping e-Learning territories is the distinction between "*intra-muros*" embodying the transition to a virtual environment of a group established in presence, and "*extended learning context"*, representing a diversification of learning contexts, settings and organisations involved.

There is a widespread pressure into learning systems toward the openness, internationalisation, enrichment and increasing **boundlessness** of learning contexts. Along these lines, the extension of e-Learning contexts corresponds, for instance, to such trends as the increase of international virtual mobility exchanges, the multiplication of learning spaces and arenas.[10]

The extension of learning contexts should be also appreciated in the framework of the so-called lifelong learning paradigm. Due to the increased participation to learning and the improved flexibility of learning delivery, there is in society an increasing diversification of

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[8]According to the European Commission; "**Formal learning** takes place in education and training institutions, leading to recognised diplomas and qualifications. **Non-formal learning** takes place alongside the mainstream systems of education and training and does not typically lead to formalised certificates. Non-formal learning may be provided in the workplace and through the activities of civil society organisations and groups (such as in youth organisations, trades unions and political parties). It can also be provided through organisations or services that have been set up to complement formal systems (such as arts, music and sports classes or private tutoring to prepare for examinations). **Informal learning** is a natural accompaniment to everyday life. Unlike formal and non-formal learning, informal learning is not necessarily intentional learning, and so may well not be recognised even by individuals themselves as contributing to their knowledge and skills". European Commission; (2000) *A memorandum on lifelong learning*, Bruxelles. See also Cedefop, Terminology of vocational training policy – A multilingual Glossary for an enlarged Europe , (2004)

[9]See in this respect the Creative commons initiative www.creativecommons.org

[10]See the conclusions of the Report published by the LEONIE consortium *Understanding Change, Adapting to Change, Shaping the Future* MENON Network EEIG, 2005

"learning patrimonies"[11], or learning contexts that surround learning experiences This diversification can be seen on the basis of such elements as:

- physical features: age, gender, disabilities
- education: fields of study, degrees earned, computer literacy
- cultural background: language, place of origin, traditions, sensitive subjects
- employment background: experience, time in current job, relationships with other participants
- expectations: reasons for attending the course, expected results. [12]

The whole issue of personalisation of e-Learning experiences lies on the considerations of these fundamental contextual elements.

On the other hand, the diversification of learning contexts has not meant the disappearance of classrooms and institutions. With regards to e-Learning, this could imply the change of setting of a school class or a working group created intra-muros, i.e.: in presence, to a virtual environment. The most common dynamic of blended learning is exactly this: a group is formed in presence and within the boundaries of a single institution, or in the framework of institutions and then it develops on-line with the possibility of further presential moments. In these situations, e-Learning does not serve the purpose of going beyond traditional/institutional learning contexts, but it helps in maintaining the ties which has developed with the classroom or the institutional context of the learning experience.

In a nutshell, it can be argued that a discriminating choice for present and future e-Learning is going deeper, i.e. maintain, develop and reinforce the relational ties created *intra muros* or going wider, i.e. allowing to expand relational networks beyond organisational and social cultures as well as geographic boundaries.

The positioning of the e-Learning territories represented in the following map (figure 2) depends on the proximity of each territory to the identified cardinal points, i.e.: Informal/Formal, and intra muros learning/extended learning context.

The main features of each territory are described synthetically in Table 1, where for each territory a detailed description is provided together with emerging trends and examples coming from countries.

The most important "message" that the "e-Learning territories" approach wants to pass is that an additional level of "differentiation" and articulation is needed to understand present and future dynamics of e-Learning.

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[11]For the concept of "learning patrimony" see the report "Technologies for the Knowledge Society & Lifelong Learning - Key Findings and Suggestions for Action" http://www.education-observatories.net/pole/reports_html

[12]Moises Sheinberg, (2001) *Know Thy Learner: The Importance of Context in E-Learning Design* http://www.learningcircuits.org/2001/oct2001/elearn.html

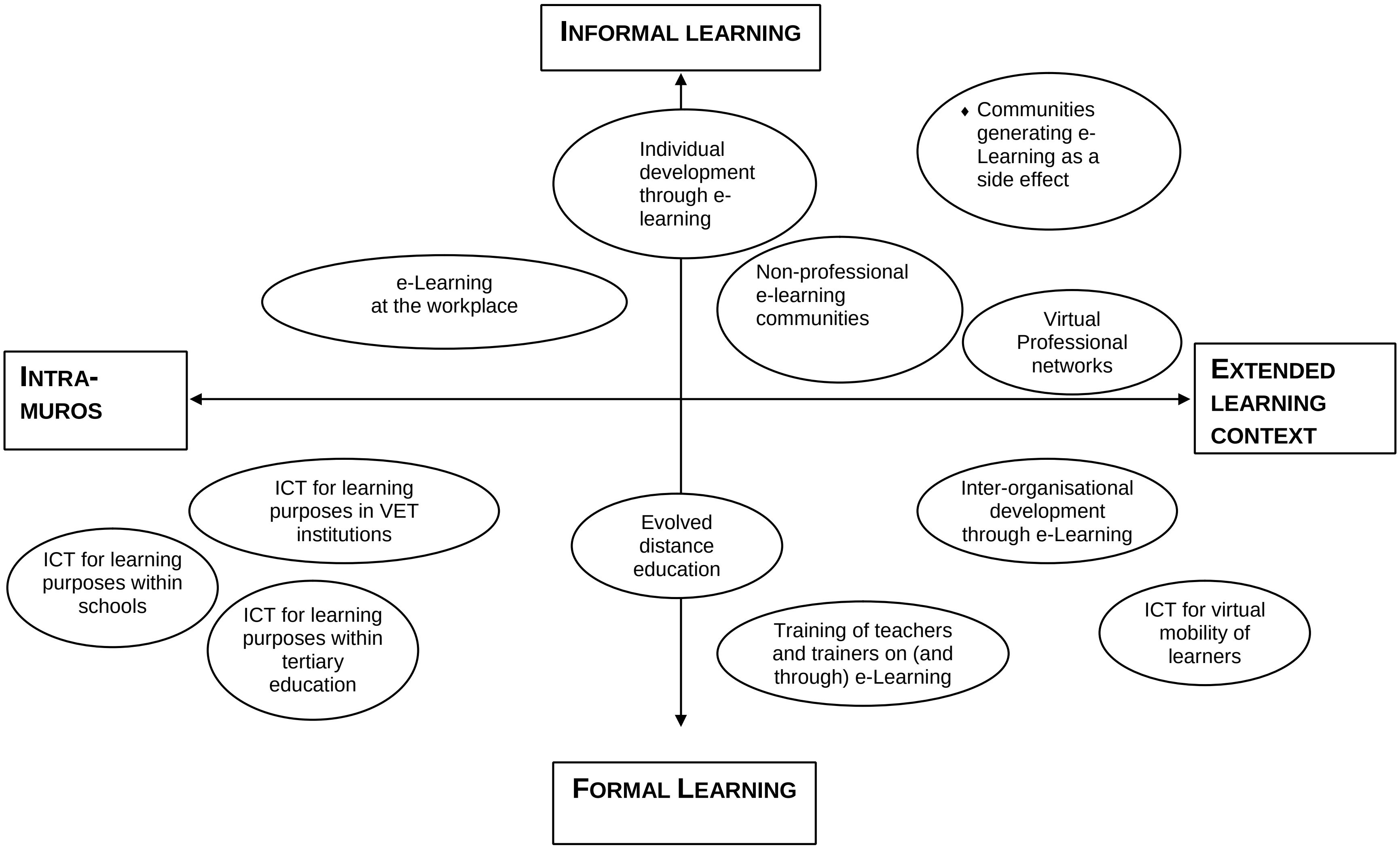

Figure 2: HELIOS Map of e-Learning Territories

Table 1. Main features of the HELIOS e-Learning Territories

Territory	Main Features
1. ICT for learning purposes within schools	Use of ICT for learning within school settings. The range of institutions covered by the term varies from country to country. The term *school* refers to primary schools (sometimes divided even further into pre-schooling and junior schools) and secondary schools. The applications of e-Learning within schools can take several forms: activities enabled through ICT conducted into classroom or at a distance (e.g. e-Homework); activities led by teachers or organised by learners' group, activities involving a single classroom or classroom networks, school e-twinning, etc.
2. ICT for learning purposes within Tertiary education	Use of ICT for learning in universities, colleges etc., which may lead to an academic degree, and in research centres. The applications of e-Learning can take several forms, ranging from lectures placed on line by a single teacher, to the dual mode or mixed mode (institutions offering programmes for both campus-based full-time students and off-campus part-time students), to the provision of degrees entirely on line. Even students or the faculty/teachers or even the university or region/country can lead initiatives.
3. ICT for learning purposes in VET institutions	Vocational education and Training prepares learners for careers or professions that are historically non-academic, but rather related to a trade, occupation or 'vocation', in which the learner participates (or aiming at). Vocational education is in most cases a form of secondary or post-secondary education. In some cases, vocational education can lead to tertiary education study and an academic degree, however it is rarely considered in its own form to fall under the traditional definition of higher education. e-Learning in the vocational training settings encompasses ways of delivery similar to those endorsed in school education or higher education, or to those endorsed in the corporate sector (i.e. e-Learning chunks on demand/on the job). In any case the most significant *trait d'union* of the majority of e-learning application into VET is the competency based approach, directed at current and likely future jobs, duties and tasks within an occupation or industry.
4. e-Learning at the workplace	Use of ICT for learning into the corporate sector and the public administration/agencies. Differences in the scope and in the delivery schemes of e-Learning, between the public and the corporate sector, prevail mainly due to the organization structures and practices and the related human resources policies. In general, e-Learning may take the form of structured training programmes fully on-line or blended schemes (complemented with seminar/classroom based training), e-Learning chunks on demand/on the job. The driving concerns related to most of these e-Learning offers are the return on investment (emerging also in the public sector), the increased access and flexibility in training delivery, the contribution of the e-Learning in achieving organisational change and fostering knowledge management practices. In this territory the slow emergence of "communities of practice" approaches is also observable in the most sophisticated organisations.

Territory	Main Features
5. ICT for virtual mobility of learners	Virtual mobility is considered an instrument for internationalization, learning, working, etc., further contributing to the integration of the European area. Virtual mobility has been at the heart of open and distance learning (ODL) projects of the European Commission since the second half of the 90s but its full scale development depends, to a large extent, on the establishment of strategic partnerships among education and training institutions focused on research collaboration and curriculum development. Constituting elements of virtual mobility are: trans-national lectures and/or learning materials, cross-border recruitment of students, intensity of communication flows, the international accreditation of learning achievements, the multilingualism, complementary to both physical mobility and conventional teaching[13].
6. Evolved distance education	According to its original definition, distance education takes place when a teacher and his/her student(s) are separated by physical distance, whereby technology means, often in concert with face-to-face communication, is used to bridge this gap. Distance education programs can provide adults with a second chance at a college education, reach those disadvantaged by limited time, distance or physical disability, and update the knowledge base of workers in on-the-job training schemes. The evolution of distance education is mainly featured by the wide adoption of ICT, as delivery means (by the "traditional" distance universities and distance learning organisations), as well as at the institutional level, through the 'birth' of a new generation of organisations exclusively offering distance and open education, in particular at the university level (e.g.: UOC)..
7. Training of teachers and trainers on (and through) e-Learning	In the foreseeable future teachers and trainers will make even more use of ICT for professional activities including lesson planning and preparation of didactic materials, recording learning progress of the students and other administrative tasks, as well as their own professional development and continuing education. Many governments are investing in preparing teachers and trainers for a 'technologically rich' future: enabling them to acquire proficiency in using technology for education purposes and also challenging their pedagogic practice.
8. Individual development through e-Learning	Individual development through e-Learning includes 'home learning' as a whole, ranging from education to training related activities, together with any other technology-enhanced learning activities not necessarily mediated by formal E&T institutions, in a 'Lifelong Learning' (LLL) perspective (acc. to the definitions outlined in the 'Memorandum on Lifelong Learning').

[13]See, on this issue, "the challenge of ICT to university education: networking, virtual mobility and collaborative learning" Jørgen Bang Aarhus university, Claudio Dondi Scienter http://www.eden-online.org/contents/publications/new_learning/the_challenge_of_ict.pdf

9. Virtual Professional networks	A professionally oriented virtual community is geared towards professionals and/or facilitates the dialogue on professional issues. Professionals participate in this type of communities, in order to contact each other and exchange information with people outside their own team or organization who require similar information to carry out their own (professional) duties. In these communities learning is sometimes intentionally generated in order to achieve professional development goals (although non professionally related learning might be a side effect)
10. Inter-organisational development through e-Learning	Inter-organisational development can be described as a cooperative relationship between organisations that relies on neither market nor hierarchical mechanism of control but it is instead negotiated in an ongoing communicative process. Collaboration between organizations has come into focus in recent years with the recognition that success in a global economy comes from innovation and sharing of ideas. The more change there is in its environment, the more connections an organization needs with the outside world. e-Learning, given the networking possibilities that it enables, is increasingly used for the purpose of inter-organisational development.
11. Non professional e-Learning communities	Non-professional learning communities can be found, for instance, in the areas of E&T, if learning is shifted to the 'virtual space'. They can be created by training providers as a complement of a course or by grassroots initiatives due to a common personal (non-professional) interest. Their learning purpose is explicitly perceived and agreed by all members of the community, although not necessarily leading to formal recognition. Learning taking place in these communities might contribute to the development of skills and competences for the workplace, but also for private and social life.
12. Communities generating e-Learning as a side effect	These virtual communities do not foresee learning as their main objective. Establishing a relationship to other members of these communities is prompted first and foremost by a common interest or common value commitment resulting from either geographical or intellectual proximity, demographic similarity, common hobbies, belonging to the same NGO or charity, to name a few. These communities may take the form of popular chat rooms, blogs, fora where informal learning takes place.

Conclusions

The analysis carried out so far should not lead to the conclusion that a "balkanisation" of e-Learning has took place: none of the e-Learning territories above has to be conceived as an insulated area with static boundaries, but rather research should be fostered on their interaction and their contextualisation into learning patrimonies[14].

Neither it can be excluded that new e-Learning territories emerge and replace those proposed or significant reshuffles among territories take place.

Moreover, different representations and descriptions of the variety of present e-Learning developments are equally plausible.

However, the articulation of e-learning territories is considered useful for several reasons:

- It helps to overcome simplistic views on functional differentiation of e-Learning
- It provides a platform for dialogue for practitioners and policy makers, and it is expected to nurture the research agenda of researchers
- It contribute to overcoming to debate on the disappearance or full-deployment of e-Learning[15] as it is argued that e-learning is at a different stages of evolution in different "territories"
- It can be adopted as a tool for forecasting e-Learning developments starting from territorial views and not in aggregate terms.

A conclusive remark could therefore be formulated: as proteus e-learning changes into all possible forms. a possible way to draw a snapshot of its present state of evolution is to frame it into evolving e-learning territories.

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[14] See above

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Ideas from the United Kingdom on research and development to utilise the innovation potential of Information and Communication Technologies in order to enhance learning

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This paper is written as a supporting contribution to the Round Table on 'Not enough research or not the right research to see the full innovation potential of ICT implemented in learning systems? Or is the problem somewhere else?' You will see from my title that I have slightly changed the focus: the goal should not be research to utilise more fully the innovation potential of ICT in learning systems but how to enhance learning in order to produce learning outcomes that are valued. It would be possible to achieve the former in a way that did not achieve improvements in desired learning outcomes – learning is ultimately about values and technology should be used primarily to enhance learning, not to achieve technologically-framed goals.

So, what can ideas from the UK tell us about my question: how can research and development utilise the innovation potential of ICT in order to enhance learning. In the UK a number of national organisations have recently produced reviews and strategy documents that directly addressed this question[1] and one outcome has been proposals to fund a programme of multidisciplinary research on 'technology enhanced learning' (TEL).[2] It may therefore be worth drawing on ideas from these reviews and strategy documents to see if they can inform a broader international dialogue on future research on learning systems innovation, of which this Round Table is a part. I am an Associate Director of the UK's Teaching and Learning Programme (TLRP), with responsibility for workplace learning, professional development and international collaboration.[3] TLRP is trying to develop knowledge of how to improve

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[1] The reviews and strategy documents include:
Becta, Review 2005: Evidence on the Progress of ICT in Education,
http://www.becta.org.uk/page_documents/research/becta_review_feb05.pdf
Becta's Research and Development Strategy 2005-8
Delivering research and evidence which can support the strategic development of ICT in education
http://www.becta.org.uk/page_documents/research/research_strategy05-8.doc
HEFCE, Strategy for e-learning (2005), http://www.hefce.ac.uk/pubs/hefce/2005/05_12/
JISC, The e-Framework for Education and Research – an Overview,
http://www.e-framework.org/resources/eframeworkrV1.pdf
JISC, Designing for Learning: an update on the Pedagogy strand of the JISC e-Learning Programme, www.jisc.ac.uk/elearning_pedagogy.html
Josie Taylor *et al*, An e-learning research agenda (2005) (ESPRC/ESRC /core e-science review group)
http://www.epsrc.ac.uk/CMSWeb/Downloads/Other/E-learningResearchAgenda.pdf
ALT Learning Technology Research Strategy – 2005
http://www.alt.ac.uk/ALT_2005_Research_Strategy_20050420.html
Technology Enhanced Learning has been identified as being of key importance for the UK government and there are official strategies in relation to particular educational sectors in Northern Ireland, Scotland, Wales and England.

[2] Research on Technology Enhanced Learning: Understanding, creating, and exploiting digital technologies for learning – Call for research proposals (TLRP 2006)
http://www.tlrp.org/manage/documents/CALLTELfinal-1.pdf
The European Commission is currently using the phrase 'Technology Enhanced Learning' for Framework VII, and will promote it as a 'new' research area. 'Technology enhanced learning' includes what has recently been termed 'e-learning'.

[3] TLRP is a £38m ESRC initiative involving, at present, some 450 researchers. The Programme manages some 60 projects and also coordinates a number of thematic investments. It has strong links

teaching and learning across all the phases of formal and informal education across the lifecourse, and has been given responsibility for managing a major new programme on TEL research.[4] From all the above I have drawn out five particular challenges that TEL research and development will have to meet if it to enhance learning and support innovation in learning systems.

Challenge 1: Research on 'technology enhanced learning' needs to be genuinely interdisciplinary

TEL as a field spans the disciplines of learning, cognition, information and communication technologies (ICT) and education, as well as drawing on the broader social sciences. However, if TEL research is to be more widely used then there needs to be greater recognition of the need to develop the area as a genuinely interdisciplinary research field. Those working in this field need an awareness of research on teaching and learning and research and development on innovative digital technologies to support knowledge development and human interaction. A virtuous circle could be created if innovation in one research area challenges those working in the other area to rethink ways of making learning more effective and researchers then collaborated in constructive and iterative processes of engagement and mutual development in order to achieve that goal.

Research areas that require collaboration across the social/educational and technical/computing research communities could include, for example, the development of naturalistic and multimodal interfaces to support distributed and mobile communities of learners, an open architecture for TEL systems, and dynamic user modelling to improve personalisation of learning. The overall challenges to the research community will be to develop innovative applications of digital technologies that will contribute to making education and lifelong learning more personalised, inclusive, flexible and productive (TLRP e-team, 2006):

> *Personalised:* Transforming the quality of teaching and the learning experience by exploiting the responsive and adaptive capabilities of advanced digital technologies to achieve a better match with learners' needs, dispositions and identities.
> *Inclusive:* Improving the reach of education and lifelong learning to groups and individuals who are not best served by mainstream methods.
> *Flexible:* Enabling the provision of education and skills to be deployed in more open, variable, and accessible ways, so that learning opportunities are

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with many user organisations and has established a significant range of output vehicles for dissemination and impact. It already has funded a number of projects that have a TEL component.

[4] The management of the commissioning of the TEL research is being conducted by the TLRP e-team: comprising Dr Richard Cox (University of Sussex); Professor Diana Laurillard (Institute of Education, University of London); Dr Lydia Plowman (University of Stirling); Professor Josie Taylor (Open University) and the Director of the TLRP: Professor Andrew Pollard (Institute of Education, University of London). ESRC, EPSRC and the e-Science Core Programme have provided approximately £6m funding for an initial four years to support a limited number of teams or consortia (approximately 3-5, with awards up to £1.5m each). Additionally, a number of small six-month development networks (up to £60k) will be funded, in anticipation of a second round of the competition, for which additional support is being discussed with potential co-funders. The TLRP e-team drew together many of the ideas that are reflected both in this paper and in the call for research proposals mentioned above. http://www.tlrp.org/manage/documents/CALLTELfinal-1.pdf

available in a more seamless environment that can link classroom, home, workplace, and community

Productive: Achieving higher quality and more effective learning in affordable and acceptable ways.

It may be self-evident that in order to understand TEL and make it more effective it is necessary to promote a strong interdisciplinary research agenda. However, interdisciplinarity brings together not only different disciplines but also very disparate research traditions. One consequence of this is that while some researchers find a new 'home' and commit to the new area, others prefer to work in the area but, in terms of their outlook, orientation and identity, remain firmly attached to their original disciplinary base. One way to overcome this may be to establish TEL research centres rather than relying on collaboration of individuals who are still in disciplinary homes.[5] Such centres have the advantage that there can be a continuing dialogue about research perspectives leading to mutual development. This type of approach may help researchers come to terms with the multiple voices and perspectives that influence the area and understand how the practice of the various disciplines differ in their approach to the adoption and use of learning technologies.

The following summary from the Research Councils funded review of TEL expresses the scale of the challenge: 'Research into e-leaning is inherently multidisciplinary, requiring partnerships between those who develop technology and a broad range of social science researchers who seek to understand the nature of learning and the interaction and organisational effects of technology. This combines perspectives, methods and theories from the technical domains (e.g. Computer Science, Technology, Artificial Intelligence); design disciplines (e.g. Design, Human-Computer Interaction (HCI); the learning sciences (e.g. Educational Technology, Psychology, Education) and the disciplines studying communication, communities and discourse (i.e. Social Sciences, Linguistics). Establishing and maintaining these multidisciplinary research teams is essential for successful e-learning research, particularly given the longitudinal nature of the research involved, and requires us to move forward in a coordinated manner in order to build effective e-learning environments in the future' (Taylor *et al.*, 2005 p. 2).

Challenge 2: recognising the value of personalising learning but recognising its drawbacks too

Personalised learning appears to be a killer application for TEL, so some advocates of TEL promote personalised learning as if it is a 'universal good.' This ignores the fact that much learning has a strong social dimension, whereby quite often an individual might rather study the same topic area as others precisely because it brings access to a peer group and a tutor, even if the topic is of less interest to her or him than another topic that he or she would largely have to study on their own. To achieve the highest ambitions for education and lifelong learning we need to exploit fully what

[5] In the US they have established dedicated e-learning research centres such as the Stanford Institute for Learning Sciences and Technologies (SILST). The UK has had inter-disciplinary research institutes at the Open University and elsewhere; and the London Knowledge Lab is an example of a centre that is multi-institutional as well as inter-disciplinary.

technology offers in support of our goals, but not to set the goals simply to get the maximum use from technology. Overuse of technology might narrow the range of learning outcomes in ways that may be unhelpful for an individual – some large IT employers, for example, were recruiting arts graduates with good communication skills as network consultants in preference to computing graduates on the grounds that it was easier to teach the former IT skills than it was to teach the latter communication skills!

So providing there is recognition that personalising learning can be more useful in some contexts than others, then using TEL to personalise learning in order to improve learning outcomes (broadly defined) is an important challenge.[6] One avenue worth exploring could be transforming aspects of the teaching and the learning experience by exploiting the responsive and adaptive capabilities of advanced digital technologies to achieve a better match with learners' needs, interests, dispositions and identities.[7] However, in order to do this, we need a more explicit understanding of the nature of learning itself, both formal and informal, and the way it is responding to changes in society and the opportunities created by new technologies (TLRP e-team, 2006).

The Association of Learning Technology (ALT) Research Strategy (2005) raises the issue, however, that it is less of a question as to whether we can deliver personalised learning experiences per se and more 'How do we deliver a personalised experience within a mass system? Unless an educational system is capable of scaling up it will inevitably be too expensive and become moribund as soon as initial enthusiasm wanes. A lot of what currently passes for personalisation is only 'skin deep', and does not really help the learner beyond a psychological feel-good factor. There are two conflicting paradigms: mass education and the user expectation of a personalised learning experience. Research into how technology can continue to help resolve this conflict is required' (ALT, 2005, para 18).

Research under the personalisation theme could explore: how digital technologies can help to match the needs, abilities, aspirations, and circumstances of learners and learning communities through personalised technology and services; how technologies can be developed and used to connect learners to networks of others and to derive social support in learning processes and to enable learners to make informed choices about their own learning and to learn where, when and with whom they want, in ways that suit their approaches to learning and learning identities; and how to provide learners with easy access to a personal learning environment that offers culturally, educationally and psychologically appropriate tools, resources, and support for their learning; the application of learning strategies and other approaches to learning, user profiling, recommender systems, learner modelling, and personal development planning, to support effective tools and services that are capable of matching individual needs, abilities, interests, dispositions and identities, and of yielding a higher level of personal performance; how to develop ways of networking individuals and groups of learners to achieve new, socially appropriate forms of

[6] In this context it is worth bearing in mind that TLRP draws attention to the need to define learning outcomes quite broadly so as to include both the acquisition of skill, understanding, knowledge and qualifications and the development of attitudes, values and identities relevant to a learning society.
[7] That this is more complex than it might appear arises partly because learners' needs, interests, dispositions and identities need not necessarily be congruent.

challenge and support in learning; the use of an understanding of the implications of personalised learning to investigate innovative solutions for new areas of curriculum development, and for new and more challenging forms of assessment (TLRP e-team, 2006).

Challenge 3: build on achievements that have already been made

One problem is that insofar as Technology Enhanced Learning is maturing as a discipline so there is a widening of the gap between leading edge research and standard practice. While some state of the art developments can perform a showcase function, it is important to build on the achievements behind the leading edge that could have a significant impact. 'An e-learning Research Agenda' (2005) took care to highlight that much has been done and a number of developments are starting to permeate approaches to education, training, learning and development. There have been significant developments in advanced ICT techniques, such as 'an advanced e-infrastructure that includes the virtualisation of computational and data resources through the techniques of Grid computing, the automated processing, integration and reuse of information through Semantic Web technologies, support for knowledge sharing and distributed team-working, and new mobile and ubiquitous computing systems' (TLRP e-team, 2006, p.3).

Additionally 'every member state of Europe now has an e-science programme, and the EC IST programme supports concertation activities in areas such as Semantic Grid and standards. The US cyber-infrastructure has also been influential. These meet internationally through community efforts such as the Global Grid Forum (GGF) and nationally through the network of e-Science centres and the e-Social Science community. Such new developments stand to benefit the entire learning technology lifecycle, starting with the conceptualisation, design and development of systems and content to support learning experiences and opportunities, through to deployment, maintenance, evaluation and reuse. Importantly, they can support practitioners and stakeholders at each stage including teachers, learners, administrators, researchers and service providers' (TLRP e-team, 2006, pp. 3-4).

More general developments in computer science are also applicable to TEL, so that in some areas it will be more a question of adapting tools rather than developing them afresh, as 'personalised tools, services and environments, context-aware computing, mobile computing, enhancement of collaboration and workflow tools and services, autonomic (self-managing) systems, human computer interaction and context-aware computing amongst others' become more widely available (TLRP e-team, 2006, p.3). Also some TEL, such as the use of virtual microscopes; simulations in science, medicine and engineering; virtual 'cases' in speech therapy and so on, are so widely used and appreciated that learning without them is now almost unthinkable.

However, there is another dimension to 'building on achievements that have already been made' and that relates to the use of evidence from research and development studies that have already taken place. In a developing field it is often more exciting to seek funding for new developments than to consolidate what has already been achieved.[8] The ALT Learning Technology Research Strategy (2005) also highlighted how there was 'a growing need for co-ordinated evaluations, which collect together smaller studies by practitioner researchers, in order to develop an understanding of the bigger picture……This needs core researchers who can cope with large distributed, possibly part time teams and trained part time researchers/evaluators in distributed, virtually connected communities' (ALT, 2005, para 42). Co-ordinated evaluations could be used to produce overview articles to be disseminated widely.

Challenge 4: implementation rather than development as the major challenge

'Recent educational research on classroom use of information and communication technologies (ICT) has found that teachers continue to be centrally important in designing and supporting learning with ICT across the curriculum. The potential of new technologies is still not being realised, with few teachers and lecturers making full use of computers and other technologies' (TLRP e-team, 2006, p. 4). Similarly, the ALT Research Strategy (2005) points to how much research in LT has been accused of 'failing to address the problems facing practitioners or resource controllers.' This was partly due to a 'frequent lack of understanding, especially by developers, of institutional contexts' (para. 4). ALT (2005) believes there to be an ongoing requirement to bring together researchers, practitioners, developers, and resource controllers in order to ensure effective deployment. Only in this way can 'embedding' of TEL be achieved. One problem is that researchers are often not bound by the same constraints that are considered the norm for mass education. Some researchers exploit technology without a thought-through pedagogic strategy, whereas other researchers use a clear pedagogic strategy but in a context of a single lesson or classroom that is treated as a 'one-off' intervention, almost totally divorced from what happens the rest of the time or in other lessons. Resource controllers do not seem to find either approach helpful. Also new approaches to learning usually have to be introduced within existing administrative, organisational, learning and assessment systems. The interaction between them is currently seriously under-researched.

If a researcher is serious about implementation then they need an evidence-informed approach to the management of change, and will need to consider how this will interact with the approach to TEL. Some questions they might ask include: How does change impact upon motivational issues? What are the drivers and rationales for change? What are appropriate strategies for managing and enabling change and mechanisms for implementation? How well do we understand issues of scalability?

Implementation not only takes place in particular social, economic, organisational and cultural contexts, but there is also often a strong political dimension too. Technology-enhanced learning has been massively over-hyped in the past (indeed from the 1960s onwards). However, if the 'selling' of the prospective rewards of technical innovation were scaled back, better managed expectations may result but would such generous funding be forthcoming?

[8] Some educational institutions have development units where the express intention is to 'follow the funding', with a preference to move on to a new development rather than trying to embed the last initiative once that funding has ceased.

The UK does have a variety of organisations that seek to promote the take up of TEL in different sectors.[9] Becta (2005) point out how 'achieving evidence-informed policy and practice is challenging. Many ICT research studies can lack utility in supporting strategic decisions. Policy and technology developments are rapid and research studies can quickly date. Links between research and decisions making can be weak' (p. 2).[10] The Becta Review (2005) highlighted how the educational context is one of variable capability with ICT – both in terms of institutional provision and educational practice. Yet there are pockets of innovation from which others can learn. Becta is seeking to develop robust ways of identifying effective innovative practice with ICT, and also understanding how it is best developed in those who have not yet developed it. Therefore understanding how organisational and professional change with ICT can be achieved is important.

Challenge 5: Issues of fairness, equity and inclusion

The development and implementation of TEL gives rise to demanding educational, technological and organisational challenges. However, these are mirrored by an equally demanding set of political, economic, social and cultural challenges. E-learning may have been recognised as politically significant by the UK government but 'concerted and co-ordinated political action will be needed to achieve the combined agendas of lifelong learning, widening participation, e-Government and active citizenship in the 21st Century. Yet there continue to be major practical difficulties that are rooted within societal and economic concerns that must be overcome. For example, the UK 'digital divide' remains a problem - women, people aged 55+, those not in work, those from social classes C2DE, and people without formal educational qualification continue to feel disconnected from our increasingly connected vision of the future' (Taylor et al. p. 8). Research is also needed in how TEL can support multiple cultures, particularly as 'Western methodologies often rely heavily on a particular style and format of online tutorial support that is sometimes replicated without thinking through the cost and cultural implications. As blended learning becomes the new norm, we should be researching what blends work best across a range of sectors, disciplines and cultures' (ALT, 2005, para 42).

A key goal of TEL should therefore be to improve the reach of education and lifelong learning to groups and individuals who are not best served by mainstream methods. Research in this area might include exploring 'how digital technologies can be used to support learners who are exceptionally talented, who have become disaffected from learning or who are otherwise unable to study to achieve enhanced learning outcomes and progression. How can technology enhanced learning - excite and stretch high achievers; motivate excluded learners through more engaging learning experiences that scaffold progress into more challenging learning opportunities; provide greater

[9] British Educational Communications and Technology Agency (Becta), for example, was set up to offer 'timely, evidence-informed, advice both on the implications of ICT for schools and the learning and skills sector and on the best way of realising the full potential of ICT in education; continue to play a leading role in developing the evidence base that is needed to underpin the educational use of ICT; and carry out in-depth studies to evaluate new technologies, applications and software in order to understand their benefit for the education system.'

[10] The aims of the Becta Research and Development Strategy (2005) are therefore to: 'deliver research and evidence which can support the strategic development of ICT in education, and to inform and influence the decisions of educational decision makers – either directly, or indirectly, via intermediaries, advice streams or national policies.' (pp. 2-3).

accessibility to learning technologies for learners with physical disabilities; support learners with cognitive disabilities to enable them to achieve their learning ambitions; provide higher quality access to learning for learners at times and places of their choice, in association with appropriate others, at any stage of learning?' (TLRP e-team, 2006, p.8). This could include developing the design principles and prototypes that will help disaffected learners or those with cognitive disabilities to make faster progress and achieve greater accomplishment of basic skills and concepts, than may be possible otherwise. Research to address issues of social inclusion could include 'making affordable the forms of inclusive accessible learner-centred design that challenge current forms of HCI; technical solutions to support learners with limited literacy, language or cognitive skills in access meaningful learning resources and experiences; finding design solutions that support learners outside the mainstream in truly intuitive, empathetic means of interaction; understanding the psychological and social requirements, and developing appropriate technical solutions, for bringing reluctant users into the digital world' (TLRP e-team, 2006, p.17).

Conclusion: educational purposes – innovation – pedagogy – technology-enhanced learning

Education should be about the development of character as well as the intellect; helping individuals develop the emotional, social and intellectual capacities to participate fully in society. If this leads to a sense that we need to reform aspects of our learning systems then this reform should perhaps be driven by clearer purposes than to, for example, to raise achievement: it could include young people feeling connected with the world; engaged with learning; valuing and respecting difference; wanting to be active citizens. Once we are clearer for example on what an educated 19 year old might look like, then we can look to pedagogic means to achieve these goals – for example, a strategy might be to develop greater resilience (Dweck, 1999); improve informal reasoning (Perkins, 1985); or help individuals develop a wider range of approaches as these are all things we do not do very well in many current approaches to education. Technology enhanced learning can play a role in this, but let us be clear that this is a second or third order issue – being clearer about educational purposes and devising a pedagogy to achieve those goals should be the drivers of innovation in learning systems. TEL may have a role to play in this but that role should not be as the driver of the reform: values driven, pedagogically sound and technologically enhanced and underpinned by research and development looks like a balanced approach to learning to me.[11]

[11] An example of appropriately modest aims for TEL comes from a consideration of the pedagogy strand of the HE eLearning programme that has as its core aims: to provide the post-16 and HE community with accurate, up-to-date, evidence- and research-based information about effective practice in the use of elearning tools; and to promote the application and development of elearning tools and standards to better support effective practice (JISC, 2005). See: www.jisc.ac.uk/elearning_pedagogy.html. This approach is informed by evidence from Beetham H (2004) Review: developing e-Learning Models for the JISC Practitioner Communities.

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Decision making model for strategic planning of e-learning implementation

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Abstract

Strategic planning of e-learning implementation includes decision making about the most suitable form of implementing e-learning on different levels. Decision making about e-learning implementation has been covered as consisting of four phases: (1) intelligence, (2) design, (3) choice and (4) implementation. During the Intelligence phase we have precisely identified our central decision problem and have conducted situation analysis. In the Design phase we have developed alternatives and established criteria and subcriteria. The questionnaire about the importance of the advantages and goals of e-learning implementation and about criteria and subcriteria significant for decision making was created. Essential for the survey was use of Croatian e-learning experts that are familiar with higher education (HE) environment. Further, we connected these findings with the results of the factor analysis which was performed on the complete survey. The results of the factor analysis have served as input in the multicriteria decision model (AHP) that we have developed in the Choice phase.

In this article, firstly we will present and analyze the results of the complete survey. Secondly, the outputs of factor analysis will be stated and compared with the model used in the questionnaire. Finally, the structure of AHP model will be given and qualitative and quantitative evaluation of the model will be indicated.

Keywords

e-learning, mathematical modelling, decision making, AHP

1. Introduction

E-learning is usually defined as a type of learning supported by information and communication technology (ICT) that improves quality of teaching and learning. Implementation of e-learning contributes to the advancement of higher education (HE). E-learning system is a powerful tool for achieving strategic objectives of the university (teaching, research and serving the society) and it contributes to the progress on the institutional level as well as the personal level, including both teaching staff and students [3]. It supports collecting, analyzing and applying information appropriately and comprises different teaching methods, for example information management, creative thinking, critical thinking, problem solving and collaborative learning [1].

Generally speaking, universities in Croatia are currently at the stage of strategic planning and bringing decisions about the implementation of e-learning in the existing academic activities. Strategic planning and decision making about the e-learning implementation is one of the aims of Tempus EQIBELT project [8] coordinated by the University of Zagreb, which provides useful platform for our research.

In our paper we will present the possibility to use mathematical models and statistical techniques in strategic planning and decision making about e-learning.

2. Objectives and Research Methodology

The overall objectives of the study are:

- to provide basis for decision making for members of EQIBELT project team and university strategy teams in the process of creation of e-learning vision and strategic documents
- to develop the general model for decision making about e-learning implementation in the HE based on theoretical findings and surveys results
- to complete the factor analysis, validate the theoretical model and reduce a large number of variables to a smaller number of factors, i.e. designing the improved theoretical model for modelling purposes
- to develop the AHP and ANP model for decision making about e-learning implementation in HE
- to compare decision models for e-learning implementation in HE based on some other research methods or built on questionnaires including experts from other countries

The specific objectives of this paper are:

- presentation and analysis of the results of questionnaire performed on expert group
- presentation and validation of the theoretical model for decision making about e-learning implementation in HE, by means of factor analysis
- developed structure of AHP model for strategic planning of e-learning implementation
- qualitative analysis of contributions from the questionnaire

We have treated decision making as consisting of four phases: (1) intelligence, (2) design, (3) choice and (4) implementation.

During the Intelligence phase we have precisely identified our central decision problem and have performed situation analysis which has included a review and presentation of key facts and major trends concerning the problem stated.

In the Design phase we have developed a theoretical model for decision making about e-learning implementation and created the questionnaire which was based on this theoretical model (criteria/subcriteria). We have analyzed many relevant sources, but the most important inputs for establishing the criteria/subcriteria and developing the theoretical model were e-learning strategic documents of leading EU universities.

The alternatives in decision making process on e-learning implementation are:

- ICT supported face-to-face learning,
- Blended learning and
- Learning that is entirely online.

In the statistical evaluation of the results we have used factor analysis to validate the theoretical model for decision making about e-learning implementation.

We have connected the results of the complete survey with the factor analysis and these results have served as input in the multicriteria decision model (AHP) that we have developed in the third phase.

The fourth phase of the decision making will be the implementation of e-learning. The action plan and the control system will be included in the fourth phase.

3. Questionnaire Description and Response

After we had developed the theoretical model for decision making about e-learning implementation, we have created a questionnaire about the importance of the advantages and goals of e-learning implementation and about criteria and subcriteria essential for decision making about the e-learning implementation. The alternatives were not included in the questionnaire, but explanation of each criteria/subcriteria was attached to the questionnaire.

The pilot survey had been conducted at the 1st Policy Workshop on Creating University E-Learning Vision and Strategy, held in March 2006 in Dubrovnik [8], where 33 questionnaires were collected. After the pilot survey, we have carried out the complete survey and collected a total of 90 questionnaires. The participants were: vice-rectors, vice-deans, members of relevant university bodies, members of government bodies responsible for implementation of e-learning methodology and technology, members of EQIBELT project team and university strategy teams, university teachers and student representatives involved or interested in e-learning, coordinators of CARNet reference centres for e-learning, members of the project team for standardization of e-learning material, project managers of e-learning projects in CARNet [7], tutors in ELA (E-Learning Academy) [7] and e-learning specialists in SRCE [9]. The criteria for the selection were: expertise in e-learning and familiarity with HE environment. In other words, a representative sample of e-learning experts in Croatia was surveyed.

4. The Results of the Survey

In this section we present the results of the complete survey on the 90 experts on e-learning in the HE in Croatia and compare them with the pilot survey.

In all questions the discrete scale for validation of importance was from 1 to 5. Figure 1 shows the ratings of advantages of e-learning implementation. In Figure 2 we can find the results of prioritizing of goals of e-learning implementation and Figure 3 ranks importance of criteria. Details about ranking of the proposed subcriteria are given in the Table 1.

The most important advantages of e-learning implementation are *Accessibility of knowledge*, *Flexibility of learning* and *Preparation of students for lifelong learning*. There are slight changes from the pilot survey but the groupings (first three advantages and last three advantages) remain the same.

The highest ranking goals of e-learning are *Improving the quality of educational process and learning outcomes* and *Innovation and modernization of the higher education system*. The goals *Prepare students for lifelong learning* and *Enable better and broader access to education* were also recognized as very important. Let us emphasize that the experts consider again, the improving the education quality as the most important goal of the e-learning implementation. It can be recognized as a sign of awareness that introduction of quality culture in Croatian higher education system is very important.

All proposed criteria were accepted as important, but four of them were ranked above the average mark of four. These criteria are *Organizational readiness of environment*, *Development of human resources*, *Availability of human recourses* and *Availability of basic ICT infrastructure*. *Legal and formal readiness of environment* and *Availability of specific ICT infrastructure* are ranked below the average. This last ranking reflects stage of development of e-learning in Croatia, which is generally below the EU level, and therefore the importance of legal framework and appropriate ICT infrastructure is not recognized. Compared to the pilot survey, this complete survey respected more the availability and development of human resources and we found it much more in accordance with EU experiences. In general, the results of the complete survey are very similar to the results of the pilot survey and this fact confirms the consistency of the performed research.

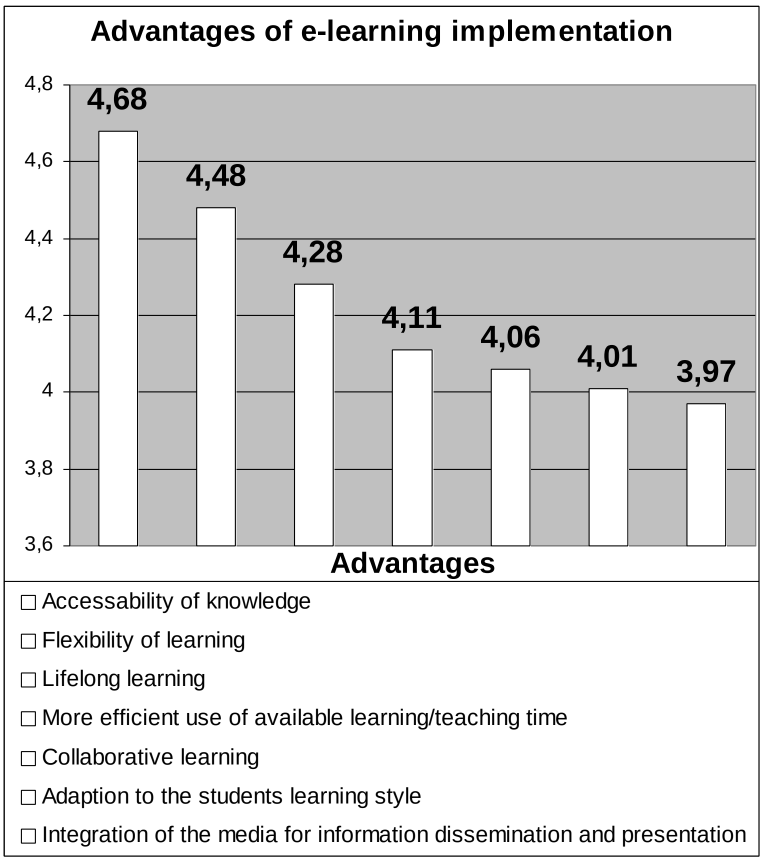

Figure 1. Advantages of e-learning implementation

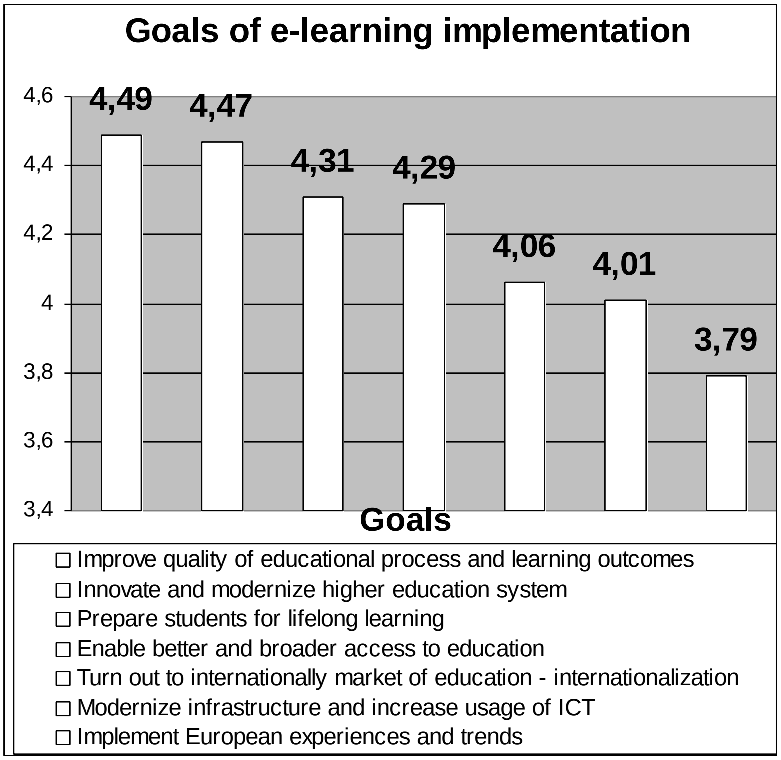

Figure 2. Goals of e-learning implementation

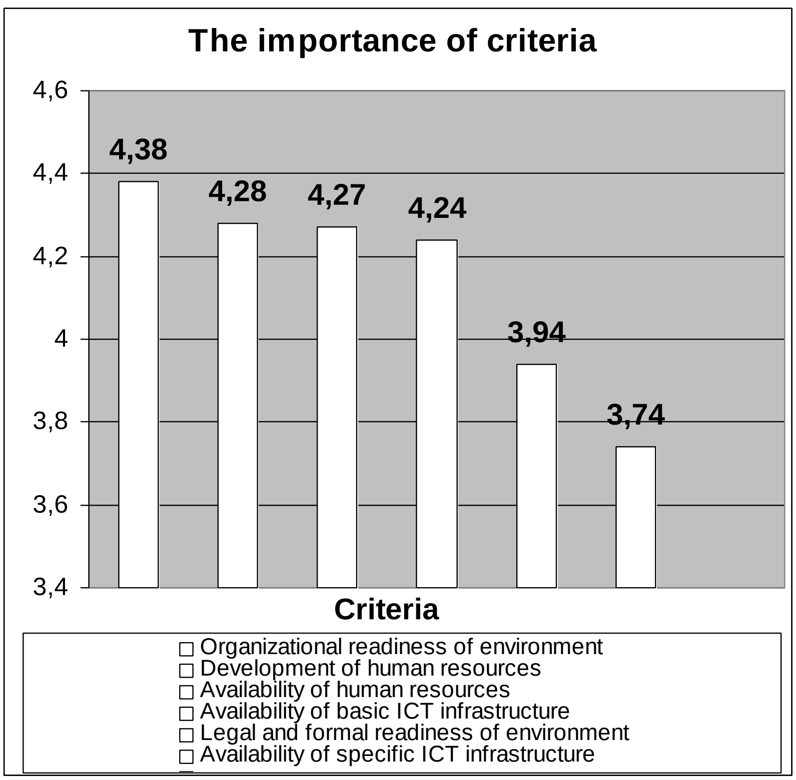

Figure 3. The importance of criteria

Table 1. The importance of subcriteria

ORGANIZATIONAL READINESS OF ENVIRONMENT	
Faculty strategy for development	**4,54**
Organizational readiness of universities/faculties for e-learning implementation	**4,42**
University framework for development	**4,34**
Financial readiness of universities/faculties for e-learning implementation	**4,21**
AVAILABILITY OF BASIC ICT INFRASTRUCTURE	
Network infrastructure	**4,50**
Teachers and students equipped with computers	**4,43**
Classrooms equipped for e-learning	**4,17**
Integral information system of universities/faculties	**3,86**
DEVELOPMENT OF HUMAN RESOURCES	
Continuous training of academic staff	**4,63**
Continuous training of support staff	**4,17**
Training of students for use of e-learning	**4,04**
LEGAL AND FORMAL READINESS OF ENVIRONMENT	
Evaluation and quality control at universities/faculties	**4,20**
System and criteria for academic staff promotion	**4,04**
Standardization of digital educational materials	**4,03**
Protecting intellectual property rights on state and academic level	**3,49**
AVAILABILITY OF HUMAN RESOURCES	
Specialized e-learning centres at universities	**4,56**
Availability of technical support staff for e-learning	**4,36**
Availability of support staff for graphical design, animation and video	**4,09**
Availability of support staff for methodology of e-learning	**4,08**
AVAILABILITY OF SPECIFIC ICT INFRASTRUCTURE	
Virtual learning environment	**4,31**
Managed learning environment	**4,06**
Library management system	**3,97**
Production of video and audio materials	**3,61**
Network videoconferencing system	**3,60**
Exam management system	**3,57**
Video and audio streaming	**3,49**
Systems for simulation and virtual environment	**3,32**

4.1. Additional contributions from the experts

In the questionnaire we asked the participants to add additional advantages and goals that were not listed. Here we point out some of their contributions.

Additional advantages of e-learning implementation at universities: possibility of student self evaluation; interactive evaluation of knowledge; constructive approach in acquisition of knowledge; building learning communities (networks of learners); enable student initiative and creativity; transparency of student assessment; enable efficient teaching for more students; better planning in advance "covers" possible mentor's inadequacies; wider accessibility of education to students with disabilities and underrepresented groups; better documented process of learning and assessment process; new emphasis on methodology and pedagogy etc.

Additional goals of e-learning implementation at universities: reduction of costs of learning and better accessibility of education and training; contribution to competitiveness of national economical players; better transparency of information on faculty and university level; increase the efficiency of studying and decrease the student drop out etc.

5. Results of the Factor Analysis

Factor analysis is a generic term for a family of mathematical and statistical techniques that can simultaneously manage over a hundred variables, compensate for random error and invalidity, and disentangle complex interrelationships into their major and distinct regularities [6].

We have used factor analysis to validate the theoretical model (Table 2), to reduce a large number of variables to a smaller number of factors for modelling purposes (AHP modelling), to specify the strength of the relationship between each factor and each variable and to determine which sets of items should be grouped together in the theoretical model. The complete results of the performed factor analysis are presented in the paper "Validation of theoretical model for decision making about e-learning implementation" submitted to JIOS [4].

The extraction method which was used in the factor analysis was Principal Component Analysis [2] and the rotation method was the orthogonal Varimax rotation [2] with Kaiser normalization. The number of factors was specified, m=5 (5 factors were recognized in the theoretical model). The factor analysis was performed with the support of the statistical program SPSS [2].

We set the lower boundary for projection of variable variance on the factor on 0.519 and noticed that 6 variables did not correlate above 0.519 with the principal components of the original correlation matrix and therefore we excluded them from the model. Moreover, 5 out of the above mentioned 6 variables relates almost equally to two or three factors. Finally, the new theoretical model was reduced to 21 variables [4]. Experts did not agree upon importance of *Protecting intellectual property rights* and *Sandardization of digital educational materials* and in our opinion it shows that in general the present state of e-learning implementation in HE in Croatia is at a rather early stage. Furthermore, the variables *Training of students for use of e-learning*, *Integral information system of universities/faculties*, *Virtual learning environment* and *Organizational readiness of universities/faculties for e-learning implementation* were excluded because of the redundancy with other variables in the theoretical model.

The factor analysis results have also confirmed 5 factors of the theoretical model for decision making about e-learning implementation (Table 2).

The factor analysis performed does not only confirm the major findings of prior data acquisition and analysis, but it also refines and better restructures our first theoretical model. We assume that there are two reasons for correspondence between the two models. Firstly, the fact that the qualitative analysis in the first part of research was thoroughly made on a considerable sample of strategic documents on e-learning implementation and, secondly, the use of experts in the survey. The latter was essential for this highly specific area which requires both familiarity with e-learning and expertise in the HE environment.

Table 2. The results of the factor analysis (*Rotated Component Matrix*)

	F 1	F 2	F 3	F 4	F 5
F1 - HUMAN RESOURCES					
Availability of support staff for methodology of e-learning	**,883**	3,415E-02	5,202E-02	-1,120E-02	-4,832E-02
Availability of technical support staff for e-learning	**,835**	6,881E-02	,119	2,543E-02	,103
Availability of support staff for graphical design, animation and video	**,761**	,118	9,200E-02	,105	1,353E-02
Continuous training of support staff	**,709**	,146	,164	,196	,106
Specialized e-learning centres at universities	**,652**	-1,242E-03	,176	,206	4,064E-02
Continuous training of academic staff	**,610**	,175	,139	,238	,156
F 2 - SPECIFIC ICT INFRASTRUCTURE FOR E-LEARNING					
Video and audio streaming	-,196	**,840**	9,800E-02	-1,927E-03	,108
Network videoconferencing system	-5,610E-02	**,806**	,176	,204	,154
Systems for simulation and virtual environment	,265	**,784**	-9,944E-02	9,253E-02	,153
Production of video and audio materials	,214	**,769**	9,195E-02	-9,597E-03	-4,100E-02
Exam management system	,160	**,609**	,254	,136	-,101
Library management system	,242	**,603**	,179	9,750E-02	-,276
F 3 - BASIC ICT INFRASTRUCTURE FOR E-LEARNING					
Network infrastructure	,163	,193	**,778**	,107	3,312E-02
Teachers and students equipped with computers	,266	,105	**,720**	-6,693E-02	-1,287E-02
Classrooms equipped for e-learning	-3,167E-02	,183	**,625**	2,887E-02	,564
Managed learning environment	,268	,233	**,528**	,417	-,240
F 4 - STRATEGIC READINESS FOR E-LEARNING IMPLEMENTATION					
Faculty strategy for development	,191	3,302E-02	5,800E-02	**,792**	,154
University framework for development	9,796E-02	,282	-,100	**,662**	-3,168E-02
Financial readiness of universities/faculties for e-learning implementation	,194	-3,291E-02	,397	**,558**	7,218E-02
F 5 - LEGAL AND FORMAL READINESS FOR E-LEARNING IMPLEMENTATION					
System and criteria for academic staff promotion	,123	-9,182E-02	-4,377E-03	2,484E-02	**,807**
Evaluation and quality control at universities/faculties	,340	,251	6,778E-03	,289	**,512**

6. AHP Based Model for Decision Making on E-Learning Implementation

AHP is one of the most widely exploited decision making methods in cases when the decision (the selection of given alternatives and their prioritising) is based on several criteria/subcriteria.

The method application can be explained in four steps [5]:

1. The hierarchy model of the decision problem is developed in such a way that the goal is positioned at the top, with criteria and subcriteria on lower levels, and finally alternatives at the bottom of the model.
2. After the hierarchy has been determined, the decision makers begin the procedure of prioritising in order to determine the relative importance of elements on each level. On each hierarchy structure level, the pair-wise comparisons should be done by comparing all possible pairs of the elements of this level, starting with the top of the hierarchy and working this way to the lowest level.
3. On the basis of the pair-wise comparisons, relative significance (weights) of elements of the hierarchy structure is calculated. Finally, these results are eventually synthesised into an overall priority list of alternatives. Decision maker is allowed to change preferences and to test the results if the inconsistency level is considered high.
4. Results are priorities of the alternatives in the form of priority list of alternatives and hierarchy tree with objectives' relative significance. The sensitivity analysis is also carried out. Sensitivity analysis is used to determine the sensitivity of the alternatives to changes in the objectives' priorities.

In the Choice phase, we have developed AHP based model for decision making on e-learning implementation based on the reduced and restructured theoretical model (21 variables).

We have built the AHP model in TeamEC2000 software which is specially designed for making group decisions. The hierarchy tree (criteria and subcriteria) and alternatives for our problem are shown in Figure 4.

The evaluation of the established AHP model will be carried out in two ways. First approach is based on the qualitative analysis of similarity of the obtained results with implementation strategies of comparable European universities. The problem in this analysis is that the Croatian universities did not define their benchmark universities. Benchmark universities are a group of universities which we would like to compare ourselves to. These comparable universities have to be identified on the university level as a result of serious institutional research and therefore this can not be obtained as the output of some individual research.

The second one is quantitative one in which as a sample, the group of the vice-deans/deans of faculties, schools and departments and the members of university bodies responsible for teaching, quality improvement or university development, will be used. These professionals have a responsibility to initiate and implement strategic decisions about the most suitable option for e-learning implementation at Departments/Faculties/Universities in Croatia.

The results of the group decision making incorporates knowledge of all stakeholders in the process of group decision making and will conclude with the recommendation for applying the most suitable option for implementing e-learning. This evaluation will be reported on in another paper.

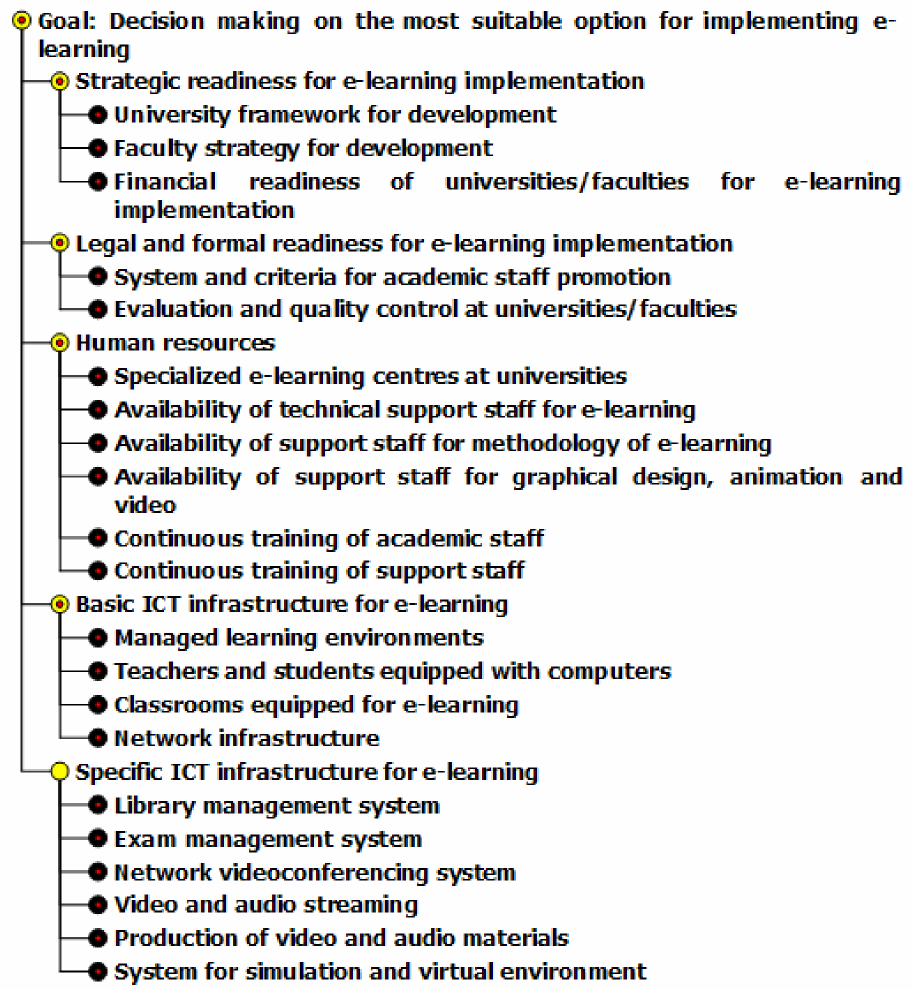

Figure 4. AHP based model for decision making on e-learning implementation

7. Conclusion

The results of the survey performed on group of experts on e-learning in HE were used as input for mathematical modelling. This modelling contributes significantly to institutional planning, management and quality development for online distance education and e-learning.

Organizational readiness, that includes university framework and faculty strategy for development, as well as Financial readiness, were recognized as the most influential criteria for e-learning implementation. Furthermore, the Human resources criterion, that covers continuous training of academic staff, support staff and students, was also highly ranked.

Survey participants ranked the Basic ICT infrastructure much higher than Specific ICT infrastructure and this, among other, reveals the fact that Croatian universities still starve for basic ICT infrastructure.

Legal and formal readiness is in the AHP model was reduced to just two subcriteria (Academic staff promotion and Quality control), since the Standardization of e-learning materials and Intellectual property rights were not uniformly recognized as significant or insignificant in the factor analysis.

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IDENTIFYING INNOVATION IN HIGHER EDUCATION ELEARNING STRATEGIES

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Introduction

There are many case studies of individual Higher Education Institutions (HEIs) devising distinctive eLearning strategies, reported by the HEI itself, journalists, or research observatories. An extraordinarily wide range of university-level eLearning programmes are rapidly becoming available from large numbers of HEIs across Europe, and there are strong attempts being made to identify and disseminate case studies of innovative eLearning practices (e.g. MENON, 2006). However, the vital research goal of obtaining more systematic evidence across countries in relation to HEIs' innovations in eLearning strategies represents a particular challenge for collectors of case studies, especially given the diverse processes in different countries for measuring pedagogical value and cost-effectiveness.

By contrast, there are typically several reports a year of large-scale attempts to survey HEIs in relation to eLearning, sponsored, for example, by EU programmes or industry groups. Yet the factors that determine educational effectiveness are not, so far, well understood; and consequently it can be difficult to develop reliable quantitative survey items that simultaneously enable valid and insightful comparisons between essentially qualitative eLearning strategies. Moreover, such quantitative evidence is not collected systematically by the typical HEI; when collected, such evidence is commercially sensitive; and it is not easy for researchers to obtain independently of the HEI.

So, claims are made, for example, that European universities plan to "expand their use of eLearning" (BBC News, 2005), but it is not at all clear what measures of expansion are appropriate, and what kinds of strategies are associated with such expansion.

The two-year research study described here attempted a mixed-method approach to the problem of identifying examples of innovation in relation to the eLearning strategies developed by HEIs. Where possible the study estimated the impact of the implemented eLearning programmes, but the emphasis was on illuminating a range of innovative eLearning strategy cases, rather than necessarily determining best practice.

Two key research questions asked by the study are:

1. How can innovation in Higher Education eLearning strategies be identified?

2. What factors are critical to the success of these strategies?

This research did not set out to obtain, directly, insight into why eLearning has not been more widely adopted by HEIs, why various eLearning projects have failed, why some eLearning projects have achieved less success than anticipated, or why some eLearning projects have achieved success more slowly than anticipated. However, by researching innovation, the challenges faced by the innovators, and how strategies needed to change over time, it is anticipated that the findings from this study might indirectly illuminate these crucial questions.

It is not possible within the space available here to do more than outline the methodology and highlight a few key findings: fuller reports are available on the project website www.spi.pt/innounilearning/

Methodology

The study was divided into a number of phases. In Phase 1, a survey instrument was used in combination with a range of mostly quantitative data sources to develop a list of 64 HEIs with potentially noteworthy eLearning programmes. In Phase 2, fuller data was collected on 25 of these HEIs, using, where possible, multiple interviews supplemented by evidence from documentary sources. In Phase 3, intensive data collection visits were made to eight of the HEIs.

Phase 1(a): Identification of population

The first step aimed to compile a comprehensive list, in each of the research partners' countries (France, UK, Hungary, Austria and Portugal), of HEIs with potentially noteworthy eLearning programmes. The European Commission's definition of eLearning was adopted: "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" (EC, 2001).

The original plan was simply to identify HEIs that had programmes satisfying this definition. However, this proved to be not as straightforward as might be expected. For example, while some 95% of the UK's 200 (or so) HEIs are using Virtual Learning Environments (VLEs) (Jenkins, Browne & Walker, 2005), the number of potential HEI candidates in Hungary was very much smaller. Furthermore, while it was clear that some HEIs had implemented institution-wide VLEs, with extensive use of online resources, services and discussion environments, in other HEIs just a few departments or courses were engaged in eLearning innovation. For many HEIs, it was not always possible to tell from websites and prospectuses whether "remote exchanges and collaboration" in fact took place at all.

So a range of sources were used to compile these initial population lists, sources which inevitably varied from country to country. These sources identified HEIs which…

- have featured strongly in previous surveys or case study collections (e.g. the "Forum neue Medien in der Lehre" in Austria);
- have a high media profile as long-standing eLearning players;
- offer eLearning courses through well-known international consortia (e.g. the World Universities Network);
- have been referenced in academic literature;
- have featured in leading conferences in relation to eLearning (e.g. ELearnExpo in France; eLes04 in Portugal; Online Educa and EDEN);
- have won awards, accreditation, or government funding for major eLearning-related initiatives (e.g. JISC projects in the UK or the Portuguese e-U initiative);
- were nominated by eLearning practitioners in HEIs already identified.

Basic data was then collected on each HEI from public websites, including (where available) names of central units involved in eLearning, technological tools and teaching methods used, particular curriculum strengths, and specific eLearning initiatives.

Given the very high numbers of HEIs identified, particularly in France and the UK, it was decided that an element of selection was needed, in order to ensure a manageable workload. So judgements were made on the basis of the evidence collected above about which HEIs seemed the most "noteworthy". These judgements were validated by an Advisory Panel, resulting in a final sample size of 87 HEIs, as shown in Table 1.

Country	n
Austria	13
France	25
Hungary	7
Portugal	11
UK	31
Total	87

Table 1: Numbers of HEIs selected for the survey

Although this latter selection process was done on a principled basis, it would have been preferable to have surveyed all the HEIs identified. Sampling would have been a possible alternative approach, but the aim was to maximise the chances of identifying innovation rather than to obtain representativeness.

Phase 1(b): Development of survey instrument

Criteria were developed to help identify particular strengths. Paulsen (2003) observes that recurring themes in recommendations from European projects about success factors in large-scale online education are related to institutional processes, cost-effectiveness and sustainability, efficient and well-integrated ICT systems, and a focus on pedagogy and online teaching. To elaborate these criteria, a range of academic literature was used, including the review of eLearning by Wentling et al (2000), which emphasised a multi-level approach to evaluation, including organisational aspects and student satisfaction; WCET (2001), which looked at best practices in institutional activity relating to eLearning; Massey (2002), which surveyed 450 eLearning adopters across the EU; Franklin et al (2004), which aimed to identify critical points for evaluating eLearning; Huang et al (2004), which examined what factors an accreditation system for online teaching should take into account; Hodgson (2002), which considered pedagogical practices in EU-funded programmes; and JISC (2005) which summarised a range of projects looking at pedagogy in higher education.

In order to gather data relating to these criteria, a questionnaire was constructed, drawing on this literature and more. It asked detailed questions about eLearning at the HEI using four sections: *Teachers*, *Learners*, *Teaching Methodology* and *Institution*. The questions sought quantitative or categorical responses where possible, in order to facilitate comparisons across HEIs, with opportunities to highlight innovations. The questionnaire was validated by the Advisory Panel, and is available at the project's website as part of the eLearning Programme Review Process Document.

Phase 1(c): Survey and additional evidence

The questionnaire was translated into the languages of the countries involved, and the selected HEIs were contacted to request their participation. An overall response rate of 74% was achieved; and the responses were subjected to detailed quantitative and qualitative analysis.

Portugal came out particularly strongly overall. Hungary showed strength in the section on teachers, while the UK was strong on institutional aspects. However, one should be cautious in making country comparisons, not least because of the linguistic differences. It was also clear that the rankings within countries provided some surprises in comparison with the data on noteworthiness gathered in Phase 1(a). Much of this could be attributed to differences between respondents rather than between HEIs. A particular problem of this kind of survey is that for large HEIs in which responsibility for eLearning is decentralised to faculties or departments, there is not always a single individual who can simultaneously represent the HEI in terms of both innovation in particular curriculum areas and in the institution-level infrastructure and processes that support innovative eLearning. Sometimes it proved difficult for HEIs to identify which individuals collectively would be best-placed to complete the questionnaire. So it is possible that the results over-represent HEIs in which eLearning is predominantly centralised (33%), or part of an institution-wide initiative (32%).

Some respondents were also clearly more enthusiastic than others in highlighting their institution's eLearning successes. Moreover, it is likely that respondents were eLearning advocates. For example, email (71%) was cited more often than face-to-face interaction (59%) as a mechanism for "learner to learner" and "learner to teacher" interactions. Paper-based assignments and online assignments are almost equally used, although paper-based exams (56%) are still used more often than online exams (25%).

How well the perceptions of eLearning advocates match reality is difficult to tell. In selecting HEIs for more detailed examination, it was therefore decided that in addition to ten HEIs selected purely on the basis of the questionnaire data, a further three institutions per country would be selected (making a total of 25), by supplementing the data with additional qualitative evidence available in the public domain and building on the data on noteworthiness gathered in Phase 1(a). This process also enabled the study to represent a diversity of strategies across the countries involved, rather than simply selecting those HEIs that scored highest in total. As earlier, an Advisory Panel conducted a review of the selection process prior to the start of the next phase.

Phase 2: Data collection for the 25 highlighted HEIs

In Phase 2, fuller data was collected on the 25 selected HEIs. Where possible, multiple telephone interviews were supplemented by evidence from documentary sources.

The schedule for the telephone interviews was based on a benchmarking methodology developed by the United States' Institute for Higher Education Policy (2000), which intended to provide a measure of eLearning quality. The interviews supplemented the data already obtained on aspects such as course development processes; the pedagogical guidance and support available to staff; the range of student activities, the resources available to them, their interactions with tutors and other students, and their assessment; and the use made of data on educational effectiveness, enrolment and costs.

Some 43 interviews were conducted, and subjected to a range of analysis techniques. Findings from these 25 highlighted HEIs are summarised in the "Noteworthy eLearning Programmes Report" on the project website. Some key findings are given in the discussion below.

Phase 3: A detailed study of eLearning strategies – case study visits

In Phase 3, eight HEIs were selected for detailed eLearning strategy case studies. Campus visits and interviews were arranged with senior management, with those staff involved in originally creating the programmes, with the teachers currently involved in the programmes, and with existing or former students. Each case study provides an overview of the institution, its educational structure, curriculum needs, and eLearning strategies.

The inclusion of the student perspective and of all available evidence of educational impact was seen as particularly important. Clegg et al (2003) argue that uncritical acceptance of pressures to adopt new ICT for education, under the rhetoric of "student-centred learning", can turn out to have negative consequences for students.

The format of the case study visits was based on the template developed for JISC in the UK, and the interview schedules attempted to establish stakeholders' perceptions of quality and factors of success, in relation to aspects such as the environments for learning, pedagogic approaches, course development processes, and quality improvement processes. The interviews also attempted to identify how the HEI's eLearning strategies have developed over time.

Findings

The study found firstly that blended learning is overwhelmingly the preferred teaching mode: in only two of the 25 HEIs were purely online programmes featured as cases of innovation.

Secondly, while a minority of the HEIs have formal eLearning strategy policy documents, two distinct types of strategies were observed: some HEIs have chosen to target niche markets, such as international postgraduate professional programmes in particular departments; other HEIs are aiming for whole-institution strategies from the start. Wirtschaftsuniversität Wien provides an example of a niche strategy, beginning Learn@WU in a small way with the faculty of Business Computer Science, and seeing wider acceptance develop. Dennis Gabor College, Budapest, and IAE, Caen have similarly used niche strategies to build up eLearning gradually. The UK Open University, in contrast, emphasises large-scale systems in its whole-institution strategy. ENIC, Lille is similar in that eLearning is a required component of all programmes.

Thirdly, while there are differences between these types of strategy (see below) in terms of the factors that respondents noted are critical for success, there are also some commonalities. In particular, the study provides some evidence supporting the hypotheses of Bates (2005) that these critical factors included:

- sustainable business plans, including an accurate assessments of the student market and control of costs;

- an ambition for quality assurance processes and student support services to be at least as strong as those in established programmes (whether these established programmes are face-to-face or traditional distance education), with an emphasis on "customer-focused" objectives such as providing timely and constructive feedback on assignments and queries, and on facilitating student interaction with tutors and peers; and

- technology that is robust, scaleable, affordable, productive, and widely accessible, with good quality technical support.

Somewhat surprisingly, there seemed to be little use made of data on enrolments, costs, and successful or unsuccessful applications of technology to evaluate programmes' effectiveness.

Differences between HEIs adopting the niche strategy and those adopting the whole-institution strategy can be illustrated by comparing Universidade do Porto and the University of Ulster. Both HEIs have multiple campuses, faculties with a high degree of autonomy, and a history of eLearning innovation that had led to a proliferation of systems of varying robustness. But while Porto established institution-wide technological and student support frameworks to advance eLearning, Ulster decided to create international online courses in niche areas incrementally. For Ulster, critical success factors included ensuring early triumphs, designing the initial technical and student support systems in such a way as to allow generalisability, and targeting staff development at those creating new courses. For Porto, critical success factors included motivating staff through an Excellence Award rather than pressuring them, and promoting best practice cases. Both HEIs established effective central teams to help staff build eLearning courses and to provide student technical support.

Finally, nearly all the respondents noted that the shift towards eLearning has been accompanied by a shift in pedagogical approach, towards more collaborative, problem-based and project-based learning. Several respondents noted students becoming more independent in their learning: more willing to ask questions, to seek alternative resources and to discuss with their peers. Educators, too, seemed to be aware of changes in their role as students exploit the flexibility of eLearning to become more autonomous and less constrained by place and time.

In relation to the question of how innovation in Higher Education eLearning strategies can be identified, no easy answers were found. A range of sources were found to be needed in each country to identify an initial population, while the effectiveness of the survey was hugely influenced by the quality of responses. Very different HEI lists were generated by these two different data collection approaches. The schedule of questions used for the telephone interviews of Phase 2 and the campus visits of Phase 3 produced rich accounts of innovation; but if there is to be viable identification of innovative strategies across countries, then further work is needed to refine the survey instrument to take account of these schedules.

This study has not attempted to compare HEIs that have been successful in eLearning with those that have been unsuccessful, so one has to be careful about interpreting these results. Moreover, the methodology suffers from dependence on self-reporting, common to case study and survey research in this field. However the research does at least provide some evidence of the factors that those who have implemented successful eLearning strategies consider to be critical, drawing on the innovators' diverse experiences of having to refine their strategies over time.

Acknowledgments

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Beyond the Hype – Towards a Research Methodology for Assessing Institution-Wide Relevance of Novel Educational Technologies

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Abstract

In recent years, the e-learning community has witnessed a steady increase in innovative web-based technologies and platforms that have immense educational potential, such as weblogs, wiki's, audio/video streaming and podcasting. The phrase "Web 2.0" has become a buzz-word and every self-respecting higher education institution has to take position with regard to the technologies and the innovations that they afford. We want to argue that a period of intensive multi-disciplinary research is needed in order for an institution to make informed decisions as to the relevance of such technologies for its mainstream educational activities. In this paper we describe the first steps in search of a generalist methodology for performing such multi-dimensional and multi-disciplinary assessment research, by reflecting on the practices at our own institution.

The suggested technology assessment methodology takes its starting point in assessing the educational relevance of a certain technology on the basis of reports in the literature and selected experimental setups, both locally and in international contexts. This assessment includes an evaluation of the fit of the new technology with existing educational practices or with the long-term educational direction of the institution. In a second –parallel – phase the new technology's degree of fit with existing technologies is assessed, together with its scalability and maintainability at the institutional level (and thus the economical and organisational aspects of the technology). The need for teacher training is assessed through the organisation of training seminars. Finally, the need for support structures and people is estimated by extrapolating the experiences of the technical staff with the experimental technology setup.

These data are then gathered into an assessment report which is presented to the institutional decision makers, who will decide on the status of the technology within the institution, i.e. whether the technology enters the realm of mainstream technologies – with full support from the institutional technology staff – or whether it continues to have the status of "experimental technology".

The paper concludes with some suggestions for the further development of a technology assessment methodology for higher education institutions.

1. Introduction

Higher education institutions are being faced with a rapidly changing technological landscape, increasing flexibility demands in the organisation of formal education, as well as increased competition from new education providers both at the national and the international level (Turner and Stylianou 2004; Downes 2005; Wise and Quealy 2006). Learning is gradually moving from a purely campus-based face-to-face activity to a blended form, in which some learning activities are supported through e-learning tools. In recent years, a majority of higher education institutions have chosen to support part of their learning and teaching activities through the use of so-called

Virtual Learning Environments (VLE's) or Learning Management Systems (LMS's). In most cases, these VLE's consist of vendor-supplied monolithic platforms that are structured around course content as it is offered by a teacher. Such monolithic systems have – in some cases – been integrated with other organisational ICT to allow for efficiency and scalability (Truyen and Van Rentergem 2005).
However, a tendency appears to be emerging towards more flexible systems and architectures - such as so-called service-oriented frameworks (Wilson, Blinco et al. 2004) - that can support multiple types of learning (Portier and Koopal 2005) within and across institutions (Koopal, Laagland et al. 2005).
Indeed, the past 5 years have witnessed the emergence of a plethora of innovative web-based technologies and tools - collectively named "Web 2.0" - that have educational potential, such as collaborative content creation and management tools (e.g. Wiki, Weblog, Plone, Drupal), web-based meeting and collaboration platforms (e.g. Breeze, Skype, WebEx, FlashMeeting), online multimedia sharing (e.g. video streaming, podcasting, Flickr), content sharing and syndication (e.g. del.icio.us, RSS). These technologies are becoming increasingly popular outside the arena of formal education, and they are now gradually entering the educational realm, because of their ability to cross institutional, regional, cultural and national boundaries.

Problem formulation

Within this dynamic landscape higher education institutions need to find a balance between flexibility of learning support – including the need to support emerging educational tools – on the one hand, and efficiency and scalability of ICT solutions on the other.

The literature shows at least two possible scenario's:

a. some universities opt to radically change their ICT infrastructure to service-oriented frameworks in order to achieve this balance and allow for easy integration of external tools (e.g. UTwente: Koopal, Laagland et al. 2005), whereas
b. others choose to retain their more transaction-based systems and add new functionalities that continue to make use of the underlying organisational databases and thus capitalise on the investments made (e.g. K.U.Leuven: Truyen and Van Rentergem 2005).

Both scenarios pose technological challenges with regard to the integration of new educational tools into the existing systems, since the new tools need to fit with existing technology. Therefore it is argued that – for both scenarios – it is important to perform a thorough review of new technological tools that emerge, and try to establish the level of need for the new technology, as well as the degree of fit with the educational model(s) of the institution.

Research question

How does one go about to perform such a thorough multidisciplinary assessment of the institutional relevance of new educational technologies?
Can a general research strategy be developed to perform such assessment exercises and what would be the different components of such a strategy?

In the following sections we develop a first draft of such a strategy on the basis of our experience at K.U.Leuven. We also reflect on the limitations of our approach and on possible future paths.

2. Elements of a technological assessment strategy

We want to suggest a theoretical assessment strategy that contains at least four stages of research. We will briefly describe the different stages, give more concrete examples and refer to the concrete case of the K.U.Leuven. Please note that this paragraph only describes the assessment stages and not the eventual implementation stages. Moreover, the chronology in the model is probably theoretical: in practice, a number of these stages will coincide.

a. Detection stage (What's happening out there? Is something missing in here?)

A first important stage is the detection stage. We want to argue that an organisation needs sensors within and outside the organisation that scan the environment for potentially useful tools and technologies. Such an organisational sensor can take different shapes. It can consist of one or more specialist departments or services within the organisation whose task it is to support, develop or do research in educational technology. The sensor can also consist of teachers or teaching teams who consider themselves as educational forerunners or innovators, and who have a tradition of trying out new things. Sensors may take the shape of teachers, researchers or administrators who visit other institutions and take home some novel ideas. Finally, the technology detection sensor can be situated at a more strategic management level within the organisation, if environmental changes force radical changes on existing educational practice.

Organisations can choose to actively support the detection stage, or leave the detection to coincidence or chance. Possible ways to actively detect new technologies include the installation of one or more specialist 'sensor' departments, membership of cross-institutional networks of innovators, financial support measures for educational innovation, etc.

In this stage it is important that the signals that are picked up by the sensors are channelled within the organisation to the right level of decision making, depending on the nature of the organisational sensor. In case of a specialist department working with educational technology assessment, the decision regarding which technologies to further investigate may lie with the local management. In settings without a specialised department a specific channel needs to be set up such as an advisory committee, or a member of senior management with a specific educational technology focus. On the other hand, it is also important to keep as wide a scope as possible at this stage, in order not to rule out potentially powerful tools or technologies.

b. Needs analysis stage (Is it something that we need? Who is using it already?)

Once a new technology or tool has been identified, it is important to establish whether there is a current or future need for the technology. The main activity in this stage is to gather examples from within and outside the organisation, and to try and estimate the potential scale at which the technology may be used. Relevant questions at this stage include: for which type of teaching or learning has this technology proven

appropriate, useful or necessary; what are the experiences of the teachers and students who use it (either within our own institution or outside); how many similar learning situations can we envisage for which this technology may be needed, etc. Possible sources of information at this stage include specialist journals, weblogs, communities-of-practice and presentations at conferences, but also interviews with internal users. Possible active interventions at this stage may include pilot studies, feasibility studies or comparative analyses financed through internal or external funds.
In this stage it is important to try and assess the merits of the technology proper, i.e. without referring to the specific educational or technological situation at one's own institution. It is of major importance to assess the source of the information, in order to establish the need for or potential use of the technology. It has too often been the case that technology providers or developers have pushed a new technology as 'the next revolution in education' (Cuban 1986; Verjans and Van Petegem 2006). It is important to "see through" the hype.

c. Alignment analysis stage (How does it fit with educational policy & technology?)

Once the potential need for or usefulness of a new technology has been established, the most important stage of the assessment process needs to be initiated, a stage in which attempts are made to determine the level of alignment of the new technology with the current and the future situation. "Alignment" or "fit" is a well-known concept in the literature on strategic and ICT management, and refers to a set of parameters and relationships between those parameters which are in a temporary state of balance (Zajac, Kraatz et al. 2000; Bergeron, Raymond et al. 2001). This alignment needs to be assessed in different areas: institutional educational policy and strategy, educational practice, technological compatibility, administrative compatibility, and fit with support and training processes. This consultation round involves a broad range of internal (and external) stakeholders, during which the characteristics of the new technology need to be matched against the characteristics of

a) *Current educational policy and strategy of the institution*, if and when it is available. If there is a mismatch between some of these characteristics, one needs to establish whether the educational policy or strategy is currently under revision. If this is the case, the new technology may match the envisaged educational policy, in which case the new technology may contribute to the change from the current to the future situation. For example, if the educational policy of university X has a strong student-centric focus, and a technology is purely teacher-centric, the adoption of such technology will probably create an unwanted mismatch.
b) *Current educational practice*. In quite a number of institutions there is a gap between educational policy and practice. If a new technology does not fit with current educational practice, resistance against the new technology may be expected, and the impact of that resistance needs to be assessed. For instance, if institution X has adopted an educational policy that is student-centric, but current practice is teacher-centric, then the introduction of student-centric technology may create an intended mismatch, with the aim of supporting the transition to student-centric education. However, a fair amount of resistance against the technology is to be expected, and the impact of that resistance needs to be assessed and accompanying measures need to be planned for.
c) *Technological architecture and infrastructure*. Technological solutions that are based on completely different architectures or on incompatible

infrastructures require a great deal of extra development, tailoring and maintenance. Important technological issues include adherence to international standards, compatible systems of authentication, authorisation, security, content, etc. For instance, if institution Y has invested a large amount of effort and money in the development of comprehensive ICT systems (ERP solutions) to streamline data management and administrative processes, new technology that can easily be linked to those ERP systems will align better and will need less tailoring and maintenance. Only if the existing data management and administrative technologies prevent an institution from achieving its strategic objectives, will it make sense to introduce educational systems that are completely independent from the existing technology base. An example is the LMS advice that was developed at the Technical University of Twente in the Netherlands (Koopal, Laagland et al. 2005), where the existing LMS was proving itself to be insufficient, and where the opportunity is being used to make a fresh start, and perform a thorough technology assessment exercise.

d) *Administrative compatibility*. Formal education involves a number of administrative and legal issues that may cause mismatches with some of the Web 2.0 technologies. Administrative issues include formal student evaluation or other official processes related to certification of knowledge or learning. For instance, if educational legislation stipulates that the content on the basis of which students are assessed needs to be archived for at least 5 years, then inherently dynamic systems such as wikis or discussion forums will need to be adapted to allow those rules to be applied. Legal issues include protection of intellectual property rights, privacy, liability, etc. For instance, European legislation concerning intellectual property rights stipulates that specific copyright-related exceptions apply to restricted educational environments. Systems that allow open access to content and/or learning and that make use of copyright-protected materials may not be able to apply the exceptional rule.

e) *Accompanying organisational processes*. Part of the alignment assessment relates to accompanying organisational processes, such as access to technical experts, support resources and training staff. Possible instruments to assess these processes are to a list of available technical people, their competences and their workload, the availability and workload of current support and training staff, and the organisation of prototype training sessions for selected staff members. These data comprise the preparation of the next stage in the technological analysis, in which the business case is made, by producing estimates of the financial and organisational cost as well as the expected benefits and added value, both in the short and the long term.

d. Business / organisational impact analysis stage (When we take this to an institutional level, what will it cost and where will it lead us?)

A final stage in the assessment of new educational technology brings together the results of the previous stages and builds a business case on top of that. The results of the previous stages are reported by summarising (a) the added value of the new technology for the institution in relation to its current and future educational and organisational strategy, (b) the outcomes of pilots or experiments (within the institution or in other institutions), (c) a comparison of similar tools and products, and (d) the result of the alignment evaluation stage.

A succinct business case needs to be made – depending on the envisaged size of the investment – which tries to quantify the expected costs and benefits of introducing the technology, as well as the expected impact on the organisation for the short and mid term. A project needs to be defined with clearly quantifiable outcomes, milestones and deliverables, a budget and a cost-benefit analysis. The input for the cost simulation comes from (a) an analysis of the product price and licence fees; (b) the estimated implementation costs in terms of person/hours and additional hardware; (c) the estimated changes that are need to integrate the new technology with the existing technological and administrative systems in terms of person/hours; (d) the additional support and training staff that will be needed, and (e) the staff costs related to the accompanying actions that are needed to get the necessary organisational support and visibility for the new technology. The benefit analysis will need to present a clear case for the added value of the new technology by referring to the estimated usage and consequences for the organisation as a whole, and the timescale for actually achieving that added value. Finally, in this stage an institution needs to try and predict the expected impact of the technology on the organisation in terms of resistance against or support for the new technology, including a best-case and worst-case scenario.

Reflection, limitations and further steps

By way of conclusion, we want to make a few short reflections on the limitations of the strategy that we presented and suggest some further steps.

A first main reflection is that the assessment strategy is a theoretical model that is too comprehensive and time-consuming to be practically applicable to the increasing amount of new relevant tools that keep arising. Therefore, a number of shortcuts are needed, but at which stage in the process? Is it possible at stage 1 or 2 to prioritise, and what would be the criteria that one could apply?

Secondly, collaboration across institutional borders is warranted in order to share the workload. However, only the analyses in stages 1 and 2 are to some degree context-independent. In order for the results of stage 3 to be re-usable, a set of parameters needs to be identified that allows for a relevant comparison of the organisational and technological contexts of participating institutions. On the whole, more specific parameters and criteria need to be developed in order for the model to become operational.

Until recently, new technology assessment exercises at K.U.Leuven were performed in an ad-hoc fashion. This paper is a first attempt to suggest a more structured approach, which needs to be discussed within the institution in order to ascertain its level of generality. Moreover, in the next academic year, a number of new technologies will be assessed for their institutional relevance, and the model will be used as the basis for this assessment. It is expected that these cases will provide valuable input as to the operationalisation of the model.

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Collaborative learning in virtual environments: Group work competence assessment

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1. Introduction

Highly complex social and technological changes are taking place nowadays which affect current modern society: globalization, knowledge and information society, networks, new methods of communication… Education is nowadays facing these changes and challenges of current modern society, which obviously have an affect on it, and thus that implies redefining the parameters of traditional Higher Education. The virtual dimension brings huge possibilities for cooperative e-learning since it breaks time and space barriers and opens up new areas and new learning scenarios which could not be considered in face-to-face synchronous contexts. Virtual environments favour social interaction and new forms of collaboration based on common interests rather than geographical proximity[1].

It is essential, though, that the appropriate methodologies are introduced to provide students with the necessary skills to keep up with current society and changes. Students must be given the opportunity to develop interpersonal communication skills, to question themselves, to discuss issues, reflect on them and set challenges to themselves. Cooperative e-learning methodologies provide skills and strategies to students that include evaluation, analysis, planning, organization, communication, negotiation, problem-solving, inter-disciplinary team work, and others that coincide with the needs of individuals in current Information and Knowledge Society. Some of them correspond to different levels, that is, some concern development of different strategies, others aim to develop social link and motivation, etc.
The educative system should be nowadays centred on learning rather than teaching, therefore, students should be provided with the maximum skills and abilities to make them, in this sense, as autonomous as possible. Student should be placed at the centre of the learning process and at the centre of the cooperative relations constructed in the e-learning environment.

In this paper, we present and list down the research results carried out at UOC[2] since 1998 up to nowadays about collaborative working and learning in virtual environments. We also describe competences and skills taking into account the European High Education Area, and finally, describe the parameters with which one can assure and assess the acquisition of collaborative work competences in virtual environments by students.

2. Relevant research results

A group of UOC teachers, belonging to a research team (TACEV)[3] have been analysing, for the last 8 years, collaborative work and learning in virtual environments in three different UOC subjects[4].

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[1] Harasim, 2000; Kaye, 1992
[2] The Open University of Catalunya (UOC), a fully online university, was created 11 years ago to provide distance education at university level. Its educative model is based on the concept of Virtual Campus

[3] **TACEV**: In Catalan, Collaborative Working and Learning in Virtual Environments (Treball i Aprenentatge Col·laboratiu en Entorns Virtuals)
[4] **Multimedia & Communication**: a compulsory introductory subject common to all UOC courses.
Software Development Techniques: it aims to implement a real software development project.

Starting from a qualitative research methodology on case studies at UOC, key elements were identified to be taken into account when planning collaborative work, stages of the process, importance of management and other aspects related to cooperative work.

2.1 Planning collaborative work in virtual environments

When planning e-learning activities which include cooperative work it is important to bear in mind a number of factors which condition the coherence of the overall project. Cooperative learning may play different roles depending on the methodology employed by the teacher and the goals we wish to achieve. It is important that teachers bear in mind the following considerations as they have a conditioning effect on the entire learning process, therefore, they must be highly explicit to both the teacher and the student. The following are elements that take into account when planning collaborative work:

- The overall goal of the learning activity

- The role of cooperative learning and work in the overall educational activities, whether it is part of the main or secondary objective.

- How open or close is the learning activity. The approach will be different depending on whether learning to work in teams is part of the learning process or it is not.

- Team creation. Again, the approach will be different depending on whether forming groups is part of the learning process or it is not.

- Nature of the proposed activities, as not all activities are suitable for a group work approach

- Employed techniques, that is, how the students are to carry out the activities.

- Tools. They may vary depending on whether the project entails synchronous or asynchronous communication.

- Teachers' role in the learning process, which is conditioned by the set objectives of the activities and the subject. Students should be given, from the very beginning, explicit information on the teacher's role in the learning process.

Evaluation. It must be specified what is to be evaluated, which is obviously conditioned on the set objectives. Besides, it must be specified whether the subject involves continuous assessment or whether it just focuses on the final outcome.

2.2 Virtual group work: stages

The observation and analysis of cooperative learning among more than a hundred groups for the last few years, allows us revealing that virtual group work tends to go through four stages that are all critical to the success of the virtual team since they involve decision-making, planning, organization, communication and other major aspects.
These four stages should be described as accurately as possible to be able to recommend activities that facilitate teacher and student dynamics and assessment.

Management Software: it forms part of two different degree courses: "Computers Engineering" and "Business and Economics"

These stages are the following: (Guitert, M 2003)

a) **Group creation**. This stage may vary depending on the subject goals and on the time available. As it is a virtual environment, students do not know the other classmates in person and hence they group themselves on the basis of the virtual introductions done at the beginning of the course and on the information gathered in the activities proposed by the teacher (i.e. a virtual discussion). These activities should foster and encourage students' interaction and mutual knowledge of each other to, precisely, facilitate group creation. Teachers must provide support and guidance to students in this phase by stimulating participation and communication in the forum, accepting the groups that students propose and inviting them to proceed with work and also helping those students with no group to integrate.

b) **Consolidation.** At this stage, groups have been given access to their group space. Students continue to get to know each other and compare working methods and strategies. It is an extremely important stage as it is immediately previous to the beginning of the learning task. Besides, it is the period when all group members start to get familiar with the group work context, get organised and take decisions together. Teachers should, at this phase, have a guiding role, so that they can regulate the organisation of tasks, propose a system of communication and task planning, give support, promote development of a suitable climate to work, etc…

c) **Implementation.** This stage is highly dependent on the previous ones. Its success depends on how well the other two stages have developed. The better the groups have established themselves previously, the more efficiently they work at this stage. Teachers have a monitoring role here, allowing groups to function autonomously and trying not to intervene too much or too directly. They just mediate when the groups need help to overcome a problem, when some members are not participating enough or if they consider that the group requires a bit of help or guidance.

d) **Closure**. During this final phase, it is important that the group members reflect together and carry out a joint overall evaluation of, not only their work and outcome product, but also in terms of group dynamics. Teachers encourage students to consider, discuss and reflect on the process they have followed.

2.3 Virtual group work: management

When elaborating a project in group, it is essential that all aspects of the process are appropriately managed and planned, especially in asynchronous contexts (Guitert, M. 2005). Failure to achieve this, could imply that students spend excessive time organising themselves to the detriment of the academic task.

We have hereafter listed the different elements involved in the development of the project:

a) **Project organisation and preparation:** In this initial phase of the project, groups must devote time to decide together on the project preparatory actions. It has been proved that the project success or failure may very well depend on how well they have organized these first steps. Groups should first of all **plan and distribute their tasks** and prepare a working calendar bearing in mind their availability. They should then set some group agreements that cover areas such as communication and information exchange, decision-making methods, work division, use of the virtual work space, conflict prevention and resolution. This initial preparation and organisation phase favours group dynamics.

b) **Project monitoring and closure**: Monitoring should not be limited to the end of the project, but should be considered as an integral feature of the process from start to finish. Two levels of project monitoring can be identified: one as a follow-up done by the teacher all along the process as part of a continuous assessment and, the other, at the very end of the project, done by both the student and the teacher.

c) **Tools and platforms**: In order to carry out a collaborative learning process in virtual teams, group working tools are required, that is, those that facilitate group learning and online group activities. Two tools that were employed for these matters in the various subjects analysed were UOC Virtual Campus and *Basic Support for Cooperative Work* (BSCW); some other examples could be *Writely*, wikis…or those that support synchronous communication.

3. European Higher Education Area: group work competence

The Bologna process in the European Higher Education Area (EHEA) aims to increase mobility of students across Europe by establishing joint programmes, offering degrees by institutions from different countries and adopting a system of easily readable and comparable degrees, this can be done by agreeing on the skills, abilities, competences and learning outcomes to be achieved in Higher Education.

In today's net society, it is essential that students acquire abilities and skills to be able to work in a collaborative and cooperative way in virtual environments, asynchronously. Collaborative learning means establishing added value and a new understanding with group members. Etymologically, collaborate means to "work together" and implies the idea of achieving objectives, creating something new or different through collaboration, which means something more than simply exchanging information[5].

EHEA places great emphasis on a number of aspects related to group work, both directly and indirectly:

- Cooperative work fosters active and participative learning since it is the student who constructs and exchanges knowledge and who regulates and administers the learning process
- The employability principle. Teamwork is one of the most highly valued workplace skills
- Cooperative work with others fosters intercultural and inter-disciplinary learning and permits exchange of knowledge
- Students engaged in teamwork apply conflict resolution, negotiation, argumentation and consensus-seeking skills and learn to plan their own work and that of the rest of the team. There are many aspects and decisions that teams have to take while working together. Groups may have an initial period where they seem to often disagree or take too much time on making up decisions. They soon learn to be operative, negotiate the options and work efficiently.

Given all these requests, the emergence of new virtual learning environments seems to be the ideal setting for development of alternative teaching approaches[6] and increase changes in educational structures.

It is essential to integrate methodological proposals of virtual collaborative work that helps student acquire knowledge, skills and attitudes which are considered key elements in today's net society. These skills can be best developed through ICT learning and teaching[7]

By working in a collaborative way in virtual environments, students obtain communication skills that allow them to interact with each other, share information, reflect together and enable them to build up jointly a fully online project, breaking time and space barriers.

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[5] COLLIS and MOONEN, 2001; GARRISON and ANDERSON, 2000; HARASIM, 1990, 1993, 1997 and 2000; HILTZ, 1996; LAURILLARD, 1998. KAYE, 1992

[6] McClintock, 2000

[7] Bates, 1999; Moore, 1996

A key element that students also learn about by working together is that the attitude adopted is highly connected to the success of the group work and to the acquisition of the commented skills. It is important that their attitude implies commitment, constancy, respect and sheerness on the exchange of information; all these aspects help them create a sense of community and hence enable the groups to work efficiently.

Tuning Project[8], which tries to, precisely, tune up European High Education systems, points out that students should acquire a set of competences that in the document are divided in three different categories: instrumental competences (skills to search information, analyse it, organize it…), interpersonal competences (to be able to work in teams, to have communication skills, commitment…) and systematic competences (research skills, to adapt oneself to new situations, project management abilities…). All these skills and abilities are acquired by working in a collaborative way.

With the objective of improving the teaching practice on collaborative work in virtual environments, we have been focusing on systematize the evaluation process. After the first research done by the research team form UOC, TACEV, where collaborative skills were analysed, it has been analysed how the acquisition and achievement of such identified competences can be assessed and evaluated by the teachers; that is to list down criteria to bear in mind when evaluating collaborative skills and abilities. This way, all teachers can use the same criteria when assessing their students.

4. Evaluating group work competence in virtual environments

4.1 Context

Some UOC subjects focus on ICT literacy and provide students with generic competences on ICT while elaborating a virtual project in groups in an asynchronous way. They foster the development of generic competences and skills linked to the Information Society which fit the Bologna Process and its aim to find comparable learning outcomes. The previous analysis carried out by TACEV research group identified what competences students needed to acquire at university level in order to have them prepared for today's Information Society. The conclusions drawn in that analysis identified a set of competences and skills related to generic competences on Information & Communication Technologies and on cooperative work skills. In fact, these two concepts are related as technology facilitates collaborative learning, since it requires active participation from students.

While carrying out the virtual project in a group, pupils achieve competences related to digital information search, analysis, synthesis and management. Besides, it is also implied that they organize, process and present this information. They learn to not only improve their net search abilities but also to reflect on what they find and have a critical eye and perspective on the found information.

According to our experience and analysis, during the elaboration of the virtual project in groups, students attain basic attitudes needed for any cooperative virtual work (commitment, sheerness, constancy and respect), as well as abilities related to virtual and asynchronous communication (interaction, exchange of information, taking decision, critic and constructive analysis, etc.), planning and organizing (setting up group agreements, committing to these agreements, revising the initial planning, etc.) and information search and management, (starting from an asynchronous virtual discussion to organize the information, processing and presenting it).

[8] "Tuning Educational Structure in Europe", Project from European Universities to adapt to the Bologna Process

Skills are achieved progressively, students develop abilities that are constantly put into practice and reinforced on each stage of the project, so that a the end of the course they are very conscious that they have acquired a set of skills that they did not have before starting elaboration the virtual project in groups and they value all of them. The fact that the subject is based on a continuous assessment process facilitates the progressive acquisition of the aimed skills. Apart from the assessment and feedback students receive by the teacher during all group work process, students carry out a self assessment and a group assessment, at the end of the subject, where they are forced to evaluate and reflect on several aspects, such as their acquired competences, the group work process, results achieved and outcomes. All this information helps teachers evaluate their students and it complements the assessment made by them, in fact, in most cases, it just a corroboration and confirmation of the evaluation previously made by them. Even though there is a group assessment, students receive an individualized qualification. This qualification is the result of the outcome/ product plus the analysis of the student's individual process within the group work (his/her attitude, contribution, interaction…)

4.2 Indicators of group work

After having reflected on the list of competences that students should acquire in High Education in order to prepare themselves for today's Information Society, and bearing in mind all technological and social changes, we have now moved forward to analysing and assessing how the acquisition and achievement of such competences can be and evaluated by the teachers and identify those elements that help students to attain all those competences related to collaborative group work.

Besides, it is important that teachers can inform students at the very beginning of the course of all aspects that they are going to be assessed on, as that makes them realise what competences they are working on and acquiring all along the process. With this purpose on mind, a material was created to be given to the students at the very beginning of the course where all aspects related to team work are described (what is understood by collaborative work, communication among members, attitudes to take, development of group work, information management, work and time planning …).

By assessing the acquisition of competences, and bearing in mind the Bologna process, we will be able to easily compare learning outcomes and degrees from different universities in Europe.

Four different areas have been identified which correspond to the verification parameters of the skills achievement related to group work competences. These parameters (indicators) are the result of the virtual cooperative work undertaken by 20 teachers from UOC who carry out group work dynamics in their virtual classrooms; each class having an average of 15 groups (with 4 members each), which makes a sum of 300 groups and hence, more than a thousand students. The main areas coincide with, precisely, the educative material provided to the student at the beginning of the course. They are the following:

a) Communication and Interaction among the group members
b) Group Work Planning and Organization
c) Information management among group members
d) Attitude

A set of indicators have been identified for each of these 4 areas to help teachers evaluate their students' collaborative skills; this way, all teachers have the same criteria to assess students. We present these indicators in the following grid:

Communication and Interaction	Planning and Organization	Information management	Attitude
- **Participation** of all groups members: number and quality of the messages sent by each group member in their group work space -**Interaction quality:** the exchange carried out among the group members is agile, constructive and productive - **Constancy and regularity** on the information exchange enables the group to work productively and discuss together - **Ability to take decisions:** the group takes up decisions easily and without much time requirement - **Communicative style**: it is clear, precise and facilitates the acquisition of the objectives - **Constructive and critic reflections** are shared on the opinion given by all members so that they help reflecting and evolving - There is a common **reasoning and thinking** to help out taking up decisions - **Group cohesion** has favoured group work	- **Ability to organize themselves** as a group before starting the project - Ability to decide together some **initial group agreements.** These agreements are related to the regularity of connection, anticipating possible problems, - **Group organization.** The group organizes themselves and distributes work and roles i.e. coordinator, secretary…bearing in mind each members' profile - The **planning** has been established taking into account all phases of the project, availability of the members, time…. - **Group agreements** have been useful, borne in mind and carried out by the members - **Planning revision.** The group has revised and, if necessary, slightly changed the planning	- Use of the **Debate area** to exchange information - Use of the **shared file area** to exchange documents and work done - Use of **asynchronous communication** as the main way of communicating. If synchronous communication has taken place (chat, phone calls…) the group has summarized them for the teacher to monitor and have been placed on record - The **Organization of the Information** facilitates the group work management i.e. new version of documents, file organization…	- **Commitment**. The group members commit themselves to work, they hand in work on time, they follow group agreements, they all participate actively… - **Willingness to disclose information**. Members exchange information and opinion - **Constancy**. Members participate regularly all along the process - **Respect**. Members show respect on their messages by thanking the others' work, encouraging each other, apologising if necessary and creating a good climate for work

This grid has been implemented by a team of 20 teachers in the subject that facilitates the acquisition of the ICT generic competences.

Once the semester finished, a survey was made and given to the students in order to analyse, among many other things, the acquisition of group work competence. One of the questions was “Assess your degree of acquisition of group work competence in virtual environments”. Five hundred and eighty students answered the question, and the percentages of the given answers are as follows: none: 1,4%; little: 1,9%; average: 20,2%; quite a lot: 45,8% and a lot : 30,6%
So we considerate that the 76,4% of students acquired this competence a lot or quite a lot, only a 3, 3% of students thought they not acquired this competence.

It is important to highlight that the students assessed in a very positive way the work process and the feedback and assessment given by the teacher in the open questions from the questionnaire. Some of the students’ comments are the following: “*…I have learnt lots thanks to my peers’ knowledge…”, “…to work in groups really enriches…” , “…to know in advance the assessment criteria on group work has helped us regulate the group’s dynamic, as well as receiving the teacher’s feedback”*.

4.3. Future perspectives

With the objective of keeping on improving collaborative work in virtual environments, we are currently systematizing the evaluation items. We have worked to be able to build up a complete grid, with the necessary information to help us assess and evaluate group work skills. We are presently analysing the right tools that allow us to systematize better the competence evaluation process as well as the items that the system can give us in order to have, as much information as possible, about the individual work within a group. The system would then give us some automated alerts in case that, for instance, a student had not been interacting enough with the other group members or if there was a lack of regularity in the participation….
In the same area, with all this information and the identified elements, we aim to evolve the subject as well as the material and guides on collaborative work in virtual environments given to both students and teachers at the beginning and the process of the course.

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Productive Learning in Social Work Education

A case-study of a Learning Community in European Social Work, mediated through the Learning Management Systems

Introduction

Higher Education Institutions (HE I) and work-life training in Europe are influenced by both the Bologna-process[1] and the Lisbon Agenda[2]; resulting in considerable changes in both formal and informal learning area. The adjustment to these processes has great impact on the framework for higher education in Europe, and will jointly have considerable influences on the students learning environments. This leads to a demand for optimal flexibility in all learning arenas, not only in the institutions offering formal learning, but also in the field of vocational continuous and further education. All over Europe adjustment takes place to meet these new challenges.

Information and Communication Technology (ICT); especially Learning Management Systems (LMS)[3] is central here (Paulsen, 2003). But voices claims that research at this area is delayed; having a 'didactic lag' (Laurillard 2002, Säljö & Lindroth 2002, ODL- Liaison Policy Paper May 2006). As a partner of a research team studying the: "Transformation of Productive Learning Practices", my aim is to increase knowledge about learning in technology-enhanced learning environments. My project is an ethnographic study of computer- supported collaboration and cooperation in a pan- European course for social work education, with the leading research questions: **What are the characteristics of an ICT-based 'Productive Learning Community'? Which ICT activities support learning in a virtual classroom?** Keywords are: *'learning community'*, '*robust learning'* and '*productive dialogue'* (Wasson & al, 2003, Wasson & Ludvigsen, 2003).

Virclass

The Internal Market[4] gives another challenge to the HE I educating health- and social professionals; meeting clients from different cultures demands new skills and knowledge. The European Social Work Thematic Network (EUSW-TN) launched Virclass[5], "The Virtual Class Room for Social Work in Europe"; to give the participating students knowledge and understanding of commonalities and differences in core issues of social work (Larsen, 2005). First being a preparation for a summer school, it continues as an optional e-learning course for students in BA or MA programmes, while employed social workers can use them as post-graduate education (Larsen & Hole, forthcoming).

Theoretical Backdrop

The Virclass project is a collaborative between HE I all over Europe; with more information at the webpages; here are only a short presentations of some core elements.

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[1] Introduction of European Credit Transfer System (ECTS), a common system for marks, graded A-F, the 3+2 years Bachelor and Master Programmes, increased possibilities for student mobility over national boarders.

[2] Which among other element emphasises Life Long Learning and the Learning Economy as an agent for change in European Economy?

[3] Or Virtual Learning Environment.

[4] Focusing on the free movement of goods, trade and workforce.

[5] Administrated from Bergen University College, but given as collaboration between 8 Universities all over Europe.

Learning Theory

Virclass is based in sociocultural learning theory, focusing not on the ‘single learner’, but on the learners’ activities in a *community of practice,* as *situated learning* (Dysthe 2001, Lave & Wenger, 1991, Nielsen & Kvale, 1999, Wenger 1998).

The emphasis is on communication and cooperation, due to learning activities related to empirical workplace experiences. Knowledge of how *situated, reflective practice* is developed, (Bruner, 1996, Schön; 1987, Lave & Wenger, 1991); what supports *“rich interactions*” (Dillenbourg, 1999), promote s*tudent activity* (Biggs 1999) and encourage *communication* and *cooperation* (Brown et al, 1989) is central to partake in individual and collective processes leading to extended knowledge (Koschmann, 1996, Säljö, 1999/2001).

Cooperation

When cooperating one gets both individual learning and increased knowledge in the group (Koschmann & al, 1996), and the work task for the students was made to make sure that the student had to cooperate when fulfilling them. Here; the international cooperation’s gives extra challenges due to cultural background; added to the individual differences (Marton & al, 1986/2000, Biggs, 1999).

A main idea with the students collaborating was to benefit all learners. The first assignment was to introduce oneself[6], thereafter present own social work practice, discuss and compare this with peer-students, and finally reflect over own learning process, as a ‘meta-learning’ (Thorpe, 2000).

Also the teachers were collaborating; one teacher was responsible for each course, but she/he was supported from at least one other teacher.

A Community of Learning

Situated learning focuses on teamwork among participants within a given social practice (Lave & Wenger, 1991, Wenger 1998). Learning occurs in the interaction between the learner, peer-students, teachers, other actors and the learning resources available, in a community of practice.

The education of professional workers in the health- and social work field is rooted in a Master-Apprentices view (Dreyfus & Dreyfus, 1986, Nielsen & Kvale, 1999, 2003), where experience-based knowledge is supplemented with knowledge from academia. Theory and practice, thoughts and actions are integrated (Schön, 1987), assignments should make a bridge between the ‘reality in practice’ and the theoretical world of schooling ,and individual guidance is an important supplement to collective processes of learning (Brown & al, 1989, Säljö, 2001, Wenger, 1998), as.

This first year; Virclass had students from 16countries, from first years Bachelor students to PhD graduates with outstanding work experiences. A crucial point is if the teachers took advantage of this by encouraging the students to exchange experiences between them in the virtual learning environment.

How to enhance ‘productive learning’ in a LMS?

My project is exploring different ways we can exploit the pedagogical opportunities to knowledge-building collaboration in a technology enhanced learning environment. The students’ learning activities take place as ‘*written action’* inside a LMS. The technology opens up for the students to participate in dialogue and cooperation across time- and- space dimensions, but it will also bring forth elements which can restrain the students’ learning. Bearing this in mind, my research questions are:

- **In which ways can a learning environment be created that promotes learning of social work through collaboration and dialogue in a virtual classroom?**

[6] Create Social Presence, (Gunawardena & Zittle, 1997)

- **To what extent will the work with the assignment encourage learning of professional knowledge?**

The departure point is the virtual learning environment, created and maintained by the different actors. I focus on the discourse connected to assignments attached to specific learning tasks. Here I include both the teachers and the students. The aim of the study is to identify to what extent different elements in the learning environments assist in creating a *productive learning practice*; by using the written dialogue (Scardamalia & Beireiter, 1996) as statements documenting learning activities.

The Case

The case-study includes all the Virclass participants who finished the e-learning course; Module 2, and the teachers which taught and tutored here, in the spring 2005.

The basic idea in Virclass was to create conditions for knowledge-building through student-centred, task-orientated methods in an inclusive, collectivised environment. My primary research question is:

> **Which qualities characterise this learning environment; what is it like to be a teacher/student here, to what extent is VirClass participation for knowledge-building, related to the actual professional knowledge**?

To gain greater understanding of these issues; I focus on the students' learning-work and the teachers' experiences of being a virtual teacher.

The study aims to discover how the students learned professional knowledge by working with assignments, to what extent they are 'scaffolding' further knowledge-building through their discussions, and how the collaboration between the students develops during the course. To inquire whether this has succeeded or not, I examine the students' discussions in Virclass. Through the analyses of this collaboration in the virtual dialogue, I investigate if a 'learning community' was developed; considering all aspects of the learning-process, as it was carried through at this first Virclass.

Methods

This is a study at the micro-level, with data from written collaboration, supplied with statistic and written material from the evaluations. The focus will be on how teachers and students organise & utilise available learning resources, and how they interact the artefacts (Säljö, 2001) in the LMS to get knowledge, skills and competence to practise social work.

To gain knowledge about how learning took place in VirClass, and if teachers encouraged 'productive learning practices', I use ethnographic micro-sociology. By this; I seek to understand how a social act is 'rational', due to the actors own understanding (Atkinson 2001, Hammersley & Atkinson, 1995, Silvermann, 2004).

The findings are interpreted utilising sociological action-theory related to the frames for a given situation (Goffman 1959/87, Goffman 1974), written accounts used as trails of social action (Fashold, 1990, Sarangi & Roberts: 1999), an analysed in view of a critical approach (Carr & Kemmis 1986). Learning is seen as a situated activity (Lave & Wenger, 1991), using Wenger's analytical concept 'Communities of Practice' as a starting point (Wenger, 1998). The statements are analysed trough conversations analysis/discourse analysis (CA/DA) (Resnick 1997, Wells 1999).

Data Collection & analysis

The data stems from the assignment and lessons from the teachers to the students; questions and answers between the students and from the group of students to their tutor, and extract from the discussions-forum at the LMS.

This is supplemented with descriptive statistics, in order to describe the use og the LMS. A survey before start will act as both an observation and a description of the environment where teachers and students are participating (Ragin & Becker, 1992).

Preliminary findings

In Module 2[7], "Comparative Social Work; An European Perspective on Core Issues of Social Work", the students could choose among five different courses. Two of those, called Course A and Course B, gives the data for my in-dept analyses. In Course A, five students followed the course-, (17 enrolled before start), while 6 students fulfilled Course B (of the 18 enrolled).
Only one of the teachers[8] was a 'Native-English-Speaker'; - all the other participants had English as their second[9] written language, which without dept has influenced their communication skills and -abilities.
Due to delays in getting approval from all the students participating in the courses, I have not started the in-dept analysis of the student discussion in the discussion forum. But even without these discussions there are interesting findings, pointing at crucial factors when planning and conducting virtual courses.

Teachers use of communicating tools

Both teachers were posting messages[10] to the students at the bulletin board as their main way of tutoring the student through the course. This way they were guiding the students to different task and assignment, where to find lectures and tutorials.
The two teachers had very different ways of lecturing and coaching in the virtual environment. One of them used the 'bulletin-board' as the sole way of communicating with the students in plenum; -except for a 'Welcome' message in the discussions area. During the 12 weeks, the teacher posted 23 messages at the board, while the project leader supplied 3 messages (these 3 were posted at all 5 courses at the same time; giving important information for all the students).
He did his tutoring in direct contact with the sole learner, mainly via e-mail, and only once posting an answer to all students in the discussions forums. The other teacher also posted messages at the bulletin-board; (21 from him, 7 from the project leader); but he also participated in the discussion in the discussions forum, raised questions and answered questions from the students.
In this way; we see very diverse ways of using the 'artefacts' in the LMS; even though the basic outline of the two courses is the same, they give quite different impressions. To what extent this influenced the students learning work during the course are not examined yet.

Communication between the students

There were opportunities to discuss in discussions forums. Each course had a common "Theme discussion"; as a:

> *"space for professional discussions and questions concerning the different themes you are studying, … informations you want to share ---or need*

and a *"Break talk"*

> *… break talk…is for informal information, … just to get to know each other better. "*

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[7] Accreted 10 ECTS

[8] Even though two teachers was responsible for each course, only one teacher communicated with the student at the platform.

[9] Or maybe a third or fourth?

[10] A 'message' at the bulletin board might be everything form two short lines to long, well formulated and specific guidelines, information, instruction and tutorials.

Each course also divided the students in smaller groups; for an extensive discussion about the core topics of the course.
The students in the two courses communicated in entirely diverse manners. The discussion-forums present quite different ‘communicogram’ (Dysthe, 2002). There were many postings; both in the plenary discussions and in the smaller group; but the different groups structured their discussions diversely. Addressing all students at one time or answering one specific student; sometimes writing single statement; (monologue) or developing a higher degree of ‘dialogicality’ (Dysthe, 2002).
But it still remains to look into the consequences of these different choices, due to creating a technology- enhanced learning environment.

Conclusion

As said earlier, the analyses of the content in these posting; how they ‘answered’ to the teachers tasks, in which way they creates a collaborative learning environment, scaffolds good discussions e.t.c. are not finished yet. But even though the analysis is not finished; there are tendencies in the findings which answers to my research questions.
There seems to be ways of structuring the learning environment which enhance productive learning, gives rooms for fruitful dialogues and rich interactions, directed to knowledge exchanging, offering support for peer-students; and assignments which encourage extended knowledge building. Exercising this through a European collaboration between teachers educating social workers, also supports the goals in the Bologna –declarations, and helps the social workers /social work students to meet the challenges in the new Europe.
Several adjustments have been done according to the experiences and evaluation from the first Virclass before the start of a new course in the autumn 2006. Hopefully will the insight gained from this study also help the teachers to use the opportunities in the LMS to support a Learning Community; and letting the students exchange experiences and support each others learning in an fruitful dialogue.

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“More is different” – How e-Learning within Online Learning Communities can make the difference

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Introduction

The first generation of e-learning looked mainly into the reproduction of existing content in digital format, often reproducing paper-based material on the web. This content usually originated from face-to-face training. However, we have learnt the lesson that education is not automatically improved by simply adding technology but that whenever computers and networks are used for distributing information and for replacing teachers, they do more damage than good. With the rise of communication and collaboration possibilities through the internet and with a broader understanding of how technology can enrich teaching and learning processes e-learning is changing. Today, a different understanding of e-learning is emerging. E-learning, in this sense, can make the difference when it is oriented towards communication and mutual gain between the members of a community of learners (Downes 2004). This process poses new challenges on research in e-learning. First, there is the need to understand what a community is about. Then it is important to learn how it relates to learning, i.e. how can we identify successful community development processes which lead to learning?
From a research perspective we can see that although some research is done in the field of communities (Rheingold 1993, Kelly 1994, Gordin 1996, Blanchet & Trognon 1994, etc.), the notion of community based e-learning and online learning communities still lacks attention. From an educational viewpoint, it is important to gain insights into community development processes in order to design effective learning scenarios. This implies to ask the question of the pedagogical infrastructure underlying the environment: how to support and stimulate the constructive exchange between the community members in a way that through the collective element individual knowledge and competence can develop? It is clear that we need to understand, identify and analyse the process of community building and development in order to be able to stimulate and support collaborative exchange and communications.
In this article we therefore present a grid as a tool for analysis and description of learning community building processes. It has been developed in a three-year research project (Aimard 2005) and is based on a comprehensive literature review and validated against empirical data. The outcome is a methodological framework which uses social psychology methodology, conversational analysis and social representation analysis to suggest characteristics and indicators for the analysis of community development and learning processes. It enables to analyse and measure learning community activities and focuses on interaction or outputs which are produced by the community. This means that the data analysed is found in the activity of the community members (outcomes of communication, artefact production). The grid combines three elements: the characteristics of learning communities, indicators to verify this characteristics based on conversational analysis methodology, and it specifies the type of data needed for this analysis.
In the first section, the conceptual background and terminology for different types of communities is presented. The main characteristics for community development are analysed and described putting specific emphasis on *learning* communities. This lays the foundation for the second part, which describes the construction of an analysis grid.

1. From Community to Online Learning Community

Sociological research about the notion of community has intensified over the last years with the development of virtual communities on the Net. However, one can still benefit from a tour through some earlier theoretical work coming from the field of group dynamics and social psychology. Starting from the very basic origin of the notion of community we will distinguish characteristics of a community of *learning*, a community of *practice,* a *virtual* community, and an *on-line learning* community.

1.1 More is different – or "What is a community?"

The concept of "community" appeared only quite recently in the social theory landscape. The German sociologist and philosopher Ferdinand Tönnies (1887) was the one who distinguished *Gesellschaft* (society) from *Gemeinschaft* (community), the latter being a more cohesive social structure, typically a family but shared place and shared belief could also be determining factors. *Community* in this sense is viewed as an organic entity based on the sense of friendship, family, respect of rituals as well as on the social link founded on mutual understanding, consensus and language. On the opposite, *society* embodies a kind of hyper-individualism in which the relations between the people become mechanical, transient and contractual (Fernback & Thompson 1995).

Coming from social psychology and group dynamics we also can derive fruitful insights:

"Groups are intermediate structures between the individual and society, they are a place of exchange and psychological and social construction" (Blanchet &Trognon 1994, p. 8).

Social psychology leads us to consider a community or a group not as a mere "neutral" gathering of people – but rather views the fact that people "come together" as a phenomenon with new, distinct characteristics. As Kevin Kelly (Kelly 1994) points out, the gathering, the grouping of people, which corresponds to a shift from the individual reality to the collective reality bears its own dynamics:

"It has long been appreciated by science that large numbers behave differently than small numbers. Mobs breed a requisite measure of complexity for emergent entities. The total number of possible interactions between two or more members accumulates exponentially as the number of members increases. At a high level of connectivity, and a high number of members, the dynamics of mobs takes hold. More is different."

(Kelly 1994, p. 17)

1.2 What is a community of learning?

A community of learning can be defined as a community with the objective to enable its members to develop a learning process. It can also be stated that every community in a certain way is a learning community as it carries the learning desire as its driving force (Gordin 1996). To use the term "community of learning", however, means to emphasize the construction of knowledge as a primary objective, around which they are structured and they function.

"(...) within a learning community students engage in acquiring conceptual structures and explanatory systems useful to understand and transform their physical, social, and psychological world."

(Gordin 1996)

We see the community as having its own working momentum, from which derives the action of its members (Kelly 1994) – and it seems that this is a recent trend in educational research and practice which looks at virtual environments. Stephen Downes claims that the creation of virtual learning environments and virtual learning communities is going to "necessarily

reshape how we use learning." (Downes 2003) From that new concepts are emerging like the "learning opportunity" which – rather than the pre-defined learning path – is integrated in the environment, and can pro-actively or reactively be initiated through the learners themselves:
"Learning opportunities – either in the form of interaction with others, in the form of online learning resources (formerly known as learning objects), or in the form of interaction with mentors or instructors – will be embedded in the learning environment, sometimes presenting themselves spontaneously, sometimes presenting themselves on request."(Downes 2003a, p. 2)

The inner dynamics of communities is also emphasised by Kevin Kelly who defines community as a "vivisystem", a system with near-organic properties (Kelly 1994). He develops the idea that it is important to let the organic potential of the systems express itself and accept to let go of the control. Using the metaphor of the swarm to refer to the biological dimension of the network society, as it emerges within our cognitive, cultural and economic evolution, his analysis underlines four distinct aspects of such a system:

- The absence of imposed centralized control
- The autonomous nature of subunits
- The high connectivity between the subunits
- The webby nonlinear causality of peers influencing peers.

Kelly's contribution is difficult to transport into the reality of educational practice, as most learning communities are hetero-organised but has the great merit to bring to attention the role of the pedagogical authority or control. If asserted in an imposed and centralized way, this authority or control, generally embodied by the educational decision-maker (whether it is the designer, trainer, tutor or alike), may be considered as a contradicting force against the development of a community. This leads us to consider the intrinsic paradox of working with online learning communities between the "pedagogical steering wheel" on the one hand and appreciating inner dynamics and free development on the other.
Moreover, this vision of the community brings into focus the dialectic relation between the members: simultaneously independent in their operating learning process (each entity must be able to work for itself) and at the same time strongly interconnected. Studies of constructivist self-directed learning on the one hand (Riley 1996, Holec 1981) and collaborative learning on the other hand (Johnson & Johnson 1994, Henri &Lundgren-Cayrol 2001) support this dialectic idea by showing that such a set-up is favourable to the exchange of ideas or the confrontation of viewpoints, thus enabling a creative climate where multiple knowledge constructions can take place.

1.3 What is a community of practice?

A third concept, the concept of a community of practice describes a community with the goal to develop a knowledge linked to a specific domain of practice.
"People belong to communities of practice at the same time as they belong to other organizational structures. In their business units, they shape the organization. In their teams, they take care of projects. In their networks, they form relationships. And in their communities of practice, they develop the knowledge that lets them do these other tasks."(Wenger 1998)

A community of practice can be defined along three dimensions: joint enterprise, mutual engagement and shared repertoire. Joint enterprise relates to the negotiation of a common goal. Mutual engagement describes what "binds members together into a social entity". Shared repertoire refers to the resources produced by the community (routines, sensibilities, artefacts, vocabulary, styles, etc.) (Wenger 1998). The first two elements have already been illustrated as criteria for the existence of a community (see above). The element of shared repertoire, however, extends the notion of rules or norms that is found in the literature about community. It is taking into account the results or artefacts produced by the common experience of the group as a resource for the group: these resources or tools represent traces of the collective life of the group and influence its sedimentation.

Wenger (Wenger 1998) is relating typical activities within communities of practice to a time pattern analysis. The time frame dimension is important to consider when analysing how communities develop. Wenger determines five stages in the rise and fall of a community of practice: the potential stage, and the coalescing stage, (people come to recognize each other) are the "pre-activity" stages. Then comes the active stage when members develop their common practice, by engaging in joint activities and creating artefacts. Then the intensity of the activity decreases as the community becomes dispersed (the links are loosened) and memorable (the community is a reference, can be archived).

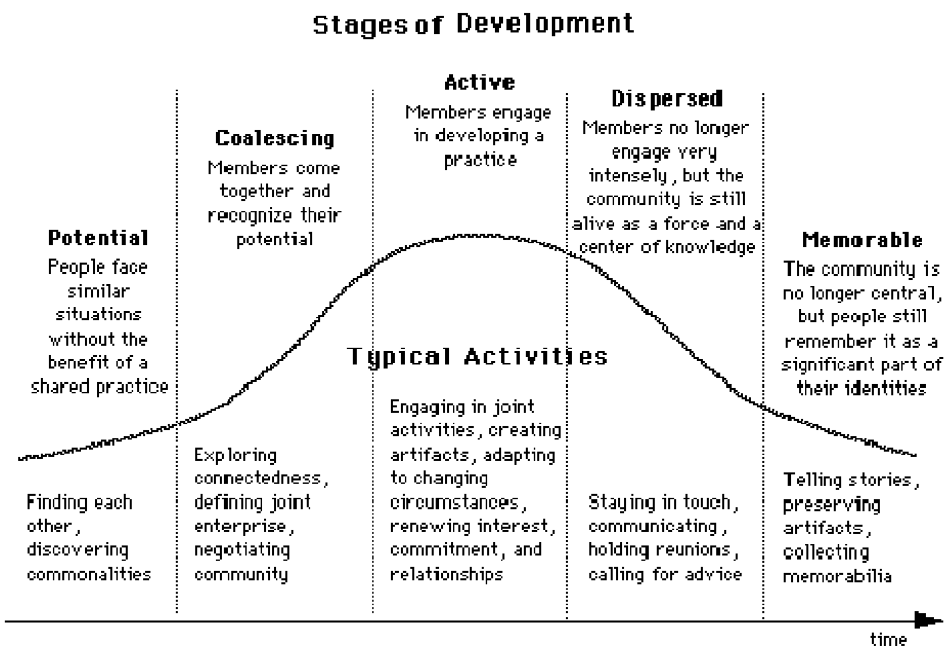

Figure 1. Stages of development of communities of practice (Wenger 1998)

The dimension of time is crucial in the building and development process. To exist altogether, the members of a community must take time: time to meet, to organise common actions, to reflect on and comment these actions. When not taken into account, this could have negative impact on the cohesive intensity of the community, as the two aspects seem to be correlated.

1.4 What is a virtual community?

Through the evolving possibilities of communication through the Internet, virtual communities are on the rise. Rheingold emphasises the personal and human nature of such distributed gatherings of persons: "Virtual communities are social aggregations that emerge from the Net when enough people carry on those public discussions long enough, with sufficient human feeling, to form webs of personal relationships in cyberspace." (Rheingold 1993)

The emergence of these social aggregations which are based on interpersonal relationships is linked to the development of tools for computer mediated communication: chat, forum, mailing list for example. It has different implications from the concept of the community of practice: the primary objective is not necessarily to develop a specific professional practice but to communicate, to get in contact. The WELL community (Whole Earth 'Lectronic Link) is a typical example of a virtual community (cf. Rheingold 1993). The focus is on the exchange and the emotional intensity rather than the construction of knowledge or a specific practice. A more recent example of such communities are the so called “online dating communities” (like Meetic).

1.5 What is an online learning community?

Online learning communities, as well as virtual communities extend the concept to the specific purpose of learning. The term underlines its specific technological dimension: the community is using the Internet to carry out its activities, often using a virtual environment or platform which then serves as a technical operating support for the community. However, it is important to stress that the existence of a group, which can result from a presential context of learning for example, may precede the setting up of an on-line community -though not necessarily. Some even argue that an effective online group interaction is facilitated through group processes which have been initiated through face-to-face meetings before the online community is set up.

Even if the access to the communication tools, structured in a virtual environment, seems an essential condition (Downes 2004), it is not enough to use a virtual environment to create an on-line community.

It is essential to find out what it is that makes a group of individual persons a community – only through sharing the same learning objective. Or, as Nolan puts it, what occurs on-line that leads some people to experience them as communities in the first place? (Nolan 2002). And what is important in a community of learning: "how do members of a community encounter, engage, master, use and transform the knowledge-in-use in the community?"

It seems crucial in order to explore these important questions to understand which processes are involved that lead people to work together towards their goal, define and carry out tasks, manage and share information, and deal with knowledge construction. Let us now try and look into these processes.

2. Looking Into Community Processes

As we have briefly presented, social psychology research about community (whether it is virtual, online, or of learning) provides us with insight into what can be the constitutive elements of a community "in progress". On that basis and further reviewing of specialized literature, we have identified seven main characteristics which reveal the building and operating processes of a community. They can be synthesized as the following:

1. a common goal is being defined;
2. to be involved;
3. to be in relation;
4. to exist as an individual;
5. to create with others;
6. the community is organised, rules and norms are being created;
7. the community develops over time (stages of development).

The first criteria, "a common goal is being defined", corresponds to the concepts of *joint enterprise* (Wenger), *mise en commun du but* (Blanchet & Trognon) and *distinct focus* (Downes) which are presented in the first section. It underlines the fact that the members of the community must define or negotiate a common goal which then forms the ground for their working together.

The second criteria, "to be involved", refers to *strong connectivity* (Kelly), *sentiment d'appartenance ou de rejet* (Blanchet & Trognon), *sense of the whole* (Downes), and *mutual engagement* (Wenger). The concept of *appreciation of participants contribution* (Downes) can also be seen as a reinforcement of this criteria. The idea contained is that commitment of the members is essential to the cohesion of the whole – it is in a way the "organic" bond which ties the members together.

The third criteria is "to be in relation". It draws from the concepts of *établissement de relations interpersonnelles* (Blanchet & Trognon) and *communication and interaction as primary objectives* (Downes). It also includes the notions of conflict management and mutual support. It is to be considered distinct from the preceding criteria as it deals with the study of the specific mechanisms of interpersonal relationships.

The fourth criteria, "to exist as an individual", refers to the tendency for the members to claim acknowledgement of their being individuals (as not having their identity restricted to being "a member") and also to the importance for the members to have a sufficient margin of action within the community to express their individuality. It is related to the *absence of imposed centralized control* (Kelly) and translates the idea of *empowerment of members* (Downes).

The criteria, "to create with others" refers to what Wenger calls *shared repertoire* (see section 1 above). The collaborative creation of common resources contributes to the *empowerment of members* (Downes), *integration of content and communication* (Downes) and to the *sense of history* (Downes).

The constitution of a community relies on the definition of roles, status, rules and norms which we have termed "the community is organised, rules and norms are being created". The definition of rules and the organisation can be influenced by the pedagogical purpose and be influenced more or less internally by its members or externally by the educational authority.

The last criteria, "the community develops over time", refers to the importance of the timeframe in which the community is developing itself. It is presented in the approach of the *stages of development* model (Wenger).

This list does not claim to be exhaustive but is meant to constitute a first approach of the main processes involved in the building and development of a community. It is a first approach to capture the complexity of such a phenomenon, and it is looking at the on-going process of the construction of communities.
After the description of the main characteristics of how a community is created and functions we need to identify indicators for these characteristics which reveal their manifestation and which can be applied on a set of data. Conversational analysis methodology led us to determine the detailed indicators for each of the seven characteristics described above (Traverso 1999, Kerbrat 1996). Some elements of social representation analysis methodology are used as a complement[1]. They are relating to each characteristic and allow to measure them.

[1] For further information about the methodological framework, see Aimard 2005.

Since indicators are always restricted to certain kind of data environments for which they are valid we also need to describe the data type which is suitable for the analysis grid. This relates to how a community documents its own activity or how this activity can be traced. Two types of data can be used:

- the "discourse" that is how the activity is materialized in the communicational exchanges: what are the members saying to each other during the activity (the interactions) and also what are they saying about their activity (questionnaires, surveys, interviews)
- the "product" that is the materialisation of the activity within the environment (documents, artefacts produced by the members of the community during their activity).

It is interesting to note that in the case of the online learning communities, the collection of the interactions data is facilitated by the automatic recording features of virtual environments, as well as by the fact that these interactions are often textual (whether it is through textual synchronous communication, sometimes called *chat,* or the asynchronous communication like the discussion forum).

In the following table, we present the characteristics and their related indicators.[2]

[2] A comprehensive description and explanation of characteristics and indicators, including the analysis of data can be found in Aimard 2005.

Characteristics of a community	**Indicators** → *type of data*
A common goal is being defined	• Social representation[3] of the task or of the objective (how the participants perceive and tell about the task/objective) → *questionnaires, interactions* • Negotiation of local goal for each particular synchronous communication session (how a consensus is reached or fails to be reached in the interactions) → *interactions*
to be involved	• Expression of the Ego involvement (Shield-Weininger 2002): - use of verbs expression opinion and cognitive involvement (how often such structures are used in the interactions) • Perception of the collective level (*vs* individual): how is the use of personal pronouns "We" vs. "I" distributed in the interaction data → *interactions*
to be in relation	Manifestation of interpersonal relations: • Linguistic and paralinguistic indicators of the symmetrical horizontal relation (on an axis between distance and intimacy) = *relationèmes* (Kerbrat 1996) and indicators of non-symetrical, vertical relation (on an axis power and hierarchical places)= *taxèmes* • Ways people address one another and refer to one another • use of emoticons and expression of personal emotions → *interactions*
to exist as an individual	• presence on the thematic references of personal information topics (mention of personal information) • thematic breach in the flow of task oriented communication (people suddenly introduce a new topic to be recognized → *interactions*
to create with others	• presence of a commonly elaborated artefact as a result of collective activity, social representation of this product (has this artefact been created or not, how people perceive, judge it) • externalisation of the processes leading to creation of the artefact in the virtual environment → *interactions* → *artefact*
the community is organised, rules and norms are being created	• Presence of thematic references concerning roles, status, norms (internal organisation) • Evidence of creation or usage of rules (for example specific computer-mediated communication rules, idiosyncratic rules or rituals developped by the given community) • Evidence of disruptive behaviour towards the rules → *interactions* • Perception of the pedagogical context (of the training project, of the task) as defined by the educator (external organisation) → *description*
the community develops over time (stages of development)	Use of Wenger model of the stages development (see above) →*questionnaires, interactions, artefact*

[3] Social representation as defined in Jodelet 1984, Moscovici 2000.

This grid has been validated against a set of data in the frame of a research project in the University of Strasbourg (Springer & Aimard 2004, Aimard 2005). For this research, three types of qualitative data were combined (interaction transcripts and artefacts produced by the members, questionnaires) in order to analyse community building and development processes in online learning environments.

3. Conclusion

E-learning can make the difference when it is moving towards community based learning. In the article several models of communities have been analysed to show the main characteristics of community building processes. The notion of online *learning* communities or *learning* within communities has been focussed on specifically and a grid has been constructed to analyse these specific processes. The grid outlines important characteristics and relates them to indicators for learning community processes. It is a tool to understand how learning communities function.

Can learning communities be constructed? Can learning communities at all be organised as part of a formal training? The article reveals that successful online learning communities bear an intrinsic paradox: on the one hand it can be supported and designed and on the other hand online communities have their own dynamics and are only successful when this can express itself unrestrained. One can argue that this dialectic is inherent to the relation between teaching and learning processes. However for online learning communities the shaping of this relation becomes a critical factor for success. In pedagogical practice, teachers have to be aware that they might have to let go of the pedagogical steering wheel, at least in its traditional form. A task which is far from being easy because in order to support online learning communities they have to shape open learning opportunities. For that, different factors have to be taken into account:

- to determine favourable conditions (according to the outlined characteristics of the grid);
- to create "learning experiences" (Chapelle 2001) or "learning opportunity" (Downes 2004) by defining a scenario (eg. a problem to solve or an artefact to be collaboratively created);
- to create awareness of spontaneous learning events which arise during the course of activity of learning community;
- to support peer-to-peer interaction;
- to create awareness of learning processes based on spontaneous activities (metacognition).

Further work should focus on providing practical tools and guidelines for teachers and practitioners which are based on the conceptual work outlined in this article.

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Language Technology for eLearning – Implementing a Keyword Extractor

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Abstract. We will describe the design and implementation of a keyword extractor in the context of eLearning. This tool should extract lexical units from learning objects which are highly topical for the content of this learning object and therefore good keywords. Authors of learning objects will be supported in generating this type of metadata. We will describe how we formalise the notion of *keywordiness* and use distributional characteristics in two statistical approaches which yield an ordered list of keyword candidates. The keyword lists which are generated are compared to manually compiled lists in order to evaluate the recall and precision of the tool.

1 Introduction

Given the huge amount of static and dynamic content created for eLearning tasks, the major challenge for extending their use is to improve the effectiveness of retrieval and accessibility by making use of Learning Management Systems (LMS) and Learning Object Repositories. The aim of the EU funded project *Language Technology for ELearning* (LT4EL) is to tackle this problem by providing Language Technology based functionalities and by integrating semantic knowledge to facilitate the management, distribution and retrieval of the learning material. The project wants to improve on existing eLearning platforms and repositories by allowing for the construction of user specific course material through the semantic querying for topics of interests. In order to reach this objective, we apply relevant research which has been carried out in the area of Language Technology and the Semantic Web. Specifically, we improve the retrieval of static and dynamic content by employing linguistic resources and tools for the semi-automatic generation of descriptive metadata and glossaries. We develop new functionalities such as a keyword extractor and a glossary candidate detector which are tuned for all the languges represented in our consortium, i.e.

Bulgarian, Czech, Dutch, English, German, Maltese, Polish, Portuguese, and Romanian. The new functionalities could be integrated in any open source LMS or learning object repository, however, for validation purposes the ILIAS Learning Management Systems (LMS) (http://www.ilias.de) has been selected.

In this paper, we will focus on the keyword extraction tool which will support authors and distributors of learning objects in the task of keyword generation. In section 2 we will motivate our task of automatically extracting keywords and put this task into a larger context. Section 3 is about the characteristics of good keywords. These characteristics will be operationalised for the keyword extraction task. In section 4, we will describe the linguistically annotated input. The following section is dedicated to the methods we are going to use in order to measure keywordiness and to some additional weighting which we will introduce to the keyword ranking. In section 6 we will explain how we will handle multi-word terms. Evaluation of the results is the topic of section 7. We will finish with a look at related work and an outline of further work for the generation of metadata and glossaries.

2 Semi-automatic metadata generation for eLearning Contents

In eLearning, we deal with static and dynamic contents. The static contents comprise to the largest part of learning objects of varying granularity. A learning object should be accompanied by metadata which describe it in terms of its content, its context of use as well as its interrelation with other learning objects. *Learning Object Metadata* (LOM) [1] has become the most widespread and well-known standard for the encoding of the metadata. The aim of the LT4eL project is to improve the retrieval and accessibility of eLearning content through the identification of the learning material by means of descriptive metadata. To this end, we employ available Language Technology resources and tools to develop functionalities which facilitate the semi-automatic generation of content-related metadata. It is not yet an established practice to supply metadata along with the contents of eLearning platforms. Their generation is a tedious task and not widely accepted by authors as part of their work. This has, however, the highly undesirable consequence that these contents are invisible outside the narrow scope of a particular LMS and not easy to disseminate, e.g. through learning object repositories. Language technology can provide significant support for this task. In particular, within LOM, the element *General* allows for the representation of a document's content by topical keywords.

The content-oriented functionalities being developed within the project can play a crucial role in the semi-automatic generation of metadata. The result will be two modules:

- semi-automatic selection of keywords;
- selection of definitory contexts, to be used for glossary entries.

The term *semi-automatic*, in that context, implies that the final selection of metadata remains under the control of the author. These functionalities will be realised as software modules which can be used stand-alone, as web services, or integrated into Learning Management Systems.

In the following section, we will describe the keyword extraction task in more detail.

3 Characteristics of good keywords

The keyword extractor is based on quantitative and qualitative assumption about the characteristics of good keywords.

Keywords are supposed to represent the topic(s) of a text. They therefore tend to appear more often in that text than could be expected if all words were distributed randomly over a corpus. In other words: typical keywords tend to appear frequently in certain documents and will not appear at all in most other documents. A statistics which is used to model the expected distribution of words in texts is Poisson or, alternatively, a mixture of Poissons (cf. [4]). While the distribution of function words is close to the expected distribution under the Poisson distribution model(s), good keyword candidates deviate significantly from the expectation. The score of this deviation can be used as a statistics by which the lexical units are ranked ([3]).

A second distributional characteristic of keywords is what has been called their *burstiness* (cf. [8]). Good keywords tend to appear in clusters within documents. It can be observed that, once a keyword appeared in a text, it tends to appear in the following section of the text in much shorter intervals as would be the case if all the occurrences of this word were distributed evenly throughout the text. When the burst ends, the frequency comes back to normal, until the keyword appears - and probably bursts - again.

This distributional behaviour reflects the fact that good keywords represent topics, and reference to a certain topic is a local phenomenon: most texts deal with many (sub)topics and in some texts a topic is resumed after a while.

Additionally, good keyword candidates can be characterised qualitatively. They appear typically in certain salient regions of a text. These are the headings and the first paragraphs after the headings as well as an abstract or summary. Words occurring in these areas of the text will be weighed higher than the rest. Central terms might also be highlighted or emphasised by the author, e.g. by using bold font or underlining the word.

It has been shown that the results of the keyword selection, measured against the performance of human readers, improves significantly if the text is annotated linguistically (cf. [5] and [6]). Linguistic data and tools such as part of speech taggers and shallow parsers are needed for this task and are being supplied in this project for the various languages.

In the following section we will describe the way from the raw text of learning objects to full linguistic annotation.

4 Linguistically annotated input

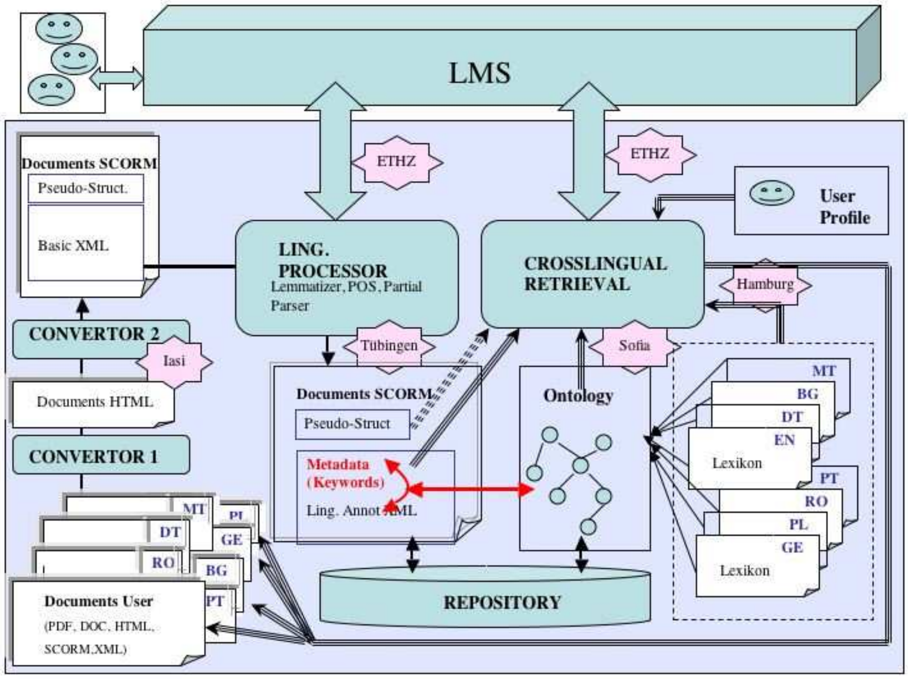

Fig. 1. LT4EL system architecture and workflow

Figure 1 describes the workflow which leads to linguistically annotated learning objects for all languages in the project. The keyword extractor draws on this linguistic information.

1. Learning objects of various formats, e.g. PDF and DOC, are converted into HTML, using standard tools.
2. The HTML files are then converted into a project specific XML format, called BaseXML. This is basically pure text with some structural and layout information that has been extracted from the HTML markup. Only the information relevant for metadata generation tasks is preserved.
3. Linguistic annotation will be added to the BaseXML files. Each language partner uses their own linguistic tools to provide the annotation.
4. The different output formats of the linguistic annotation are harmonised by converting them into one common document format which is determined by a DTD.

The linguistic tools segment the text into linguistically relevant units and describe these units. The units are: sentence, chunk, and token. The most relevant unit for keyword extraction is the token. Tokens are classified for the parts of speech (noun, verb, etc.) and their morphological features (number, person, etc.). In addition, the baseform of the token is specified. The following is an example from the Polish corpus:

```
<tok id="t226"
base="szata"
ctag="subst"
msd="sg:nom:f">
    Szata
</tok>
<tok id="t227"
base="graficzny"
ctag="adj"
msd="sg:nom:f:pos">
    graficzna
</tok>
```

The keyword extractor makes the following uses of the linguistic annotation:

1. The software will work on *Lexical units*. Lexical units are abstractions from the inflected forms which are used in the texts (e.g. the tokens *system* and *systems* will both be counted as occurrences of the lexical unit /system/). Note that we do not try to disambiguate these lexical units semantically. Instead, we expect that a lexical unit which is a good keyword appears in only one sense throughout the text.
2. We use the part of speech information to classifiy lexical units as either relevant (mainly nouns) or irrelevant (mainly function words).

5 The statistical measures

5.1 Residual inverse document frequency

Two statistics which model the distribution of a term w in a collection of documents are the *document frequency* df_w and the *collection frequency* cf_w. Document frequency is the number of documents in which the term occurred at least once, while the collection frequency is the total number of occurrences of this term in the whole corpus. Inverse document frequency IDF for the word w is defined as $-log_2(\frac{df_w}{D})$, where D is the total number of documents in the collection. We can also model IDF assuming that the appearances are independent and follow a Poisson distribution: $(IDF = -log_2(1-e^{-\frac{cf_w}{D}}))$. It has been shown that function words follow largely this distribution, while interesting content words deviate from this distribution (cf. [3]. Thus, the difference between the predicted and real IDF is smaller for function words, and larger for content words. This difference, called residual inverse document frequency, will be used to measure the keywordiness of w.

5.2 Term burstiness

Term burstiness is a formal description of term (re)occurrence patterns in texts. It has been introduced by Slava Katz (cf. [8]) and developed further by Anne de Roeck and her team (cf. [9]). This approach is in contrast to those approaches, including RIDF, which view a text as a bag of words without taking its inner structure into account.

The concept of term burstiness, as described above, can be formalised by measuring the gaps between the individual occurrences of each term in a text. Sarkar et al. (cf. [9]) use a combination of two exponential functions to model term burstiness. The functions describe the reoccurrence rate of a term before and and after it appeared in a text (the further being modeled after the reoccurrence rate of the term in other texts).

Intuitively, the reoccurrence rate of before and after the (re)appearance of the term vary significantly for good keywords. The authors show that the model is good in distinguishing a) frequently occurring common function words; b) frequent, but well spaced function words; c) infrequent and scattered function words and d) topical content word.

Since we are interested in the latter, we will experiment with term burstiness statistics.

5.3 Combining the measures

De Roeck et al. show that in the domain of topical content words their results match the results which have been yielded e.g. by Church (cf. [3]) very well. Nevertheless, we will compare the ranking of keyword candidates according to both measures. If the order of terms varies for our data, we will introduce a measure which combines the output of both methods.

Additional weight (a bonus) will be given to lexical units which:

- appear in salient regions of the text (header, first paragraph)
- are emphasised or highlighted

The exact measure of this bonus has to be determined experimentally.

6 Multi word lexical units

Special attention will be given to multiword terms. A first analysis of Polish learning objects that have been keyworded manually revealed that a large part of these keywords were multi-term units (e.g. *wirtualna szkoła, system zarządzania nauczaniem*).

We will, for all terms which are highly ranked as keyword candidates, use a statistics which measures the connectedness of these terms with their neighbours. We choose mutual information (MI, in short) for ranking pairs of keyword candidates and their neighbours for connectedness. MI measures the observed co-occurrence of two terms against the expected co-occurrence of these terms, given their individual frequency in the corpus and the assumption that all words are distributed randomly. This statistics is well-known for identifying technical terms, and it has been shown by Yamamoto and Church that terms which rank high both in RIDF and MI score are both topical and terminologically interesting (cf. [10]).

Therefore we will inspect the neighbourhood of all high ranking keyword candidates to detect multi word units.

7 Evaluation

We want to know how well the keywords which our programme extracts automatically will match those items which humans marked as relevant. In the project, learning objects for all the involved languages will be annotated manually for relevant terms. We will use the same learning objects to extract our lists of keyword candidates and set a threshold as a cutoff point for our keyword list. For those lists we will measure:

- How many of our keyword candidates are also in the list of manually selected keywords (this approximates the recall measure);
- How many of our keyword candidates are not in the list of manually selected keywords (this approximates the precision measure).

We are however aware that the notion of keyword is a vague one and that no two human annotators will come to the same lists of keywords. Human annotation is therefore not an ideal gold standard to measure our data against. We therefore decided to let two humans annotate the same Polish and German learning objects and to measure the inter-annotator agreement (cf. [2]). It seems to us a much fairer to assess the performance of the automatic keyword extractor against the performance and agreement of the human annotators.

8 Related work

Jelena Jovanović et al. (cf. [7]) provide, with their TANGRAM system, a solution for the automatic generation of metadata. They also work with the LOM metadata scheme. Their approach however, works top down. They start with a domain ontology and look in the learning objects for those terms which are derived, as lexical units, from the concepts of this ontology. We think that a top-down approach matches well with the bottom-up approach which we have outlined here. Indeed it is one of the goals of the LT4EL project to combine both approaches.

The LON-CAPA learning content management and assessment system also uses automatic keyword generation (www.lon-capa.org). In this system, however, the author is presented with all textwords which are not in a stopword list. If the user does nothing, the most frequently chosen keywords from a list are chosen (Gerd Kortemeyer, personal communication). So the system relies on an existing community working in one domain and supplying keywords for learning objects in that domain. As far as we can see, there is no language technology used in this approach, which more resembles data mining. Relying on the collaborative work of a community of authors is an interesting approach which can be seen as complementary to our approach.

9 Conclusions

With LT4EL, we want to use Natural Language Processing techniques and resources to enhance the usability and effectiveness of eLearning systems and processes.

On the one hand, we want to support authors of learning materials in the tedious task of metadata generation. This part of the task should neither be avoided by the author, nor should it distract too much from the original task, the generation of high-quality learning material. On the other hand, we want to employ language resources, in particular ontologies, to help users find the best learning material they can get to satisfy their current information needs.

We consider the diversity of languages in the European context not as an obstacle to an international eLearning infrastructure, but as a challenge. By tackling multilingual issue we want the broaden the horizon of the learner beyond what is available in his native language and in English.

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Modelling of E-Learning Course Scenario's

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Introduction

Just publishing learning content on the website is not enough. To deliver the learning content following a creative e-learning concept is a real challenge. It means analyzing the content and cutting it into pieces, called blocks and also find out what is the focus of the course. It means finding the best presentation layer and putting it above the content layer to create a scenario model fulfilling the requirements of the learner. This is the focus of our paper and we will present our findings step by step.

1. Converting a course into an e-learning presentation

1.1. Learning content decomposition and tree structured content parts or blocks

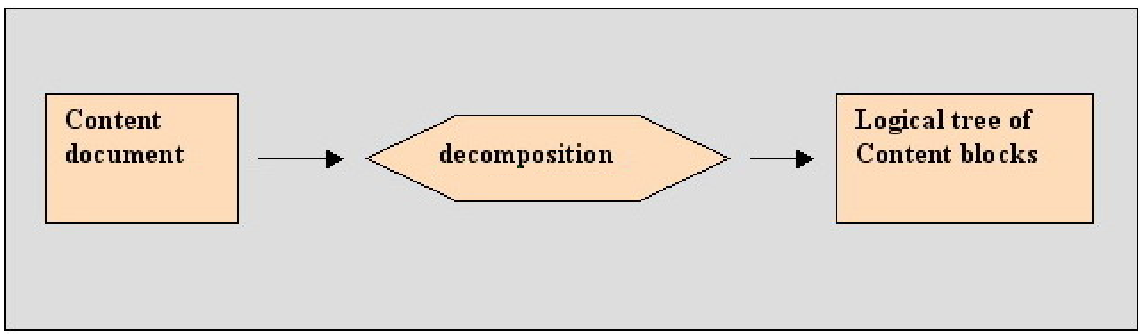

Figure 1. decomposition of content document

We are all very familiar with the structure of a book in chapters. A course is similar with a book. A chapter contains many blocks, being smaller content parts. If the chapter can really be split into more individual content topics, or which can be learned as individual topics, than the learning content is split into two or more independent content units, put together in a sequence. So the learner will learn them as one logical content module. Each unit is composed of a set (one or more) of blocks, corresponding to some smaller content parts, being structured as a relational tree. The learning content is split into a set of full text documents each linked with a block in this structure. The relation between a block and another block of lower level (a sub block) is defined as: "can be explained as" or "consists of" or other explaining expressions.

1.Chapter
- 1.1.Unit
  - 1.1.1.Block1
    - 1.1.1.1.sub-block2
    - 1.1.1.2.sub-block3
  - 1.1.2.Block4
  - 1.1.3.Block5
- 1.2.Unit
- …

Figure 2. three structure of content blocks

Example of a decomposition of a text document

Hoofdstuk1: Internet als info en communicatie kanaal van het bedrijfsleven

I.De toegang tot bedrijfsrelevante informatie

0. Inleiding

Wanneer men op zoek is naar bedrijfsrelevante informatie, is het internet een uiterst geschikt middel. Het internet kan namelijk gezien worden als een bibliotheek van allerhande informatie van heel de wereld over de meest uiteenlopende onderwerpen. De kunst is enkel, in dit ongestructureerde geheel van data de juiste en relevante informatie te vinden die men zoekt.

1. Zoekmachines

Elke internetsite heeft een uniek adres. Men weet echter vaak niet op welk adres men de nodige informatie kan vinden, het is dus nu juist de kunst dit adres te vinden. De gemakkelijkste manier is door gebruik te maken van allerhande zoekrobotten. Zij zorgen namelijk voor een snelle en makkelijke navigatie over het Web door het simpelweg intypen van sleutelwoorden, waarna de zoekrobot sites waar het kernwoord in voorkomt gaat opzoeken. Vervolgens bekomt men een lijst van adressen waar het vermelde trefwoord in voorkomt. Een voorbeeld van een bekende zoekrobot is **Yahoo**.

Hierbij is ook interessant te vermelden dat je op de volgende sites terecht kan voor het adres van de internetsite van een bedrijf of voor het telefoonnummer en het adres ervan:
http://www.infobel.be
http://yellow.advalvas.be/
http://www.digikids.be/dk_NL/SITES_FORUMS/THEMASITES/BEDRIJVEN/A.htm

Figure 3. Learning content document

The content tree structure of the text:

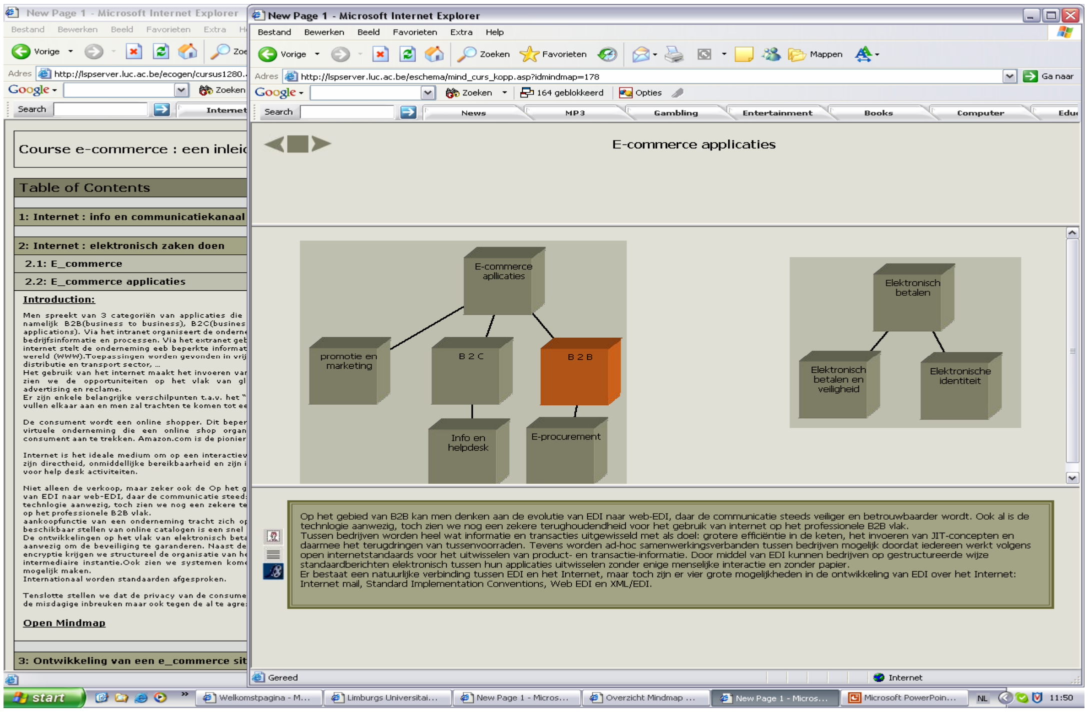

Figure 4. Three structure of content blocks

1.2. Decomposition of the blocks into the ALO's

A learning object (LO) is an independent content component that can function as the learning content of a course module. It can be defined as any digital content resource that supports learning, that can be re-used and that can be delivered on demand across the network, be it large or small. A learning object is such a composition of a set of blocks. The blocks, presenting the smaller learning content parts, are composed of the learning content (full text doc) and of a set of added atomic LO's, being small learning content elements (short text documents, figures, digital images or photos, live data feeds, live or pre-recorded video or audio snippets, animations, some questions and answers, some tests, some mouse-over animations, and smaller web-delivered applications).

The content linked with a block is a part of the original text, it is a full text document, including figures, Q&A, test questions, hypertext links, …being all the atomic learning objects (ALO).
This full text document will be decomposed into ALO's, namely figures, Q&A … all being the presentation elements.

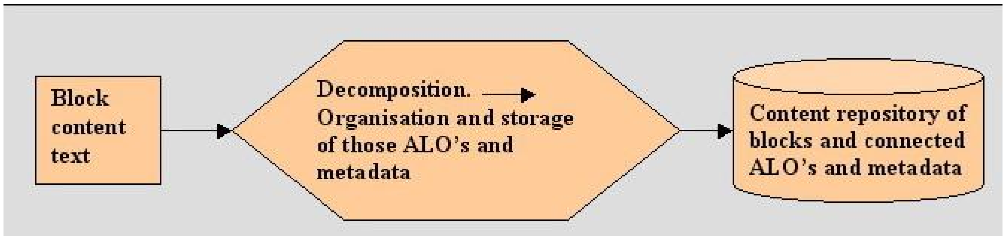

Figure 5: a block content text decomposed into ALO's

1.3. A scenario model

In instructional design a scenario model has to be defined. A composition of blocks will be choosen and the architecture of the blocks will be designed. All additional elements are parts of the presentation layer. The learning content included in the block (being the full text document) will be supplemented with other supporting, interactive and animating elements, being all parts of the presentation layer.

The presentation layer is composed of presentation components put above the same original content components. Some of the presentation components are content related and others are more design/format related. An example of content related presentation component: someone tells the story of a best practice. An example of design related presentation component: a live picture of the storyteller is shown on the screen. The presentation components are belonging to one or more scenarios models.

e-learning course module						LO
Scenario model	Scenario model 1 **EDU-MAP**	Scenario model 2 **Story-telling**	Scenario model 3 **Tree structured html pages**	……	Scenario model n **Dialogue**	
Presentation layer	Presentation components: Pci: **building components of the scenarios (short text docs, figures, pictures, …)**					ALO
Decomposition of content	Learning Content components: Cci: **tree-decomposition of learning content module into n parts (full text docs)**					ALO
Learning content of the course module = e-book						LO

Figure 6. A scenario model

1.4. Process of LO creation as a composition of blocks in a scenario model

We can create different compositions or scenario models of the set of blocks to present the learning content to the learner as an e-learning course module. The blocks are the building blocks and linked with them are the basic atomic learning objects.

Not only the blocks are presented in a different composition, the blocks themselves differ in architecture by using the atomic learning objects on a different way.

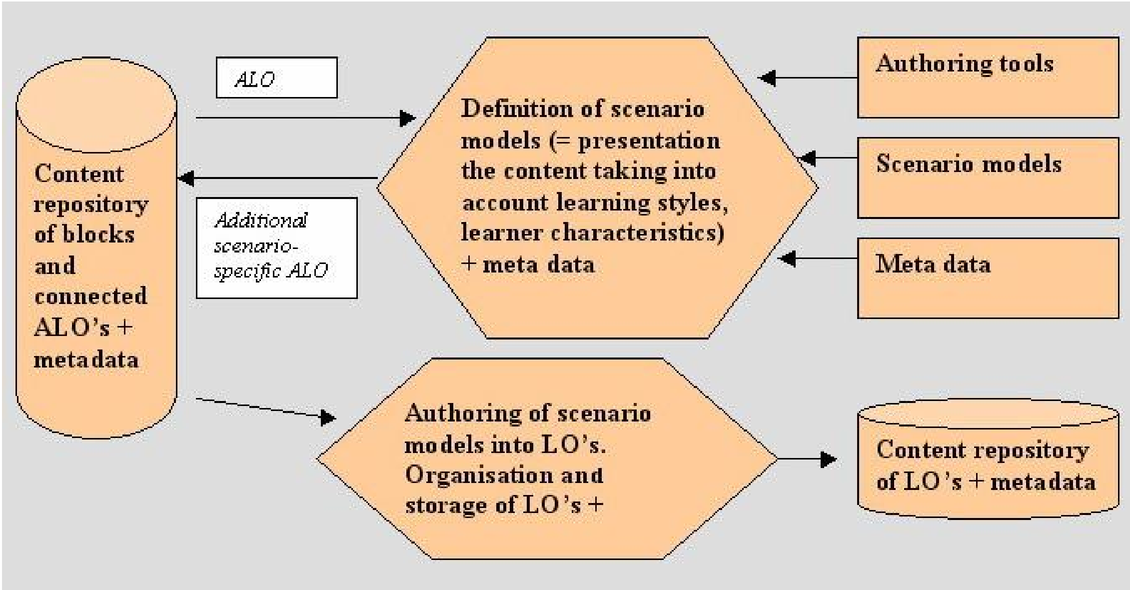

Figure 7. process of LO creation

Following the traditional "web-pages e-learning "concept, we can built a tree structured html scenario model. We can bring together the full text docs of all blocks and put them in the pre-defined tree structure. On this time the block, being a html page must be designed using the presentation of the full text and the other atomic elements, being figures, hypertext links, Q&A, keywords, audio fragments, … can be linked with it following the design of the scenario model.

Following the e-MINDMAP concept, we can build an EDUMAP scenario model.
We can organize the blocks in a graphical way in units and in EDUMAPS. Relevant atomic objects are the full text, the short text, figures, video's, ….
The data model is very similar to this of the previous scenario model.

1.5. Process of course module creation by packaging the LO's

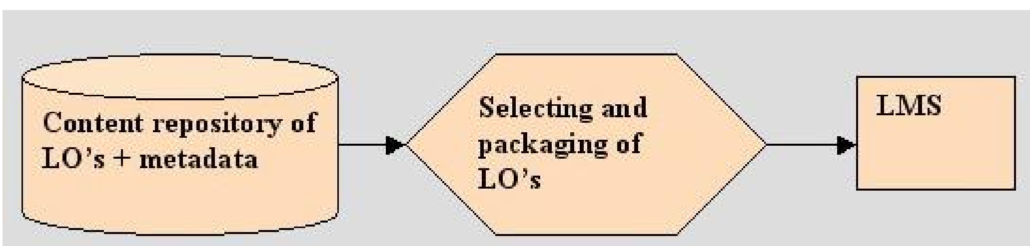

Figure 8. process of course module creation

The course module or the course consists of one or more chapters. Each chapter can be converted in one or more LO's. The course can be built by packaging some LO's, fitting the characteristics of the learner.

2. Course modules or courses presented in a chosen presentation scenario.

More and different scenarios can be built upon the same decomposition of the learning content. Dependent on the type of scenario model, a set of presentation components or atomic learning objects, will be defined and are brought together into a scenario model design. The learning objects (LO) structure corresponding to a scenario model, has to be defined and the corresponding relational data model has to be customised.
Some of the presentation components are common to different scenarios and can be re-used. Others are very specific for the scenario to which they belong. The structure of the Learning Object database has been set up to contain all kind of presentation components required to build e-learning courses following several scenario models.
We can create different compositions or scenario models of the set of blocks to present the learning content to the learner as an e-learning course module. The blocks are the building blocks and the basic atomic learning objects are linked with them.
Not only the blocks are presented in a different composition, the blocks themselves differ in architecture by using the atomic learning objects on a different way.

2.1. e-MINDMAP scenario

The e-EDUMAP is so telling the story in a graphical way and in a sequence of steps.
The blocks are composed of some atomic learning-elements, being the short text or audio document, the full text, some additional text or graphical presentations, or pictures, some questions and answers, some tests, some mouse-over animations, … .
The most challenging characteristic of the e-MINDMAP is the visual way of structuring the content. Animation can be built in too. The learner will be supported by this way to understand and to print in memory the structured content with the underlying relations between the content blocks.

An example of a course module following the e-MINDMAP concept:

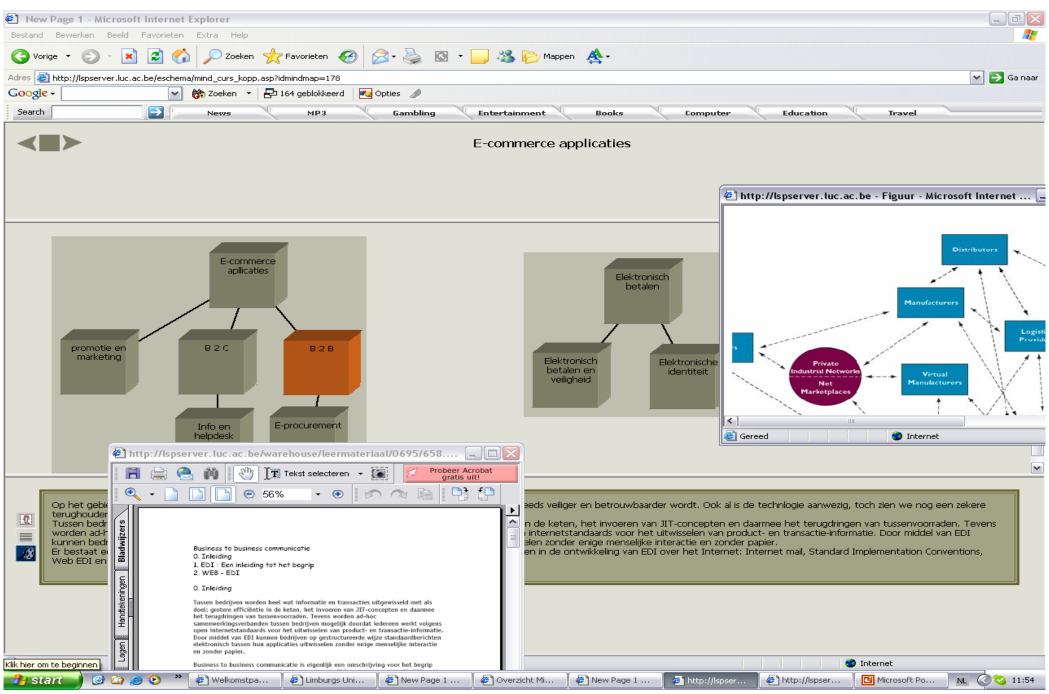

Figure 9. e-Mindmap

2.2. Tree structured interactive internet pages

We can build a tree structured html scenario model. We can bring together the full text docs of all blocks and put them in the pre-defined tree structure. On this time the block, being a html page must be designed using the presentation of the full text and the other atomic elements, being figures, hypertext links, Q&A, keywords, audio fragments, … can be linked with it following the design of the scenario model.
In this concept the focus is not the creation of the "visual overview" structure. But now it is possible to build in more interaction and a rich presentation layer.

Figure 10. a tree structured html scenario model

3. Conclusion

Our learning content can be structured as learning objects (LO) and as atomic learning objects (ALO). A learning object is seen as a composition or a scenario model of a set of blocks. The blocks, presenting the smaller learning content parts, are composed of the learning content (full text doc) and of a set of added ALO's, being small learning content elements. The blocks function as the nodes in a content tree and are the basis for the composition of a course.
A scenario model has to be defined, meaning a composition of blocks will be choosen. The learning content will be supplemented with other supporting, interactive and animating elements, being all parts of the presentation layer. The presentation layer is composed of presentation components put above the same original content components. Meaning different scenarios can be built upon the same decomposition of the learning content. Depending on the chosen scenario model, some scenario specific ALO's will be added and the LO will be created. To improve e-learning effectiveness authors can produce highly interactive and engaging content applying innovative approaches in some designed scenarios models.

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Learning Process Control of a Student Group: Improving Quality of Learning within an Intelligent Virtual Learning Environment.

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Abstract

A structure scheme for learning process control of a student group is presented in the paper. The control is based on a specific form of formative assessment and diagnostics of the student group performance. It is considered to be useful approach for improving quality of learning and for effective support for students to improve their learning. Providing automated feedback to the student group facilitates the teacher pedagogical load in this direction at a great extent and it is considered as intelligent feature of the Virtual Learning Environment. The work is part of PhD research conducted at the Technical University-Gabrovo, Bulgaria in collaboration with the University of Teesside, UK

1. Introduction

Virtual Learning Environments (VLE) are one of the modern tendencies in education considered necessary to *provide the essential conditions for quality learning*. An effective VLE should be not only a collection of learner management tools but also an intelligent tutoring system that is really *effective in supporting students* in their learning. At the same time VLEs should *facilitate the lecturers* involved in the teaching process.

Developing such a VLE is a real research challenge. The VLE should incorporate some *intelligent agents* to be able to provide *automated effective feedback* to the students and to the lecturers.

A cybernetic learning model has been developed and explored as a basis for providing *support to students and lecturers in the form of formative assessment and diagnostics that is automated to some extent* [1] [5]. Applying an accepted cybernetic approach, feedback is provided with the goal of improving students' learning; this is, in practice, *control of the learning process* (in cybernetics or process control terms) also forms a *specific type of formative assessment and diagnostics* of the students' performance (in educational terms).

Education is a very complex system. A hierarchic structure of education is proposed based on the analysis of the education system [2]. The hierarchic levels are:

- Level I - Single learner
- Level II - Student group
- Level III - University
- Level IV - Group of similar universities
- Level V - National level

The conclusions are made on the base of the current education system in Bulgaria, but the same conclusion can be made if education systems in other countries are observed.

The hierarchic structure of education demands hierarchic structure of the learning process control. Particular practical interest for both traditional and distance learning are the first two levels: control of learning for the single learner and control of the learning of the student group.

The object of control for each of the different levels is different. It is necessary to define the identification parameters of these objects at each level in an attempt to realize automated control. The control of the learning groups is aimed not only at supporting learning for the group as a whole but also at making choices which will improve future courses.

2. Object of control at II hierarchic level – student group

The situation for the control of the student group differs from the situation for control of the single learner in respect to the quantity and range of data. A large group of a full value gives relatively more rich information for the learning process over the different stages of its development. These results can be statistically processed to give a reasonably objective impression of the level and the status of learning.

The goals and tasks of the control result form the goals and task of the learning. They could be different for different type of education. The most common task for conventional education can be defined as achieving "maximum knowledge and maximum skills" within minimum time (if possible). Main output parameters of the student group as an object of control will be the level of knowledge and level of skills.

The dynamics of learning can be observed by tracing the *student group performance trend*. For this purpose time is added to the list of observed parameters.

The types of unanswered and incorrectly answered questions are chosen as additional output parameter for diagnostic purposes to provide effective control of the group and effective connection with the next hierarchic level. This parameter is analysed thoroughly and it is treated as highly important in the generation of control influences.

The suggested model of the student group as object of control with its main input and output identification parameters is shown in Figure.1. The number of the chosen parameters is estimated as minimal to provide good control.

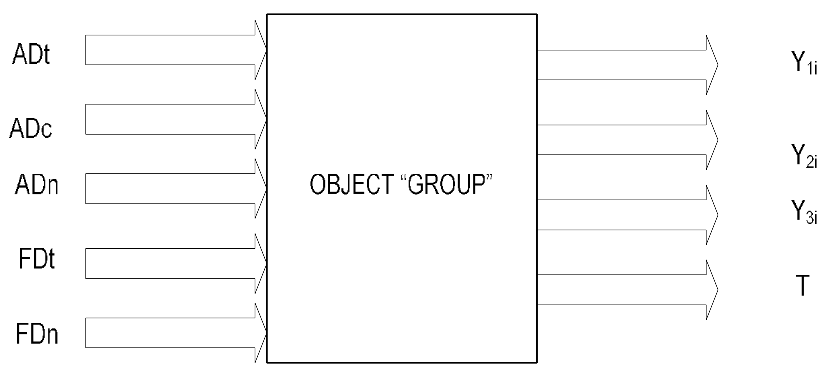

Figure.1

AD_t- Actual decisions from the teacher;
AD_n- Actual decisions according to the norms;
AD_c - Actual decisions for conferent discussion forum
FD_t –Future decisions from the teacher
FD_n - Future decisions according to the norms
Y_{1i} –Level of knowledge
Y_{2i}- Level of skills
Y_{3i} –number and type of wrong answered and non-answered questions
T –Time

For the purpose of student group control analysis of all output identification parameters of the object “student group” is necessary. It is very important also to obtain objective generalized results for the achieved level of knowledge and skills for the group as a whole.
The specified output parameters for the student group are obtained by the developed *specific test system* [3]. The test system in practice is the sensing device within the cybernetic learning model.

3. Structure scheme for control of a student group

According to the students' results, part of the arising possible situations could be define as “often happened”, “normal” or ”typical” for the learning process. For these situations, the developed control algorithm automatically generates *control influences in the form of standard diagnostic messages* to the student group. This feature could be defined as *an intelligent agent of the VLE.*
The lecturer receives automatically a signal from the automated system for the “atypical”, specific situations. It this case the lecturer is required to directly analyze the status of the student group and to make the proper control decision.

The goal of the system for control of the student group can be generalized as follows: automated control of the group for the “typical” situations arise and control by the lecturer for the specific situations. At the same time the lecturer is in the position of a supervisor of the control system. He has access to all data and automatically generated decisions. The lecturer has available some additional information, gathered by different ways for contact with the students: consultations, e-mails, personal meetings, discussion forums etc. At each moment, according to his opinion or objective need, he can override the automated control system and in this case his decisions are with higher priority. Such an approach is typical for the automated systems for control of technical and technological objects.

Based on the general approach and goal described, the defined identification parameters and the methods chosen for analysis of each identification parameter within the cybernetic learning model, a structure scheme for student group control (II hierarchic level) is developed (Figure.2).

I information channel

The test results have to be processed in a suitable way to be able to analyse the status and the progress of the student group concerning the acquired knowledge level. The analysis of the problem shows that this task is very close to the task for production quality control. There are standardized approaches for production quality control and one of the possible variants uses *statistical methods* [4].

Learning is a unique process and there are no operative standards for its quality characteristics. That is why the task *to control the quality of learning* is a specific and especially difficult one. Histograms and the control charts are one of the main tools used by statistical methods. The statistical knowledge for data analysis itself, though, is not enough to give sufficient insight into the process quality problem. Histogram and control charts, combined with a *good knowledge of a particular process* become an effective practical working tool in data analysis. *Specific new variant* for using histograms and control charts for the quality of learning control of a student group is developed [4]. Analysis of the histograms and control charts is conformed to the specific features and requirements of the learning process. The results from this analysis are a basis for developing an algorithm for quality of learning control of a student group.

A histogram with students' results (level of knowledge Y_1) is build after each test. The histogram analysis includes: calculation of the mean for the test results, its comparison to the accepted standard value (SN) and defining its position towards the defined lower (LCL) and upper (UCL) control limits, defining the class with higher frequency. The generation of control influence is automated for bell-shape, right- or left-skewed histograms. When the histogram is plateau-like, bi-modal or with two peaks the analysis of the situation and the control decision is made by the lecturer.

Evaluation and diagnostics of the dynamics of the learning is made by tracing the student group performance trend (tracing the "history" of the learning process). The trends are evaluated as: increasing tendency (progress), decreasing tendency (regress), fluctuation around certain value (stagnation), instable. The position of the trend towards the defined lower and upper control and warning limits is considered in the analysis also. As one of the most indicative parameters is considered the trend position toward an average values SN based on students' results from previous teaching periods that is used as a benchmark. The particular control decisions are based on the analysis and according to the developed control algorithm.

II information channel

This information channel is to process the data for the level of skills Y_2. The data analysis is analogous to this one applied for the level of knowledge in the ***I information channel.***
This parameter is not included in the developed version of the control system. This simplifies the development of the prototype of the suggested system for automated control of the learning process (feedback and diagnostics) and at the same time this fact does not change the developed approach.

III information channel

It traces the following of the timetable with two parameters: the time t_i for mastering a current topic teaching material and the whole time for the duration of the teaching course T, comparing them to the planned values t_{in} and T_n by the course schedule. The time is used to: define the intensity of the learning process, indicate for being behind the schedule, statistics for the number of students that do not follow the schedule. The result from the time analysis is a specific diagnostic characteristic and requires a corresponding control decision.

IV information channel

The analysis of the test question answers includes: number of the unanswered or incorrectly-answered questions, grouping these questions by type (importance), sorting these questions to define the dominant groups, defining the percentage of the dominant types etc. Statistics for the incorrect answers for each registered question can help to define the "difficult" questions. This is not only for information, but it is also a signal for possible pedagogical weaknesses in presenting the teaching material or composing the test.

The suggested analysis helps to precise the student group diagnostics and to be used mainly in two directions: improving teaching material and its presenting to the students, including additional material, consultations or discussion forum; checking for mistakes in the question formulation, other pedagogical weaknesses of the test system and/or technical problems.
The information should be used also to make conclusions on whether the individual students are properly selected for the accepted type of learning and the particular teaching course.

V information channel

Processing signals from the students: during the learning process – for immediate reaction; after the end of the teaching course (inquiries etc.) – activities for changing next teaching courses.

This type of information is not included in the automated system for control of the student group, but it helps the teacher to make decisions. It is good approach to record all information concerning the character and the content of the students' signals and opinions. To *continuous improve the quality of the teaching course*, *evaluation of its quality* is of essential importance. This evaluation could be from different points of view. S*tudent evaluation* of the quality of the teaching course is one of the most important parameters for the developed system for learning process control. Estimation of *student satisfaction with the teaching course* is envisaged at the end of each course. A special approach is developed for this purpose [6]. The analysis of the students' satisfaction with the teaching course is very important to form the control decisions for improving of future courses FD (future decisions).

Block VI – automated control system

All collected information is analyzed in block VI and the relevant automated control decisions to the student group are generated here. At the same time the whole information is presented to the lecturer and to the next hierarchic level (department, faculty). The decisions could be a wide range of and they depend on the analysis of the identification parameters.

According to the developed cybernetic learning model and identification parameters for the single learner the input parameters (control influences) are three groups: quantity of teaching material, administrative influences, psychological influences. For the purpose of the learning process of the group control in the suggested structure scheme these control influences are grouped according to the moment of their application. They are classified in two main groups: *Actual Decisions (AD)* applied immediately during the current teaching course and decisions for improving the teaching course in the future – *Future* Decisions (FD).

Block VII - lecturer

Generating the most of the control decisions the automated system *facilitates the lecturer's work in this direction to a great extent*. In spite of this the lecturer has a *key position* to control the learning process of the group. The lecturer makes the direct analysis of: histograms for three cases (bi-modal, plateau-like and with isolated peak); data from the direct contacts with the students; students' satisfaction with the teaching course. In these cases he generates the appropriate control decisions. The lecturer and his decisions have the *largest influence* and hence the *highest priority* in the system. He is at the position of a supervisor and he has access to all automatically generated decisions also. He overrides the automated system at any moment when necessary according to his opinion or in when there is a breakdown or a non-standard, unexpected or very specific situation.

The lecturer realizes also the connection with the hierarchic level III in the education structure – university, presented by one of his structure units (department, faculty etc.). This connection is very important because the regulations and norms concerning the teaching course are defined at this level.

For a current course the actual decisions ADt and ADn are important. The input influences are not specified in this general structure scheme because its purpose is to clarify the structure and the strategy of the automated system for control of the student group. For each specific course these decisions are specified based on the experience gained, traditions or using expert opinion. For example, some of the possible actual decisions from the lecturer could be:

- Changing the intensity of teaching within the potentialities of the schedule (the same quantity teaching material for longer period or less teaching material for the same period)
- Supporting the group by providing additional material, consultation, discussion forum etc
- Taking special measures for weak groups with test results below the basic value SN and unfavorable performance trend
- Other administrative, pedagogical or psychological type of help.

The ADn defined by the hierarchic level III are mostly administrative (including financial) measures. They could be, for instance:

- Changing the schedule
- Stop the course, re-grouping students
- Changing the lecturer (lecture team) – fully or partially
- Introducing more basic changes in the learning technology
- Other administrative of financial forms of influence

The changes for improving teaching FDt and FDn are not applied immediately in the current course. They express the experience gained and they are applied in the future courses. They could be:

• Signals for changing the teaching material to make it topical (fully or partially)

• Measures to improve learning technology, technical equipment etc.

• Developing new teaching materials

• Signals for changes in the lecturer's team (change of some lecturers, refreshing courses for some lecturers etc.) This activity is not specified in the structure scheme and for taking measure in this direction only the student results from the current course are not enough. It is obligatory to define the students' satisfaction with the teaching course [6].

4. Conclusion

Modern technology-based education systems (supporting traditional learning, e-learning, blended learning, ODL, VLE) still need further development to become effective learning environments. Providing both assistive tool for tutors and effective supportive formative assessment for students is regarded as essential and valuable feature of VLE and it is still challenging research area.

A structure scheme for learning process of a student group is presented. It is based on a specific form of formative assessment and diagnostics of the students' performance. The suggested system provides automated control of the group for the "typical" situations which arise and this is considered to be an intelligent feature of the VLE. The control of the learning process supports students learning, facilitates the lecturer's work and provides conditions for improving quality of learning within a VLE.

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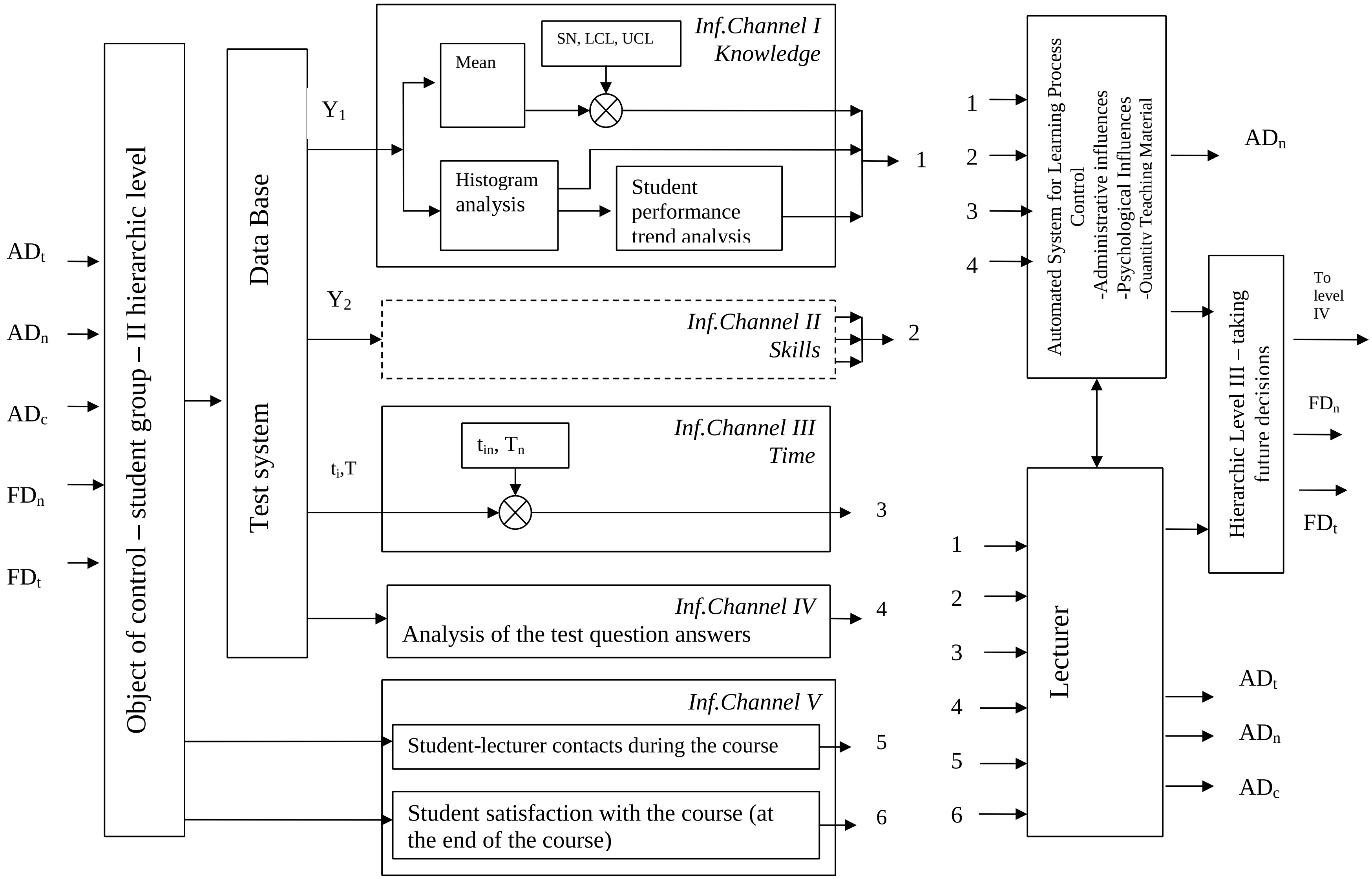

ADt
ADn
ADc
FDn
FDt
Object of control – student group – II hierarchic level
Data Base
Test system
Y1
Y2
ti,T
Inf.Channel I
Knowledge
Mean
SN, LCL, UCL
Histogram analysis
Student performance trend analysis
Inf.Channel II
Skills
Inf.Channel III
Time
tin, Tn
Inf.Channel IV
Analysis of the test question answers
Inf.Channel V
Student-lecturer contacts during the course
Student satisfaction with the course (at the end of the course)
1
2
3
4
5
6
Automated System for Learning Process Control
-Administrative influences
-Psychological Influences
-Quantity Teaching Material
ADn
Hierarchic Level III – taking future decisions
To level IV
FDn
FDt
Lecturer
ADt
ADn
ADc

Figure.2

A Case Study in Online Peer Observation Research in Progress

Poster Presentation Proposal

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Background to the Case Study

The practice of peer observation is increasingly becoming a feature of educational practice much recommended across disciplines in Higher Education Institutions (Hammerley-Fletcher & Ormond 2004, Marshall 2004) UK Higher Education and some other sectors.

Peer Observation might be described as a process whereby a teacher participates as an observer in a lesson taught by a colleague for purposes of exploring the learning and teaching process and environment. It could be said to provide a unique objective perspective on the learning and teaching process within an educational context, alongside the subjective perspective of the teacher and learners directly involved within the process.

The primary impetus for the introduction of Peer Observation, certainly within the UK Higher Education context, has perhaps been reasons of external accountability, the 'political drive to raise teaching quality via the development and sharing of 'good practice' (Shortland, S, 2004), compliance with Quality Assurance Agencies set standards, or internal ranking for tenure (Goslin, 2000; Kell, 2004). Yet, the documented failure of external quality assurance mechanisms to promote quality improvement in Higher Education (Goslin & D'andrea, 2001) has fostered a shift towards Quality Development defined as "*an integrated educational development model that incorporates the enhancement of learning and teaching with the quality and standards monitoring processes in the university*" (Goslin & D'Andrea &, 2001). Indeed, the aims and longer term benefits of peer observation are potentially broader and include the further aim of supporting continuing professional development (CPD) through peer learning. In fact, research has indicated that it is when practiced from a purely developmental perspective, for quality enhancement, outwith requirements of a quality assurance process, that teaching staff engage most enthusiastically and genuinely with the peer observation process/practice, resulting in fruitful, unexpected flourishing of discourse about faculty theoretical approaches to teaching as well as foster a communicative interaction on professional themes to the benefit of faculty and institutions alike. (Cooper, 2001; Gilpin, 2000; Marshall, 2004; Munson, 1998; Shortland, S, 2004).

A growing body of literature points to key aspects of implementation which contribute negatively or positively to the effectiveness as a CPD tool, but so far, primarily as applied to classroom-based peer observation.

Indeed, review of the literature suggests that implementation is largely restricted to face-to-face teaching contexts. Within the UK, quality mechanisms look for evidence of institutional implementation of peer observation, often in the context of QAA Subject Reviews Procedures (Shortland, 2004; Gosling & D'Andrea, 2001). However, although an increasing number of Higher Education and Further Education programmes nationally involve online teaching and student support, a search for evidence of implementation of online peer observation in the form of case studies, journal articles .or any other documents available for research scrutiny, has revealed very few examples of such procedures; the issues rarely addressed within Peer Observation guidelines. Discussion with colleagues in Australia suggests a similar situation there, despite their longstanding tradition of flexible and distributed learning. Research literature suggests that investigation of the methods, "dos" and "don'ts" appropriate to effective implementation of peer observation in the online context is very much in its infancy.

This is all despite both the growing importance of elearning across all sectors of education (Bennett and Marsh 2002) and the strong claims made for elearning as a tool to address the need to widen participation in education by removing or reducing the attendance requirement at face-to-face classes and allowing people to access learning in a variety of locations within everyday life, at home, at work (DfES eLearning Strategy, 2003; Selwyn and Gorard, 2003). Indeed within the UK at least it has been claimed that "*e-Learning is now firmly embedded in the learning strategies of almost all medium to large size employers in the UK*" (The Training Foundation).

Alongside this growth in the use of online teaching and support, there is an increasing awareness that this expansion should be supported by professional development and training, for *without staff development nothing is likely to happen beyond pilot schemes (Salmon 2000)*. Even as early as 1998 it was acknowledged that such training should go beyond the focus on the technology but also aim at raising awareness and developing practical competence in pedagogical aspects of the support of learning with ICT if we are not to leave the teacher *floundering and desperately trying to apply the theory to his/her practical teaching situation.* (HEFCE, 1998). Tonkin and Baker point out that

> *The central question isn't whether this new approach to education is effective … but what steps can be taken to not only ensure that individual courses are effective but provide the necessary guidance to promote faculty growth and development as they teach online* (Tonkin and Baker, 2003)

Indeed, it could be argued that both initial training for online teaching and ongoing professional development to support teachers as they apply their own individual teaching styles to the opportunities and challenges within the new context are all the more important in a world where online learning and teaching is still relatively young:

> "… *online learning is still in its infancy and to date comparatively few people have ever followed a programme of learning online. Classroom-based learning is still, and will continue to be for some years to come, the norm. Consequently the*

majority of tutors new to online teaching do not have that background of online learning experience upon which to draw in the same way as trainee teachers starting out in classroom teaching can draw upon their personal classroom learning experiences which will date back form their early years at school." (Bennett and Marsh 2002)

Case Study methodology

The research methods implemented on this pilot project involve a variety of strategies within a qualitative, Case Study approach. The exploration of what Yin calls "the contextual conditions" for Online Peer Observation forms the rationale for choosing a Case Study methodology whereby the act of observing and being observed is scrutinized within and the blurring boundaries of the environmental conditions enabling it, so that provisional conclusions are drawn as to whether the process is effective and how it leads to reflection on practice. Furthermore the small number of participants and the novelty of the field call for a focus on exploration and description, which is typical of the qualitative descriptive approach in general and of Case Studies in particular.

The current project builds on both areas of the debate outlined above – on the one hand the growing body of evidence for the valuable contribution that online peer observation, properly implemented, can bring to teachers' personal and professional development, and on the other, the training and developmental imperative of the growth in online teaching and learning support. It builds on the previous research findings within the University of Hull and on experience gained from the university's Master of Education in eLearning programme.

Work undertaken in partnership with the Transport and General Workers Union in 1999 using funding from ADAPT and the Union Learning Fund, showed the significant contribution of "eTeaching Practice" to new etutors *(Bennett and Marsh 2002)*. When applying this experience to the development of eTeaching Practice as a key element of the *eTutoring and eLearning Course Design* module on the Master of Education in eLearning, it was apparent that students who had the opportunity to engage in online peer observation within their eTeaching practice, gained considerably from the experience. One of these students found it so worthwhile that she contributed to the implementation of online peer observation as standard practice on the module the following year.

Both experiences are suggestive of the value of supplementing any initial training to equip tutors for online teaching with a form of eteaching practice or a form of *clinical supervision* in which the implementation of online observation provides online tutors with a structured and supportive opportunity to engage in dialogue to discuss difficulties or worries and celebrate successes, all in response to real issues arising from their own teaching and their learners' learning. The term *clinical supervision* has been attributed to Morris Cogan, 1973 (cited in Wallace, 1991:108) and has been used in the literature to describe the facilitation of dialogue around what goes on in the teaching and learning situation. This dialogue thus enables theory to emerge out of practice, rather than exclusively being applied to practice as is so often the case (Smyth, 1986: 1-2 cited in Wallace, 1991:108)

With this in mind, a pilot investigation into online peer observation was set up within the context of 6 modules delivered as part of the EU-funded project ISEeTT[1], a project which project to define *the core curriculum and quality standards for European etutor training in relation to different national contexts,* and which involves online delivery of modules focussing on course design, assessment, technical skills, elearning theory and practice, together with both an introductory module for those new to etutoring and a transnational module “Sharing European Perspectives on eLearning” for experienced etutors in the UK, Germany and Austria.

The tutors who are participants within the pilot of the Online Peer Observation scheme are 7 experienced online teachers from 6 different countries. All have participated previously in peer observation in face-to-face contexts, but only two have previous experience of online peer observation. The Online Peer Observation process itself is based on the established Peer Observation practice of the Centre for Lifelong Learning at the University of Hull, practice which has at its heart the notion that the purpose of Peer Observation is purely developmental, and should not involve judgement or evaluation of the quality of teaching. The Centre for Lifelong Learning scheme is based on a set of key principles, all of which have been taken across into the pilot study, and adapted for the online context:

- *The scheme recognises that peer observation should be non-threatening, developmental and supportive and provide a means of discussing and sharing good practice.*
- *The scheme recognises that there is no universally accepted model of good online teaching and that different approaches can lead to successful learning.*
- *The scheme assumes that the teaching of both the observed and the observer will benefit from the process of observation. The scheme aims to maximise the benefit gained from opportunities to take part in observation.*

Adapted from the CLL Peer Observation Scheme, University of Hull[2]

An additional underpinning long-term aim is, of course, that participation in peer observation should ultimately contribute positively to improving students’ learning. The pairing of observer and observee was left to the participants themslves, on the basis that the observee should be able to freely choose their observer on the basis of the principles of trust and respect.

Building on the practice in the face-to-face context, the observation process falls into 3 distinct stages:

- Stage 1 - Pre-observation discussion - preparation for the observation

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[1] *Implementing Standards in European eTutor Training* (ISEeTT), established under the second phase (2000-2006) of the *Leonardo da Vinci* Community Vocational Training Action Programme: http://www.etutorportal.net

[2] Centre for Lifelong Learning Peer Observation Scheme, University of Hull: http://www.hull.ac.uk/foundationaward/formsforweb/Teachingobsjune2003.rtf

- Stage 2 - The observation itself – around the observee agenda
- Stage 3 - Post-observation discussion/personal reflection - discussion of relevant aspects emerged from the process/personal recording of salient points

Within Stage 1, the Pre-observation discussion, the Observee should both pass relevant information about the taught module to the Observer and draw up a list of points which they choose to form the focus for the Online Peer Observation. Thus the "agenda" for any individual instance of peer observation is determined by the Observee, not conducted according to some pre-determined framework suggestive of Observer evaluation of the teaching observed. Forms are provided to help participants structure this discussion.

During Stage 2, the emerging Observee "agenda" forms the basis for Observer attention during the observation itself. So too, the Observee "agenda" should be central to the Post-observation discussion in Stage 3, the purpose of which is to ensure the developmental purpose of the observation and help both Observee and Observer to reflect on the learning gained from the opportunity to participate in Peer Observation of online learning practice. After Stage 3, participants are also encouraged to write an optional personal summary of issues arising within the observation and discussion.

Although the establishment of these three stages within peer observation process was simple, drawing as it does on the tried and tested established scheme within the Centre for Lifelong Learning, the challenges arise when one considers the practicalities and the constraints and challenges presented by both the constraints and, paradoxically, the opportunities afforded by the flexibility that is possible within the online context.

The research includes exploration of the extent to which practicalities during online peer observation do present challenges to the participants, the choices they make and the strategies they employ to overcome challenges and/or exploit new opportunities. We hope to be able to identify key aspects which contribute negatively or positively to the effectiveness of peer observation online, to complement those already established as applicable within classroom-based peer observation.

Over and above this question of practicalities, the research aims to explore the experiential value the participants come to place on the online peer observation opportunity. The main underlying principle of the online peer observation scheme is that of reflective practice supported and embedded in the constructivist opportunities offered by the online environment. As Cosh (1999) contends:

> *In a reflective context, peer observation is not carried out in order to judge the teaching of others, but to encourage self-reflection and self-awareness about our own teaching. The focus is on the teacher's own development, rather than on any presumed ability to develop the teaching of one's peers or colleagues.*

We aim to research whether a negotiated, flexible model for online peer observation is felt to offer a positive contribution to online professionals in their continuous professional development.

To both these ends, data collection methods will include semi-structured interviews, examination of the forms completed by the participants in the course of the Peer Observation, and individual reflections.

Findings – emerging issues

The pilot implementation of online peer observation within the Case Study is still underway, and a clear picture of findings has yet to emerge.

However, foreshadowed issues which are already apparent include the following practicalities inherent in peer observation within the context of online teaching:

- "Chunking" the learning and teaching activity to be observed – Classroom-based peer observation typically involves observing a "lesson"; online courses are not necessarily organised in terms of "lessons" and participants need to find another way to identify an appropriate "chunk" of learning for the observation, especially if asynchronous learning is involved

- The time-relation between "observation" and the learning and teaching activity observed - Classroom-based peer observation necessarily involves "real-time" observation; the same could be implemented for synchronous learning events online, however, even with this form of online learning, the option usually exists to "observe" a recording of the interaction *post facto*. This is even more complex in the context of asynchronous online learnting and participants need to decide whether the observation should be ongoing, continuous throughout the period of learning, or looking back at the interaction on completion of the focus activity. A potential further option within observation of a course involving asynchronous learning experience is simultaneous reflection and/or discussion between observee and observer running alongside the course that is the focus of the observation. The very richness of the flexibility offered by online learning presents a range of options which may force observee and observer to engage in additional decision-making.

- Access to course Interaction – Traditional observation occurs in an identified classroom or other learning location; online learning may involve a number of fora and/or individual and group email interactions. This flexibility presents challenges as to how much of this is "observed", and how. Additionally, there is both less, and more, of the learning process that is "observable" online. Much information traditionally gleaned by observation of non-verbal communication is inaccessible; conversely

- Mode of Observer / Observee interaction – Pre-course and Post-course discussions are typically face-to-face or via the telephone for traditional observation. Depending on their proximity, neither of these may be possible and online participants may need to identify personal preferences for asynchronous or real-time discussion, and for spoken or written communication.

Further issues to be explored further in the future include research design, ethics and teacher / learner rights within the context of online observation, cultural attitudes to per observation within transnational online learning contexts, the potential contribution and role of "online peer observation" in relation to emerging e-pedagogy, patterns of student learning, and new online teaching and support roles, and indeed, the very appropriateness of peer observation as a tool for continuing professional development within the online context.

(2727 words)

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"In der Beschränkung zeigt sich erst der Meister"

Staff competence profiles in commercial, competence-based distance education

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Introduction
This paper will give an outline of the competences that are required from tutors and support staff to guide and support students within a Virtual Learning Environment to support a new paradigm of learning within the Dutch (upper) secondary and tertiary vocational education system: competence-based education. In particular, it will address the developments at the company the authors work for: a commercial Distance Education (DE) provider.

In order to give this outline, several issues will be explored to provide the background of the paper. The definition of competence and competence-based education will be discussed. This definition will be followed by a description of the challenges that competence-based education at a distance poses for tutors and support staff, that will help identify core competences.
The competences for tutors and support staff in our commercial Distance Education (DE) company are based on the competences for teachers in secondary education and VET in the 'Wet BIO' (Law on Professions in Education), described by the Dutch government. However, in the process of formulating our competence profiles, we have taken the realities of commercial distance education into account. We will provide a rationale for the major adaptations we have made to the national profile from this point of view.
The paper will summarize the competence profiles for Head and Subject Tutors, Mentors, Workshop Teachers and Traineeship Advisors. The full profiles will be supplied as an annex.

Background
Factors such as globalization, rapid changes in technology, the knowledge economy/information society, and changing demographics causing the need to reform education and training (e.g. Leney, 2004). Given these rapid changes in today's society, the European Union has set itself the goal 'to make Europe the most dynamic and competitive region in the world', the so-called Lisbon goal of 2000 (NA Leonardo da Vinci brochure, 2003, p. 3). One of the 8 priorities is the goal to pay more attention to the learning needs of teachers and trainers (NA Leonardo da Vinci brochure, 2003, p. 3).
In line with the Lisbon goal, the Dutch government has described competences for teachers in primary and secondary education and VET in the 'Wet BIO' (Law on Professions in Education). These have been worked out by the *Stichting Beroepskwaliteit Leraren en ander onderwijspersoneel* [Foundation for professional quality of teachers and other educational personnel]. A full description in English for VET can be found at http://www.lerarenweb.nl/bijlagen/SBLcompetence_s_and_v.pdf.

Current situation
The company in question, NTI, has a considerable history of over 60 years in providing primarily course-based distance education. It started out as a (language) course provider in the 1940s. But the shift from being a course provider to becoming a recognized provider of education programs has resulted in a considerable culture change, especially in a considerable need for professional development of tutors and support staff.

The introduction of a new type of education requires new competences of the people responsible for its delivery. At our company, we are faced with a number of questions. Tutors and mentors need (new) competences in the field of facilitating CBE, of facilitating CBE *at a distance,* and of working with a new virtual learning environment.

Current roles
A description of current roles will serve as the starting point into an exploration of new competencies to be acquired. It is important to keep in mind that in commercial distance education, many roles tend to be free lance positions. In NTI's case, only the mentor role is carried out from within the organization.

1. Head Tutor: the position of Head Tutor has been introduced in 2005. This person supervises and/or develops one or more programs and its faculty in one domain at one level (either VET or HE).

2. (Subject) Tutor: until now, tutor roles have been limited and isolated. The main task of the tutor has been to correct and, if necessary, comment on homework of individual students. Recently, a reactive role in computer conferencing has been added.

3. Traineeship Advisor: with a growing number of our students entering their traineeship period, this role was created in 2004. The advisor is the company's representative during the student's practical training.

4. Workshop Teacher: the person responsible for carrying out the face-to-face parts of the program. They either combine this role with one of the above, or are only available for the workshop component.

5. Mentor: the Mentor role has only been introduced in 2004. It was decided that NTI's students in VET or HE programs should have a personal mentor to solve any administrative problems. Questions on content would be directed to the student's tutor. Mentors have also fulfilled roles in student induction. Currently, an initiative is being worked out to give the mentor a more substantial role in student support and counselling.

Concept of Competence
Before we can actually formulate the desired (new) competence profiles, we need to define what competence and competence based education mean. Competence in itself is an elusive concept. Weinert (2001, pp. 46-51) identifies seven conceptual approaches in the social sciences alone. Of these, that of action competence comes closest to the definition that is promoted by COLO (the Dutch organization of Centres of Expertise on Vocational Education, Training and the Labour Market):

> Competences are capacities, capable of development, of people to act in an adequate, purposeful and motivated manner in certain situations, i.e. to choose and apply appropriate procedures to achieve the desired results. Competences are complex by nature, refer to underlying skill, knowledge and attitudinal domains, and are applied and developed in a context. The contents of competences have several dimensions. These are: the vocational-methodic dimension, the administrative-organisational and strategic dimension, the social-communicative dimension and the developmental dimension. (www.colo.nl/begrip.php?C; translated from Dutch)

This definition is similar to Weinert's (2001) description of action competence in that a competence is defined as a complex system including cognitive, attitudinal, social and skill-related aspects. Also, both refer to people (individuals or possibly groups) as the 'carriers' of competence, and the fact that a (professional) context is implied.
As the member organizations of COLO have been made responsible for the development of the occupational competence profiles required for the current reform in the Netherlands, the use of the term 'competence' in this paper will refer to the concept of competence as defined above.

Competence based education
In the development of the Dutch national CBE-framework for VET, the work of Onstenk (1997) has been of particular influence. His 'fields of competence' (2001) can be recognized in the dimensions of competence in the COLO-definition:

- vocational and methodical competences
- organisational and strategic competences
- social, communicative, normative and cultural competences
- learning and shaping competences

(p. 39)

Rather than using a 'backward mapping' approach that standardizes curriculum development ands leads to a 'disintegrative approach' (Biemans et al., 2004), Onstenk proposes to start by looking at 'core problems', which are 'problems and dilemmas that are of central importance for occupational performance. Core problems occur regularly as part of occupational practice, and they are characteristic of the profession' (Onstenk & Brown, 2002, p. 95). These core problems, and the core tasks associated with them, will now guide curriculum development in the educational reform towards competence-based vocational education.

In the following section, we will use the concept of core problems and core tasks to explore the desired competences of our staff.

Challenges for tutors and support staff in (commercial) CB distance education
Both in regular education and in DE, the introduction of CBE causes changes that require different or new competences from the teaching and support staff. What challenges does the Dutch concept of CBE pose for tutors and support staff within (commercial) DE? The table below summarizes a number of core problems, based on the shift from more traditional DE towards CBE. The second column describes the (new) core tasks for different roles in the company.

Core problems	Core tasks
Home-study vs. workplace learning	
With its origin in traditional correspondence education, DE has long relied on the development of self-study materials, with correction of homework and 'internal didactic conversation' (Holmberg, 1995) as the main link to the outside world. With the great emphasis in CBE on the practical part of learning, on authentic situations and on integration in practice of knowledge, skills and attitudes, it is expected that work placement will take up more space in the curriculum.	Various activities must be developed (by Head tutor) and carried out in the virtual learning environment (by Subject tutor) to guide and support students while working, and to help them reflect on and give meaning to the experiences gained. The Work placement advisor will fulfil an increasingly important role within CBE.
Individual vs. collaborative study	
The tradition in correspondence education has caused an emphasis on individual learning, whereas CBE places more emphasis on developing collaboration, teamwork and social competences etc. DE's traditional concept of 'studying in your own time and place, at your own pace, in your own way' will no longer be valid throughout the study program. A serious attempt needs to be made to reconcile individual flexibility with the need to train a socially flexible workforce. Student autonomy will change from autonomy in choosing time, place and pace towards autonomy in choosing learning content.	Collaborative activities can be facilitated in DE, particularly through the implementation of ICT in the learning activities. However, the Head tutor must take into account that since the main target group of the company is between 25 and 45 years of age, and therefore has not grown up as a member of the Net Generation (Oblinger & Oblinger, 2005), students may be more apprehensive about using ICTs. Subject tutors will have the task (and challenge) to stimulate these students within a Forum.
Theory vs. practice and attitude	
Some parts of education have traditionally been more easily achieved through DE than others. According to Driscoll (2002), 'cognitive skills are best suited for delivery via Web-based training…' (p. 105). Though certain *elements* of practice and attitude can be trained at a distance (Driscoll, pp. 103-106), it seems likely a 'blended solution' (p. 106), such as a combination of web-based learning with face-to-face sessions or self-study, offers better perspectives. Integration of knowledge, skills and attitudes needs to be strived for in every part of the blend, if we take CBE seriously, but different parts of the blend will have a different emphasis.	In order to integrate knowledge, skills and attitudes, the Workshop teacher will fulfil an increasingly important role within CBE. For DE, this refers mainly to the development of a professional identity. The Workshop teacher gives an impulse to this process during workshop activities.
Modularity vs. integration	
The formulation of competences may offer a new perspective on modularity. If competences are the object of gradual development, continuing learning and development streams imply a certain sequence and connectedness between elements in the program that contradict the concept of self-contained modules.	Main task for the Head tutor is to work in a more integrated way, in order to offer the students the guidance that is needed to be able to view 'the whole picture'. This may also mean an expansion of tasks

Therefore, a new balance needs to be found between an attractive offer of modularized programs and of separate modules, and the developmental approach prominent in some of the more outspoken CBE concepts (Dochy and Nickmans, 2005).	(Dochy & Nickmans, 2005). Within DE, the Mentor can play a considerable role in guiding students in viewing the whole picture.
One size fits all vs. personalized model	
As to differences in prior knowledge, regular education experiences a shift away from the 'one size fits all' model described by Banathy (1993) towards a more personalized model. An important factor in this shift is the Recognition of Prior Learning (RPL), which is also a main policy priority in the EU in the context of stimulating lifelong learning (Leney, 2004). The competence model implies assessment independent of learning path (Dochy & Nickmans, 2005). Therefore, if a person can prove the 'possession' of certain competencies, the proposed learning path can be adapted to suit his/her personal needs.	The student will more and more be the center of attention. Students are encouraged to voice their need for more support and tutors work more as assessors rather than as homework correctors. And in the RPL procedure, the Subject tutor and Mentor will play a leading role. The former as assessor, the latter as screener of the student portfolios.
Print oriented vs. ICT integration	
The virtual learning environment offers a number of opportunities for collaborative learning and up to date learning content. Asynchronous computer conferencing allows a group of learners to exchange and share messages while not being online all at the same time (Hülsmann, 2003). This allows for 'community building', strengthening relationships to form a 'community of learners' that will stimulate and support its members in their learning endeavour. This means that students need to be offered the space and tools to engage in relating to other students.	Tutors have to learn to balance individual and collective feedback by choosing the appropriate tool (portfolio for individual feedback, forum for collective feedback). Collective feedback may help students become more aware of their own progress as compared to that of others.
Assessment *of* learning vs. assessment *for* learning	
In competence-based education, assessment is shifting from assessment *of* learning to assessment *for* learning (Dochy & Nickmans, 2005). Formative assessment is becoming an integral part of the learning process. As a consequence, formative assessment becomes an integrated activity to make a student's progress transparent, both for the learner and the teacher.	The current emphasis within DE is on individual assessment. But in relation to CBE, instructional designers (Head tutors) need to be made aware of the possibility to build in joint activities in the field of problem solving, decision making, designing, inquiry and research and meaning construction, while at the same time individual assessment needs to remain possible.

(Adapted from Dudink, 2006)

Competence profiles tutors and support staff

This section will explore and give a rationale for the changes we have deemed necessary to the competence profiles - as defined in the Wet BIO - to adapt to a distance education situation. The Wet BIO includes seven main competences for teaching staff which are oriented at the relationship between the professional roles (interpersonal, pedagogical, subject related & didactical, organizational), the professional situations (with students, colleagues, working environment and self), and the required competences (1 to 7) (www.lerarenweb.nl).

A distinguishing feature of distance education has traditionally been the division of labour (Peters, 1998). 'Regular' teacher tasks can be spread over any number of specialists, e.g. content developer, homework corrector, personal tutor etc. Several of such roles have been thoroughly described by O'Rourke (1993). As described above, this division is also characteristic of the situation at NTI. Furthermore, the introduction of CBE in regular education is expected to bring about the same kind of division (Huisman, 2001).

Therefore, we have found it somewhat surprising that the *Stichting Beroepskwaliteit Leraren en ander Onderwijspersoneel* have chosen to differentiate their competence profiles across levels of education (primary, secondary (and) vocational, upper secondary), rather than across the envisioned specialized roles of teaching and support staff.

This is the main change we have made in the original profile based on the Wet BIO: since we do not offer all mentioned levels, we have chosen to eliminate the difference between levels of education, and sought to make the profiles applicable to secondary, secondary vocational as well as higher education. At the same time, we have distinguished between the roles that have been described above. For each of the different roles, an emphasis on certain competences as well as certain indicators distinguishes it from the others.

Another important change was to shift the focus from working with groups to working with individuals and providing individual student support. Individuals are at the center of our company's philosophy and are therefore placed before groups in the profiles.

Additionally, it has to be mentioned that the above competence profile does not explicitly take into account the ICT-skills that are necessary for our distance education staff. This should not be regarded as a separate competence, nor as an add-on, but as an integrated part of each of the relevant competences (Fransen, 2005). Therefore, where necessary, the original indicators have been adapted to reflect this.

Other changes refer to the characteristics of our target group. References to 'teenagers' were deleted, as our target group consists mainly of adults and adolescents. Consequently, we have changed the word 'pedagogic' into 'andragogic', to better reflect the difference in target groups between distance education in our situation and regular education.

The same goes for the cultural determination of certain types of student behaviour. Although culture is to be taken into account in distance education as well as regular education (Sanchez & Gunawardena, 1998), we feel that this competence in its current formulation refers more to regular classroom education and the political hot issue of "black" and "white" schools.

What we did include, after some hesitation, was the issue of language acquisition and its influence on learning. An incident happened where one of our students had apparently qualified for a work placement period (as a class assistant), even though she hardly had any command of the language. We feel that it is our duty to at least signal such issues and guide such students towards supporting learning opportunities.

Conclusion

As a commercial distance education provider, offering recognized vocational and higher education programs to the market, our company needs to comply with various laws and regulations. As regular education changes, so does the form and content of our offering. The introduction of Competence Based Education into the vocational education sector leads to a number of changes, not only in our educational products and services, but also in the capabilities we look for in our staff. As the title implies, we aim for mastery by specialization.

This paper has explored the particular changes in DE staff competences necessary to implement competence based education at a distance in a commercial setting. The translated profile from the Wet BIO, the full profiles of the different tutor roles in DE, and a summary table of these profiles can be found as an annex to the paper. We hope they may inspire other DE institutions.

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Role	**Summary competence profile**	**Differences with the 'wet BIO'**	**Remarks**
Head tutor	The Head tutor devises a variety of learning activities that can be carried out by the students. The Head tutor is involved in the development of learning activities prior to the learning process. The tutor makes contact with the students, encourages them to make contact with him, and makes them feel at ease. Mainly by means of computer conferencing and email. For the Head tutor, this competence applies also with respect to the program's faculty (vakgroep). He coordinates / coaches the program's faculty.	The Head tutor endorses an andragogical responsibility, instead of a pedagogical responsibility. He has sufficient andragogical knowledge and skills to professionally and systematically create a safe learning environment for the program's faculty (vakgroep) he works with. The Head tutor knows the outlines of what and how his students learned in their previous education, and knows how to build on this prior knowledge. The Head tutor takes this into account in the design of the curriculum; needs are identified both from the student target group as well as from the relevant field of business.	Especially those in VET will doubtless be involved in the transition of their programs to CBE. This adds an additional workload to their supervising tasks.
(Subject) tutor	The Subject tutor devises a small amount of learning activities that can be carried out by the students. He is not (or partly) involved in the development of learning activities. The actual performance of the activities belongs to the responsibilities as a Subject Tutor. The Subject tutor is task oriented, correcting the homework of students in order too coach students in delivering qualitative products. Upcoming in CBE is the stimulation of more cooperation with and among students by the Subject tutor. The Subject tutor knows the outlines of what and how his students learned in their previous education, and knows how to build on this prior knowledge. Particularly in the form of Recognition of Prior Learning, a procedure for which is currently under development.	The Subject tutor creates an atmosphere conducive to collaboration with and among students. But more in the sense of stimulating and, where necessary, guiding discussions in the computer conferences (moderating), switching between providing direction or support, "community-building", faciliting peer support. He forms an adequate picture of the extent to which the students have mastered the learning content and of their working methods. Especially in the sense of monitoring the students' portfolios in relation to well defined learning tasks.	
Work Placement Advisor	The Work Placement Advisor has a practical knowledge of the systems for recording students' progress used at NTI, and of ways to record his	The Work Placement Advisor makes contact with the students, encourages them to make contact with him, and makes them feel at ease.	Since the aim of the trainee period has always been to integrate and apply that what was learned in practice, the role of the Trainee Advisor will change

	own work in an accessible way. Not only does the WPA keep a file on the student, he also keeps one on the companies offering work placement, and on the work placement coaches at these companies, in connection with the need for quality assurance. Furthermore, he makes constructive contributions to different forms of consultations with people and institutions outside of NTI. Companies (potentially) offering work placement opportunities, but also, e.g., sectoral organizations. Also uses his networking capabilities to acquire potential work placement opportunities for NTI's students. He knows that adolescents and adults develop identity and values and that these processes are culturally determined, and which consequences they should have for his own way of acting. This relates in particular to the development of a professional identity. In order to fulfil his task, the WPA has a broader knowledge of the profession and not 'just' the subject at hand.	But within DE the WPA <u>works with individuals rather than groups</u>. In case he will be working with students through computer conferencing, he will also need to possess knowledge of group processes. The WPA is well informed about communication processes, manners and conventions in the students' social environment and in the practice of the professions they are preparing for. Within NTI he also applies this competence in his <u>contacts with the organizations providing work placement opportunities</u> and with the work placement coaches within these organizations.	the least. They will need training on how to support the students with the help of the VLE and computer conferencing, including peer support.
Workshop teacher	The Workshop teacher is also practical focused on the development of a professional identity. The Workshop teacher gives an impulse to this process during workshop activities. He observes students and, if necessary, points them the right direction while carrying out practical tasks. As Workshop teacher, he has the most face-to-face contact with students in relation to other tutor roles, although less frequently.	On the basis of the observations, the Workshop teacher devises a variety of learning activities and carries out these activities. But within the DE context always in consultation with the Head tutor, Program co-ordinator and Workshop organizer, the Workshop teacher is responsible for elaborating and carrying out the workshop <u>outline provided</u> by them. The Workshop Teacher largely acts as a facilitator and <u>provides input</u> with regard to the workshops.	
Mentor	The Mentor is acquainted with the regulations and collaboration procedures between NTI and the companies and institutions it collaborates with. In this case, the mentor functions as the central contact for the student. Besides a reactive attitude, waiting for the student to raise a problem, a	The Mentor focuses mainly on <u>coaching the individual study process</u>, for which he uses the virtual learning environment, email, and telephone. The Mentor selects and applies an approach to	As has been described, the Mentor role will be expanded to include new support tasks. The newly defined competences can be used in the selection and hiring process. They will also serve as a guideline for mentor development programs within the company. Expanding their role will mean higher expectancy

	proactive approach is desirable. He forms an adequate picture of the students’ individual motivation, of their progress with respect to independence and responsibility, and of the social atmosphere in the group. Whereas the (subject) tutor’s responsibility refers to the content of the subject, the Mentor bears responsibility for the learning process of the student. He monitors and/or directs the development of the student within the program as a whole. Therefore he is familiar with the organizational aspects of different types of learning environments. In particular he possesses skills in working with the virtual learning environment and the digital portfolio as a part of that environment. The Mentor is made aware of the implications of communication theories, group dynamics and intercultural communication on his own conduct. In particular: the lack of visual clues and the development of online manners (“netiquette”). He fulfils the role of ‘screener’ in the procedure for Recognition of Prior Learning (currently under development). This means screening the portfolio and giving students advice for completing the portfolio.	guide the students and to stimulate their development towards independence and responsibility. E.g. the Study Plan; in this case, the Mentor focuses on individual students and acts in a proactive manner.	levels in terms of education and experience. This will be reflected in higher salaries. At the same time, it is expected that the staff turnover rate in the mentor department will fall due to increased development perspectives. For the Recognition of Prior Learning, mentors may take on the role of portfolio coach and screener.

Competence profile Subject Tutor and Head Tutor

The traditional role of a tutor at NTI is that of the Subject Tutor correcting homework. With the introduction of competence-based education, new roles develop. Additionally, the introduction of a new virtual learning environment causes changes in the tutor activities. These changes have been outlined and described in the company’s Educational Concept 2006.

Furthermore, a new role has emerged within the organization: that of the Head Tutor. The Head Tutor directs the content-related activities of a group of Subject Tutors, and usually acts as a Subject Tutor himself as well. The Head Tutor plays an overarching, co-ordinating role, and functions as the contact person in content-related issues for Subject Tutors on the one hand, and for NTI-staff, in particular the Program Co-ordinator and Mentor, on the other hand.

Since the Head Tutor usually also functions as a Subject Tutor, the competences and accompanying indicators for the Subject Tutor are implied in the profile of the Head Tutor. Therefore, the profile of the Head Tutor has only been detailed for those items that distinguish it from that of the Subject Tutor.

Competence and description	Indicators Subject Tutor	Remarks Subject Tutor	Indicators Head Tutor	Remarks Head Tutor
A.1: Interpersonal competence The Tutor endorses his interpersonal responsibility. He is aware of his own attitude and behaviour, and of their influence on the students. He also has sufficient knowledge and skills in the field of communication and group processes in order to achieve a good collaboration with and among the students.	A.1.1. He makes contact with the students, encourages them to make contact with him, and makes them feel at ease.	Mainly by means of computer conferencing and email.		For the Head Tutor, this competence applies also with respect to the program’s faculty (vakgroep).
	A.1.2. He provides a framework in which the students can shape their own learning process, and he assists them with that.	Proactive approach in the computer conferences, feedback aimed at stimulation rather than correction, subject-oriented and qualitative monitoring of the students’ portfolios.		
	A.1.3. He creates an atmosphere conducive to collaboration with and among students.	Stimulating and, where necessary, guiding discussions in the computer conferences (moderating), switching between providing direction or support, “community-building”,		(see above)

		faciliting peer support.		
	A.1.4. He is well informed about communication processes, manners and conventions in the students' social environment and in the practice of the professions they are preparing for.	This includes the communication channels or tools that are used, such as SMS and MSN; as well as professional jargon.		
	A.1.5. At a practical level, he is informed about communication theories, group dynamics and intercultural communication. In particular, he is aware of the implications of these on his own conduct.	In particular: dealing with the lack of visual clues; the development of online manners ("netiquette").		(see above)
B.1: Andragogical competence The Tutor endorses his andragogical responsibility. He has sufficient andragogical knowledge and skills to professionally and systematically create a safe learning environment for the individual students and for the groups he works with, in which they can develop into independent and responsible persons.	B.1.1. He forms an adequate picture of the students' individual motivation, of their progress with respect to independence and responsibility, and of the social atmosphere in the group.	Stimulating reflection on these aspects.		
	B.1.2. On the basis of these observations, he selects an approach to guide the students and to stimulate their development towards independence and responsibility, applies this approach, evaluates it and, if necessary, adjusts it, for individual students and, if relevant, also for an entire group.	E.g. call in the help of students to support the learning process of others (peer learning). Evaluation takes place on the basis of both direct interaction with the students, and formal surveys originating from the Quality Assurance Department. NB: the make-up of groups is continuously changing, therefore, the individual comes first. Within the virtual learning environment, however, we do work with groups as a whole.		
	B.1.7. He is familiar with the corporate			

	cultures in which the students will have to participate during or after their education.			
	B.1.8. He is familiar with the circumstances and needs of adolescent and adult students, as well as with the problems and impediments that can occur in learning at a distance, and knows how to signal these problems in practice and how to deal with them.			
	B.1.10. He knows how adolescents and adults develop identity and values, and how they give meaning to their lives. He knows that these processes are culturally determined, and which consequences they should have for his own way of acting.	For NTI, this refers mainly to the development of a professional identity.		
C.1: Subject knowledge and methodological competence The Tutor endorses his responsibility with respect to subject knowledge and teaching methods. He has sufficient knowledge and skills to professionally and systematically create a powerful learning environment for the individual students and groups he works with, in which students can acquire the content of the subject or profession in an adequate way.	C.1.1. He forms an adequate picture of the extent to which the students have mastered the learning content and of their working methods.	… and monitors this based on the students’ portfolios.		
	C.1.2. On the basis of these observations, he devises a variety of learning activities that can be carried out by the students, which give them the opportunity to make choices, and which encourage autonomous learning, and carries out these activities. (C.1.3.)	This indicator applies to the Subject Tutor only in a limited sense, mainly in the form of discussion activities in the computer conferencing area and the introduction (there) of the ‘outside world’ and recent developments in the profession in question.	C.1.2. On the basis of these observations, he devises a variety of learning activities that can be carried out by the students, which give them the opportunity to make choices, and which encourage autonomous learning.	The Head Tutor is involved in the development of learning activities prior to the learning process. The actual performance of the activities belongs to his responsibilities as a Subject Tutor.
	C.1.4. He evaluates these learning	Mainly in the computer		

	activities and their effects, and, if necessary, adjusts them for individual students or for the whole group.	conferencing area.		
	C.1.5. He signals learning problems and impediments and works out, if necessary together with colleagues, a suitable plan or approach.	E.g. in consultation with the Mentor, other Subject Tutors or the Head Tutor.		
	C.1.6. He has a thorough knowledge and command of the learning content he is responsible for, and is familiar, on the basis of his own study or working experience, with its theoretical and practical or professional backgrounds.			
	C.1.7. He is aware of the relevance and importance of the learning content for the students’ future profession and everyday lives.	This also applies to the need to find a balance between the importance of the learning content and the needs of the student.		
	C.1.8. He is familiar with the outlines of the learning content of other subjects or professions that he collaborates with within NTI or within the program.	This is all the more important in competence-based education.		
	C.1.9. He knows the outlines of what and how his students learned in their previous education, and knows how to build on this prior knowledge.	Particularly in the form of Recognition of Prior Learning, a procedure for which is currently under development.		The Head Tutor takes this into account in the design of the curriculum; needs are identified both from the student target group as well as from the relevant field of business.
	C.1.10. He has knowledge of (research-based) instructional design, teaching methods and the educational materials to match, among which are information and communication technologies (ICTs).	The role of the Subject Tutor in this respect is mainly limited to facilitation.	C.1.10. He has knowledge of (research-based) instructional design, teaching methods and the educational materials to match, among which are information and communication technologies (ICTs).	
	C.1.11. He is familiar with various educational and learning theories, with different educational arrangements, among which contemporary job-oriented teaching methods, and knows how to put these into practice.	Specifically in the field of Blended Learning and ICT-applications.		

	C.1.12. He is familiar with the ways in which students learn, with their learning needs, with their personal development, and with the problems that can occur, and knows how to handle these.	Striking a balance between education and technology, “high tech, high touch” (i.e. the use of digital tools causes an increasing rather than a decreasing need for personal coaching).		
	C.1.13. He knows about the influence linguistic competence and language acquisition have on the learning process, and knows how to take these into consideration in his practice.	He passes signals of (too) limited language command on to the student’s mentor; particularly relevant in learning paths related to reintegration into the workforce.		
D.1: Organizational competence The Workshop Teacher endorses his organizational responsibility. He has sufficient organizational knowledge and skills to professionally and systematically create a good living and working atmosphere in his contacts with students and groups of students, which is clearly structured, orderly and task-oriented and clear in every respect to himself, his colleagues, and particularly the students.	D.1.1. He is consistent in applying concrete and functional procedures and agreements, that are accepted by the students.	E.g. frequency of being ‘present’ in the computer conference, turn around time for corrected homework or assignments; including the ability to communicatie NTI’s perspective to the student.		For the Head Tutor, this competence applies also with respect to the program’s faculty (vakgroep).
	D.1.2. He provides forms of organization, teaching aids and educational materials that support the learning activities.	Mainly sources from the Internet, references in the computer conferencing area.	D.1.2. He provides forms of organization, teaching aids and educational materials that support the learning activities.	In co-operation with NTI, the Head Tutor is responsible for the forms of organization of the program.
	D.1.3. He keeps to the planning known to the students, so that they can gear their own planning to it, and uses time in an adequate manner.	Adequate also in the sense of accountability for working hours claimed.		For the Head Tutor, this competence applies also with respect to the program’s faculty (vakgroep) and with respect to NTI.
	D.1.4. He is familiar with those aspects of group and class managment, that are relevant for this type of education.	Online communities; collaborative learning in smaller groups..		
	D.1.5. He is familiar with the	This also requires IT-skills in		

	organizational aspects of different types of learning environments within NTI and in the companies offering work placement, such as the virtual learning environment, on-the-job-training and practical workshops.	order to work with the virtual learning environment.		
E.1: Competence in collaboration with colleagues The Tutor endorses his responsibility for collaborating with colleagues. He has sufficient knowledge and skills to make a professional contribution to a good andragogical and didactical climate at his institution, as well as to good working relations and a good organization of education.	E.1.1. He shares information relevant to the progress of the work with his colleagues, and makes use of the information he receives from colleagues.	One of the tools for this kind of collaboration is working within a ‘community of practice’ in the virtual learning environment, as well as the sharing of ‘best practices’. The Tutor is also able to communicate the needs of the students within the organization.	… shares and *disseminates* information …	For the Head Tutor, this competence can be expanded with management tasks, leading at a distance, and co-ordinating the activities of Subject Tutors.
	E.1.2. He makes a constructive contribution to different meetings and other forms of collaboration within NTI.	E.g. within the curriculum committee or at tutor workshops.		E.g. exam committee, curriculum committee.
			E.1.3. He gives and receives feedback and consults with Tutors as a good colleague, and (E.1.5.) at a practical level, he is familiar with methods of collaboration and giving and receiving feedback.	
	E.1.4. He collaborates with Subject and Head Tutors and with NTI-staff involved on the development and improvement of the NTI.			
	E.1.6. He has a practical knowledge of the systems for recording students’ progress used at NTI, and of ways to record his own work in an accessible way.	In practice, this means entering student grades in ‘Docentennet’; in the medium term also in the Portfolio of the new virtual learning environment.		
	E.1.7. He has some knowledge of the forms of organization and management of institutions in vocational and professional education, and in commercial distance education.	This also entails the structure of accountability.		In this respect, the Head Tutor also functions as the link between other (regular) institutions and NTI.

	E.1.8. He is aware of the importance of and of the activities involved with quality assurance, his own contribution to that, and with methods of educational improvement and school development.			
F.1: Competence in collaboration with the working environment The Tutor endorses his responsibility for collaborating with the institution’s working environment. He has sufficient knowledge and skills to adequately collaborate with companies or organizations in order to realize their shared responsibility in the education of the students. He has sufficient knowledge and skills to adequately collaborate with people and institutions that are involved in student care or belong to the institution’s working environment.			F.1.3. He makes constructive contributions to different forms of consultations with people and institutions outside of the school.	E.g. workfield committee, sectoral organization. The Head Tutor promotes interaction and synergy between the workfield and NTI.
	F.1.6. He is familiar with the professional infrastructure which NTI is part of.	This refers mainly to the framework of regulations that apply to education, e.g. in the form of accreditation procedures or inspections.	F.1.4. He accounts for his professional views and working methods to relevant external interested parties, and, if necessary, adjusts his way of working by mutual agreement.	This refers mainly to external auditing or accrediting organizations.
	F.1.7. He is familiar with the culture and contemporary proceedings in the business community in which his students participate, and knows how to deal with these as a Tutor.			
	F.1.8. He is acquainted with the regulations and collaboration procedures between NTI and the companies and institutions it collaborates with.	Based on input received from the Head Tutor and NTI.		The Head Tutor is responsible for communicating these to faculty.
	F.1.9. He knows how to adequately gear the students’ learning and tutoring	The role of the Subject Tutor in this respect is largely		The Head Tutor takes care that both are included in the

	to one another within and outside of the school.	limited to facilitating and stimulating the integration of practical experience of the students with the theory.		outline of the curriculum.
G.1: Competence in reflection and development The Tutor endorses his responsibility for his own professional development. He explores, makes explicit and develops his views on the profession and his competence as a Tutor.	G.1.1. He works on the development of his competence in a systematic way, on the basis of a good analysis of his competences in relation to the desired competence profile.	Raises relevant training needs for his work at NTI.		The Head Tutor also endorses this responsibility with respect to the development of faculty.
	G.1.2. He attunes the development of his competences to NTI's policy and to the developments and agreements within the team.	The team in this case consists of those involved with the educational program in question: - Unit manager - Program co-ordinator - Head tutor - Subject tutors		The Head Tutor is also responsible for drawing up a faculty development plan.
	G.1.3. For this development, he uses information obtained from students and colleagues, from within and outside of NTI, and also from colleagues' assistance, e.g. in the form of feedback.	This includes the willingness to participate in information or training sessions organized by NTI.		The Head Tutor bears responsibility for communicating general feedback (e.g. from student satisfaction surveys) to his faculty.
	G.1.4. He is familiar with recent developments in the business community and in society that are relevant to his educational practice.	Has an open mind for new ideas and perspectives in the tutor profession.		The Head Tutor also includes such developments when developing or revising the curriculum.
	G.1.5. He is informed about the educational practice at other institutions for vocational and professional education, and about recent developments in the field of content, methods and forms of organization in vocational and professional education.	… and is able to 'translate' these to NTI's concept of blended learning.		
	G.1.6. He is informed about recent developments in the field of andragogy	Willingness to learn new approaches to teaching and		The Head Tutor also includes such developments

	and teaching methodology relevant to his educational practice.	learning.		when developing or revising the curriculum.
	G.1.7. He has sufficient knowledge of behavioural psychology to understand and analyse his own behaviour and that of others.			Also with regard to faculty.

Competence profile Mentor

Competence and description	Indicators	Remarks
A.1: Interpersonal competence The Mentor endorses his interpersonal responsibility. He is aware of his own attitude and behaviour, and of their influence on the students. He also has sufficient knowledge and skills in the field of communication (as well as group processes) in order to achieve a good collaboration with and among the students.	A.1.1. He makes contact with the students, encourages them to make contact with him, and makes them feel at ease.	The mentor focuses mainly on coaching the individual study process, for which he uses the virtual learning environment, email, and telephone.
	A.1.2. He provides a framework in which the students can shape their own learning process, and he assists them with that.	
	A.1.3. He creates an atmosphere conducive to collaboration with the students.	If relevant to a program, he also supports the collaboration among students.
	A.1.4. He is well informed about communication processes, manners and conventions in the students' social environment.	
	A.1.5. At a practical level, he is informed about communication theories, group dynamics and intercultural communication. In particular, he is aware of the implications of these on his own conduct.	In particular: the lack of visual clues and the development of online manners (“netiquette”).
B.1: Andragogical competence The Mentor endorses his andragogical responsibility. He has sufficient andragogical knowledge and skills to professionally and systematically create a safe learning environment for the individual students and for the groups he works with, in which they can develop into independent and responsible persons.	B.1.1. He forms an adequate picture of the students' individual motivation, of their progress with respect to independence and responsibility, and of the social atmosphere in the group.	Whereas the (subject) tutor's responsibility refers to the content of the subject, the Mentor bears responsibility for the learning process of the student. He monitors and/or directs the development of the student within the program as a whole.
	B.1.2. On the basis of these observations, he selects an approach to guide the students and to stimulate their development towards independence and responsibility, applies this approach, evaluates it and, if necessary, adjusts it, for individual students and, if relevant, also for an entire group.	E.g. the Study Plan; in this case, the Mentor focuses on individual students and acts in a proactive manner.
	B.1.8. He is familiar with the circumstances and needs of adolescent and adult students, as well as with the problems and impediments that can occur in learning at a distance, and knows how to signal these problems in practice and how to deal with them.	Here as well, besides a reactive attitude, waiting for the student to raise a problem, a proactive approach is desirable.

C.1: Subject knowledge and methodological competence The Mentor endorses his responsibility with respect to subject knowledge and teaching methods. He has sufficient knowledge and skills to professionally and systematically create a powerful learning environment for the individual students and groups he works with, in which students can acquire the content of the subject or profession in an adequate way.	C.1.8. He is familiar with the outlines of the learning content of those programs with which he is closely involved, and of the other NTI programs.	The Mentor needs this knowledge in order to advise students on desired and possible order of study, possibilities for further study, and opportunities for work placement and jobs.
	C.1.9. He knows the outlines of what and how his students learned in their previous education, and knows how to build on this prior knowledge.	This knowledge can be obtained from e.g. the procedure for Recognition of Prior Learning (currently under development).
	C.1.12. He is familiar with the ways in which students learn, with their learning needs, with their personal development, and with the problems that can occur, and knows how to handle these.	
	C.1.13. He knows about the influence linguistic competence and language acquisition have on the learning process, and knows how to take these into consideration in his practice.	Is able to advise students on courses of Dutch as a Second Language etc.
D.1: Organizational competence The Mentor endorses his organizational responsibility. He has sufficient organizational knowledge and skills to professionally and systematically create a good living and working atmosphere in his contacts with students and groups of students, which is clearly structured, orderly and task-oriented and clear in every respect to himself, his colleagues, and particularly the students.	D.1.1. He is consistent in applying concrete and functional procedures and agreements, that are accepted by the students.	
	D.1.2. He provides forms of organization, teaching aids and educational materials that support the learning activities.	Such as recording of Frequently Asked Questions, directing attention to tests of professional interest or learning styles, devising (in consultation with the student) of a study plan, and giving study tips.
	D.1.3. He keeps to the planning known to the students, so that they can gear their own planning to it, and uses time in an adequate manner.	E.g. when answering questions from students through computer conferencing or by email.
	D.1.5. He is familiar with the organizational aspects of different types of learning environments within NTI and in the companies offering work placement, such as the virtual learning environment, on-the-job-training and practical workshops.	In particular he possesses skills in working with the virtual learning environment and the digital portfolio as a part of that environment.
E.1: Competence in collaboration with colleagues	E.1.1. He shares information relevant to the progress of the	Is also able to voice the student needs within

The Mentor endorses his responsibility for collaborating with colleagues. He has sufficient knowledge and skills to make a professional contribution to good working relations and a good organization of student support.	work with his colleagues, and makes use of the information he receives from colleagues.	the organization, in particular to the : - Unit manager - Head tutor - Program co-ordinator - Quality Assurance dept.
	E.1.2. He makes a constructive contribution to different meetings and other forms of collaboration within NTI.	
	E.1.5. At a practical level, he is familiar with methods of collaboration and giving and receiving feedback.	
	E.1.6. He has a practical knowledge of the systems for recording students' progress used at NTI, and of ways to record his own work in an accessible way.	
	E.1.7. He has some knowledge of the forms of organization and management of institutions in vocational and professional education, and in commercial distance education.	
	E.1.8. He is aware of the importance of and of the activities involved with quality assurance, his own contribution to that, and with methods of educational improvement and school development.	
F.1: Competence in collaboration with the working environment The Mentor endorses his responsibility for collaborating with the institution's working environment. He has sufficient knowledge and skills to adequately collaborate with companies or organizations in order to realize their shared responsibility in the coaching of the students. He has sufficient knowledge and skills to adequately collaborate with people and institutions that are involved in student support and with NTI.	F.1.6. He is familiar with the professional infrastructure which NTI is part of.	
	F.1.8. He is acquainted with the regulations and collaboration procedures between NTI and the companies and institutions it collaborates with.	In this case, the mentor functions as the central contact for the student.
G.1: Competence in reflection and development The Mentor endorses his responsibility for his own professional development. He explores, makes explicit and develops his views on the profession and his competence as a Mentor.	G.1.1. He works on the development of his competence in a systematic way, on the basis of a good analysis of his competences in relation to the desired competence profile.	
	G.1.2. He attunes the development of his competences to NTI's policy and to the developments and agreements within the team.	Particularly by order of the Trainer-Mentor; this aspect is worked out in the job description.

	G.1.3. For this development, he uses information obtained from students and colleagues, from within and outside of NTI, and also from colleagues’ assistance, e.g. in the form of feedback.	
	G.1.4. He is familiar with recent developments in the business community and in society that are relevant to his educational practice.	The mentor acquires this knowledge both independently as well as on the basis of input provided by the trainer-mentor and of direct interaction with the Head Tutor.
	G.1.7. He has sufficient knowledge of behavioural psychology to understand and analyse his own behaviour and that of others.	

Competence profile Work Placement Advisor

Competence and description	Indicators	Remarks
A.1: Interpersonal competence The workplace advisor endorses his interpersonal responsibility. He is aware of his own attitude and behaviour, and of their influence on the students. He also has sufficient knowledge and skills in the field of communication in order to achieve a good collaboration with the students.	A.1.1. He makes contact with the students, encourages them to make contact with him, and makes them feel at ease.	The Work Placement Advisor works with individuals rather than groups. In case he will be working with students through computer conferencing, he will also need to possess knowledge of group processes.
	A.1.4. He is well informed about communication processes, manners and conventions in the students' social environment and in the practice of the professions they are preparing for.	He also applies this competence in his contacts with the organizations providing work placement opportunities and with the work placement coaches within these organizations.
B.1: Andragogical competence The Work Placement Advisor endorses his andragogical responsibility. He has sufficient andragogical knowledge and skills to professionally and systematically create a safe learning environment for the individual students (and for the groups, if any) he works with, in which they can develop into independent and responsible persons.	B.1.7. He is familiar with the corporate cultures in which the students will have to participate during or after their education.	
	B.1.8. He is familiar with the circumstances and needs of adolescent and adult students, as well as with the problems and impediments that can occur in learning at a distance, and knows how to signal these problems in practice and how to deal with them.	
	B.1.10. He knows how adolescents and adults develop identity and values, and how they give meaning to their lives. He knows that these processes are culturally determined, and which consequences they should have for his own way of acting.	This relates in particular to the development of a professional identity.
C.1: Subject knowledge and methodological competence The Work Placement Advisor endorses his responsibility with respect to subject knowledge and teaching methods. He has sufficient knowledge and skills to professionally and systematically create a powerful learning environment for the individual students (and groups, if any) he works with, in which students can acquire the content of the subject or profession in an adequate way.	C.1.6. He has a thorough knowledge and command of the learning content he is responsible for, and is familiar, on the basis of his own study or working experience, with its theoretical and practical or professional backgrounds.	

	C.1.7. He is aware of the relevance and importance of the learning content for the students' future profession and everyday lives.	
	C.1.8. He is familiar with the outlines of the learning content of other subjects or professions that he collaborates with within NTI or within the program.	
	C.1.9. He knows the outlines of what and how his students learned in their previous education, and knows how to build on this prior knowledge.	
	C.1.12. He is familiar with the ways in which students learn, with their learning needs, with their personal development, and with the problems that can occur, and knows how to handle these.	
	C.1.13. He knows about the influence linguistic competence and language acquisition have on the learning process, and knows how to take these into consideration in his practice.	He passes signals of (too) limited language command on to the student's mentor.
D.1: Organizational competence The Work Placement Advisor endorses his organizational responsibility. He has sufficient organizational knowledge and skills to professionally and systematically create a good living and working atmosphere in his contacts with students (and groups of students, if any), which is clearly structured, orderly and task-oriented and clear in every respect to himself, his colleagues, and particularly the students.	D.1.1. He is consistent in applying concrete and functional procedures and agreements, that are accepted by the students.	
	D.1.3. He keeps to the planning known to the students, so that they can gear their own planning to it, and uses time in an adequate manner.	
	D.1.5. He is familiar with the organizational aspects of different types of learning environments within NTI and in the companies offering work placement, such as the virtual learning environment, on-the-job-training and practical workshops.	
E.1: Competence in collaboration with colleagues The Work Placement Advisor endorses his responsibility for collaborating with colleagues. He has sufficient knowledge and skills to make a professional contribution to a good andragogical and didactical climate at his institution, as well as to good working relations and a good organization of education.	E.1.1. He shares information relevant to the progress of the work with his colleagues, and makes use of the information he receives from colleagues.	
	E.1.2. He makes a constructive contribution to different meetings and other forms of collaboration within NTI.	One of the tools for this kind of collaboration is working within a 'community of practice' in the

		virtual learning environment, as well as the sharing of ‘best practices’. The WPA is also able to communicate the needs of the students within the organization.
	E.1.6. He has a practical knowledge of the systems for recording students’ progress used at NTI, and of ways to record his own work in an accessible way.	Not only does the WPA keep a file on the student, he also keeps one on the companies offering work placement, and on the work placement coaches at these companies, in connection with the need for quality assurance.
	E.1.7. He has some knowledge of the forms of organization and management of institutions in vocational and professional education, and in commercial distance education.	This also entails the structure of accountability.
	E.1.8. He is aware of the importance of and of the activities involved with quality assurance, his own contribution to that, and with methods of educational improvement and school development.	
F.1: Competence in collaboration with the working environment The Work Placement Advisor endorses his responsibility for collaborating with the institution’s working environment. He has sufficient knowledge and skills to adequately collaborate with companies or organizations in order to realize their shared responsibility in the education of the students. He has sufficient knowledge and skills to adequately collaborate with people and institutions that are involved in student care or belong to the institution’s working environment.	F.1.1. He gives information about students to relevant interested parties in a professional manner, and makes use of the information he receives from them.	
	F.1.2. In consultation with the student and other parties involved, he takes care of attuning the learning within and outside of the institution, and of making clear everyone’s responsibilities and contributions therein.	This concerns in particular the consultations with the student’s workplace coach.
	F.1.3. He makes constructive contributions to different forms of consultations with people and institutions outside of NTI	Companies (potentially) offering work placement opportunities, but also, e.g., sectoral organizations. Also uses his networking capabilities to acquire potential work placement opportunieties for NTI’s students.
	F.1.4. He accounts for his professional views and working methods to relevant external interested parties, and, if necessary, adjusts his way of working by mutual agreement.	This refers to instances where organizations such as KCE (responsible for the quality of examinations in secondary vocational education in the Netherland) require such information; it is given solely at the request of NTI.

	F.1.7. He is familiar with the culture and contemporary proceedings in the business community in which his students participate, and knows how to deal with these as a Work Placement Advisor.	
	F.1.8. He is acquainted with the regulations and collaboration procedures between NTI and the companies and institutions it collaborates with.	
	F.1.9. He knows how to adequately gear the students' learning and tutoring to one another within and outside of the school.	
G.1: Competence in reflection and development The Work Placement Advisor endorses his responsibility for his own professional development. He explores, makes explicit and develops his views on the profession and his competence as a Work Placement Advisor.	G.1.1. He works on the development of his competence in a systematic way, on the basis of a good analysis of his competences in relation to the desired competence profile.	Raises relevant training needs for his work at NTI.
	G.1.2. He attunes the development of his competences to NTI's policy and to the developments and agreements within the team.	The team in this case consists of those involved with the educational program in question: - Unit manager - Program co-ordinator - Head tutor - Subject tutors
	G.1.3. For this development, he uses information obtained from students and colleagues, from within and outside of NTI, and also from colleagues' assistance, e.g. in the form of feedback.	This includes in particular feedback from workplace coaches at the students' workplace. It also involves the willingness to participate in information or training sessions organized by NTI.
	G.1.4. He is familiar with recent developments in the business community and in society that are relevant to his educational practice.	
	G.1.5. He is informed about the educational practice at other institutions for vocational and professional education, and about recent developments in the field of content, methods and forms of organization in vocational and professional education.	
	G.1.7. He has sufficient knowledge of behavioural psychology to understand and analyse his own behaviour and that of others.	

Competence profile Workshop Teacher

Competence and description	Indicators	Remarks
A.1: Interpersonal competence The Workshop Teacher endorses his interpersonal responsibility. He is aware of his own attitude and behaviour, and of their influence on the students. He also has sufficient knowledge and skills in the field of group processes and communication in order to achieve a good collaboration with and among the students.	A.1.1. He makes contact with the students, encourages them to make contact with him, and makes them feel at ease.	
	A.1.2. He provides a framework in which the students can shape their own learning process, and he assists them with that.	
	A.1.3. He creates an atmosphere conducive to collaboration with and among students.	
	A.1.4. He is well informed about communication processes, manners and conventions in the students' social environment and in the practice of the professions they are preparing for.	
	A.1.5. At a practical level, he is informed about communication theories, group dynamics and intercultural communication. In particular, he is aware of the implications of these on his own conduct.	
B.1: Andragogical competence The Workshop Teacher endorses his andragogical responsibility. He has sufficient andragogical knowledge and skills to professionally and systematically create a safe learning environment for the individual students and for the groups he works with, in which they can develop into independent and responsible persons.	B.1.1. He forms an adequate picture of the students' individual motivation, of their progress with respect to independence and responsibility, and of the social atmosphere in the group.	
	B.1.7. He is familiar with the corporate cultures in which the students will have to participate during or after their education.	
	B.1.8. He is familiar with the circumstances and needs of adolescent and adult students, as well as with the problems and impediments that can occur in learning at a distance, and knows how to signal these problems in practice and how to deal with them.	
	B.1.10. He knows how adolescents and adults develop identity and values, and how they give meaning to their lives. He knows that these processes are culturally determined, and which consequences they should have for his own way of	For NTI, this refers mainly to the development of a professional identity. The Workshop teacher gives an impulse to this process during workshop activities.

	acting.	
C.1: Subject knowledge and methodological competence The Workshop Teacher endorses his responsibility with respect to subject knowledge and teaching methods. He has sufficient knowledge and skills to professionally and systematically create a powerful learning environment for the individual students and groups he works with, in which students can acquire the content of the subject or profession in an adequate way.	C.1.1. He forms an adequate picture of the extent to which the students have mastered the learning content and of their working methods.	He observes students and, if necessary, points them in the right direction while carrying out practical tasks.
	C.1.2. On the basis of these observations, he devises a variety of learning activities that can be carried out by the students, which give them the opportunity to make choices, and which encourage autonomous learning, and carries out these activities. (C.1.3.)	In consultation with the Head tutor, Program co-ordinator and Workshop organizer, the Workshop Teacher is responsible for elaborating and carrying out the workshop outline provided by them.
	C.1.4. He evaluates these learning activities and their effects, and, if necessary, adjusts them for the whole group or for individual students.	Evaluation takes place on the basis of both direct interaction with the students, and formal surveys originating from the Quality Assurance Department.
	C.1.6. He has a thorough knowledge and command of the learning content he is responsible for, and is familiar, on the basis of his own study or working experience, with its theoretical and practical or professional backgrounds.	
	C.1.7. He is aware of the relevance and importance of the learning content for the students’ future profession and everyday lives.	
	C.1.8. He is familiar with the outlines of the learning content of other workshops, subjects or professions that he collaborates with within NTI or within the program.	He has an understanding of how his particular workshop fits within the larger whole of the other workshops and other learning activities.
	C.1.9. He knows the outlines of what and how his students learned in their previous education, and knows how to build on this prior knowledge.	
	C.1.10. He has knowledge of (research-based) instructional design, teaching methods and the educational materials to match, among which are information and communication technologies (ICTs).	This indicator is most relevant for the Head Tutor, the Workshop Teacher largely acts as a facilitator and provides input with regard to the workshops.
	C.1.11. He is familiar with various educational and learning theories, with different educational arrangements, among which contemporary job-oriented teaching methods, and knows how to put these into practice.	
	C.1.12. He is familiar with the ways in which students learn, with their learning needs, with their personal development,	All within the context of teaching the workshop.

	and with the problems that can occur, and knows how to handle these.	
	C.1.13. He knows about the influence linguistic competence and language acquisition have on the learning process, and knows how to take these into consideration in his practice.	He passes signals of (too) limited language command on to the student's mentor.
D.1: Organizational competence The Workshop Teacher endorses his organizational responsibility. He has sufficient organizational knowledge and skills to professionally and systematically create a good living and working atmosphere in his contacts with students and groups of students, which is clearly structured, orderly and task-oriented and clear in every respect to himself, his colleagues, and particularly the students.	D.1.1. He is consistent in applying concrete and functional procedures and agreements, that are accepted by the students.	
	D.1.2. He provides forms of organization, teaching aids and educational materials that support the learning activities.	… all of which correspond to the character of the educational program as a whole.
	D.1.3. He keeps to the planning known to the students, so that they can gear their own planning to it, and uses time in an adequate manner.	He announces the agenda and in particular, the goal of the workshop in a timely manner, and takes care that the program is covered adequately.
	D.1.4. He is familiar with those aspects of group and class managment, that are relevant for this type of education.	
	D.1.5. He is familiar with the organizational aspects of different types of learning environments within NTI and in the companies offering work placement, such as the virtual learning environment, on-the-job-training and practical workshops.	
E.1: Competence in collaboration with colleagues The Workshop Teacher endorses his responsibility for collaborating with colleagues. He has sufficient knowledge and skills to make a professional contribution to a good andragogical and didactical climate at his institution, as well as to good working relations and a good organization of education.	E.1.1. He shares information relevant to the progress of the work with his colleagues, and makes use of the information he receives from colleagues.	
	E.1.2. He makes a constructive contribution to different meetings and other forms of collaboration within NTI.	
	E.1.6. He has a practical knowledge of the systems for recording students' progress used at NTI, and of ways to record his own work in an accessible way.	
	E.1.7. He has some knowledge of the forms of organization and management of institutions in vocational and professional education, and in commercial distance education.	This also entails the structure of accountability.

	E.1.8. He is aware of the importance of and of the activities involved with quality assurance, his own contribution to that, and with methods of educational improvement and school development.	He takes appropriate measures on the basis of the results of Quality Assurance surveys, provided to him by the workshop organizer.
F.1: Competence in collaboration with the working environment The Workshop Teacher endorses his responsibility for collaborating with the institution’s working environment. He has sufficient knowledge and skills to adequately collaborate with companies or organizations in order to realize their shared responsibility in the education of the students. He has sufficient knowledge and skills to adequately collaborate with people and institutions that are involved in student care or belong to the institution’s working environment.	F.1.6. He is familiar with the professional infrastructure which NTI is part of.	This refers mainly to the framework of regulations that apply to education, e.g. in the form of accreditation procedures or inspections.
	F.1.7. He is familiar with the culture and contemporary proceedings in the business community in which his students participate, and knows how to deal with these as a Workshop Teacher.	
G.1: Competence in reflection and development The Workshop Teacher endorses his responsibility for his own professional development. He explores, makes explicit and develops his views on the profession and his competence as a Workshop Teacher.	G.1.1. He works on the development of his competence in a systematic way, on the basis of a good analysis of his competences in relation to the desired competence profile.	Raises relevant training needs for his work at NTI.
	G.1.2. He attunes the development of his competences to NTI’s policy and to the developments and agreements within the team.	The team in this case consists of those involved with the educational program in question: - Unit manager - Program co-ordinator - Head tutor - Subject tutors
	G.1.3. For this development, he uses information obtained from students and colleagues, from within and outside of NTI, and also from colleagues’ assistance, e.g. in the form of feedback.	This also involves the willingness to participate in information or training sessions organized by NTI.
	G.1.4. He is familiar with recent developments in the business community and in society that are relevant to his educational practice.	
	G.1.5. He is informed about the educational practice at other institutions for vocational and professional education, and about recent developments in the field of content, methods and forms of organization in vocational and professional	

	education.	
	G.1.7. He has sufficient knowledge of behavioural psychology to understand and analyse his own behaviour and that of others.	

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Competence and description	Indicators
A.1: Interpersonal competence The teacher endorses his interpersonal responsibility. He is aware of his own attitude and behaviour, and of their influence on the pupils or participants. He also has sufficient knowledge and skills in the field of group processes and communication in order to achieve a good collaboration with and among the students.	A.1.1. He makes contact with the students, encourages them to make contact with him, and makes them feel at ease.
	A.1.2. He provides a framework in which the students can shape their own learning process, and he assists them with that.
	A.1.3. He creates an atmosphere conducive to collaboration with and among students.
	A.1.4. He is well informed about communication processes, manners and conventions in the students’ social environment and in the practice of the professions they are preparing for.
	A.1.5. At a practical level, he is informed about communication theories, group dynamics and intercultural communication. In particular, he is aware of the implications of these on his own conduct.
B.1: Pedagogical competence The teacher endorses his pedagogical responsibility. He has sufficient pedagogical knowledge and skills to professionally and systematically create a safe learning environment for the individual students and for the groups he works with, in which they can develop into independent and responsible persons.	B.1.1. He forms an adequate picture of the social atmosphere in the group, of the students’ individual well being, and of their progress with respect to independence and responsibility.
	B.1.2. On the basis of these observations, he works out a plan or approach to guide the students towards a safe and harmonious living and working climate, and to stimulate their socio-emotional and moral development into independent and responsible persons.
	B.1.3. He carries out this plan or approach.
	B.1.4. He evaluates this plan or approach and, if necessary, adjusts it,

	for the whole group and for individual students.
	B.1.5. He signals problems and impediments in the students' socio-emotional and moral development and works out, if necessary together with colleagues, a suitable plan or approach.
	B.1.6. He is familiar with the social environment of his students, their primary needs, their expectations, and with the fact that these are culturally determined. He knows how to handle these.
	B.1.7. He is familiar with the corporate cultures in which the students will have to participate during or after their education.
	B.1.8. He is familiar with the socio-emotional and moral development of teenagers, adolescents and adults, as well as with the problems and impediments that can occur, and knows how to signal these problems in practice and how to deal with them.
	B.1.9. He is familiar with developmental and educational theories, as well as with different educational practices, and with the fact that these are culturally determined. He is also aware of the consequences of these theories and practices for educational practice and for his own behaviour as a teacher.
	B.1.10. He knows how teenagers, adolescents and adults develop identity and values, and how they give meaning to their lives. He knows that these processes are culturally determined, and which consequences they should have for his own way of acting.
C.1: Subject knowledge and methodological competence The teacher endorses his responsibility with respect to subject knowledge and teaching methods. He has sufficient knowledge and skills in the subject matter he teaches and knows which teaching methods to apply to create a powerful learning environment, where students can acquire the content of the subject or profession in an adequate way. The teacher realizes such a powerful learning environment for the group(s) he works with, but also for individual students. He does all this in a contemporary, professional and	C.1.1. He forms an adequate picture of the extent to which the students have mastered the learning content and of their working methods.

systematic way.	
	C.1.2. On the basis of these observations, he devises a variety of learning activities that can be carried out by the students, which give them the opportunity to make choices, and which encourage autonomous learning.
	C.1.3. He carries out these activities together with the students.
	C.1.4. He evaluates these learning activities and their effects, and, if necessary, adjusts them for the whole group or for individual students.
	C.1.5. He signals learning problems and impediments and works out, if necessary together with colleagues, a suitable plan or approach.
	C.1.6. He has a thorough knowledge and command of the learning content he is responsible for, and is familiar, on the basis of his own study or working experience, with its theoretical and practical or professional backgrounds.
	C.1.7. He is aware of the relevance and importance of the learning content for the students’ future profession and everyday lives.
	C.1.8. He is familiar with the outlines of the learning content of other subjects or professions that he collaborates with within the school or college.
	C.1.9. He knows the outlines of what and how his students learned in their previous education, and knows how to build on this prior knowledge.
	C.1.10. He has knowledge of (research-based) instructional design, teaching methods and the educational materials to match, among which are information and communication technologies (ICTs).
	C.1.11. He is familiar with various educational and learning theories, with different arrangements for secondary and vocational education, among which contemporary job-oriented teaching methods, and knows how to put these into practice.
	C.1.12. He is familiar with the ways in which students learn, with their learning needs, with their personal development, and with the problems that can occur, and knows how to handle these.

	C.1.13. He knows about the influence linguistic competence and language acquisition have on the learning process, and knows how to take these into consideration in educational practice.
	C.1.14. He has practical knowledge of frequently occurring learning disabilities and impediments to teaching, and knows how to handle those.
	C.1.15. He knows how teenagers, adolescents and adults develop identity and values, and how they give meaning to their lives. He also knows that those processes are culturally determined, and what consequences they have for his own way of acting.
D.1: Organizational competence The teacher endorses his organizational responsibility. He has sufficient organizational knowledge and skills to professionally and systematicalle create a good living and working atmosphere in his groups and in his other contacts with students, which is clearly structured, orderly and task-oriented and clear in every respect to himself, his colleagues, and particularly his students.	D.1.1. He is consistent in applying concrete and functional procedures and agreements, that are accepted by the students.
	D.1.2. He provides forms of organization, teaching aids and educational materials that support the learning activities.
	D.1.3. He keeps to the planning known to the students, so that they can gear their own planning to it, and uses time in an adequate manner.
	D.1.4. He is familiar with those aspects of group and class managment, that are relevant for this type of education.
	D.1.5. He is familiar with the organizational aspects of different types of learning environments in the school and in the companies offering work placement, such as open learning centres, workplace stuctures, on-the-job-training and practical workshops.
E.1: Competence in collaboration with colleagues The teacher endorses his responsibility for collaborating with colleagues. He has sufficient knowledge and skills to make a	E.1.1. He shares information relevant to the progress of the work with his colleagues, and makes use of the information he receives from colleagues.

professional contribution to a good pedagogical and didactical climate in his school, as well as to good working relations and a good school organization.	
	E.1.2. He makes a constructive contribution to different meetings and other forms of collaboration in the school.
	E.1.3. He gives feedbacl to and receives feedbacl from colleagues.
	E.1.4. He collaborates with colleagues on the (research-based) development and improvement of the school.
	E.1.5. At a practical level, he is familiar with methods of collaboration and giving and receiving feedback.
	E.1.6. He has a practical knowledge of systems for recording students' progress, and of ways to record his own work in an accessible way.
	E.1.7. He has some knowledge of the forms of organization and management of schools in secondary and vocational education.
	E.1.8. He is familiar with models of quality assurance and with methods of educational improvement and school development.
F.1: Competence in collaboration with the working environment The teacher endorses his responsibility for collaborating with the school's working environment. He has sufficient knowledge and skills to adequately collaborate with companies or organizations in order to realize their shared responsibility in the education of the students. He has sufficient knowledge and skills to adequately collaborate with people and institutions that are involved in youth welfare or belong to the school's working environment.	F.1.1. He gives information about students to parents or other parties involved in a professional manner, and makes use of the information he receives from them.
	F.1.2. In consultation with the student and other parties involved, he takes care of attuning the learning within and outside of the school, and of making clear everyone's responsibilities and contributions therein.
	F.1.3. He makes constructive contributions to different forms of consultations with people and institutions outside of the school.
	F.1.4. He accounts for his professional views and working methods

	with respect to a student to parents and other parties involved, and, if necessary, adjusts his way of working with this student by mutual agreement.
	F.1.5. He is familiar with the social environment of the parents or guardians, and with the cultural backgrounds of the students, and knows how to take these into consideration in his way of acting as a teacher.
	F.1.6. He is familiar with the professional infrastructure which his school is part of.
	F.1.7. He is familiar with the culture and contemporary proceedings in the business community in which his students participate, and knows how to deal with these as a teacher.
	F.1.8. He is acquainted with the regulations and collaboration procedures between his school and the companies and institutions it collaborates with.
	F.1.9. He knows how to adequately gear the students’ learning and tutoring to one another within and outside of the school.
G.1: Competence in reflection and development The teacher endorses his responsibility for his own professional development. He explores, makes explicit and develops his views on the teaching profession and his competence as a teacher.	G.1.1. He works on the development of his competence in a systematic way, on the basis of a good analysis of his competences.
	G.1.2. He attunes the development of his competences to the policy of the school and to the developments and and agreements within the team.
	G.1.3. For this development, he uses information obtained from students and colleagues, at school and in companies, and also from colleagues’ assistance in the form of feedback or supervision.
	G.1.4. He is familiar with recent developments in the business community and in society that are relevant to his educational practice.
	G.1.5. He is informed about the educational practice at other schools for secondary and vocational education, and about recent

	developments in the field of content, methods and forms of organization in secondary and vocational education.
	G.1.6. He is informed about recent developments in the field of pedagogy and teaching methodology relevant to his educational practice.
	G.1.7. He has sufficient knowledge of behavioural psychology to understand and analyse his own behaviour and that of others.

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How to Design Teachers' Training Actions to Improve Teaching with ICT

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Abstract

This paper forms part of the eLene-TT project – *elearning network for Teacher Training* – the purpose of which is to contribute to university teacher training on how to best incorporate ICT in the teaching and learning process. This document intends to gather together practical contributions about teaching training practices that incorporate and promote the use of ICT in order to clarify, facilitate and make coherent the design of Higher Education Teachers Training with ICT.

In this sense, we intend to outline some methodological criteria which will help create better formative actions for university teachers.

Keywords

Teaching training practices; Teachers training, ICT, Higher Education.

Background and aims

This study forms part of the eLene-TT project – *elearning network for Teacher Training*[1], the purpose of which is to contribute to university teacher training. In the first stage of this investigation and as a preliminary step, we designed a conceptual approach to defining functions, competence and tasks for a university teacher in a virtual environment (Alvarez, Guasch & Espasa, 2006). These results lead up to the second stage of this study, the purpose of which is to outline some methodological criteria which will help create better formative actions for university teachers.

The rationale behind this investigation leads us to display the criteria in theoretical and practical principles, so that they can base and guide the training proposals for those university academic staff that participate, or wish to participate, in educational experiences enhancing ICT applications.

The paper is structured in a first section, in which we briefly comment on the results of the first stage of our research. This analysis emphasizes the need to train teachers to change their functions and tasks. For this reason, the second section seeks to answer the question of which are the competences that Higher Education teachers need to develop in order to integrate ICT into the teaching and learning processes. The third section presents a theoretic reflection of the principles that the bibliography on the subject recognises as "good practices" for the teacher training, related to the analysis of the authentic training practices and training needs. Finally, we have identified several issues that can serve as principles or criteria for the design of ICT-supported Higher Education Teachers Training.

Method and Procedures

In order to elaborate these criteria, two research procedures have been integrated:

a) A systematised analysis of current theories was made. This tackles the issue of academic training in the prevailing growing tendency to the introduction to ICT in teaching and learning environments of higher education (Chickering & Gamson, 1987; Fox & Helford, 1999).

b) An analysis of documentary resources on several university pedagogical environments was made in order to contrast such theoretical assumptions. They were referred to the design of pedagogical practices that are promoted.

A template was elaborated in order to guarantee the necessary homogeneity in the documentary sources. The contents refer to Information about context (Institution; Department/ Studies); description of learning environment; previous knowledge (technology and pedagogical); objectives of learning; content; activities; assessment process (includes the follow-up and feedback); learning resources; methodology; teachers' role and learning products. Also, the expectations and experiences of a significant number of academic staff have been analysed. This information related to "teachers' training needs and experiences from the teachers", and it refers to characteristics of the group: previous training on the didactic use of ICT; previous knowledge; previous experiences on teaching and learning using ICT; teachers' uses of ICT; teachers' training needs to improve the use of ICT in their teaching practice and students' information.

We received 21 descriptions of teachers' training practices, and 7 analyses of teachers' training needs (focus group) which were obtained from the various European universities that take part in the eLene TT project.

An approach to the State of the art: Teachers' Training for E-learning

The most important official policies in e-learning in Europe have been developed by the European Commission (http://europa.eu.int/comm/index_en.htm). Particularly in the most recent years, the *e*Europe Action Plan has tried to bring together a number of strategic action areas, defining for each of them the challenges and some proposed solutions.

New technological developments and the ease of access to sources of information are changing the teacher's role. Probably, to train teachers to change their role and to develop it in different scenarios corresponding to different models, as we have seen, requires appropriate training models, adapted to each scenario. In addition, the new teachers' role requires new competences which have to be identified and developed, to respond to the new demands of the Information and Knowledge Society.

Which competences do teachers need to develop in order to teach in a learning environment with ICT applications?

Although using diverse terminology, all the bibliography we consulted agree in pointing out that the distinctive functions of a teacher in a virtual environment all concur in three directions: (1) the planning and design function; (2) the social function and (3) the strictly instructive function. It's worth mentioning that exercising a function does not exclude the others, rather they integrate or overlap each other during the teaching and learning process. Each of these functions is associated to different roles that a teacher can take, and these in turn are defined by the set of more or less detailed competences, a matter on which we can find no consensus. This is because teaching scripts will be defined according to the different modalities in which teaching takes place. However, it is important to stress that, in a more or less explicit manner, all authors agree in pointing out that the set of competences necessary for the technological mastery and management of the teaching process in virtual environments is transversal to all functions and roles.

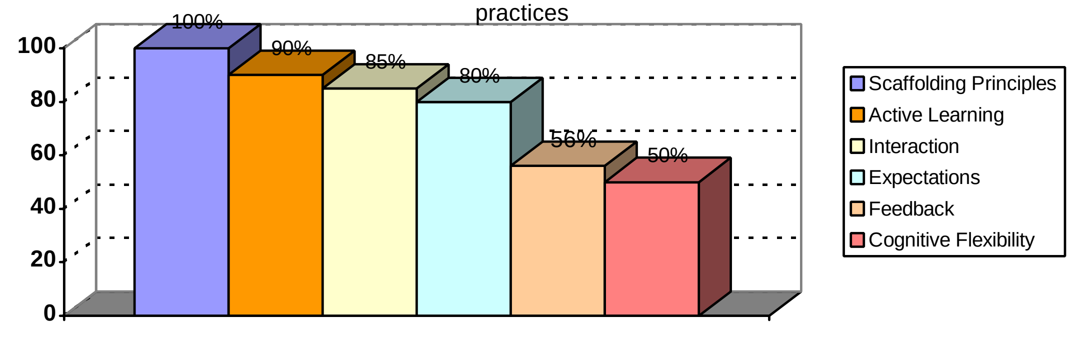
An important conclusion that can be drawn from the contrast and diversity found in the research reports we consulted, is the general assumption of the concept of socially situated competence (Messick, 1984; Gonzi et. al., 1993; cited in Eraut, 1998, Westera, 2001). In keeping with this statement it is then necessary to accept the relation that exists between competences and the specific tasks that emerge from the paeculiarities of the educative contexts in which teaching takes place, thus it does not make much sense to create standard lists of competences or tasks which define the online teaching practice.

Teachers' competences need to respond to changing roles in the knowledge society and society with greater social cohesion. These changes in their role are often not a simple additional enhancement of a professional task but a restructuring of the traditional dimensions of the teachers' role. Mainly, the changes in the teachers' role in the educational process demand a restructuring of the traditional way of planning, management, monitoring and evaluation of learning opportunities. In fact, in practice teachers' functions, roles and competences integrate and complement each other, even overlapping, although it is possible to identify some generic competences in each function as well as outline that tasks that these demand, as a guide to their performance or the training they may require in order to perform their tasks better. This situation therefore claims for the creation of formative actions which allow for an authentic and integral exercise of the teacher's functions in virtual learning environments.

What is reflected in the current formative practices, which are oriented towards the development of competences to teach online?

We have related how the bibliography conceptualises the best practices of teaching and learning processes that integrate or use ICT, and training practices and teaching training needs, in order to identify elements for the reflection about how ICT-supported Higher Education teachers training should be. When analysing criteria which are defining "good practices" (Chickering & Ehrmann 1996), we found an unbalanced performance, so this is one of the relevant points to take into account when designing teachers' training activities. However, it could be said that the methodological principles are always, up to a certain level, enhanced to the practices, because a constructivist conception of learning is usually underlying them and it leads to the development of competences, as wished. The following graphic shows the frequencies in which we find some of the criteria in the design of the analysed practices.

Graphic 1. Good Practice's criteria frequency in the design of the analysed practices



The whole analysis of the characteristics of the practices design shows that there are some methodological patterns that take into account this constructivist learning approach, also linked to the concept of *active learning*.

Most of these practices respond to a three phases or levels of progression as follows:

1. Presentation and/or representation (Familiarisation)
2. Meaning construction (Initial knowledge transformation)
3. Knowledge production (Applications and creations)

In fact, even from the expectations and needs of teachers there is a demand for an increasing number of teachers' training practices based on practical and "real world-based" activities.

A lot of evidences are found (90%) in the sense of encouraging active learning, mainly related to the use of problem-solving activities which require students to understand and manipulate course content and current or real content in its complexity.

Planning activities in a virtual environment is one of the most important aspects needed to facilitate a high level of learning (Álvarez & Guasch, 2006). There are evidences of that principle in the teachers training practices analysed: i.e.: courses divided into different parts (orientation, designing, implementation & evaluation; tutoring support during training; different training phases (1-workshop, 2-discussion seminars, 3-specific training), activities with different demands and skills (previous activity; planning activity; development activity).

It is also present in the analysis of teachers' needs. Most of the teachers point out the need of "sharing good and bad practices in a workshop with other teachers" where they can discuss their understanding of teaching and learning with or throughout ICT; or, seminars adjusted to their needs (i.e. previous knowledge, socio-cultural aspects, ICT competences…).

The teachers' training practices reviewed promote the interaction between learners; as shown in these practices, the main methodology that educational agents have been using in teacher training practices supported by ICT, is the collaborative one. This collaborative methodology appears in different kinds of collaboration, i.e. between novices (learners that do not have a previous knowledge in using ICT, or learners that do not have previous knowledge as teachers in an online context) and advanced learners (learners that use ICT, or learners that have studied in an online context before) in a peer learner support system between learners that couldn't share the same time and space (participants from different universities), between learners that have different expertise roles (pedagogic expert, with technologic expert…). These kind of collaboration and interaction allow learners to learn about it and, afterwards, to transfer this knowledge to their teaching practice.

Related to the assessment functions, and focused in teaching training practices that develop in online teaching and learning environments, feedback turns out to be a key factor in order to collect evidence that corroborate that a learner has learnt as much during a teaching-learning process –formative side- and, like a traditional assessment process, as at the end of this process -summative side- but in both cases its function is to facilitate and scaffold the learning process in order to communicate and inform the learner what (content learning) he/she has been learning and what he/she has to do to achieve learning objectives.

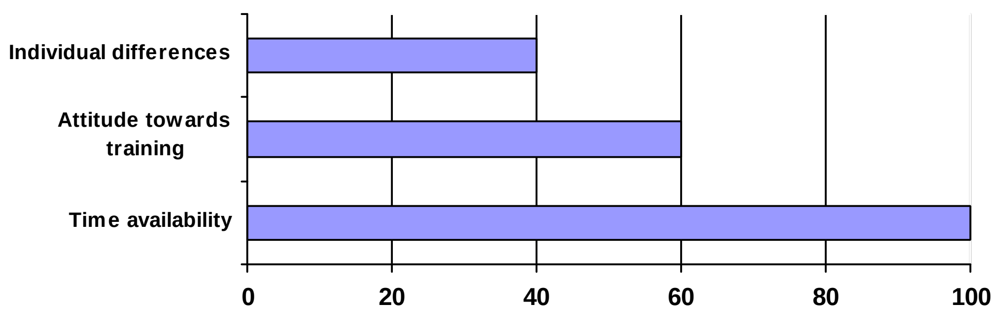
In spite of the importance of the feedback process, nowadays, comparing with the other principles or conditions above underlined as effective teacher training practices with ICT, there is no more than a few real practices examples that do it. This could be caused by the recent methodological changes that arose as a consequence of the incorporation of ICT and by changes that arose from the conditions of the instructional process (i.e. great number of participants of the course) which made it unlikely that feedback could be effective.

But, if we attend training practices which offer feedback we could observe that it shows up in different forms: in some cases, the trainer is the agent who gives feedback to their learners; in other kind of practices it is the learners who among them provide feedback, that is coherent with the collaborative methodology; and in other type of teachers training practices it is the technology that gives feedback to learners (this kind of feedback is conditional on the technologic potentialities of the platform).

In this sense, teachers reclaim to be trained to acquire assessment competencies that let them give prompt feedback with the aim to help their students in their learning process and to create different kinds of assessment activities that promote in the students different cognitive strategies.

An important lack is found in most of the analysed practices. As the following graphic chart shows, from the analysis of teachers' training needs (focus groups), most of the blocking factors for an effective training are related to people as individuals. However, differences are not only important regarding cultural and social issues, but also when talking about diverse levels of talent and different ways of learning.

Graphic 2. Effective training blocking factors



So, training ICT for teachers should be adjusted to their individual qualifications and sometimes integrated with the work of developing the whole course. It is also recommended to start from the teachers' own situation, and use it to improve the quality of their performance. As mentioned in one of the practices, "one bearing principle is to let the participants reflect at the meta-cognitive level of the virtual learning process in view of the more understandable face-to-face learning situation. This meta-discussion is carried out both in the physical and the virtual room".

How to Design the Teacher Training Action to Improve Teachers' Ability to teach with ICT?

Taking into account both the changes in teachers' functions and competences for online teaching and the experiences that can be drawn upon from the current state of affairs of teacher training, it seems that the starting point for defining the methodological criteria to be used as a guide to the design of formative actions is to manage to keep these actions close to the nature of the teacher's work in virtual environments.

The complex and changing character of teachers' roles and tasks requires learning their professional practice comprehensively. They should be able to evaluate their own practice and identify their improvement needs. They have to be able to guide and promote their own professional development in a variety of learning situations. They need to be able to develop a professional knowledge based on teaching from their practice, as far as possible, in conjunction with research-based knowledge.

This overview introduces the idea that learning in the work place is a necessity and an opportunity to improve. It is a process of discovery in which the learner is the main agent, not the teacher. The Idea is that the teacher's role is to "put it out" and the student's role is to "get it" /"pick it up". In fact, even from the expectations and needs of teachers it is asked for an increasing number of teachers' training practices based on practical and "real world-based" activities.

Therefore, before designing any modality or the content of a teacher training action, it is worth paying attention to some methodological criteria that could serve as a guide to decision-making on what to do and how by means of a formative action, so that teachers can participate actively in their training.

So, the criteria for design follow the principles of alignment in teaching:

a) Goals and purposes
b) Instructive Design
c) Evaluation

Below is a breakdown of seven principles that can serve as methodological criteria to adjust formative actions to these three dimensions of instructional design:

a) Goals and Purposes

1. Teachers training goals should be to develop competencies

This is the primary criterion and the underlying principle shows the need to state formative goals which will contribute to the development of those competences that are required by the functions, roles or tasks performed by the teacher taking part in the training. We must bear in mind, though, that the competences may vary according to the context in which they are applied.

b) Instructive Design of Training Practices

2. Teachers training should be adapted to the different delivery systems

Practices should pay attention to the use of the appropriate ICT-based learning models (face-to-face, blended supportive, blended complementary, fully online). As far as an active learning is demanded, models of practice should respond to the learning models teachers are going to develop in the classrooms and should introduce the use of different technologies to give teachers the opportunity to choose those which could fit better with their subjects and matters.

3. Teachers' training should integrate different teaching methodologies

Teaching methodologies should be varied and participative and should enhance the use of ICT as a tool rather than an end in itself. Beyond the delivery system to be used, peer-based activities are highly recommended, as well as those activities in which mentoring make the students feel comfortable and supported. Collaborative learning should be highly promoted to build teamwork and professional networks. Good practice examples and autonomous activities should be also introduced to show real scenarios and possibilities.

4. ***Teachers' training practice should be designed using scaffolding principles for active learning***

Learning objectives must involve intellectual challenges that require judgement and a complex whole of tasks that should help the beginners to try out how to operate among the complicated ambiguities of the professional world (i.e. Creating material that is slightly too difficult for the student, encouraging cognitive "stretch".) It is more important to attribute meaning to the knowledge and apply it rather than recognise it, reproduce it or widen it.

The contents of the learning require accuracy with the context. To use problems that require learner to understand and manipulate course content; to present content in its complexity, i.e. real world content.

Learning activities should be situated and promote authentic educational situations. It is required that the learners act in an effective way with the acquired knowledge - learn by doing - . i.e. to perceive the reality, represent it, contrast it, give sense to it, reconstruct it, act, work on it, assess it, , etc. It is very important to create opportunities for high levels of interaction. – i.e. to conceive the social mediation role in the learning process (guided learning; collaborative learning; tutoring, coaching thematic reflection, etc) and to conceive the learning situation as a "social dialogue".

About the **assessment process,** it is advisable to implement procedures for authentic assessment (group assessment, peer assessment, self assessment, assessment in problem basic learning, learning portfolio, etc.)

5. ***Teachers' training should respect diversity of training / learning***

To attend to the variety of educational needs of the academic staff: In a formative practice, to promote the integration and use of the ICT, in a relative frequency …, may gather learners with different levels of previous knowledge of the ICT. This must be regarded as a starting point in order to guarantee the effectiveness of the teaching and learning process. In the same way, attitudes and expectations in front of learning have to be taken into account.

6. ***Teacher training practices should consider institutional environment*** (structural frame; Human frame; Political frame and symbolic frame).

c) Evaluation of Training Practices

7. ***Teacher training practices should be evaluated***

When we are talking about the evaluation course we understand it as the value judgements that educational process participants (i.e. teachers, students, faculty members…) do about some developed course indicators that would be assessed. In order to obtain the participants' feedback of the course we consider that we have to contemplate the evaluation process in the design of teacher training practices through ICT. This feedback lets us know the degree of satisfaction among the participants and therefore to adjust and improve the course design.

Final comments

The changes associated to the introduction of ICT in teaching, and particularly in teaching in an online environment, are a challenge to teachers, which in our opinion is not resolved from a political or theoretical standpoint which dictate the what and how to do it, but rather by means of a concerted effort that will allow us to clarify which are the changes necessary for the teaching performance and which is the best support that can be offered to help achieve them.

The theoretical investigations and the practical experiences undertaken as part of the *eLene TT* project are a significant effort by the European community towards this purpose. The partial results described above open the way towards the betterment of teacher training, stemming from paying attention to the principles that should be adhered to in the design of formative actions, as an answer to the needs, expectations and realistic possibilities of university teachers who are interested in their own training.

It is important to highlight the need to reach a consensus on the functions and competences assigned to the teacher in this type of teaching, and on that basis, to create formative actions that will by themselves help teachers to find sound and concrete answers to their concerns or learning needs, always taking into account the diversity of educational situations and individual peculiarities, and counting on their active contribution to their training.

The definition of the methodological criteria for the design of teacher training that has been underlined in this study is only a starting point and constitutes one more element in the conceptual and practical mechanism of the *eLene TT* project, whose future actions will focus on extending and validating strategies and formative resources that can help to improve university teaching practices in virtual environments.

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