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Ulrich Bernath & Albert Sangrá (Eds.)

Research on Competence Development in Online Distance Education and E-Learning

Selected Papers from the 4th EDEN Research Workshop in Castelldefels/Spain 25-28, 2006

EUROPEAN DISTANCE AND E-LEARNING NETWORK

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Content

PART 4: DEVELOPING COMPETENCIES THROUGH CURRICULUM DEVELOPMENT, INSTRUCTIONAL DESIGN, AND ASSESSMENT IN ONLINE LEARNING ENVIRONMENTS

Editors' Foreword

The13 articles assembled in this volume originally have been submitted as papers to the 4th EDEN Research Workshop in Castelldefels/Spain in October 2006. They were among selected best conference papers and eventually also selected for this post-conference publication.

Thematically all articles contribute to "Research on competence development in online distance education and e-learning" and deliberately present research in their respective context. In accordance to the editors' understanding of research they are systematically and comprehensibly analyzing and/or investigating their cases in order to present facts and to reach conclusions that gain acceptance and recognition in the scientific community.

The articles in this book comply with the requirements of successful research. They have been scrutinised in a scientific peer-reviewing process and selected for publication. In accordance with the editorial guidelines authors elucidated their research methodologies and referenced individual articles to each other. Hence the 13 articles in this book are contextually related. The reader will find exemplary research works as well as contributions to the current discussions on competence issues and on teaching and learning in online distance education and e-learning.

One of the prominent membership services of EDEN is the provision of opportunities for professional development in open, distance and e-learning. With respect to research in these areas particular efforts are made biannually with EDEN's Research Workshops. The first event was held in Prague in 2000. In 2004 EDEN introduced a Best Paper Award. The competition made papers of finalists visible and distinct. For these outstanding papers two opportunities for publication were offered: One was EURODL, the European Journal of Open, Distance and E-Learning, and the other was the ASF Series on distance education edited by the University of Oldenburg with a volume on the conference theme of the 3rd EDEN Research Workshop. (c.f. Brindley, Walti, Zawacki-Richter 2004).

More emphasize on research issues in open, distance and e-learning was supported by EDEN with the launch of the policy paper on "Learning Innovation for the Adapted Lisbon Agenda" in May 2006. This important document is being made available for the reader of this volume as an appendix to our foreword.

In autumn 2006, the 4th EDEN Research Workshop was held. As stated in the call for paper the workshop aimed to focus on research both into fully online distance education, and also into e-learning that combines face-to-face teaching with online learning. Within the general theme, there were three parallel sub-themes: (i) Research into institutional planning, management and quality development for online distance education and e-learning; (ii) Research into innovative online teaching, learning and knowledge building (including assessment issues); (iii) Research into online technology tools and services. In addition a special workshop was held on appropriate research methods and designs for online distance education and e-learning.

94 papers have been submitted and all were independently reviewed by at least two academic reviewers. 60 papers have finally been accepted and have been made available to the participants of the Research Workshop from the EDEN Website.

Regarding the selection of papers for publication 24 papers have initially been taken into consideration following the original idea of making the best of the 4th EDEN Research Workshop available in a book on research into online distance education and e-learning. With the approval by the EDEN Executive Committee and the Chair of the Scientific and Programme Committee, Tony Bates, the editors of this post-conference publication assembled best research papers along a coherent thematic structure rather than covering the widest spectrum of contributions to the Research Workshop. While reviewing these best papers it became apparent that a cluster of 13 papers dealt with aspects of competency developments in online distance education and e-learning. Eventually, all authors of these selected papers agreed on the revision and extension of their conference papers under severe time pressure. This allows us to proudly present a volume with 13 exemplary research papers, which particularly emphasize:

- Concepts and developments of competencies in education and training,
- Enhancing competence development in online distance education,
- Building up institutional capacities for competence development
- Developing competencies through curriculum development, instructional design, and assessment in online learning environments.

Thus, the reader of our book will find the following:

Part 1: Concepts and Developments of Competencies in Education and Training

Schneckenberg introduces the concept of competence for the context of higher education. He presents a theory-based discussion of competence models and compares methods for assessing and measuring competences with a focus on academic teachers.

Cattaneo & Boldrini analyse the trend and impact of information and communication technologies (ICT) on teacher's practices and competences in order to define the need for updating teachers and redesigning teacher training in Switzerland.

Dudink & Niveen reflect on competences particularly required from tutors for competence-based vocational education in the context of a commercial distance education company in The Netherlands.

Part 2: Enhancing Competence Development in Online Distance Education and E-Learning

The successful online learner is critical in **Borges'** empirical study. He raises the question about competences that enhance learning, communicating and collaborating in an online distance education environment.

Cleveland-Innes & Garrison examined novice online learners and their instructors and make an argument for the importance of teaching presence for learner independence as well as interdependence in online communities of inquiry.

Paulsen argues for cooperative learning in virtual learning environments that allows both learners' independence and a learning community. He introduces a set of instruments for achieving cooperative learning.

Edirisingha, Salmon & Fothergill present findings from a pilot study on students' learning with 'profcasts' and discuss the application of the podcast technology in large scale.

Part 3: Building up Institutional Capacities for Competence Development

Aczel et al. present results from a two-year research study identifying examples of innovation in relation to the e-learning strategies developed by higher education institutions and **Ehlers** reflects about the challenge for e-learning in higher education to support competence development.

Botturi & del Percio present results of a qualitative study which investigated the instructional design process of an e-learning unit in two different institutions. Their results indicate that differences between the teams largely depend on variables in the institutional setting.

Part 4: Developing Competencies Through Curriculum Development, Instructional Design, and Assessment in Online Learning Environments

Guàrdia, Sangrà & Maina reflect on the case method for a competence-based curricula design and present a four-component case model as a result of their qualitative research.

Aguirre presents findings from action research for improving online discussions design, implementation and evaluation in order to innovate meaningful learning.

Finally, the question about assessing competence-based learning in online distance education adequately is raised by **Barberà & Ahumada,** who study the strengths and limitations of a the e-Portfolio as an alternative tool in a validated assessment system in higher education.

All articles together represent an impressive wealth of exemplary research. They render prevalent reflections on critical topic areas in the current discussions about the future developments of effective and high quality technology-enhanced education and training in general and in online distance education and e-learning in particular. The reader will find substantiated reflections on the theoretical, conceptual and institutional framework of competencies as well as on teaching and learning strategies for competence development in online distance education environments and e-learning.

We hope that this volume will find our targeted readers: Participants of the 4th EDEN Research Workshop; the wider professional community within EDEN and beyond; the research community in open, distance and e-learning at large; teachers, scholars and students with similar research interest or interest in research-based argumentation in respective topic areas; practitioners, administrators and politicians in related areas of responsibilities, who seek foundation and underpinning for their argument.

For us, the editors, this volume provides an excellent opportunity for enriching post-graduate programmes, in which we are engaged:

The Open University of Catalunya (OUC) is currently running a Master's Degree in Education & ICT *(e-learning)* in which students can follow two different paths: the professional and the academic and research one. Regarding the last one, a number of courses are offered to match the competences they should get at the end of the learning process in order to be ready and able to start working in the research and final dissertation that will be required to get Ph.D. at UOC or elsewhere. This book fits very well as a support resource in this particular path. Furthermore it matches very well with the structured and scaffold-based approach to competencies of the Master's programme and the new 20-ECTS European Certificate in e-Learning Course Design and Teaching

(in English) which has just started. The book will serve as a benchmark on and will provide access to international-wide research.

The University of Maryland University College and Carl von Ossietzky University of Oldenburg are jointly offering the Master of Distance Education (MDE) programme. A course on research methodologies is being introduced to support practitioner research as well as to prepare graduates for a dissertation track. Selected chapters will serve as strongly recommended readings.

We hope that other schools are following our examples and develop their own strategies of making best use of this volume. Furthermore we hope that this book reaches its various targets. Ultimately we wish each author and the book as a whole impact within the actual policy, professional and scientific contexts.

The volume has been made possible by EDEN, the conference organizer, OUC, the hosting institution of EDEN's 4th Research Workshop, and Oldenburg University for integrating this volume in its ASF Series on distance education. Martha Cleveland-Innes provided an inspiring feedback on the sequence of the articles, and Franziska Vondrlik from the Center for Lifelong Learning (C3L) at Carl von Ossietzky University Oldenburg, deserves our highest regard for her intrepid editorial assistance.

Ulrich Bernath and Albert Sangrà**,**
Oldenburg/Barcelona, April 2007

Reference:

J.E. Brindley, C. Walti, C. & O. Zawacki-Richter (Eds.) (2004). Learner Support in Open, Distance and Online Learning Environments. (+ DVD-Video). Oldenburg: BIS-Verlag.

Learning Innovation for the Adapted Lisbon Agenda

Policy Paper of the European ODL Liaison Committee, approved by the Member Networks and released 3 May 2006 (http://www.odl-liaison.org/pages.php?PN=policy-paper_2006)

1. Introduction: A New Focus

The Lisbon Agenda has been adapted in 2005 to act as an updated focus for European policy development. The adapted agenda calls for a strong and fundamental effort to equip the European citizens at all levels with the right knowledge, skills and attitudes, and society at large with a full understanding why this is needed. The present education and training systems are not completely equipped to face this challenge through conventional learning methods. A substantial amount of learning innovation will be required for which the knowledge base is only fragmentary now.

In the new environment, the flexible, open, innovative – the so called "atypical" – forms of education are certainly in the position to offer contributions and solutions not only to make possible a more effective and efficient investment in education and research, but also to bring learning opportunities closer to SMEs and to help individuals to be more prepared for their working life and citizenship agenda. It is worth recalling, that in 2004 a Policy Paper "*Distance Learning and eLearning in European policy and practice: the vision and the*

reality" was delivered by the European Open and Distance Learning Liaison Committee (LC) to European and national policy makers in charge of learning innovation.

The Policy Paper was generally well received, broadly quoted and commented upon and produced a certain impact on European Commission action, particularly attracting the attention on the need of coordination among EC services, on the opportunity to connect the Lifelong Learning agenda and eLearning developments, and finally on the opportunity to consult more systematically the relevant professional networks and stakeholders on new policy developments.

Recognising that significant progress has been made in the last couple of years in many areas, the present document aims at pointing out a major problem that emerged in the last year of discussions on eLearning and ICT for learning: the knowledge gap on learning innovation. This problem is deriving from (1) a lack of priority for a comprehensive learning innovation within research programmes and (2) the lack of accumulation and utilisation of current practice and the few available research results, including the consolidation of the knowledge gathered and available. For successful implementation both are needed in a well-constructed connection.

This paper of the Liaison Committee addresses the policy level issues of the Lifelong Learning context as a natural continuation of its earlier recommendations which mainly concerned open, distance and e-Learning. The Committee feels that it is now the right moment to call attention to these issues, since the experience of the member networks, each one in its own environment, shows that it is not possible to bring ICT-supported learning innovation into mainstream education and training if the supportive environment and the right context are lacking. Sustainable improvement can only be reached if the use of ICT and flexible focus of learning are proposed not as a specialised theme in the periphery of policy discourse, but at the heart of it. The following sections 2 and 3 attempt to clarify the present situation, while the final section 4 proposes a few recommendations for urgent action by EU institutions, national governments and other stakeholders of education and training systems.

2. A Renewed and Re-oriented Investment in Research

It is widely accepted that Human Resources are the determining factor for the drive towards competitiveness and growth in the knowledge-based economy and are critical to the achievement of inclusiveness, social cohesion and equity. In parallel, globalisation, suggesting mobility for goods, services, labour, ideas and societal practices, coupled with the pervasive effect of the proliferation of information and communication technologies, is exercising a strong pressure on existing education and training (E&T) systems, which run the risk of losing relevance and effectiveness. In the past, these notions have been stressed time and again; however, in our view they lack until now comprehensive rethinking, supported by validated experience and solid research.

Educational research that is relevant within the actual policy context, timely, conceptually ambitious, culturally sensitive and, above all, of convincing scientific quality is now essential for the long-term success of Europe.

In all recently adopted Communications (and Reports, EU Policy Frameworks, etc), education, training, human resources and employability are being intertwined and increasingly related to reforms in national learning systems in Europe, in the frame of the *lifelong learning perspective.*

In order to conceptualize effectively the contribution of national and European E&T policies in achieving the goals set at political level in terms of development, employment, etc., it seems appropriate to recall the main relevant European policy documents produced over the last four years. In fact, education and training are exemplary as policy area for subsidiary to play its full role – also according to the treaty establishing the European Communities –, and the increase of the quality and the scope of EU initiatives fostering E&T quality, access and openness has been spectacular.

In particular, six relevant strands of actions related to E&T research can be identified:

- The adapted Lisbon strategy
- The European Employment strategy
- The commitment of the EU vis-à-vis Lifelong Learning
- The actions aimed at increasing mobility of learners, trainees and workers
- The Copenhagen Process of enhanced cooperation in the field of Vocational Education And Training
- The European Social Agenda

In spite of the fact that all these policy strands recognize the priority of human resources development and citizens' empowerment, research on education and training in Europe is presenting a number of critical weaknesses, which might jeopardize the ambition of Europe to grow and generate new employment.

Notwithstanding the importance of independent (i.e., not policy-driven) critical research, some key problems that European research in E&T present today can easily be identified:

- It is often poorly connected with the changes and innovation processes taking place in education and training systems and it is insufficiently focused on the challenges that E&T systems are facing;
- It is often limited by national disciplinary and curricular logics and funding streams and, consequently, does not often adopt an integrated thematic approach;
- At the national level, research on E&T often depends on both the education and the research authorities, among which a higher degree of coordination and synergy should be expected.
- In several countries it tends not to be exposed to internationalization and to be limited to the "national traditional mainstreams". This fact does not contribute to a high reputation of educational research within the international research community;
- At the EU level, in each of the DGs that provide funding to E&T research such research does not get high priority in the relevant Programmes (e.g. IST, Priority 7) while in specific E&T innovation Programmes Leonardo, Socrates, or Employment innovation oriented initiatives (EQUAL, European Social Fund) insufficient resources can be devoted to studies and research; furthermore, the efforts of these entities and programmes are not enough coordinated among themselves and with the respective national authorities;
- The scale of research funding is a very small percentage of the overall expenditure on education and training.

In order to improve the state of the art of research on Education, Training and Lifelong Learning at national and at European level – and so to increase its contribution to and impact on the required learning innovation –, it is necessary to devote higher attention to this field in terms of policy attention, implementation effectiveness and resources. This should be done at complementary levels, by improving coordination, evaluation and utilization.

This does not mean to limit fundamental and curiosity-led research, but to find a balance between autonomy/originality and the need for research leaders to be accountable to society on how and where they direct research resources when a compelling need to produce an impact exists in education and training systems, and in society at large.

We therefore propose the following concrete initiatives:

1. to promote educational innovation research and its coordination by well-organized measures at EU and national level. An effort should be made to create a visible and interdisciplinary area for research on learning innovation within the EU 7th Framework Programme for RTD, within the new Integrated Programme on Lifelong Learning and in the DG Employment and Social Affairs action lines devoted to innovation; the same should apply to National Research Plans, many of which tend to reproduce the architecture of the EU Framework Programme. At present finding a "place" and a funding opportunity for integrated and interdisciplinary research on learning system interaction is often impossible since every specific programme stresses much more technological or social aspects of research, defining "not innovative enough" or "not corresponding to the work plan requirements" any proposal which tries to balance and integrate the different perspectives through which one can study learning systems innovation.
2. to increase the relevance of educational research in Europe, with a focus on meaningful linking and integrating the existing research domains (pedagogy, psychology, technology, organization, economics, institutional reform, links to society, etc.), establishing further interdisciplinary contexts that might better relate to the present and future challenges of learning systems, according to new thematic clusters. An effort is required to make the research community understand the societal demand for accountability and relevance of educational research;
3. to evaluate and systematically utilize research results, thus maximizing the impact of research on innovation and effectiveness of education and training systems, and strengthening the case for increased funding to educational research.

3. A Lack in Acumulation and Utilisation of Available Knowledge

An excuse for not investing more in educational research might be that there are already so many results which are not used in practice that the first priority should be to transfer existing results to the educational practice.

Although this is not a good reason to limit investment in research, the argumentation contains a very good point: research results – and more generally experience and knowledge derived from innovative practice – are presently under-utilised in mainstream practice.

There are, in fact, several aspects in this problem that, in a rather simplified diagnosis, can be summarised as follows:

- the lack of accumulation of available knowledge, a typical "not invented here" syndrome that makes both researchers and innovative practitioners prefer "starting from scratch" and be "new heroes" of learning innovation in their own environments rather than build on recent progress made by someone else;
- the limited effort done to circulate results of innovative projects when the funding life-cycle expires;
- the lack of awareness by decision makers of promising – but small-scale – innovation results achieved by pilot projects and action-research;
- the objective difficulty to implement system level innovation in education and training institutions that have limited possibility (financial resources, flexibility, real autonomy, etc.) to activate change levers;
- the ways to promote top-down innovation initiatives are not always "user friendly", and the implementation models seldom allow people on the front-line – typically teachers and trainers – to take the necessary time and knowledge to become owners of the innovation proposed. That is usually stigmatised as "resistance to innovation" but is frequently a well-founded resistance to "unconvincing innovation", plans that do not match, nor negotiate with the visions of the world of the interested stakeholders. Institutional leadership should create top-down the necessary conditions for fruitful bottom-up initiatives.

Each of these five aspects of the problem requires action at the level of European Institutions, National and Regional Governments and other policy makers, not in the last place at institutional level. In particular, while we appreciate the increased focus that European Programmes put in recent years on valorisation, dissemination, sustainability and mainstreaming at project level as a criterion for selection of new proposals (and see the risk of a certain routine emerging without real change), we would like to attract the attention on the need to work at a more systemic level on knowledge accumulation and dissemination.

Not all the responsibility has to be put on project partnerships. Thematic showcases of project results - preferably cross-programme - might be an easier source of information and documentation than hundreds of half-dead project web-sites.

Encouragement to utilise research results and to implement large scale innovation should be made available at all levels of policy making, from the European Education Council to the leadership of education and training institutions; and encouragement does not only consist of visions and framework policy papers: it needs to include top level commitment, reward to innovators, strategies and monitoring instruments that help to learn from mistakes rather than killing anything that does not perform perfectly after two years and institutional sanctioning of actors involved..

This culture of support to innovation – that is claimed as necessary in the European economy and society – needs to be embedded first of all in every part of our education and training systems. If it does not happen within learning systems, it is very unlikely to happen in society at large. The capabilities in education institutions to implement learning innovation using ICT have been analysed in earlier papers of the Committee and in the HECTIC project.

4. Recommendations

Several points of action can be identified from the considerations expressed in the previous sections. Some call for immediate intervention, while others are more directed to set renewed working conditions to better link policy, research and innovative practice.

4.1. Recommendations for urgent Action at EU Level

U1. Establish a consultation and operational framework to guarantee sufficient resources for education and learning innovation research, eventually establishing a Bridge Programme or Action Line on Learning System Innovation, at both EU and national level. If this objective cannot be achieved, at least guarantee that existing work plans encourage and welcome an integrated and interdisciplinary approach to learning systems innovation.

U2. Increase the space and funding for research and evaluation within the new integrated programme for Lifelong Learning and within the DG Employment and Social Affairs initiatives oriented towards innovation, so to encourage the necessary links among Innovative Practice, Policy Making and Research.

U3. Guarantee that the new Lifelong Learning Programme pays sufficient attention and devotes appropriate resources to flexible and distance learning and technology supported learning, especially for the hitherto neglected areas of informal and non formal learning.

U4. Make sure that – when the new generation of European Programmes is starting in 2007 – visible research results and previous projects results are made available, in a user-friendly thematic approach, to new proponents to avoid massive "re-inventing the wheel" and waste of public resources.

U5. Dedicated policies at European and national/regional levels will be needed to stimulate and support leaders in E&T institutions to decide on and implement the strategic changes they opt for. These policies should address coherently personal and institutional development aims, to guarantee full adoption of the innovation agenda at all operational levels.

4.2. Recommendations for systemic Innovation Support at all Levels

S1. Link educational policies to broader innovation, competitiveness and inclusion policies in order to respond to the needs for education and training that result from the adapted Lisbon Agenda. Involve the professional environment both in the definition of the new Lifelong Learning Programme and in the implementation of its strategic actions.

S2. Develop effective mechanisms to let all stakeholders contribute to the development of a new research agenda. Promote utilisation of research results by stimulating both researchers and "research users" (practitioners, policy makers, education and training institutions) to establish collaboration channels and to adopt mutually understandable terms, concepts and – most importantly – some common value commitments and visions on future Lifelong Learning in Europe.

S3. Make all possible efforts to develop a culture of innovation in all education and training institutions and in all policy making bodies; concrete support and rewarding mechanisms have to be given as much importance as strategic orientations and financial resources to this purpose.

S4. Efficiently combine top-down and bottom-up approaches to learning system innovation, always reminding that innovation cannot be imposed: it has to be adopted, and the energy and motivation at all levels can only be sustained by promoting and allowing ownership of innovation by all stakeholders.

S5. More effective communication approaches are needed to involve media and create public awareness, but also to establish the capacity of policy makers to listen to the suggestions and the proposals coming from all stakeholders of the education and training systems. Transparent, coherent and service/support-oriented policy making processes and policy-derived Programme/project structures are strong motivators for the uptake of relevant and sustainable change.

The European ODL Liaison Committee and its Member Networks are available for European and national/regional authorities to support policy design, development and implementation as discussed in this Paper. They can provide unbiased practice-based expertise in almost all EU Member States covering most sectors of education and training. They can be instrumental in guaranteeing the flow of information, suggestions and feed-back which in our view is indispensable for the shaping of a Europe which is capable of playing a leading role in a changing world.

3 May 2006

PART ONE:
CONCEPTS AND DEVELOPMENTS OF COMPETENCIES IN EDUCATION AND TRAINING

DIRK SCHNECKENBERG

Competence Reconsidered – Conceptual Thoughts on eCompetence and Assessment Models for Academic Staff

Abstract

In the light of ICT-driven innovation in our society and new requirements that citizens face in their work and life contexts, 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 competence and the concept of eCompetence for the context of higher education. On basis of this theory-based discussion of competence models, the paper compares a range of methods for assessing and measuring eCompetence of academic teachers.

1. The Relevance of eCompetence in Education Innovation

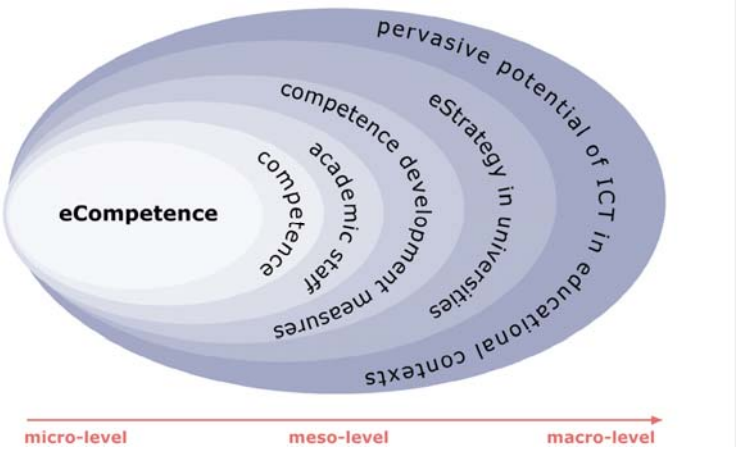
The 2006 policy paper of the ODL Liaison Committee has amongst other things stressed the importance of *human resources development* as one key driver for a competitive knowledge society. It has pointed out the role of the education and training system in societal innovation, the need to rethink and 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 topics of *competence development* in general and of *eCompetence* in particular are 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, Atkins & Van Houweling 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, Frommann & Phan Tan 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.

The *scope of research* can be illustrated in a model which represents the main layers into which the eCompetence topic is embedded. This model includes a range of layers which start at the micro-level of eCompetence as being a part of the general action competence of an individual academic staff member in a university. The individual academic staff member is part of the group of faculty staff at the meso-level of a university. The collective eCompetences of the academic staff members are influenced by a portfolio of direct competence development measures that the university might have set up as part of its human

resources management; and they are influenced by the wider eLearning-related contexts and conditions, which motivate academic staff members to reflect upon the potential of new technologies for teaching and learning. The eStrategy of a university is finally influenced by the wider pervasive potential of ICT in educational contexts of the society.

Figure 1: Model of eCompetence Layers



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, Euler, Seufert, Hasanbegovic & Voss 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 activities. As a consequence they need to develop competences to cope with the technological challenges in their workplace (Salmon 2004).

3. Research Method and Design of Analysis

This paper relies on a *desktop study* of relevant research literature. The focus of the desktop study on the concept of competence is on competence research and on motivational and cognitive studies in psychology, on learning theories and models in pedagogy, and on external competence standards and wider contextual factors for competence management in organisational and business sciences. For the conceptualisation of eCompetence, this study relies on contributions from media pedagogy and on research in the wider eLearning community. Finally, the study on competence assessment relates to current research in cognitive psychology, social sciences and educational sciences.

Based on the desktop study of relevant research literature, this paper includes three main *chapters*:

- the discussion of different approaches to the concept of competence, the extraction of key components for competence which are relevant for educational contexts, and the integration of these key components into a coherent concept of action competence;
- the construction of a concept of eCompetence for academic teachers. The eCompetence concept builds on the conceptual clarification of competence and includes the main variables of the pedagogical and of the electronic contexts, which determine the options of the teacher to interact in his or her specific teaching and learning scenario;
- the comparative analysis of a range of assessment methods, which could be applied to measure eCompetence of academic staff.

The main *research questions* of this study are:

1. What is competence? What are the key components of the concept of competence? Which approach to competence is adequate as theoretical basis for a conceptualisation of eCompetence in educational contexts?
2. What is eCompetence? What are the main components and theoretical assumptions of the concept of eCompetence and how can this concept be applied to academic teachers in higher education?
3. How can eCompetence of academic staff be measured? Which competence assessment measures are adequate for the target group of academic staff?

4. The Concept of Competence Revisited

The clarification of the concept of competence starts with a short *overview of the research field*. The point of departure for the rapid evolution of the competence topic in science and its application as a powerful instrument for managing and developing human resources, can be – at least in the United States, traced back to the publication of McClelland's seminal paper in 1973, which is titled "Testing for competence rather than 'intelligence'" (McClelland 1973). In this paper, McClelland doubts that the traditional way of testing abilities of students and employees through writing exams and measuring intelligence quotients (IQ) are adequate methods to predict their future success in related jobs. As consequence of his argumentation, McClelland proposes the competence concept as alternative basis for assessing people's abilities and for predicting their performance in solving specific tasks. The concept of competence subsequently has become an influential component in the areas of education and human resources management across the world; in the United States its popularity is symbolised by characterising the whole field related to human resources management in public and private sectors in the accompanying scientific discussion with the term 'competency movement' (Adams 1997, p. 18).

Nowadays, definitions of competence are as manifold as their use in various contexts. A wide range of scientific papers deals with competence and its underlying concepts, as well as with the challenges of competence development, competence assessment, and competence management. Contributions on the concept of competence vary in the range of included competence components and characteristics, and they take place within a number of different scientific disciplines.

The research literature that relates to the concept of competence contains many contributions with an interdisciplinary theoretical background. From the work undertaken

by Weinert and North & Reinhard we can extract two *classification schemes for science disciplines*, which are relevant for competence research. The range of relevant science disciplines is shown in the following table:

Table 1: Science Disciplines in Competence Research (based on Weinert 2001; North & Reinhard 2003)

Researcher	**Range of Science Disciplines**
Weinert	developmental sciences, psychology, linguistics, sociology, political science, economics
North & Reinhard	1. cognitive sciences – including psychology, pedagogy, philosophy, linguistics, neuro-, and computer science 2. social sciences – including sociology, organisational studies, business science, public management science

As part of a study on educational systems for the Organisation for Economic Co-operation and Development (OECD), Weinert has found a wide spectrum of theoretical approaches to competence in the scientific discussion. But he has not found a common conceptual framework that could overarch the differing theoretical discussion strings. Accordingly, he writes: "An exhaustive definition of competence would have to include all the intellectual abilities, content-specific knowledge, skills, strategies, meta-cognitions and action routines that contribute to learning, problem solving and a variety of achievements. Such a definition would mean that the concept of competence covered all of a person's cognitive resources, that is, all those mental conditions that underlie individual performance, intra-individual performance changes, and inter-individual performance differences at any given point in time. The advantage of such a broad definition is also its greatest disadvantage. One would be confronted with a problem not yet solved in the 100-year history of scientific psychology: a complementary classification and performance-specific integration of ability and knowledge. There is neither a theoretical nor a practical solution to this problem at this time." (Weinert 1999, p. 26). Weinert's reflections show clearly that *competence is a complex research subject* - the level of complexity makes it almost impossible to define a general or generic competence concept, which would represent all inherent theoretical aspects in an adequate and objective way. Subsequently, Weinert identifies at least nine different ways, in which competence is defined or interpreted (Weinert 2001). These approaches to competence are listed in Ehler's paper on e-Irritation (cf. Ehlers, in this volume).

Therefore, Jonathan Winterton characterises the *concept of competence* in current research as fuzzy, when he states: "There is such confusion and debate concerning the concept of competence that it is impossible to identify or impute a coherent theory or to arrive at a definition capable of accommodating and reconciling all the different ways that the term is used." (Winterton, Delamare Le Deist & Stringfellow 2005, p. 29). This assessment of the competence concept as being *fuzzy* and *unprecise* is shared by Erpenbeck and Heyse - they observe an abundance of contributions on the competence topic in the German research literature alone (Erpenbeck & Heyse 1999, p. 163).

Before we further discuss and try to integrate the conceptual key components of competence into a coherent theoretical model, on which the main assumptions of eCompetence will be based, first we focus on the *concept of action competence*. Weinert characterises action

competence as a *holistic approach* to competence, when he states: "Action competence includes all those cognitive, motivational and social prerequisites necessary and/ or available for successful learning and action" (Weinert 1999, p. 10). The concept of action competence combines systematically *cognitive* and *motivational components* into a coherent *dispositional system* of *knowledge*, *skills* and *attitudes* (KSA); it assumes a *learning process* at the core of competence development; and it obviously puts an emphasises on action, on *performed behaviour* – as the single visible component, by which the underlying dispositional competence factors can be assessed and interpreted.

Due to its holistic quality, Weinert notes that the concept of action competence is quite commonly used to analyse conditions for successful actions in professional, institutional or social contexts (the COLO competence definition approach is one Dutch example described in Nieveen & Dudink in this volume). The concept of action competence includes not only cognitive dispositions and motivational factors; it also combines *individual*, *role-specific* and *collective conditions* for the successful development of competences within a social group or within an institution. The combination of these conditional factors implies that

- competences for successful action can be distributed within institutions in a social network of individual actors;
- institutional human resources management strategies can build on a normative definition of institutional key competences, which summarise and specify the required individual competences in a social network of individual actors;
- the complementary development of competence for specific areas of action within a social network of individual actors needs to be framed by a wider institutional strategy (Weinert 1999).

One important notion on the dispositional components of knowledge, skills and attitudes within the action competence concept is that competence development 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 also refers to the KSA triad as dispositional key components of competence. She 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, Boon, Van Lieshout, Schafer & Schrijen 2002, translation from Dutch by author). This definition is quite compact and coherent. The dispositional components of competence consist of the already well-known triad of knowledge, skills and attitudes. When an individual actor carries out a specific action, in order to show competent behaviour in the context of performance, the dispositional components of knowledge, skills and attitudes need to be combined and to be interrelated with each other in a *process of integration.*

In addition to this integrative moment related to the act of performance, van der Blij characterises the dispositional KSA component of competence as complex. *Complexity* is an important criterion for competence, because complexity makes a difference – it draws a line between *skills* and *competences*. The degree of complexity is included in the task and in the context of performance. Those tasks, which an individual actor can process in a highly routinised way, mainly require skills. In contrast to routinised task-

solving those complex tasks, which an individual actor is facing in an unstable and challenging context, require competences for adequate action.

Motivation is the one key component within the architecture of any competence concept, which is frequently regarded as taking a particular position. Competent performance is closely related to motivation. But in many conceptual approaches motivation is not included as integral component of competence. For example, Van der Blij refers in her definition to this motivational aspect of the competence concept, when she speaks of the *ability to act*. Notably, this ability to act is *optional*. The potential action of the individual actor depends on his or her motivation to act. Only if substantial motivational drivers to trigger an adequate performance evolve in a specific situation, the ability to act – as potential, will transpose in adequate action. In this way, *motivation is a conditional influence factor* on competence. Boyatzis (1982) has expressed this optional character of competence – as disposition, and the role of motivation – as essential trigger for action, in a concrete example: "A lot of times, people don't use their competencies. Take consultants. For years, I've watched them with clients – they are very charismatic, sensitive, empathetic – then, they'd come back to the office and behave like jerks." (Adams 1998, p. 43). Obviously, although in this example the consultants are competent to behave in a charismatic, sensitive, and empathetic way, they are seemingly not motivated to use these competences in their familiar, 'remote' work environment.

In chapter four, we have identified (1) learning, (2) a system of dispositions including knowledge, skills and attitudes, (3) motivation, (4) performance, (5) the context of performance and (6) key competences as *main competence components*. These components can be *merged* within an *action competence approach* as shown in the following model (cf. Ehlers, in this volume):

We can make basic assumptions and a set of subsequent implications for each key component of the competence model as shown in the table below:

Figure 2: Model of Action Competence

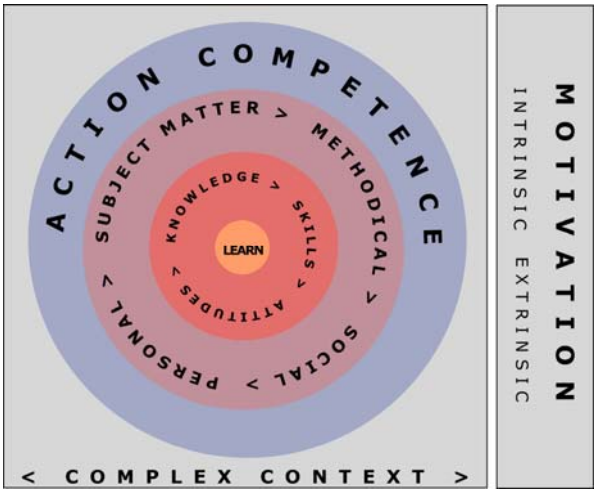


Table 2: The Concept of Competence - Key Components and Basic Assumptions

Key Component	Basic Assumption
Learning	Is at the core of any competence development – there is no competence development without learning.
System of Dispositions	Is the basis for goal-oriented, adequate action in a complex context – there is no competent action possible without the system of dispositions.
Motivation	Is the essential condition for competence-based performance – you can be competent, but if you are not motivated to act, there will be no action at all. Not an integral component of competence, but independent influence factor.
Performance	Is the visible manifestation of 'hidden' dispositional competence components in specific social context – assumptions on implicit competences have to be validated and interpreted by observation of real performance.
Context	First, particular context of performance defines and specifies competences, which are necessary to adequately act in given situation – it is not possible to specify competences without a analysis of specific requirements which are included in context. Second, degree of complexity within context of performance is trigger for learning process.
Key Competences	The typology of subject matter, methodical, social and personal competence specifies visible shell of performance. Typology provides a conceptual substructure for the component of performance; combined key competences integrate into action competence.

These key components of the competence model, their key assumptions and further implications serve as theoretical basis for the subsequent conceptualisation of eCompetence for academic teachers in higher education institutions.

5. What is eCompetence in the Higher Education Context?

Based on the action competence approach, the focus of the *eCompetence concept* is to analyse the educational contexts, in which the competence of academic teachers to apply ICT in teaching and learning becomes manifest. 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. Here we focus on individual eCompetence for discussing on how to diagnose and to measure this competence type of the individual teacher.

eCompetence, when analysed closely, is a verbal specification of competence. It is a sub-class of the competence term, related to an electronic context, or eContext. As we can see in the model of layers in the first chapter, eCompetence is at its core dealing with the development of personal competences in the creative use of ICT. In this perspective, we have inferred a general work definition as basis for a conceptualisation of eCompetence in higher education. In this general mode, *eCompetence is understood as the ability to use ICT in teaching and learning in a meaningful way.*

Based on this argumentation, we will subsequently focus on the development of a concept of eCompetence for academic teachers in universities. Objective is to build a *generic model for eCompetence*, which takes into account the potential performance options of an academic teacher in a digital learning environment. Considering closer a potential structure for the concept of individual eCompetence, one can identify the following key components: the university teacher - which bears the competence as his or her general cognitive disposition to act, and the teaching and learning scenarios - which embed or rely on the use of ICT as the particular context in which the performance of the university teacher is situated.

It may be useful to first clarify what the term *scenario* means. A scenario is a description of a future event or context, in which an individual actor or an organisation will eventually be situated. Scenario planning is a strategic tool, which is widely used in corporate management for planning and decision-making within uncertain contexts. Scenario planning explores potential developments, which could evolve within this specific context of an individual actor or an organisation. The main objective of scenario planning is to get a closer idea on the impact of potential future developments within the context on potential performance options of an individual actor or of an organisation, and to find a coherent strategy to be able to efficiently act within the emerging contextual conditions. This can be done by adapting individual competences and organisational structures and processes to the main contextual conditions of the predicted scenario. In its essence, scenario planning builds on the above described method of context analysis for defining competence profiles – with the difference that the context is not a real one, but a potential future one (Schoemaker 1995, pp. 26-27; Erasmus 2006).

Let us observe more in detail the key components and which implications they include for the construction of a theoretical concept for individual eCompetence.

The *first key component* is the *competence of the individual university teacher*. We have deduced in the above given observation a specific approach to define competence that sets its focus on the performance dimension of the academic teacher. So the approach here discussed is tying the dispositional dimension – as individual prerequisites of a teacher to act in an adequate way, and the performance dimension - as the combination of key components of the competence of the teacher in observable action, together. In chapter four we have analysed a set of key competence components and gradually constructed a model that defines and integrates the key competences personal, social and communicative, methodical and subject-specific competences into an overarching action competence. In the construction of the concept of eCompetence, we apply this action competence model and its inherent implications to the individual teacher.

The *second key component*s are the *teaching and learning scenarios* which embed or rely on the use of ICT as the particular context in which the performance of the university teacher is situated. We like to apply the term *eContext* to this use of ICT in teaching and

learning scenarios of the university teacher. This eContext is not yet specified. Nonetheless, we assume that the eCompetence construct can only be inferred in a meaningful way from the specification of the situative context as the dimension in which the performance occurs. The eContext determines as contextual environment the options of the lecturer to perform in a given situation. So we have to ask ourselves which variables are included in this eContext in order to identify, which competences are required by the teachers to adequately act in a given teaching and learning scenario (on the strong embedment of competence requirements and profiles for teachers in specific situational contexts cf. Cattaneo & Boldrini; Borges; Cleveland-Innes & Garrison, all in this volume).

The approach that we have chosen to specify the eContext term combines two *contextual key influence factors*. The first key influence factor is the pedagogical design of the learning environment, and the second key influence factor is the technological design of the learning environment, in which teacher and learners interact and communicate with each other. Both key influence factors determine in their combination the potential action patters of the academic teacher in the learning environment.

The *pedagogical design* of the learning environment can vary according to the pedagogical model that the teacher applies. A range of distinct pedagogical models have emerged in educational sciences for the design of lectures and courses in universities. We assume that the university teacher will think in the design choices and apply the coherent methods and instruments of a specific pedagogical model for a specific learning environment that he or she needs to organise. This way, the teacher can select from a spectrum of pedagogical models for teaching and learning the model that seems most appropriate for the specific learning environment, in which he or she will interact with the student group (Wildt 2004, pp. 205-209; Viebahn 2004, pp. 29-30).

Next to the selection of an appropriate pedagogical model, a *selection of the ICT tools* that are adequate for use in the pedagogical scenario has to take place. The ICT options, which are available for the teacher, are combined in a spectrum of electronic variables which range in their complexity from simple electronic documents – as for example the storage of pdf files on a website for download, to highly complex electronic learning environments – as for example the setup and use of a virtual classroom with complex applications for interaction and communication. In an ideal pedagogical design scenario, the university teacher would select the ICT options for his or her learning environment only after the pedagogical model for the specific teaching performance has been decided upon. It is likely that an economic science teacher, who needs to cope with a mass lecture in front of a thousand students, will have different pedagogical concepts and ICT options in mind in comparison to a philosophy teacher who plans a course with a small work group. In practice, the selection process of the academic teacher will probably take place on a more pragmatic basis, combining both the pedagogical model and the ICT options which are available within the university in a simultaneous way.

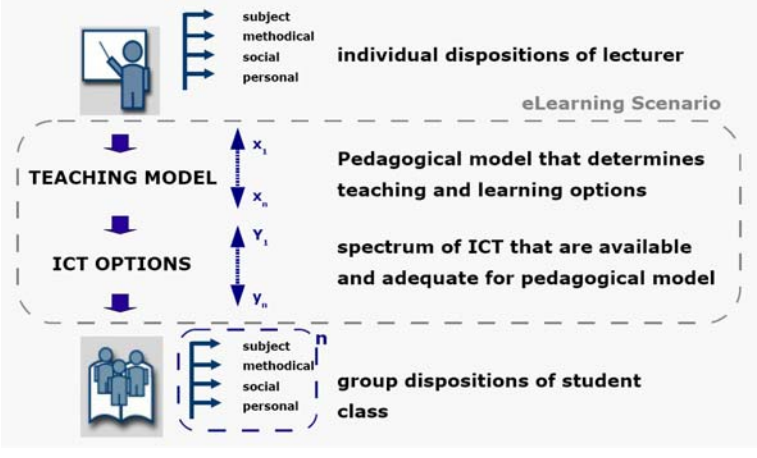
To sum up this argumentation string, we assume that the eContext in the concept of the university teacher's individual eCompetence is determined by two key influence factors, which are the pedagogical and the technological design of the learning environment. Both key influence factors can be illustrated in form of a *spectrum*, which arrays the choices teachers can make on pedagogical and technological design options. The pedagogical design options are represented in a spectrum of pedagogical models for the

learning environment; and the technological design options are represented in a spectrum of electronic variables for the learning environment.

When we combine these two spectra in a generic model for individual eCompetence, there is nonetheless one additional key component to be added, otherwise the model will not be consistent in itself: this is the *eCompetence of the students* that interact with the teacher or with each other in the specific teaching and learning scenario. Each student possesses a specific eCompetence on his or her own, which can be conceptualised in a similar way as we have inferred the eCompetence of the academic teacher. The main difference between teacher and students is not contained in the dispositional dimension, but in the performance dimension of the competence concept that is determined by the context. The primarily goal of the teacher is to teach, the primarily goal of the student to learn. One important aspect within this relation is the fact that the efficiency of a specific course setting is largely dependent on the degree, in which the competences of the teacher and the competences of the learner intertwine in teaching and learning processes (cf. Borges in this volume).

So the roles in the interaction between teacher and student are situated at opposite sites of the teaching and learning process, but nonetheless they need to complement each other. The personal eCompetence of individual students thus describes their ability in using ICT in their learning activities. And the combined individual eCompetences of students in a particular course sum up to the group dispositions of the student class to adequately use ICT in their learning (Schneckenberg & Wildt 2006).

Figure 3: Generic Concept of eCompetence



6. 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 and 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, cf. Barberà & Ahumada in this volume on the increasing relevance of ePortfolios in line with the competence-based learning evaluation). 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, Tenhula & Vaskuri 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 & 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 other'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 2001, p. 11).

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, Grote & Frieling 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.

7. Conclusions

The discussion of approaches to measure eCompetence of academic staff members has started with a *conceptual clarification* of the terms competence and 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.

On the basis of a literature review on competence research several key components for competence have been identified and shortly discussed. These key components have then been merged into a *concept of action competence* and the basic assumptions and subsequent implications for the key components have been presented in a table.

In a next step, we have applied this action competence model to the specific eContext as the ICT-enriched teaching and learning scenarios of academic teachers. 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 generic model for eCompetence.

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 eCompetences - one current example is the definition of a European eCompetence Framework for the ICT supply sector, which is organised by CEN – the European Committe of Standardisation, and the particular variables and performance conditions in real contexts (CEN 2006). The wider the definition of eCompetences 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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ALBERTO CATTANEO & ELENA BOLDRINI

A Quali-quantitative Research Pattern for the Surveying of a Competence Profile of the Teacher Using ICTs in a Blended Learning Project

Research and Training: ICTs in Vocational Training

SFIVET (Swiss Federal Institute for Vocational Education and Training) is a national university institute dealing primarily with the teachers' training operating in vocational education[1]. 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, both on the teachers' professional profile side – with attention to the vocational didactics – and on the apprentices' one.

At the beginning of 1998, Switzerland was wondering about the national state of the art for what concerned technology assimilation by – and impact on – the Swiss society. A task force was *ad hoc* created in order to formulate some proposals which could enable the integration of Information and Communication Technologies (ICT) in the educational field, in the economical one, and – more widely – in the whole society and national culture. The results of this research were collected in a report called "Swiss information society", on whose bases, on 18th February 1998 the Federal Council gave off a document – "Stratégie du Conseil fédéral suisse pour une société de l'information en Suisse" - whose primary objective was the realisation of a strategy to develop the ICT diffusion. For what especially concerns education, the strategy was based on the people qualification and alphabetisation about ICTs with the clear goal, on one hand, to offer to everybody the opportunity to use ICTs and, on the other side, to reorganize the whole educational system by following two different and principal ways. The first one is direct: i.e. innovate the infrastructure, the primary school, the vocational training,

[1] Until December, 31st 2006, SFIVET was named ISPFP (i.e. Swiss Pedagogical Institute for Vocational Training). From the beginning of 2007, ISPFP raises a more autonomous position towards the Federal Department of Economy, under whose authority it came under. SFIVET is EHB in German (stands for Eidgenössischen Hochschulinstituts für Berufsbildung), IFFP in French (Institut Fédéral des hautes études en Formation Professionnelle), and IUFFP in Italian (Istituto Universitario Federale per la Formazione Professionale).

professional specialization, the second one is more indirect, in the sense that it acts thanks to the research in educational field, teachers' training and scholastic reorganisation.

Just these were the premises on which the above mentioned project ICT.SIBP-ISPFP born. 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[2].

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 enabled 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. This focus on the teacher's side does not mean that the research pattern did not interest the impact of distance learning on the apprentices too; we gathered indeed some qualitative and quantitative data (interviews and log-files) about the students practices, but we did not systematize them in the form of an apprentice's competence profile in a distance learning environment: a model for the surveying of this kind of abilities could be found in Borges (in this volume).

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 on the concept of *competence*, which constitutes a competence profile (*référentiel de compétences*). Nowadays the interpretations of the concept of competence are several and various, creating a sort of conceptual nebula (cf. Schneckenberg, in this volume), which is not so useful to conduct a research pattern. This polysemy, anyway, forced us [1.] to clarify the 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 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 the actor involved in it (Le Boterf, 2000).

[2] 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 cf. Cattaneo, Comi, Merlini, Sanz & Arn (2005), Cattaneo (2005), and Cattaneo & Boldrini (2005).

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).

Starting from the idea that the competence is *in-situ* built[3], we organized 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 in 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 analyse 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 itself 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 of 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 the researcher to manage a great amount of data, helping him to codify it, to systematize the originated categories, and to visualze 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

[3] This definition – and the research pattern based on it – is not so far from what Nieveen & Dudink (in this voulume) used for the description of the competences required to the tutors and support staff to guide students in a Virtual Learning Environment in order to support an effective competence-based education in the vocational system. As presented in Boldrini & Ghisla (2006), there's a huge part of the literature concerning the competence theme, understanding it in a [1.] *situated* way and [2.] *holistic* way; in this perspective the approaches of the so called *action competences* used by Ehlers (in this volume) - «action and competence are therefore inseparable connected: competence leads to action and action results in comeptence» (ivi, pg.3) and Schneckenberg (in this volume) deriving from Weinert's reflections (Weinert, 2001) is similar to our theoretical foundation too.

[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.

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 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 artificial 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 caused by 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 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"[6], 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".

[6] This expression stands for all the didactical aspects specifically concerned with e-Learning.

- "Collaboration" has a more organisational value, as it concerns the attitude to team-working, to the division of tasks, to the organisation 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.

Table 1: Absolute and relative distribution of the occurrences for "general competences" and their "principal declinations"

General competences	Principal declinations	(and %)	Nr. occurrences
Didactical aspects	Accompaniment	(13.13%)	122
	e-L: didactics	(36.06%)	335
	Motivation	(2.15%)	20
	Problem-solving	(2.58%)	24
Personal characteristics	Flexibility	(6.03%)	56
	Meta-reflection	(6.89%)	64
	Person	(4.41%)	41
Psychology	Psychology	(10.98%)	102
Collaboration	Collaboration	(10.55%)	98
e-L: technique	e-L: technique	(7.21%)	67
Total		*(100%)*	*929*

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.[7] of our *corpus* are 7304, all selected for the analysis, which originated as output the following dendrogram[8].

[7] U.c.e. stands 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).

[8] 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.

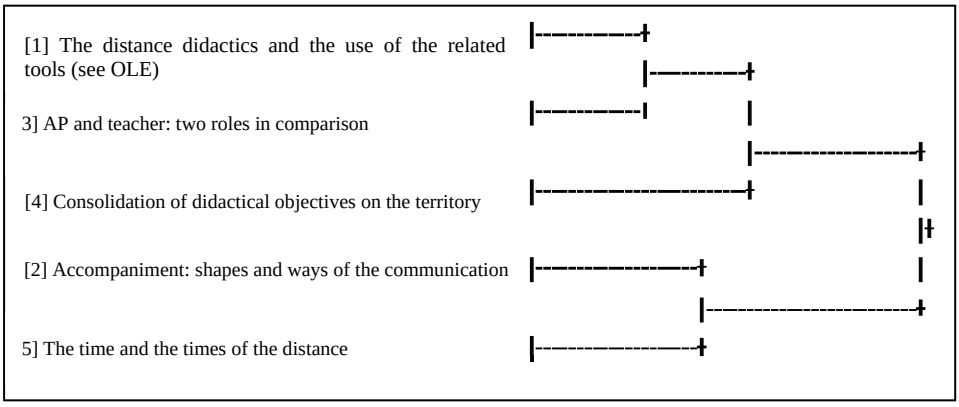

Figure 1: The five classes emerging from ALCESTE analysis represented in the dendrogram

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 Online Learning Environments – OLE).* 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 some themes concerning 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 theme 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[9] 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 potentiality of usage in the didactics. He/She can identify which instrument is suitable to 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 implicate 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 the traditional presence didactics to the distance situation, 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, of the individualisation *parcours*, 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 their learning path. Doing this, the teacher

[9] It is possible for each competence area to have, in the protocol at our disposal, a very accurate and precise description of the knowledges, the know-hows 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.

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 realisation 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 critical 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 characterized 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 competence, creating and maintaining a positive atmosphere, organising 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 significance.

Some peculiar points emerging from the *référentiel* (competence profile) 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* (research attitude) 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 a 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 some challenges, the same objectives, and collaborates as a real *équipe* (team), 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 and Perspectives 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 a set of competences empirically pointed out, and which will be useful for the design of training paths 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.

The work done opens by the way at least three paths of reflection and perspectives of widening:

1. *On the methodological side*

   The research device could and would be improved both on the level of the software interaction and on the more wide field of the general approach.

   Concerning the use of software, we are questioning the chance to improve the interaction between Atlas.ti and Alceste, testing other ways of making them interact and not only using them "in parallel"; besides, we're considering the possibility to resort to other softwares (e.g. Taltac[10]) to improve the quality of the corpus.

   Regarding the general approach, we are trying to improve the data collection process through other techniques available for the theme (e.g. Berufsfeldanalyse, Handlungsfeldanalyse, Analyse des pratiques, Analyse du travail ,…)

[10] See www.taltac.it for details.

2. *On the theoretical side*

   Going on from the last point, we are working on the possibility to enlarge our scientific tool-bag and to make a comparison among different kinds of techniques concerning the analysis of professional practices (see above).

   This kind of work has to be seen in the larger attempt to verify the consistency of the model and of its basic assumption, and – if it's possible – to compare it with other models aiming at the same objective. In this sense the real potentialities of Activity Theory in order to enrich the value of the model itself should be investigated more.

   Another final implication could be about how to define an operational concept of competence.

3. *On a more operational side*

   Our institution is largely involved in the process of redefining all the professional profiles and *curricula* of vocational training (see for example the ORFO project[11]). In this sense we are going to transfer the results shown here and to capitalize them in other SFIVET projects.

   On the other side, SFIVET mission is primarily a training mission, so the other big question is how to translate in teacher's training actions the results obtained with the professional profile: the immediate sequel of this work should then concern some concrete proposals to improve teachers' competences about ICT didactics. Another consequent spin-off could also be the development of some experimental competence-evaluation tools, such as an ePortfolio built as an instrument used by the teachers for the meta-reflection and research about the achievement of their own competences during the training.

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ELLIS NIEVEEN & GERTRUDE DUDINK

"In der Beschränkung zeigt sich erst der Meister" Staff Competence Profiles in Commercial, Competence-based Distance Education

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 (CBE). 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 company are based on the competences for teachers in secondary education and Vocational Education and Training (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 cause 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 competence-based education (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.

Research Approach

Our primary approach in compiling the competence profiles has been literature research. A large part of this research was carried out in the context of a graduate project in a Master of Distance Education program (Dudink, 2006). A wide scope of literature has been included, ranging from international distance education literature to national policy papers on competence based education, and from conceptual treatises on competence issues to practical 'cookbooks' on designing competence based education.

Furthermore, elements of action research have been applied in the sense that we have included experiences of our practitioners in our attempt to translate theory into practice and have used an iterative and reflective approach to cover the interplay between theory and practice.

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. Ehlers (in this volume) and Schneckenberg (in this volume) refer to the same concept elsewhere in this volume; Cattaneo & and Boldrini (in this volume) refer to a very similar definition proposed by Le Boterf.

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 and leads to a 'disintegrative approach' (Biemans, Nieuwenhuis, Poell, Mulder & Wesselink., 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 Traineeship 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	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

workforce. Student autonomy will change from autonomy in choosing time, place and pace towards autonomy in choosing learning content.	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. 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 & Nickmans, 2005).	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 (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	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.

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.	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.

Cattaneo and Boldrini (in this volume) and Schneckenberg (in this volume) have chosen a different approach by compiling separate competence profiles for staff using ICTs in their teaching. The rationale for this difference may be the fact that their institutions are transitioning from face-to-face education to blended or distance education, whereas our institution is transitioning from traditional correspondence-based distance education to online distance education. The latter transition seems to be more gradual in that distance education approaches have already been applied.

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.

Implications for Practice and Research

From the practical perspective of our work environment, our main goals for the near future will be to validate the proposed competence profiles and to translate them into practical instruments that can be applied in the context of the company's personnel policies. Head tutors have already expressed their interest in these profiles and tools as a guideline for selecting and assessing their faculty. The profiles and the tools deduced from them will also be applied within quality assurance procedures serving the external accountability function – showing how staff competences and development are measured and recorded.

The application of ePortfolios towards this aim, as proposed by Schneckenberg (in this volume), should be further investigated.

An interesting issue to pursue would also be the question raised above as to whether it is more appropriate in certain situations to compile separate profiles for teaching staff using ICTs or to integrate required new skills (e.g. command of online tools), knowledge (e.g. new didactical approaches) and attitudes (e.g. belief in the affordances of ICTs for student learning) into generic profiles, particularly in the context of blurring boundaries between conventional and distance education (Mugridge, 2003/1992; Rumble, 2003/1994).

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. A summary table of these profiles can be found as an annex to this chapter. We hope they may inspire other DE institutions.

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Competences & Indicators Subject Tutor		
Remarks with respect to competences & indicators formulated for Subject 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.	Subject Tutor	Mainly by means of computer conferencing and email.
	Head Tutor	For the Head Tutor, this competence applies also with respect to the program's faculty (vakgroep).
	Mentor	The mentor focuses mainly on coaching the individual study process, for which he uses the virtual learning environment, email, and telephone.
	Traineeship Advisor	The Traineeship 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.
	Workshop teacher	No remarks
A.1.2. He provides a framework in which the students can shape their own learning process, and he assists them with that.	Subject Tutor	Proactive approach in the computer conferences, feedback aimed at stimulation rather than correction, subject-oriented and qualitative monitoring of the students' portfolios.
	Head Tutor	No remarks
	Mentor	No remarks
	Traineeship Advisor	n/a
	Workshop teacher	No remarks
A.1.3. He creates an atmosphere conducive to collaboration with and among students.	Subject Tutor	Stimulating and, where necessary, guiding discussions in the computer conferences (moderating), switching between providing direction or support, "community-building", facilitating peer support.
	Head Tutor	(see above)
	Mentor	He creates an atmosphere conducive to collaboration with the students. If relevant to a program, the mentor also supports the collaboration among students.
	Traineeship Advisor	n/a
	Workshop teacher	No remarks
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.	Subject Tutor	This includes the communication channels or tools that are used, such as SMS and MSN; as well as professional jargon.
	Head Tutor	No remarks
	Mentor	He is well informed about communication processes, manners and conventions in the students' social environment.
	Traineeship Advisor	The Traineeship Advisor also applies this competence in his contacts with the organizations providing work placement opportunities and with the work placement coaches within these organizations.
	Workshop teacher	No remarks

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.	Subject Tutor	In particular: dealing with the lack of visual clues; the development of online manners ("netiquette").
	Head Tutor	(see above)
	Mentor	In particular: the lack of visual clues and the development of online manners ("netiquette").
	Traineeship Advisor	n/a
	Workshop teacher	No remarks
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 person**s.**		
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.	Subject Tutor	Stimulating reflection on these aspects.
	Head Tutor	No remarks
	Mentor	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.
	Traineeship Advisor	n/a
	Workshop teacher	No remarks
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.	Subject Tutor	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.
	Head Tutor	No remarks
	Mentor	E.g. the Study Plan; in this case, the Mentor focuses on individual students and acts in a proactive manner.
	Traineeship Advisor	n/a
	Workshop teacher	n/a
B.1.7. He is familiar with the corporate cultures in which the students will have to participate during or after their education.	Subject Tutor	No remarks
	Head Tutor	No remarks
	Mentor	n/a
	Traineeship Advisor	No remarks
	Workshop teacher	No remarks
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 learing at a distance, and knows how to signal these problems in prac-tice and how to deal with them.	Subject Tutor	No remarks
	Head Tutor	No remarks
	Mentor	Here as well, besides a reactive attitude, waiting for the student to raise a problem, a proactive approach is desirable.
	Traineeship Advisor	No remarks
	Workshop teacher	No remarks

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.	Subject Tutor	For NTI, this refers mainly to the development of a professional identity.
	Head Tutor	No remarks
	Mentor	n/a
	Traineeship Advisor	This relates in particular to the development of a professional identity.
	Workshop teacher	For NTI, this refers mainly to the development of a professional identity. The Workshop teacher gives an impulse to this process during workshop activities.
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.	Subject Tutor	… and monitors this based on the students' portfolios.
	Head Tutor	No remarks
	Mentor	n/a
	Traineeship Advisor	n/a
	Workshop teacher	The Workshop teacher 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.)	Subject Tutor	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.
	Head Tutor	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.
	Mentor	n/a
	Traineeship Advisor	n/a
	Workshop teacher	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 individual students or for the whole group.	Subject Tutor	Mainly in the computer conferencing area.
	Head Tutor	No remarks
	Mentor	n/a
	Traineeship Advisor	n/a
	Workshop teacher	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.1.5. He signals learning problems and impediments and works out, if necessary together with colleagues, a suitable plan or approach.	Subject Tutor	E.g. in consultation with the Mentor, other Subject Tutors or the Head Tutor.
	Head Tutor	No remarks
	Mentor	n/a
	Traineeship Advisor	n/a
	Workshop teacher	n/a
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 pro-fessional backgrounds.	Subject Tutor	No remarks
	Head Tutor	No remarks
	Mentor	n/a
	Traineeship Advisor	No remarks
	Workshop teacher	No remarks
C.1.7. He is aware of the relevance and importance of the learning content for the students' future profession and everyday lives.	Subject Tutor	This also applies to the need to find a balance between the importance of the learning content and the needs of the student.
	Head Tutor	No remarks
	Mentor	n/a
	Traineeship Advisor	No remarks
	Workshop teacher	No remarks
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.	Subject Tutor	This is all the more important in competence-based education.
	Head Tutor	No remarks
	Mentor	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.
	Traineeship Advisor	No remarks
	Workshop teacher	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. The Workshop teacher 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.	Subject Tutor	Particularly in the form of Recognition of Prior Learning, a procedure for which is currently under development.
	Head Tutor	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.

	Mentor	This knowledge can be obtained from e.g. the procedure for Recognition of Prior Learning (currently under development).
	Traineeship Advisor	No remarks
	Workshop teacher	No remarks
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).	Subject Tutor	The role of the Subject Tutor in this respect is mainly limited to facilitation.
	Head Tutor	No remarks
	Mentor	n/a
	Traineeship Advisor	n/a
	Workshop teacher	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.	Subject Tutor	Specifically in the field of Blended Learning and ICT-applications.
	Head Tutor	Staff Competence Profiles in Commercial, Competence-based Distance Education No remarks
	Mentor	n/a
	Traineeship Advisor	n/a
	Workshop teacher	No remarks
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.	Subject Tutor	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).
	Head Tutor	No remarks
	Mentor	No remarks
	Traineeship Advisor	No remarks
	Workshop teacher	All within the context of teaching the workshop.
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.	Subject Tutor	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.
	Head Tutor	No remarks
	Mentor	Is able to advise students on courses of Dutch as a Second Language etc.
	Traineeship Advisor	The Traineeship Advisor passes signals of (too) limited language command on to the student's mentor.
	Workshop teacher	The Workshop teacher 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.	Subject Tutor	E.g. frequency of being 'present' in the computer conference, turn around time for corrected homework or assignments; including the ability to communicate NTI's perspective to the student.
	Head Tutor	For the Head Tutor, this competence applies also with respect to the program's faculty (vakgroep).
	Mentor	No remarks
	Traineeship Advisor	No remarks
	Workshop teacher	No remarks
D.1.2. He provides forms of organization, teaching aids and educational materials that support the learning activities.	Subject Tutor	Mainly sources from the Internet, references in the computer conferencing area.
	Head Tutor	In co-operation with NTI, the Head Tutor is responsible for the forms of organization of the program.
	Mentor	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.
	Traineeship Advisor	n/a
	Workshop teacher	… 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.	Subject Tutor	Adequate also in the sense of accountability for working hours claimed.
	Head Tutor	For the Head Tutor, this competence applies also with respect to the program's faculty (vakgroep) and with respect to NTI.
	Mentor	No remarks
	Traineeship Advisor	E.g. when answering questions from students through computer conferencing or by email.
	Workshop teacher	The Workshop teacher 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 management that are relevant for this type of education.	Subject Tutor	Online communities; collaborative learning in smaller groups.
	Head Tutor	No remarks
	Mentor	n/a
	Traineeship Advisor	n/a
	Workshop teacher	No remarks
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.	Subject Tutor	This also requires IT-skills in order to work with the virtual learning environment.
	Head Tutor	No remarks
	Mentor	In particular the Mentor possesses skills in working with the virtual learning environment and the digital portfolio as a part of that environment.
	Traineeship Advisor	No remarks
	Workshop teacher	No remarks

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.	Subject Tutor	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.
	Head Tutor	… 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.
	Mentor	Is also able to voice the student needs within the organization, in particular to the Unit manager Head tutor Program co-ordinator Quality Assurance dept.
	Traineeship Advisor	No remarks
	Workshop teacher	No remarks
E.1.2. He makes a constructive contribution to different meetings and other forms of collaboration within NTI.	Subject Tutor	E.g. within the curriculum committee or at tutor workshops.
	Head Tutor	E.g. exam committee, curriculum committee.
	Mentor	No remarks
	Traineeship Advisor	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 Traineeship Advisor is also able to communicate the needs of the students within the organization.
	Workshop teacher	No remarks
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.	Subject Tutor	No remarks
	Head Tutor	Mainly applicable to Head Tutor
	Mentor	No remarks
	Traineeship Advisor	No remarks
	Workshop teacher	No remarks
E.1.4. He collaborates with Subject and Head Tutors and with NTI-staff involved on the development and improvement of the NTI.	Subject Tutor	No remarks
	Head Tutor	No remarks
	Mentor	No remarks
	Traineeship Advisor	n/a
	Workshop teacher	n/a

E.1.5. At a practical level, he is familiar with methods of collaboration and giving and receiving feedback.	Subject Tutor	No remarks
	Head Tutor	Mainly applicable to Head Tutor
	Mentor	No remarks
	Traineeship Advisor	No remarks
	Workshop teacher	No remarks
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.	Subject Tutor	In practice, this means entering student grades in 'Docentennet'; in the medium term also in the Portfolio of the new virtual learning environment.
	Head Tutor	No remarks
	Mentor	No remarks
	Traineeship Advisor	Not only does the Traineeship Advisor 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.
	Workshop teacher	No remarks
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.	Subject Tutor	This also entails the structure of accountability.
	Head Tutor	In this respect, the Head Tutor also functions as the link between other (regular) institutions and NTI.
	Mentor	No remarks
	Traineeship Advisor	This also entails the structure of accountability.
	Workshop teacher	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.	Subject Tutor	No remarks
	Head Tutor	No remarks
	Mentor	No remarks
	Traineeship Advisor	No remarks
	Workshop teacher	The Workshop teacher 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 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.1.1. He gives information about students to relevant interested parties in a professional manner, and makes use of the information he receives from them.	Subject Tutor	No remarks
	Head Tutor	No remarks
	Mentor	No remarks
	Traineeship Advisor	More precisely: 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.
	Workshop teacher	No remarks

F.1.3. He makes constructive contributions to different forms of consultations with people and institutions outside of NTI.	Subject Tutor	No remarks
	Head Tutor	E.g. work field committee, sectoral organization. The Head Tutor promotes interaction and synergy between the work field and NTI.
	Mentor	No remarks
	Traineeship Advisor	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.
	Workshop teacher	No remarks
F.1.6. He is familiar with the professional infrastructure which NTI is part of.	Subject Tutor	This refers mainly to the framework of regulations that apply to education, e.g. in the form of accreditation procedures or inspections.
	Head Tutor	More precisely: 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.
	Mentor	No remarks
	Traineeship Advisor	More precisely: 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 Netherlands) require such information; it is given solely at the request of NTI.
	Workshop teacher	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 Tutor.	Subject Tutor	No remarks
	Head Tutor	No remarks
	Mentor	n/a
	Traineeship Advisor	…he knows how to deal with these as a Traineeship Advisor.
	Workshop teacher	…he knows how to deal with these as a Workshop Teacher.
F.1.8. He is acquainted with the regulations and collaboration procedures between NTI and the companies and institutions it collaborates with.	Subject Tutor	Based on input received from the Head Tutor and NTI.
	Head Tutor	The Head Tutor is responsible for communicating these to faculty.
	Mentor	In this case, the mentor functions as the central contact for the student.
	Traineeship Advisor	No remarks
	Workshop teacher	n/a

F.1.9. He knows how to adequately gear the students' learning and tutoring to one another within and outside of the school.	Subject Tutor	The role of the Subject Tutor in this respect is largely limited to facilitating and stimulating the integration of practical experience of the students with the theory.
	Head Tutor	The Head Tutor takes care that both are included in the outline of the curriculum.
	Mentor	n/a
	Traineeship Advisor	No remarks
	Workshop teacher	n/a
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.	Subject Tutor	Raises relevant training needs for his work at NTI.
	Head Tutor	The Head Tutor also endorses this responsibility with respect to the development of faculty.
	Mentor	No remarks
	Traineeship Advisor	Raises relevant training needs for his work at NTI.
	Workshop teacher	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.	Subject Tutor	The team in this case consists of those involved with the educational program in question: Unit manager Program co-ordinator Head tutor Subject tutors
	Head Tutor	The Head Tutor is also responsible for drawing up a faculty development plan.
	Mentor	Particularly by order of the Trainer-Mentor; this aspect is worked out in the job description.
	Traineeship Advisor	The team in this case consists of those involved with the educational program in question: Unit manager Program co-ordinator Head tutor Subject tutors
	Workshop teacher	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.	Subject Tutor	This includes the willingness to participate in information or training sessions organized by NTI.
	Head Tutor	The Head Tutor bears responsibility for communicating general feedback (e.g. from student satisfaction surveys) to his faculty.
	Mentor	No remarks
	Traineeship Advisor	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.
	Workshop teacher	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.	Subject Tutor	Has an open mind for new ideas and perspectives in the tutor profession.
	Head Tutor	The Head Tutor also includes such developments when developing or revising the curriculum.
	Mentor	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.
	Traineeship Advisor	No remarks
	Workshop teacher	No remarks
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.	Subject Tutor	… and is able to 'translate' these to NTI's concept of blended learning.
	Head Tutor	No remarks
	Mentor	n/a
	Traineeship Advisor	No remarks
	Workshop teacher	No remarks
G.1.6. He is informed about recent developments in the field of andragogy and teaching methodology relevant to his educational practice.	Subject Tutor	Willingness to learn new approaches to teaching and learning.
	Head Tutor	The Head Tutor also includes such developments when developing or revising the curriculum.
	Mentor	n/a
	Traineeship Advisor	n/a
	Workshop teacher	n/a
G.1.7. He has sufficient knowledge of behavioural psychology to understand and analyse his own behaviour and that of others.	Subject Tutor	No remarks
	Head Tutor	Also with regard to faculty.
	Mentor	No remarks
	Traineeship Advisor	No remarks
	Workshop teacher	No remarks

PART 2:
ENHANCING COMPETENCE DEVELOPMENT IN ONLINE DISTANCE EDUCATION AND E-LEARNING

FEDERICO BORGES

e-Competence of Online Students of the Humanities at UOC

Abstract

This research aimed at knowing to what extent students of the Humanities at UOC (Online University of Catalonia) showed evidence of e-Competences. A model of e-Competences was created, based on Daniel Birch's (2001), and a questionnaire was designed which reflected the items in the model. Students of two subjects of the Humanities, one taken in the first term, the other taken in the final stage of the degree, replied to the questionnaire. Responses were analyzed and so were respondents' mails posted to their virtual classrooms during the term. Results suggested that respondents were aware of the competences they put in practice in order to learn online. Results showed also that only part of those competences was manifested in the online classroom. Students in their first semester online showed a higher number of e-Competences, took part in classroom dynamics more actively and asked more frequently for help, whereas the more experienced online students showed a wider variety of e-Competences and more evidence of metacognition.

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

When learning takes place in an online environment, there is a set of competences required, and expected, other than specific competences required as part of a subject or course. This set of 'generic', 'general', or 'cross-curricular' competences needed in an online setting, or e-Competences, as a subclass of the concept of Competence (cf. Schneckenberg in this volume), could enable online learners to best achieve personal and curricular objectives while studying in an online setting.

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 think they have and which are brought into action when learning, being manifested as competences. 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.

This research on e-Competences was carried out between October 2005 and January 2006 as the final research project in the researcher's doctoral courses at UOC, Universitat Oberta de Catalunya, Spain, where all academic programs are taught and learned online, much in the collaborative mode (cf. Ehlers in this volume). This research originated from the researcher's interest in issues connected with the online learner, and also from being an online lecturer at UOC.

2. Research Question

Due to scarcity of research on the online learner, and also a shift in Higher Education in Spain towards a European Higher Education Area, where learning (and teaching) should be based on competences (Bologna, 1999), it was thought appropriate to get to know about UOC online students' competences when learning online.

Data disclosed in an internal report (DEME, 2005) showed which competences UOC graduates considered they had acquired and were being used after graduation. Those corresponded to Stephenson's capabilities as competences for an unfamiliar context and unfamiliar problems (cf. Stephenson & Yorke, 1998), i.e. competences for work and for managing life. The researcher was interested in e-Competences as those competences required for students' performance in the online setting at UOC (cf. Cleveland-Innes & Garrison in this volume). This research was therefore an attempt for the researcher to learn about e-Competences in action, with real online students and in a real online setting.

The initial question "Do UOC students show e-Competences when learning online?", taking into account the context and the scope of the research as a final exercise in the doctoral courses, became "Do UOC students in the Humanities degree show the use of e-Competences?", since it was necessary to restrict the study to a sample of the whole population of UOC students, over 32,000 students at the time of the research.

3. Research Methodology

3.1. Theoretical Model

In order to try to answer the research question, first a model of competences for successful online learners was developed, as seen in Annex 1, following Birch (2001). In this suggested model both skills and instances of e-Competences are shown. Then two instruments were devised in order to find instances of the e-Competences established in the model.

3.2. Instruments

Two instruments were devised in order to measure the existence of e-Competences as shown by students. One was a questionnaire and the second was a text analysis of the mails posted in the online classroom by respondents to the questionnaire, as it was thought that instances of e-Competences should be seen in students' mails in their online classroom. Data from the questionnaire would be analyzed statistically, thus being the quantitative component in the study, with the analysis of mails posted in the classroom as qualitative data. 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. 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 (cf. 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 skills and competences when learning online.

A Likert-type questionnaire was designed (Annex 2), with 22 items, plus an optional one for comments or observations, to which students had to assign a 1-to-5 value. The

values, as seen in Annex 2, were intended to provide similar separation between values, going from *Never, Total disagreement* (1) to *Always, Total disagreement* (5). The items were statements intended to elicit a response as to their coincidence or appropriateness with the student's personal traits, and they matched, one by one, the competences put forward in the model shown in Annex 1.

Text Analysis

The second instrument used, text analysis of the mails posted in the classroom by the students who responded to the questionnaire, was intended to find evidence of competences away from students' subjective answers to the questionnaire. This was done with Atlas-ti, a software tool for qualitative analysis (cf. Cattaneo & Boldrini in this volume). The corpus for text analysis consisted of mails that had been posted to their classrooms by respondents to the questionnaire between the beginning of the term on 14 September 2005 and 28 December 2005 in the case of one subject, *Prehistory and Ancient History* and between 14 September 2005 and 21 December 2005 for *Anthropology of Religions.*

Since this research was done as the researchers' last assignment in the doctoral courses at UOC, to be handed in after Christmas holidays, there was no opportunity to observe mails in the classroom until the end of the term. Together with this, actual final dates for observation were chosen because for the former subject 28 December was the deadline for the second test out of three in the course, and for the latter subject 21 December was the deadline of the last assignment in the course. It has to be noted that most teaching and learning had taken place already by the end of December.

3.3. Groups

Study groups were taken from the degree where the researcher carried out his daily work, the degree of Humanities. It was not intended that the study groups were representative of the student population in the degree, even less so of the complete population of UOC students. Instead, the main concern was to apply the designed research to two groups: one of inexperienced students and another of more experienced students, then contrast them for differences in the e-Competences shown.

Therefore, with the help of colleague lecturers in Humanities two groups of students were selected: one was made up of newly arrived students and the second group consisted of students with an experience of three or more semesters as online students at UOC. The group in their first term in the degree (A group) was spread in two online classrooms in the subject *Prehistory and Ancient History* (subject offered to novice students in their first term in the degree). The other group, again in two online classrooms, was taking *Anthropology of Religions* (subject taken usually in the last term or at the final stage of the degree). All students in this second group (B students) had two to eight terms of experience as online learners in their degree.

Therefore the scope of this research was not extrapolation to a larger population of students, but to observe, by seeing two pictures 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, Haywood & MacLeod (2003) 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.

3.4. Consent From Participants

The next stage was explaining to those involved, online teachers and online students, how the study would be carried out, and also to obtain their consent. Consent from lecturers, online teachers and students was considered as an important stage in the research, since research consisting of voluntary responses from students and observation of their mails in the classroom should be done with their consent and keeping their privacy. Kastman and Gurak (1999) were of help in devising the text about the research posted to teachers and students.

Firstly, permission was asked to lecturers in charge of the subjects involved. Once they had known about the research and accepted, they wrote a mail to the online teachers in charge of the daily moderation in each of the four classrooms, informing them about my proposed research and their acceptance, that they were advised to take part, and that the researcher would contact them shortly if they agreed to take part. As all four online teachers responded favourably, providing written consent in a mail to either the lecturer or to the researcher, they were sent the mail in Annex 3 with an outline of the proposed research, how the researcher would approach students and how data would be collected. After this, students were informed, and their consent asked, in an e-mail posted by the researcher in all four classrooms (Annex 4).

It is to be noted that while online teachers were asked to reply with an e-mail of acceptance (*explicit consent*), students were told not to reply to the researcher unless there was objection to one's mails being observed in the classroom (*implicit consent*). This difference in asking for consent was due to the fact that it was preferred to obtain written permission from each online teacher of the four groups involved, while only to get mails from specific students who denied consent, so that all those who granted consent did not have to write and send anything. As it happened, not one student denied consent.

As seen in the mail in Annex 4, students were informed about the research, were asked to respond to the questionnaire that would be posted afterwards, and were told to reply to the researcher if they objected to his or her mails being observed in the classroom by the researcher. They were also informed that responses to the questionnaire and results from mail observation would be kept anonymous.

3.5. Collection of Data

a. Questionnaire

The questionnaire was posted right after posting the mail to students. It was posted to each of the four classroom forums 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), and because 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. After those nine days no more

responses arrived. Values given by students to each of the items were transferred to a spreadsheet and then statistically analyzed, as seen in item 4: Results.

b. Text Analysis

All the mails posted in the classroom forum by respondents were copied, saved in text format, then opened up with Atlas-ti one by one. Each of these mails in text format was read and 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 mail from one respondent to the rest of the group:

> *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.

It is clear that in the same mail, even in one single paragraph as seen above, more than one e-competence occurrence could be spotted. Diagram 1 below shows the type of instance of evidence collected, in this case evidences in Catalan and Spanish found in mails by B respondents in relation to *Seeking feedback*:

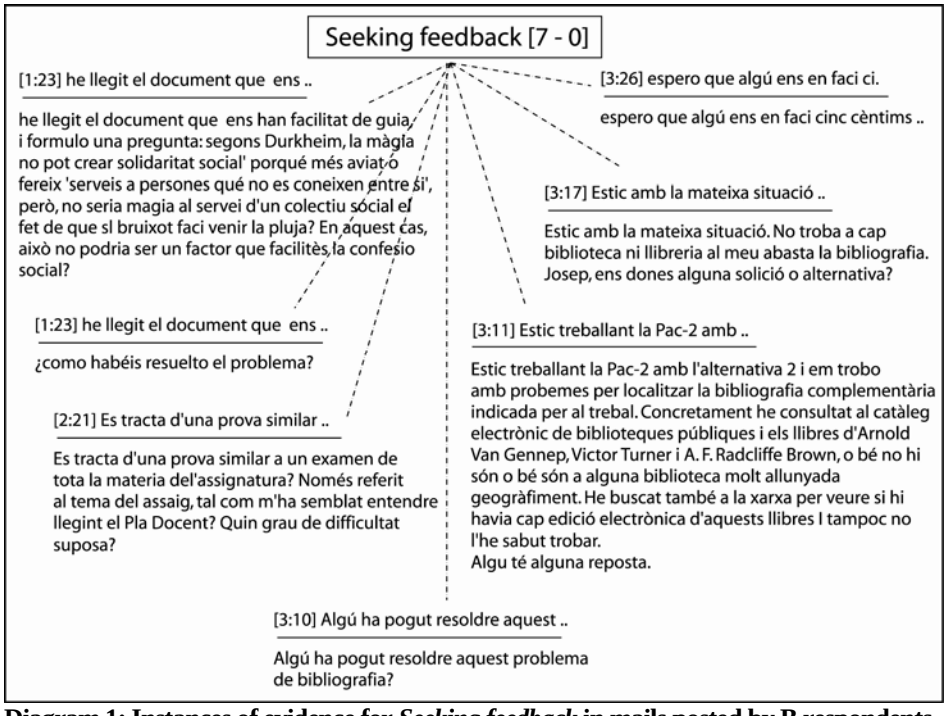


Diagram 1: Instances of evidence for *Seeking feedback* in mails posted by B respondents

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.

Table 2: Respondents to Questionnaire

Students	Responded	Enroled	% of enroled
A	26	168	15,48
B	14	89	15,73

There were more women respondents in both groups (Table 3), with proportionally more women responding in the more experienced students' group (B students).

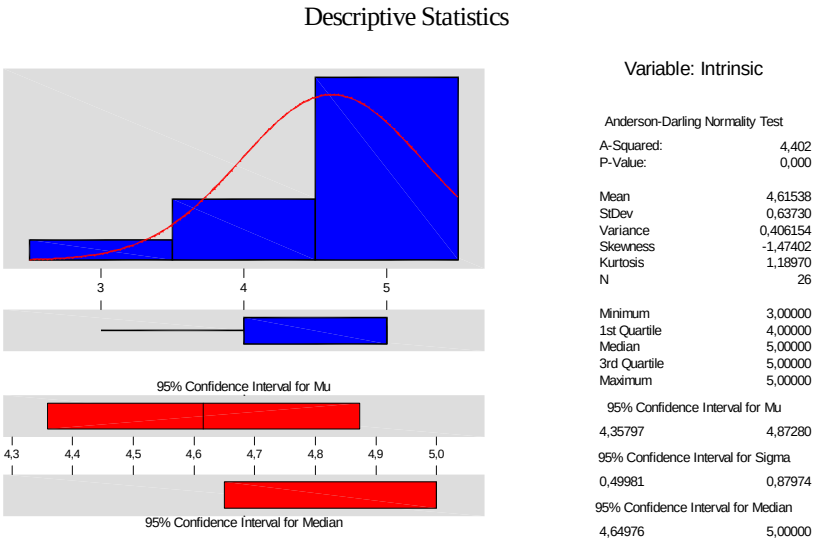
Table 3: Response by gender

Students	Women	% of respondents	Men	% of respondents
A	17	65,4	9	34,6
B	11	78,6	3	21,4

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 5 shows the mean, median and standard deviation values for all 22 items in the questionnaire.

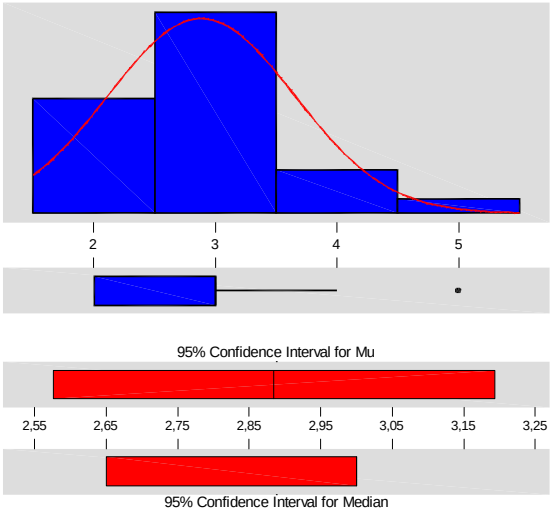
The trend for practically all values was consistent for high values of agreement. One example is *Intrinsic motivation* as seen in Diagram 2.

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. Diagram 3 *Engagement* shows the one element in the model suggested that was rated the lowest by A respondents.

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



Variable: Engagement

Anderson-Darling Normality Test

A-Squared:	2,176
P-Value:	0,000
Mean	2,88462
StDev	0,76561
Variance	0,586154
Skewness	0,783349
Kurtosis	0,981219
N	26
Minimum	2,00000
1st Quartile	2,00000
Median	3,00000
3rd Quartile	3,00000
Maximum	5,00000

95% Confidence Interval for Mu

2,57538	3,19385

95% Confidence Interval for Sigma

0,60043	1,05685

95% Confidence Interval for Median

2,64976	3,00000

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 (Table 4).

Table 4.: 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 deal 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 competences 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 4):

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

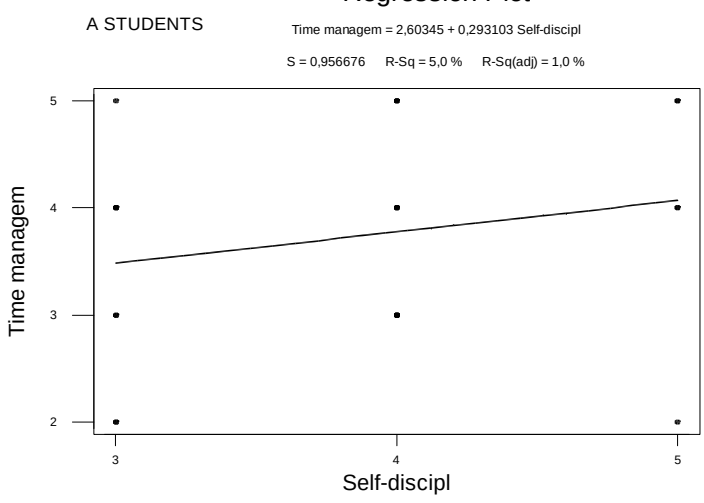


Diagram 5: Linear regression plot for *Goal setting* and *Work planning,* A students.

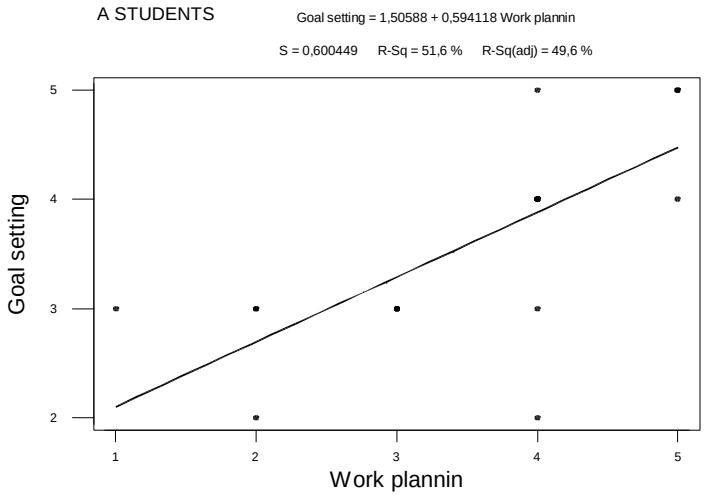


Diagram 5 shows the highest correlation coefficient found, the one between *Goal setting* and *Work planning*, which is 0,71.

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 5 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 5: 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 5), again with scarce correlation among items. In Annex 5 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. For their part, B respondents showed lower ratings for both *Goal setting* and *Work planning*.

4.2. Results from Text Analysis

Text analysis of the mails posted by respondents to the Questionnaire (26 A students and 14 B students) provided the results shown in Table 6 below. Most of the e-Competences in the Model were not observed in the mails posted by students: 16 e-Competences out of 22 for A respondents, 12 out of 22 for B respondents.

Instances of e-Competences observed are different for Self-direction competences and for Metacognitive competences for the two groups of students. However, as regards collaborative competences, both groups show evidence of almost the same e-Competences: *Engagement*, *Timeliness*, *Seeking feedback*, *Giving feedback*, although with a different frequency.

A graphic display of these occurrences, in Diagram 6 below, shows both groups, where A students (i.e. novice online students) manifest an overwhelming majority of e-Competences related to collaboration. In contrast, B students show a wider variety of e-Competences, again with most of the occurrences in the collaborative area, although with a lower frequency than A students.

Table 6. Occurrences observed for e-Competences in mails posted by respondents to the questionnaire

	A students	**B students**
Self-direction competences		
1. Skill gap identification.	0	0
2. Intrinsic motivation.	10	7
3. Goal setting.	0	1
4. Work planning.	0	1
5. Time management.	1	0
6. Task monitoring.	0	0
7. Self-discipline.	0	0
8. Self-awareness	0	0
9. Knowledge application.	0	0
Metacognitive competences		
10. Self-orientation for learning.	0	0
11. Self-orientation applied.	0	1
12. Self-monitoring.	0	3
13. Reflection.	0	0
Collaborative competences		
14. Radio speaking.	0	0
15. Active reading.	0	0
16. Writing for comprehension and personal style.	0	0
17. Engagement.	15	11
18. Timeliness.	24	17
19. Respect.	0	0
20. Tolerance.	0	1
21. Seeking feedback.	19	7
22. Giving feedback.	27	25

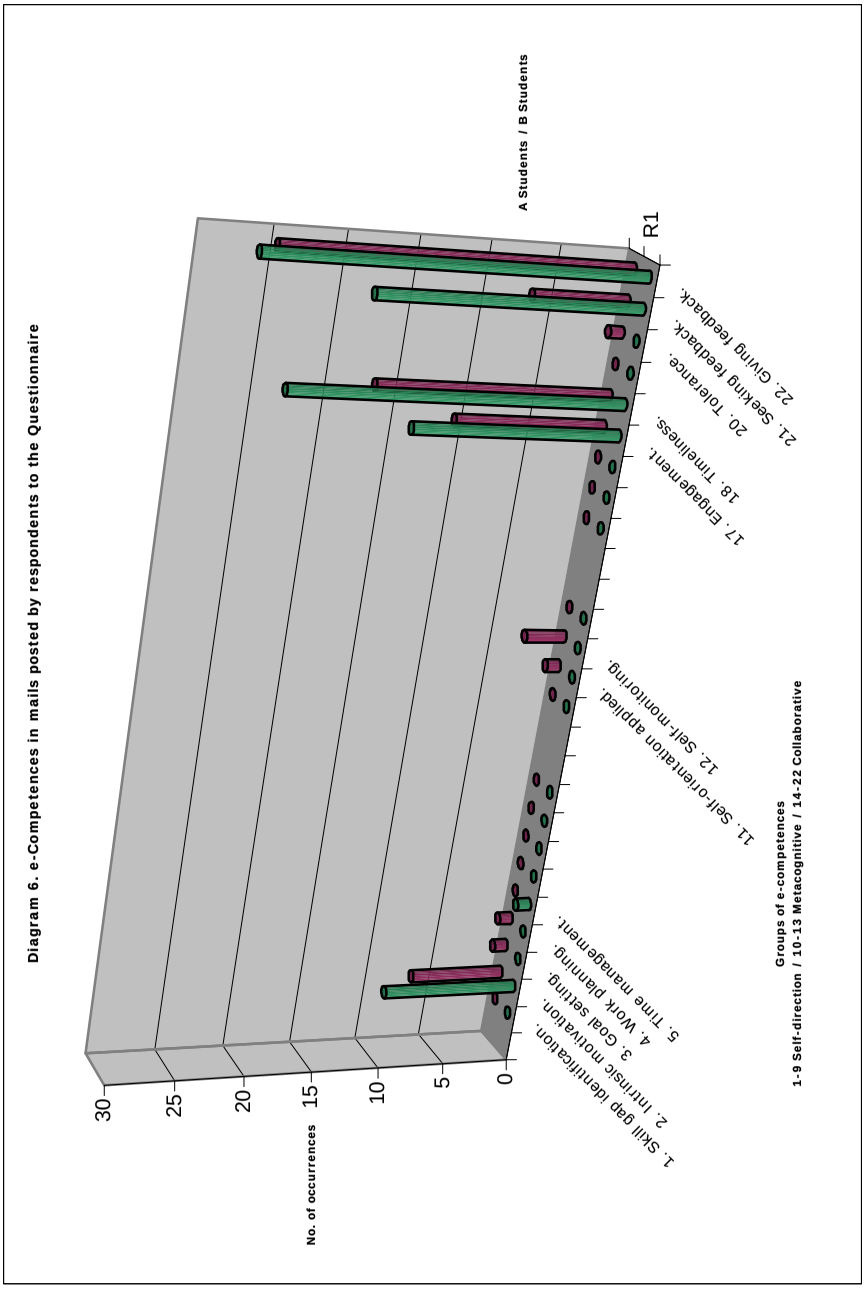


Diagram 6. e-Competences in mails posted by respondents to the Questionnaire
A Students / B Students
R1
No. of occurrences
30
25
20
15
10
5
0
1. Skill gap identification.
2. Intrinsic motivation.
3. Goal setting.
4. Work planning.
5. Time management.
11. Self-orientation applied.
12. Self-monitoring.
17. Engagement.
18. Timeliness.
20. Tolerance.
21. Seeking feedback.
22. Giving feedback.
Groups of e-competences
1-9 Self-direction / 10-13 Metacognitive / 14-22 Collaborative

5. Discussion

The response rate of over 15% in both groups of respondents was regarded as good enough to be significant to all four classrooms of the two Humanities subjects selected. Any rate below 10% would have been regarded as unsatisfactory. However, it is to be noted that although response was high enough to be significant to the groups selected, extrapolation was not an aim in this research: since the degree subjects selected cannot be regarded as a representative sample of the whole population of Humanities students at UOC, it would be risky to extrapolate them beyond the degree subjects.

It is clear to the researcher that results obtained for B students (students with 3 or more terms of experience as online learners in their 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 find themselves at a different stage in their degree and who may not have gone through the same circumstances and experiences as online students. In addition, there has been no action undertaken on B students prior to observation.

Both groups of respondents seem to have a high level of e-Competences (in their own opinion) as seen in high values in rating items from the questionnaire. A students in their first term online considered their engagement to be somewhat lower or less intense than what they thought it was expected from them: *Engagement* is salient among all other items as it is given the lowest values (see Annex 5). This could be an indication of honesty in A respondents, therefore of some degree of reliability of the answers to the questionnaire. Had responses not been honest, this e-competence would have been rated without deviation from the rest. For B students, *Engagement* is not rated as low as for A students but still is a little lower than the rest (see Annex 5). Likewise, B students also rated high all e-Competences except for two: *Goal setting* and *Work planning*.

Results from text analysis show that most of e-Competences were not present in the students' mails (6 out of 22 were observed for A students and 10 out of 22 for B students). From this 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 than others, results in this study suggest that it is possible that any e-competence, of any kind, can actually be seen manifested if students communicate it. For example, in A respondents' mails up to 10 instances of *Intrinsic motivation* were observed (see Table 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 could go undetected in the virtual classroom but they could still be applied by the learner.

While the group of novice online students provides 96 pieces of evidence, compared to 74 from the more experienced students, B respondents show a wider array of evidence (40% higher than that of A students). Collaboration is the group of e-Competences mostly observed in mails. A students asked for help more often (19) than B students (7), although evidence of *Giving feedback* was high in both groups alike (see Diagram 6).

Although there was a possibility that this research gathered data from "good students" only, 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, and B4, B8).

6. Conclusions

Responses to the questionnaire indicate that students from both groups seemed to be aware of what they were doing in order to learn in an online setting. Both groups too showed that e-Competences can be manifested, from observation of respondents' mails posted in their virtual classrooms.

Some differences stand out between the two groups. First, it looks as if novice students think that their engagement could be greater than what actually is. Secondly, A respondents showed a higher number of evidence of e-Competences than B students, whereas these used a higher variation of them. While A respondents took part more actively in the classroom than their more experienced counterparts, B respondents for their part manifested a wider variety of e-Competences. This could make us think that there could be a way to prove with data what common sense tells us, that experienced online students have logically a wider array of e-Competences than novice online students. In order for this to be extrapolated to online students in general, beyond common sense or personal experience, it should have to be researched with many more students and with a wider variety of subjects and degrees though.

Thirdly, A students asked more frequently for help than experienced students, and showed fewer instances of metacognitive e-Competences than B students.

It could appear that by using two tools, a questionnaire and text analysis of mails posted in the classroom, two pictures have been obtained instead of one. On the contrary, probably two sides of the same coin is what was obtained: one side would be the subjective consideration of which e-Competences students think they have, and to what extent, and the other side would be which e-Competences are actually manifested when learning online. Therefore, although research could be done on which e-Competences students consider they possess, and in a different study we could observe which e-Competences students show when learning online, in each of these instances we would be looking at one of the sides in a two-sided event. To see the coin as a whole we would have to know what students consider about their e-Competences, *and at the same time* which of these are actually observed or manifested. For example, no evidence of *Tolerance* was found in the mails from A respondents, while only one was found for B respondents. Does this mean that these students are not tolerant? Certainly not. It only shows that it

was not manifested, that most probably there were no circumstances during the time of observation that made it necessary for students to apply it or produce it.

Another reason to join in the research an "objective" tool such as text analysis to a rather "subjective" one as a questionnaire is that there could be a lot of difference between what students think they do or know (their *potential* of e-Competences) with which is actually produced or manifested during the term (*actual* e-Competences used in an online learning setting). The fact that *Engagement* was the lowest rated e-competence in the questionnaire responses, while in students' mails *Engagement* was observed 15 times, could call for not relying solely on subjective, reflective data from students when studying e-Competences, as students' perception could go one way and evidences another way, and this should have to be taken into account by the researcher.

This research shows the potential opened up for studying online learners' e-Competences. Further research could aim for instance at knowing whether collaborative e-Competences are either more likely to occur or easier to manifest than self-direction and metacognitive e-Competences. A good alternative research could be to do the same research with all the students in both subjects, not leaving participation to students' good will. This should inevitably have meant integrating the questionnaire into the curriculum of the two degree subjects chosen (possibly as a reflection element connected with one or more parts of the course contents), so that a more comprehensive picture were obtained: responses from all the students in those four classrooms and all their mails observed. The addition of external data such as grades or drop-out rate could have complemented (or complicated) results from responses and from mail observation, but these were not cross-checked with grades or drop-out rate because the research had to be finished before the end of the students' term.

Certainly extensive research is needed if results from studies on e-Competences were to be claimed significant for online learners in general. Since the numbers in this research are scarce to get firm conclusions, 26 A students and 14 B students, due to the scope an context of this study, a more comprehensive study should be made with much higher numbers and a variety of subjects from different degrees, thus treating statistically evidence shown by mails in the classroom and then compared to data from questionnaire responses. Results might be then applicable to a larger population of students; only results from research on e-Competences coming from larger and appropriate samples over a wide variation of degrees could be significant, and lead to the improvement of online teaching and to better institutional policies.

Finally, research could help develop a more comprehensive model of e-skills and e-Competences required for success in online learning. As to the model used for the research, 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.

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Annex 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.

Annex 2. Questionnaire on Online Learners' e-Competences

Please 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.

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

Thank you very much!!

Annex 3. Mail sent to each of the online teachers

Dear xxx,

Thank you very much for having accepted my proposal.

In my next mail I will attach the mail I would like to post in your classroom forum so that your students know more about the research and also what to do if they do not accept their mails to be used for my research.

Please do not hesitate to let me know any ideas or questions you might have.

This is the process to be followed now:

1. In my next two mails you will receive my suggested mail to students and the questionnaire.
2. Please let me know if you think they are fine, with any questions or comments you might have.
3. Please tell your students about me and my proposed research, and whatever you consider relevant.
4. After this I will post my mail to students and the questionnaire. There will be no further intervention on my part in your classroom.

I am sending you now my proposed mail to students and the questionnaire.

Thank you again. I'm looking forward to your reply.

Best regards,

Federico Borges Sáiz

Annex 4. Mail posted in each of the classroom forum before posting the questionnaire

Dear students,

I am Federico Borges Sáiz, a lecturer in the English Language coordination at UOC.

As you know from your teacher, I asked his permission to collect data from your classroom as part of my research on e-Competences when learning online in the Humanities degree. I am writing to you to ask for your collaboration too.

My next posting will be an individual questionnaire. I will appreciate if you reply to it with your answers, just answering 1, 2, 3, 4 or 5 to each of the questions. This questionnaire will only take 5 to 10 minutes of your time. Both your teacher and I think that this questionnaire can provide you with some reflection on your performance as an online student. In order that it does not interfere with your work, it is best to fill it in and send it as soon as you can.

I intend as well to collect and observe mails posted in the classroom forum since the beginning of the term. I will file them and I will analyze them to find evidence of online learning traits. Mails will be analyzed respecting senders' anonymity; senders will not be identified in any way, as research interest lies in the contents of mails, not in senders' identities. If any student does not want his or her mails to be incorporated to the research, just send a mail to me at *fborges@uoc.edu* and his or her mails will not be used for this research.

In due course I will send an account of results from the research, which will also be disseminated in an international scientific publication later on.

If you still have any doubt or question you can ask your teacher or write to me to *fborges@uoc.edu*

Thank you in advance for your participation.

Federico Borges Sáiz.

Annex 5.: Mean, median and standard deviation values for A respondents.

e-competence	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-competence	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

MARTHA CLEVELAND-INNES & RANDY GARRISON

Learner Independence and Interdependence in Online Communities of Inquiry: The Case for Teaching Presence[1]

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

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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; "computer supported collaborative learning (CSCL) is described and suggested as a way to support competence development" (Ehlers, in this volume). 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. Asynchronous 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 (Garrison, 2003). The role of the teacher was inherently diminished through the design process and the replacement of the teacher by the institution or a tutor.

"Research could aim … at knowing whether collaborative e-competences are either more likely to occur or easier to manifest than self-direction …." (Borges in this volume). 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.

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

Design

The goal of this research was to examine the expectations and experiences of novice online learners related to independence and interdependence in online learning. Data were drawn from two sources in a larger study on student adjustment to the role of online learner (Garrison, Cleveland-Innes & Fung, 2004). Qualitative responses from pre and post questionnaires regarding student online experiences and data from transcripts on online discussions were reanalyzed for evidence of independence and interdependence. In addition, interviews with instructors about his/her expectations of learners were analyzed for specific

evidence of the need for learner independence/interdependence. The current study is a secondary analysis of primary data from the original quasi-experimental design.

Sample

Two core courses taken early in an online graduate program were purposively selected to include the greatest number of novice online learners. All courses were delivered with a combination of print and electronic material for content support and online conferencing in support of interaction. Online conferencing was the central mechanism for the understanding of expectations in the new role of online learner; an opportunity for student engagement and group interaction. Students were not organized into cohorts nor do they necessarily participate in courses with the same students. This means that, for the most part, students in these courses were unknown to one another. Online conferencing occurred according to the design of the particular course in different frequencies and for differing lengths of time across courses. Two sections had weekly conferences, while four sections had five conferences across thirteen weeks. Conferences were instructor led and required in all sections. Required conference participation was used for assessment in some courses while it remained a voluntary activity in others.

Participants were enrolled in two graduate programs at Athabasca University. 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.

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 a 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

	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 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 play 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). At the heart of this are issues of self-direction. Learner independence is predicated upon self-monitoring (independence) and self-management (interdependency) of the educational experience. Achieving self-direction that comes with online learning represents a significant role adjustment. The challenge and goal is to help learners to monitor and manage independence and interdependence effectively with the ultimate goal to become more self-directed.

There is an important distinction to be made between desired independence on the part of the 'self' in terms of constructing meaning (self-monitoring), and required independence as set out by the contingencies of the communication medium and 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

Effective, meaningful online learning communities do not just emerge spontaneously (Wood, 2003). To design, create and facilitate functional educational online communities requires specialized teaching presence. Students must feel a part of a purposeful community of inquiry and learning. Educationally, they must be connected and focused on meaningful discourse and reflection. The elements that comprise the essence of online communities of inquiry move in a dynamic relationship with each other and the community they support. Adjustments occur in the nature of teaching presence, social presence, and cognitive presence as learners create and adjust to individual roles within the group, and community builds.

Paulsen's discussion (in this volume)of cooperative and collaborative learning suggests both independence and interdependence may emerge in online environments. To do so, individual flexibility must be aligned with peer engagement and an affinity for the online community. Building an online community demands more in terms of teaching presence than being a "guide on the side" (MacKenzie, 1998, How does the teacher act? para. 1.). Teaching presence functions as the organizing element for both social and cognitive presence. The multitude of choices available to students and attention to content in a sea of available

information (Bonk, Olson, Wisher & Orvis, 2002) is sorted out through the development of teaching presence. While it will change in character and function, teaching presence remains in the center of the community as a continual point of reference, source of guidance and the key to role identity adjustment. It is by the facilitator's actions that learners are acknowledged, engaged, connected with one another, validated, and supported. It is the facilitator that acts as the tour guide in relation to the subject matter, highlighting and shaping learning experiences.

Based on this analysis and interpretation of detailed data from students and instructors, we can conclude that teaching presence holds a unique position 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 online 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 challenge is for the instructor to consider the appropriate balance of independence and interdependence through design, facilitation and direction responsibilities.

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.

Further Research

It is time in distance education to work toward sound models that represent effective online education (Garrison, 2001; Wilson, 2001**)**. The Advisory Committee for Online Learning states that there is a compelling case for a serious commitment to more in-depth research, theoretical and applied, to take advantage of online learning media (Advisory Committee for Online Learning, 2001, p. 55). Scholars and practitioners in the field need to be guided by sound research in teaching and learning, particularly as faculty and students adjust to the online environment. For some, "the most useful and powerful studies ... are the ones dedicated to empirically validating best practices." (Grandzol & Grandzol, 2006, p, 5).

This research is meant to be a step in that direction. A new role for students in higher education is being created through the increasing use of online learning. Online students continue to comprise a growing percentage of the higher education student population, many indicators suggesting a significant growth curve, particularly for traditionally marginalized populations (Allen & Seaman, 2004; Roach, 2002). Allen and Seaman (2004)

report that 62.5 percent of post-secondary institutions offering traditional undergraduate courses offer some courses online. Garrett and Verbik (2004) reported that "an institution-wide strategy for on-line learning was increasingly common" (p. 5) on a global scale. More work is needed as we move forward; while "there is general consensus on the ubiquity of digital communications and the changing expectations of students, the complexity of learning situations means that few studies using traditional research design parameters have addressed effectiveness" (University of Alberta, 2005).

According to findings reported here, students demonstrated that it is "useful … to become members of virtual communities of students" (Peters, 2002, p. 35). The nature of these interactions and communities appear to modify but maintain the core value of distance education – learner independence. Learner interdependence is a requirement in this new role. More research is required to understand the role adjustment with regard to increasing independence and the need for self-direction. Concurrently, the supportive nature of interdependent and collaborative learning experience needs to be considered. At the same, a clearer understanding of what self-direction means in distance education is needed. Is self-directed online learning an informal option or should it be considered a formal core distance education activity and goal?

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. According to Schneckenberg (in this volume) "the design of innovative teaching scenarios is demanding new competences from the academia" (p. 18). Further research on instructor competencies in online innovations, while supporting learner independence and interdependence, is required.

Limitations of the Study

This study included only courses from a single, publicly funded distance education institution. Future research must expand to other types of institutions that may draw students more or less willing to be independent and interdependent learners. In addition, the role of teacher and learner are inexorably linked. The extend to which students are willing and able to increase independence and interdependence will be influenced by the balance of direct instruction, support and facilitation and design and organization provided by the teacher.

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.

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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 facilitatio**n*** (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 its 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	• 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. • 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. • 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. • 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. • I keep open a separate forum for students to interact with me one-on-one if they wish. That's **student driven**.

Facilitating Discourse	• . . . 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. 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	• 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. • 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. • 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. • 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. • 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	• 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	• 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. • 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 . . . • 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. • 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.
Design & Organization	• 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

MORTEN FLATE PAULSEN

COGs, CLIPs and Other Instruments to Support Cooperative Learning in Virtual Learning Environments

Abstract

Adult students often 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] (Paulsen, 1992 and 2003), which was based on the three traditional theoretical perspectives on distance education described by Keegan (1996, p. 56).

- theories of autonomy and independence (e.g. Moore 1988),
- theories of industrialization (e.g. Peters 1988), and
- theories of interaction and communication (e.g. Holmberg 1988).

The article illustrates the *Theory of Cooperative Freedom* 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. About 60% 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* (Paulsen & Rekkedal, in Paulsen 2003).

The article also refers to two reports (Paulsen 2005 and 2006) from online surveys about NKIs systems and plans regarding individual progress planning, supervision and cooperation. The first survey was answered by 364 NKI students from November 2004 to January 2005. The second survey was answered by 542 NKI students from October 2005 to January 2006.

[1]The first version of the theory was published in my monograph *Frome Bulletin Boards to Eelectronic Universities* (Paulsen 1992). It was updated in my book *Online Education and Learning Management Systems* (Paulsen 2003).

Individual, Cooperative and Collaborative Learning

Learning theories can be individual, collaborative or cooperative, and online education technology can support the theories. In a white paper from Epic Group plc on personalization and e-learning, Clark concludes that technology may support both individual learning and access to social networks:

> Personalisation thrives on technology and technology thrives on personalization. Mass market technology is clearly aimed at personalizing experiences for individuals, while at the same time, increasing their access to social networks…. (Clark 2004, p. 26)

In an article that focuses on cooperation and the use of technology in classrooms, Johnson and Johnson discuss the three types of learning. They (Johnson & Johnson 2004, p. 786) state that: "Cooperative learning is the instructional use of small groups so that students work together to maximize their own and each other's learning". Gokhale (1995, p. 23) presents a very similar definition of collaborative learning stating that it is: "An instruction method in which students work in groups toward a common academic goal". This confusion between cooperation and collaboration is pointed out by Johnson and Johnson:

> Although there is a clear definition of cooperative learning, there is considerable ambiguity about the meaning of collaborative learning. The two terms (cooperative learning and collaborative learning) are, therefore, usually used as interchangeable and synonymous. (Johnson & Johnson 2004, p. 788)

In the article *Collaborative versus cooperative learning*, Panitz (2003) starts to point out that there is a certain amount and overlap or inter-concept usage between the two and that it is an elusive goal to find a distinction between their definitions.

In this article, which focuses on virtual learning environments, the three terms are clearly distinguished and defined as follows:

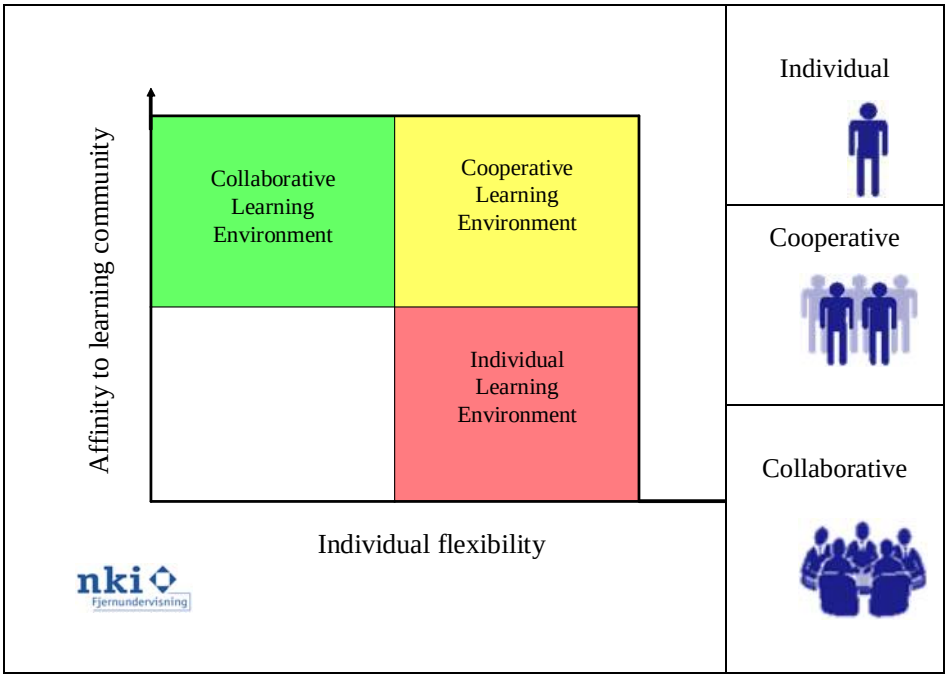
Individual learning provides superior individual flexibility, but very limited affinity to a learning community. It has a strong position in online education delivered by institutions with a tradition in distance education.

Collaborative learning requires participation in a learning community, but limits individual flexibility. One may say that collaborative learning requires that students sink or swim together. Collaborative learning is common in online education offered by traditional face-to-face institutions.

Cooperative learning 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 13.

Figure 1. Individual, cooperative and collaborative learning environments



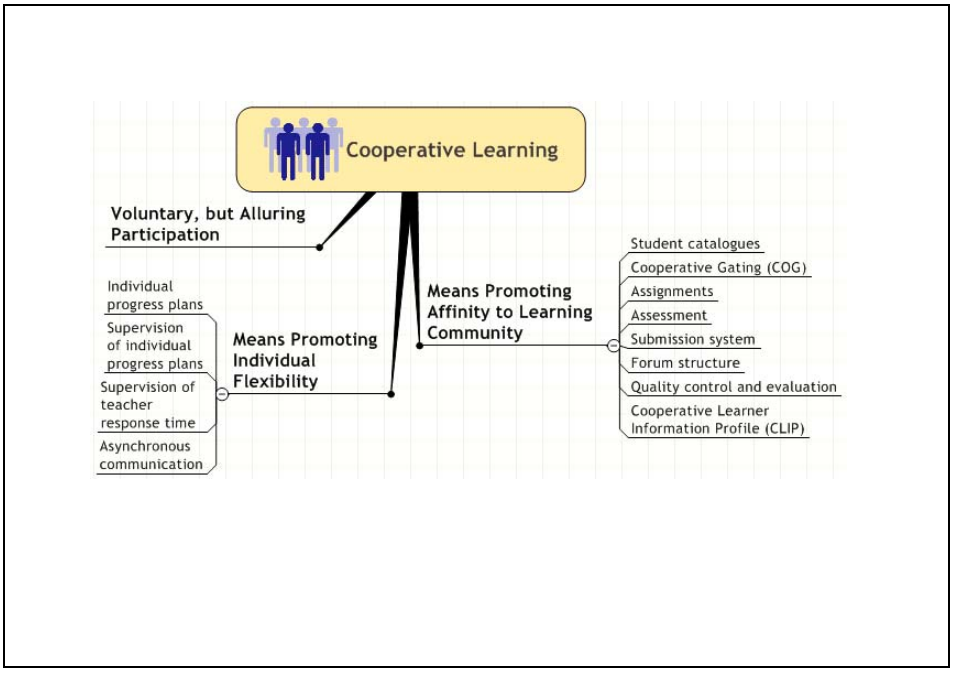
Cooperative learning environments could be well or poorly designed. A well-designed virtual cooperative learning environment is built on a number of means that support individual flexibility and other means that facilitate affinity to a learning community. As illustrated in Figure 14, The Theory of Cooperative Freedom is based on the following three pillars:

1. voluntary, but alluring participation,
2. means promoting individual flexibility,
3. means promoting affinity to learning community.

According to this, NKI Distance Education has developed the following philosophy on online learning: NKI Distance Education facilitates individual freedom within a learning community in which online students serve as mutual resources without being dependent on each other.

The remaining part of this article presents and discusses some of the most pivotal means that should be addressed in building a virtual cooperative learning environment.

Figure 2. Mindmap showing cooperative learning issues discussed in this paper



Voluntary, but Attractive Participation

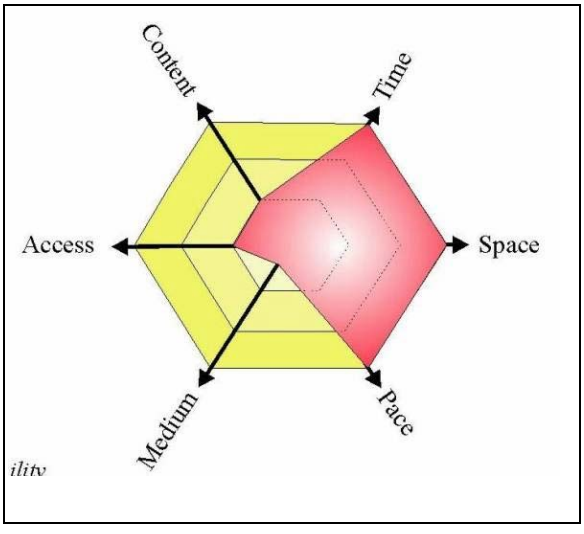
In virtual learning environments, a cornerstone in cooperative learning is that cooperation should be voluntary, but attractive, appealing and alluring. It should be offered as an attractive opportunity to those who seek cooperation. The challenge is therefore primarily to help those who are interested 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 *Personalisation and e-learning*, Clark (2004) discusses individual flexibility with regard to: learning style, motivation, portfolios, where to learn, what to learn, when to learn and how to learn. He also states (Clark 2004, p. 6) that: "Many simply want a predictable system that works rather than a profusion of choices. Theorists may want to complicate things but simplicity is often a virtue in practice".

In cooperative learning, individual flexibility and freedom is paramount. As illustrated in Figure 15, *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.

Figure 3. Facets of flexibility discussed in the Theory of Cooperative Freedom



However, flexibility is not easy to provide. Individual flexibility tends to add both costs, administrative difficulties and pedagogical challenges. In the book *Flexible Learning in a Digital World*, Collis and Moonen (2001, p. 16) present several factors that constrain learning flexibility. They state that flexibility could be unmanageable, not acceptable, not affordable, and not realistic.

There is also a tension between the urge for individual independence and the necessity to contribute in a collective learning community. It is therefore necessary to find a reasonable balance between individual flexibility and participation in the learning community. Figure 15 uses the read area to illustrate an institution that is relatively flexible in time, space, and pace.

Means that support flexibility in time and pace are discussed in the following.

Individual Progress Plans

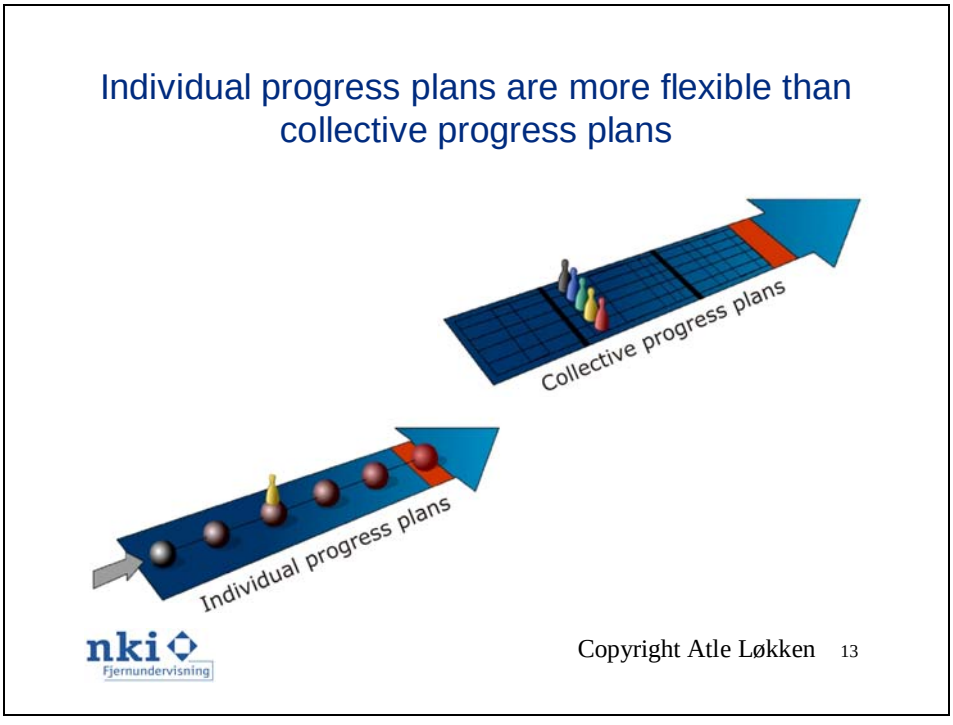
One of the most strategic decisions providers of online courses need to make is whether the students' progress plans should be individual or collective. This is a decisive dilemma and challenge for cooperative learning, because its focus on individual flexibility favors individual progress plans while collective progress plans make cooperation easier. The two models are illustrated in Figure 16.

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 4. Individual versus collective progress plans

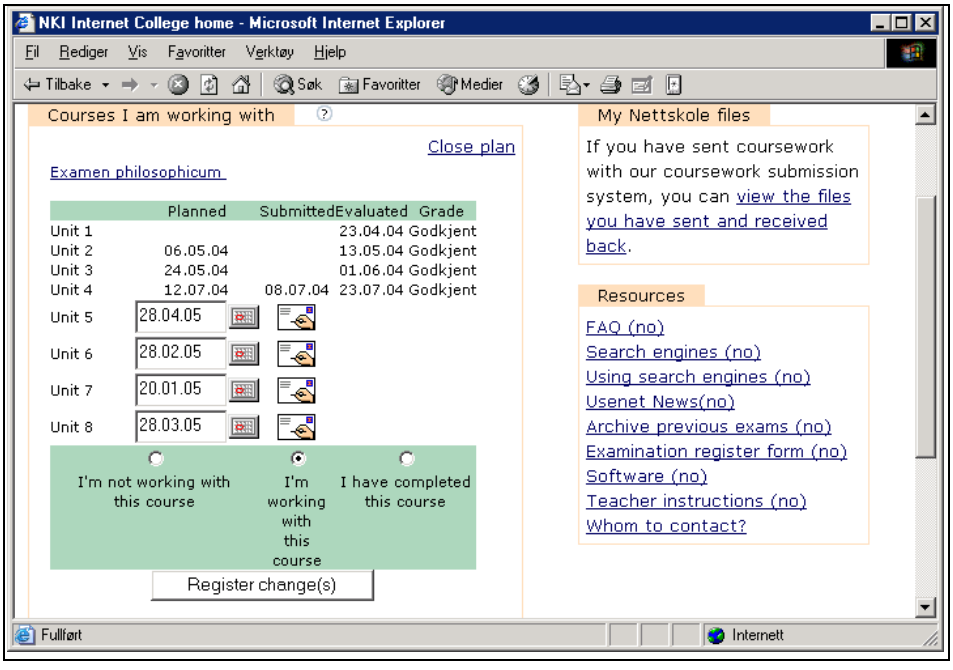


Tools for individual progress planning could support planning and tracking of student progress in learning environments with individual pacing. Such tools could provide various progress reports and opportunities to initiate automatic and manual reminders to procrastinating students. The tools could:

- 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 17, NKI has integrated tools for individual progress planning in its LMS system SESAM. All students are encouraged to register their individual progress plans, and they may change their plans whenever they like.

Figure 5. 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 18, the students' contact list would be less useful if it only showed planning information for some of the students.

Figure 6. NKI's contact list showing some progress plan information for fictitious students

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

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 February 2005, about 2200 students have registered their plans. In December 2005 the number was 2700, in March 2006 it was 3100 and in November 2006 it had grown to 3600. This is a large number of students, but it still constitutes less than 50% of the student population.

Two surveys answered by 154 (Paulsen 2005) and 336 NKI students (Paulsen 2006) revealed that the respondents were very positive to the planning system. In the first survey, 52% of the responses were very satisfied, 36 % satisfied, 11 % neutral, 1 % dissatisfied and 1 % had no opinion. In the second survey, 44 % of the responses were very satisfied, 36 % satisfied, 12 % neutral, 3 % dissatisfied and 4 % had no opinion. In the qualitative responses, the system was referred to as simple and motivating. Some stated that it made planning easier and resulted in improved progression. A typical comment was: It helps me keep up a steady study progression so that I finish the work before my exam.

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 view 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.

Since the fall of 2004, NKI has gradually, introduced, tested and evaluated 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 fictitious students are more than 20 days behind their schedules:			
Student	Course	Submission	Days behind schedule
Nordmann, Mari	Accounting	2	23
Nordmann, Kari	Accounting	4	25

NKI is also testing, improving and contemplating good procedures to remind and encourage students who are delayed. The following means have been introduced:

- 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.

In his master thesis, Fagerberg (2005) interviewed 15 online students who studied psychology at NKI about their evaluation of NKI's online tools. He (Fagerberg 2005, p. 4) concluded that systems and tools for planning and supervision were perceived as more important than tools for collaboration and social interaction.

A survey answered by 336 NKI students (Paulsen 2006) revealed that the respondents were positive to the supervision system. In the survey, 25 % of the responses were very satisfied, 41 % satisfied, 22 % neutral, 4 % dissatisfied, 1 % very dissatisfied and 7 % had no opinion.

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 obligatory synchronous communication should be avoided if possible.

Cooperative Forums

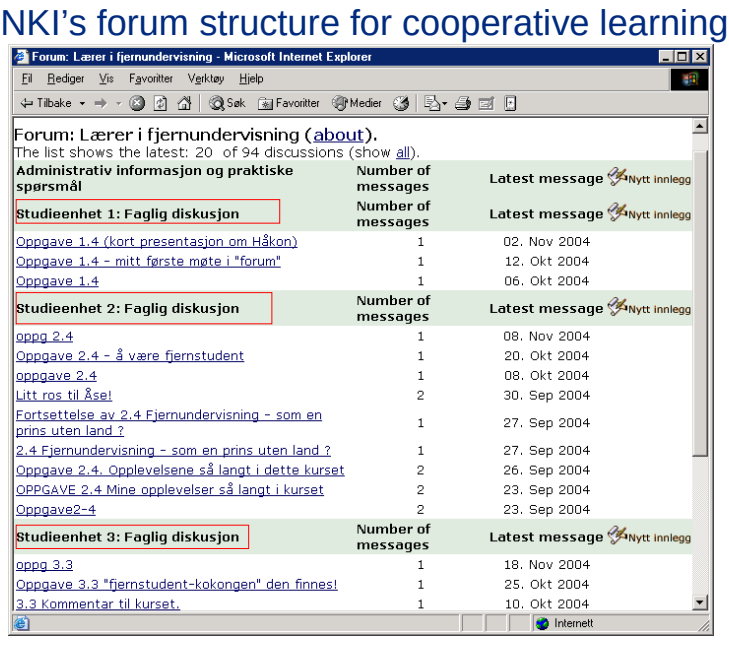
Discussion forums are excellent means to promote learning communities. It is however necessary to consider how access to a forum should be granted to establish an effective learning community. Should it be open or closed? Voluntary or obligatory? Large or small? There are no simple answers to these questions. 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 19. These are fixed sections that cannot be altered by students.

Figure 7. 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 8.

Figure 8. 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 among the 150 teachers, the overall average response time 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 overall average response time has been below three days, except from 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 can 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.

Learner Profiles

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].

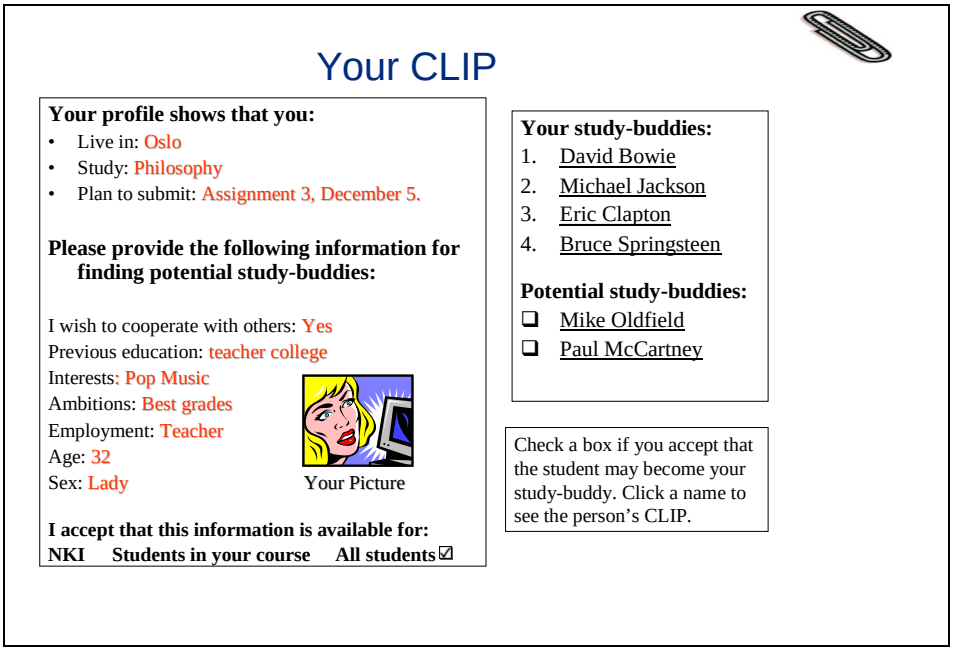
Using CLIP, LMS systems may help students find study-buddies or learning partners that are motivated and fitting for cooperation. CLIPs could herald a new and innovative pedagogy for cooperative learning. CLIP could provide efficient tools for establishing smaller and larger groups with the right mix 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 21. 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.

CLIPs may build on theories, ideas and features discussed in social capital and social software literature. Resnick (2002, p. 1) argues that socio technical capital is a new construct that provides a framework for generating and evaluating technology-mediated social relations. In online education one may think of this as learning capital. In a blog entry, Butterfield (2003) characterizes social software as tools that people use to interact with other people, employing information about identity, presence, relationships, conversations and groups.

[2] See http://www.imsglobal.org/accessibility/ for more information about LIP.

Figure 9. User interface illustrating a Cooperative Learner Information Profile



Social software for educational purposes seems to be scarce. However, online alumni network may have some features of interest. In Norway, the Norwegian School of Management recently introduced an online alumni service. In its alumni magazine, the school (BI 2005, p. 92) states that 9000 alumni students have made use of the service. All alumni students have online contact cards that they may update and supplement with information about their work and professional interest. All alumni students may search the complete database of information in order to find useful resources and contact people.

Since NKI has 12-14,000 students, the potential socio technical capital within the virtual learning environment is substantial if the institution could develop effective CLIP-tools.

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 point 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.

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.

Learning Partners

Based on the learning profile concept, NKI has introduced a service for Learning Partners (Slåtto & Paulsen 2006) was introduced in March 2006. The students that want Learning Partners are asked to:

1. register their personal presentations,
2. decide who may access it,
3. search for potential learning partners,
4. Invite somebody to become their learning partner.

In November 2006, 3100 students had registered a personal presentation and an increasing number includes a personal picture. At the same time, 2500 had indicated their privacy level and preference regarding having learning partners as indicated in the Table 1. About 450 of the students had found one or more learning partners.

Table 1. Student preferences regarding Learning Partners and privacy

	Want Learning Partners	Don't want Learning Partners	Sum	Percent
Closed	54	411	**465**	18,6 %
Limited	778	492	**1270**	50,7%
Open	572	196	**768**	30,7 %
Sum	**1404**	**1099**	**2503**	
Percent	56,1 %	43,9 %		

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

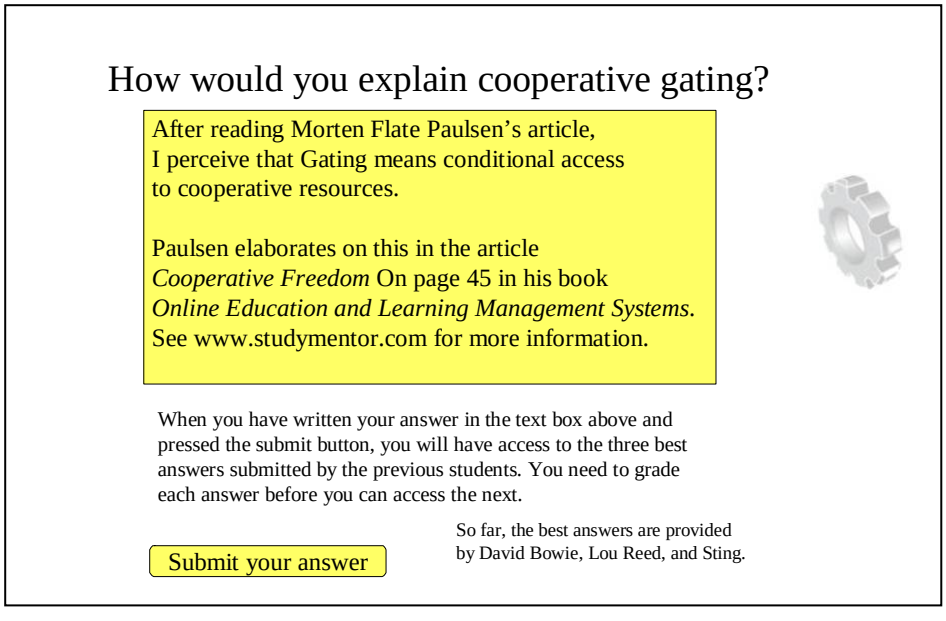
Online assessment could be grouped in four categories (Paulsen 2003, p. 68): self-assessment, computer assessment, tutor assessment and peer assessment. All categories could have a cooperative flavor if they are designed with cooperation in mind:

- *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)

Figure 10. Example of in-text question using cooperative gating



Wells (1992) described gating as a pacing technique that denies students access to information before they have completed all prerequisite assignments. The acronym COG – Cooperative Gating – has evolved as a result of writing this paper. It signals that students must complete a task 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.

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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PALITHA EDIRISINGHA, GILLY SALMON & JOHN FOTHERGILL

Profcasting – a Pilot Study and Guidelines for Integrating Podcasts in a Blended Learning Environment

Introduction

Podcasting is a new technology filtering into education from its original uses in entertainment, journalism and personal broadcasting. Students' learning supported by specially produced podcasts, which we call 'profcasts', differs from their learning through structured campus or other e-learning processes. This chapter describes a recent pilot study of integrating weekly profcasts in a blended learning environment at a UK University and suggests guidelines for profcasting in such a setting. Following a literature review on the use of audio technologies in education and, more recently mobile learning technologies, the chapter introduces the pilot study and its results. It discusses the findings in relation to two main questions: How does students' learning supported by podcasting differ from their learning through structured campus or e-learning processes? What are the issues in relation to switching from using MP3 players for entertainment to learning? The chapter proposes guidelines for integrating profcasts within a blended learning environment, for testing with larger numbers of staff, students and disciplines. Finally, it sketches further research on podcasts for learning being carried out under the IMPALA (Informal Mobile Podcasting And Learning Adaptation) project based at the University of Leicester.

The Background

The study arose from our interest in digital audio loaded onto students' own mobile devices, especially MP3 players such as iPods, which offer platforms for a variety of services with potential impact on learning and teaching in HE. 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).

Podcasting and MP3 players are new to education, yet already widely used by students for entertainment. The academic community is showing a strong interest in podcasting, with at least 20 experiments running in the UK 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'.

Research into students' experience of podcasting is in its early stages. Few studies exist of the impact on students' learning of the newest learning technologies (Littlejohn, 2004). Literature on podcasting is limited to descriptions of small projects and positive but informal accounts of user satisfaction in small trials. Issues in using podcasting in formal higher education 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.

The core content 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 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 & 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. The pedagogical potential of mobile learning technologies include: support of learning activities (Sharples, 2001), catering to specific needs and cognitive abilities of diverse learners (Kukulska-Hulme & Traxler, 2005; JISC, 2005), providing situated and authentic learning experiences (Sariola & Rionka, 2003) and offering a personalised learning experience (Plant, 2001). Taylor, Sharples, O'Malley, Vavoula and Waycott (2006), McAndrew, Taylor and Clow (forthcoming) 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. Sharples (2000) proposes that PDAs can provide the learner with flexibility and freedom to learn from any location as well as tools to engage in lifelong learning.

The Profcasting Pilot Study

Our pilot study was within a UK research project entitled Informal Mobile Podcasting And Learning Adaptation (IMPALA, www.impala.ac.uk). IMPALA will deliver a testable and transferable pedagogical model of podcasting for student learning in HE.

The pilot 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 podcasts were about 10-minutes long and the 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 through both qualitative and quantitative data collection methods. Qualitative methods included personal interviews with six students and the module tutor. Student interviews, lasted about an hour, were conducted using a semi-structured interview schedule developed to explore how student learning is supported by podcasts and students' preparedness for using personal entertainment devices for learning. Interviews with the tutor were informal and were conducted a number of times over the course of the semester by email, telephone and during personal conversations. The focus of these interviews was to obtain information related to the pedagogical rationale for each podcast and the integrating podcasts with e-tivities, online lectures, assignments and other learning resources. Formally conducted interviews were recorded on tape and transcribed verbatim for analysis to identify key themes and issues.

Quantitative data were collected through an end-of-semester evaluation questionnaire developed to identify students' access to technologies for listening to podcasts, pattern of listening, reasons for not listening, perceived pedagogical benefits of listening to podcasts and their recommendations for podcasts. The questionnaire was administered through the VLE and 24 students completed the questionnaire. The data were analysed using basic descriptive methods using Excel to derive percentages and numbers for each item on the questionnaire.

Additionally, threaded discussions on Blackboard and the personal reflections of the authors (of this chapter) as e-moderators of the module also contributed to the analysis. Questionnaires, interviews and the content on the threaded discussions were helpful in exploring student experience of learning from podcasts, their perceptions of how these contributed to learning and issues related to using their personal MP3 players to listen to academic material.

Results and Discussion

Access to Profcasts

The students indicated they owned or had access to at least one MP3 player or other suitable playback facility (see Table 1).

Table 1: Students' access to MP3 players (N=24)

None	2
An iPod	3
A mobile telephone	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

The varying degree of size, portability and ease with which MP3 files can be accessed can have a bearing on students' potential use of learning material in the form of MP3 files.

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 a 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 to 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 in the players' memory was the key issue and/or a reluctance to upgrade.

How Did Profcasts Help Student Learning?

The questionnaire asked students to select the most important aspect of learning through profcasts. Based on the number of responses, four items on the questionnaire (aspect of learning) ranked highest:

- podcasts provided a good introduction to online learning material,
- podcasts helped me to organise my weekly learning activities,
- podcasts helped me to stay focused on the course,
- podcasts provided a sense of informality.

Six items on the questionnaires (listed below) were ranked low by the sample of students on the pilot study module:

- to use time effectively,
- to understand more about e-tivities,
- by providing a summary of e-tivities,
- to stimulate my interest in the subject,
- motivational,
- helped with assessed work (assignments, exams).

Students' responses show that podcasts were helpful in supporting many organisational and affective aspects of learning. Students were carrying out most of their learning and studying tasks online, most of the time independently. Podcasts offering organisational and affective support were seen as particularly helpful for their learning and completion of the module.

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 had 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 were:

> … 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.

Students on the module supported by pilot profcasts were carrying out much of their learning activities individually and online; there are similarities between their context of learning and those of distance learners, highlighted by Clevelland-Innes and Garrison (in this volume). Podcasts have the potential to improve the cognitive and teaching presence to support learning, while improving students organisational and online learning skills. Podcasts can be a useful addition to the range of distance and e-learning tools identified by Aczel et al. (in this volume).

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 lectures 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 …. First 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.

A 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 project.

Moving From Entertainment to Learning

One student felt that although he was willing to use his MP3 player for learning as well as entertainment, he needed to be static 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 they 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.

Data from student interviews reveal a variety of issues related to switching from entertainment to learning. To summarise, some students need to be static for listening to academic material, despite using a mobile device such as an iPod, to be able to pay attention to the content. Concentration is required for listening to academic material

compared with music aimed at entertainment. Further study is needed to understand how podcasts can be designed and developed for wider use by students.

Guidelines for Profcasting

Our pilot 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; podcasts must therefore be integrated with other learning activities so that students recognise the relevance and the value of listening to podcasts.

Based on this pilot study we propose the following guidelines for developing profcasts:

1. integrate podcasts into the course with strong links to other learning activities and resources, especially if they encourage active learning and/or collaboration with others;
2. record them afresh each week and include up to date news and feedback;
3. make them partly reusable and recyclable by some sections not being dependent on news or feedback from that week;
4. make sure that the file sizes are small enough so that they are easily downloadable onto any mobile device offering MP3 playback as well as tethered computers;
5. follow a 'radio magazine' style rather than a lecture. Make sure that the podcast is not too long for listening.

We also propose a framework for developing profcasts (Table 2).

Table 2: A proposed profcast development framework

1	2	3	4	5
Introduction 1 minute	**News** 2-3 minutes	**Feedback** 2-3 minutes	**Feedforward** 2-3 minutes	**Fun finish** 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 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

We invite readers to experiment with this framework and report back on the IMPALA blog at http://www2.le.ac.uk/projects/impala.

Further Research

The findings reported in this chapter are part of the IMPALA research project funded for 2006-07 by the UK Higher Education Academy. The pilot study surfaced the following specific research questions for further investigation:

- How does students' learning supported by podcasting differ from their learning through structured campus or e-learning processes? For example, does podcasting assist with student motivation? Is their learning more flexible, easier or successful?
- What kinds of pedagogical applications can be developed for podcasting through MP3 players, for students' informal use within formal HE modules that enhance their learning?
- Can students switch from using MP3 players for entertainment to learning?
- What are the psychological, social and institutional barriers to and advantages of more informal learning using podcasting?

The IMPALA project examines how student learning can be supported by podcasts across a much wider range of students, disciplines and institutional contexts. The disciplinary contexts include Chemistry, Engineering, English Language, Human Geography, Physical Geography, Genetics, Media and Communication, Physics, Sociology, and Veterinary Sciences involving five UK universities. To date, a range of approaches to using podcasts within the IMPALA project has emerged:

- as a teaching and learning strategy in modules populated by large numbers (200+) of students;
- to provide audio-visual fieldwork guides: to explore geomorphological features, natural habitat, landscape;
- to provide audio-visual laboratory work guides: instruments, techniques, software, data analysis;
- to bring topical issues on the environment, sustainability and development, and informal content (local community voices and subject experts') into the formal curriculum;
- to encourage student collaboration and active learning through student-created 'digital story telling';
- as extensions to lectures: summaries, additional learning resources, further reading and research;
- to build confidence in subjects such as Mathematics;
- to support workshops in scientific subjects such as Chemistry;
- to develop students' study skills during the first year at university;
- to support online learning of campus-based students.

By evaluating student experience of using podcasts and staff experience of developing and implementing podcasts, in specific disciplinary and institutional contexts, IMPALA will deliver pedagogical models for integrating podcasts in higher education. The project website and the blog at http://www.impala.ac.uk provide useful resources and findings for researchers and practitioners interested in podcasting in higher education.

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PART 3:
BUILDING UP INSTITUTIONAL CAPACITIES FOR COMPETENCE DEVELOPMENT IN DISTANCE EDUCATION

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Identifying Innovation and Success Factors in Higher Education eLearning Strategies

Introduction

Recent claims have been made that European universities plan to "expand their use of e-learning" (BBC News, 2005) and that more students are signing up for it (OECD, 2005). However, as the time gets closer when virtually all Higher Education Institutions (HEIs) have some kind of Virtual Learning Environment (VLE) (e.g. Jenkins, Browne & Walker, 2005), it is not at all clear what kinds of institutional strategies are associated with such expansion, nor what the success factors might be. Research attempts have generally fallen into two categories: case studies and large-scale surveys.

There are many case studies of individual 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.

This two-year research study – InnoUniLearning – 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 were:

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/

Recent Research

The Observatory on Borderless Higher Education (OBHE) conducted a survey of online learning in Commonwealth universities in 2004, following on from one in 2002. This survey (OBHE, 2004) obtained 122 replies from 12 countries. Just 9% of the HEIs responding either lacked an institution-wide written online learning strategy or lacked plans to develop one (compared with 18% in the previous survey). Meanwhile, the OECD, in partnership with the OBHE, carried out a survey of eLearning in 19 HEIs in 13 countries from around the world, of which five countries were European.

The OECD/OBHE research noted that while student take-up of eLearning is growing, face-to-face teaching remains central in most campus-based HEIs, and cross-border enrolments for eLearning remain small-scale. Rather, eLearning was often seen not as distance learning but as ICT-enriched education, supplementing on-campus programmes and adding flexibility and content. IT and business/management were commonly cited as the subject areas making most use of eLearning.

Both the OECD and OBHE surveys found widespread VLE adoption, "with trends towards institution-wide implementation and consolidation in favour of the two leading commercial vendors, Blackboard and WebCT" (p. 157). Just over half the OECD HEIs were using a commercial VLE; the rest were using a combination of in-house and open source VLEs. While the HEIs tended to perceive eLearning as improving the quality of teaching, few offered positive systematic evidence; and resistance among students and academics and lack of clarity about the economics were seen as key issues.

Methodology: Phase 1

A key strength of the OECD/OBHE approach was combining quantitative and qualitative approaches: the OBHE survey and the OECD case studies. However, the two country populations were rather different. The InnoUniLearning research described here similarly combined approaches, but drew the case studies from the survey respondents: HEIs in five European countries. Another strength of this study is that rather than attempting to obtain a snapshot of eLearning across HEIs, InnoUniLearning focused on identifying innovation in eLearning strategies, and on the factors that were perceived as critical to the success of these strategies.

The InnoUniLearning 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 87 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 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 judgments were made on the basis of the evidence collected above about which HEIs seemed the most "noteworthy". These judgments 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 might have been preferable to have surveyed all the HEIs identified. Selection was undertaken in order to enable steps to maximise the response rate (see below). Sampling would have been a possible alternative approach, but the aim was to identify a range of 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, Armstrong, Olwer and Petch (2004), which aimed to identify critical points for evaluating eLearning; Huang, Zhang and Dong (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; the OECD/ OBHE (2004) studied mentioned earlier; 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* (asking particularly about the training and support available to them), *Learners* (particularly the training, support and online services available to them), *Teaching Methodology* (including the kinds of ICT used and assessment practices), and *Institution* (focusing on policy, quality assurance and management). 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): Administration of Survey

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. OBHE (2004) had a response rate of 24%. This difference might be

attributable to two main factors. Firstly the InnoUniLearning survey targeted HEIs with "innovative strategies", rather than aiming for representativeness, and hence the target population could be expected to be more interested in responding to a survey about eLearning. Secondly the sample size for InnoUniLearning was smaller (87, compared with 500 for OBHE) and each HEI was sent the survey by a contact in the same country as the HEI; hence it was easier to follow up non-responses.

Analysis of Responses from Phase 1

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 and accessibility. France appeared particularly keen on audio & video conferencing, while Portugal seemed more concerned with chat-rooms, DVDs, CD-ROMs & eBooks. However, one should be cautious in making country comparisons, not least because of the linguistic differences; and the different sample sizes.

It was also clear that the rankings of HEIs 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. Although some respondents were more enthusiastic than others in highlighting their institution's eLearning successes, it is likely that respondents would be eLearning advocates.

A further 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. It would not be unusual for the survey to be passed to central eLearning departments where they existed. So it is possible that the results over-represent HEIs in which eLearning is predominantly centralised (see Table 2).

% of HEIs	**All**	**AT**	**FR**	**HU**	**PT**	**UK**
Predominantly centralized	45	40	55	71	29	35
Devolved to lecturers or departments within an institution-wide initiative	44	30	45	0	57	60
Entirely devolved to faculties or departments	3	10	0	14	0	0
Initiated by individual teaching staff only	5	10	0	14	14	0

Table 2: How is eLearning managed in your institution? (select one option)

63% of HEIs have a written e-learning strategy. However the format and purposes of these strategies varied.

Respondents found it difficult to estimate the proportions of web supplemented, web dependent and fully online courses. However, estimates were obtained from 52 of the 64 HEIs that responded. Taking the means of these proportions resulted in Figure 11, suggesting that of these HEIs with the most "noteworthy" eLearning, 6% of courses

were fully online, 60% were web dependent, and 34% were web supplemented. Blended learning then seems to be the norm. The OECD study suggested that web dependent or higher online presence "accounted for well under 5% of total enrolments at most OECD/CERI institutions", so on this basis the InnoUniLearning study would appear to have succeeded in identifying HEIs leading in the field of eLearning. However, the OECD study issues a warning about the difficulty of tracking enrolments with accuracy. Moreover, these InnoUniLearning estimates are on the basis of respondents' estimated proportions of courses rather than enrolments, and eLearning advocates in central eLearning departments might overestimate proportions.

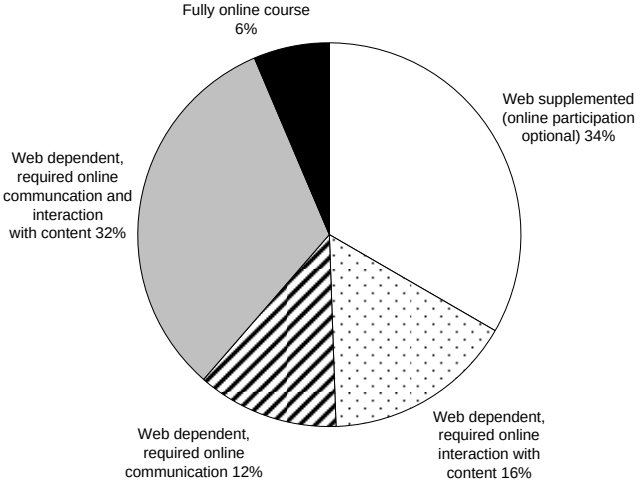

Figure 11: Mean proportions of different kinds of eLearning courses

Just under half of the HEIs responding to this item had no fully online courses. A third of the HEIs had less than 5% of its courses fully online. Two HEIs had a majority of their courses fully online.

The median number of students using eLearning for the HEIs that provided numbers was about 3000. About a third of the HEIs had fewer than 1000 students using eLearning. About a quarter had over 20,000 students using eLearning. The median number of staff was about 100. About a third of the HEIs had fewer than 50 staff using eLearning. About a quarter had over 500 staff using eLearning.

Range of eLearning Services

The survey also asked HEIs to indicate all the communications technologies that are used in teacher-to-learner and learner-to-learner interactions (Figure 12). Email was most popular, followed by asynchronous text-based discussion forums and face-to-face interactions. Telephone is used for teaching in almost all of the HEIs responding from Austria and Hungary, but only around half of the HEIs in Portugal and the UK, and 65% of the HEIs in France. Fax is still used for teaching, particularly in Hungary (57%), but hardly at all in France (5%). Chat rooms appear to be growing in popularity, particularly in Portugal. Most of the HEIs engaged in audio-conferencing and video-conferencing were from France, with varying amounts of activity in other countries.

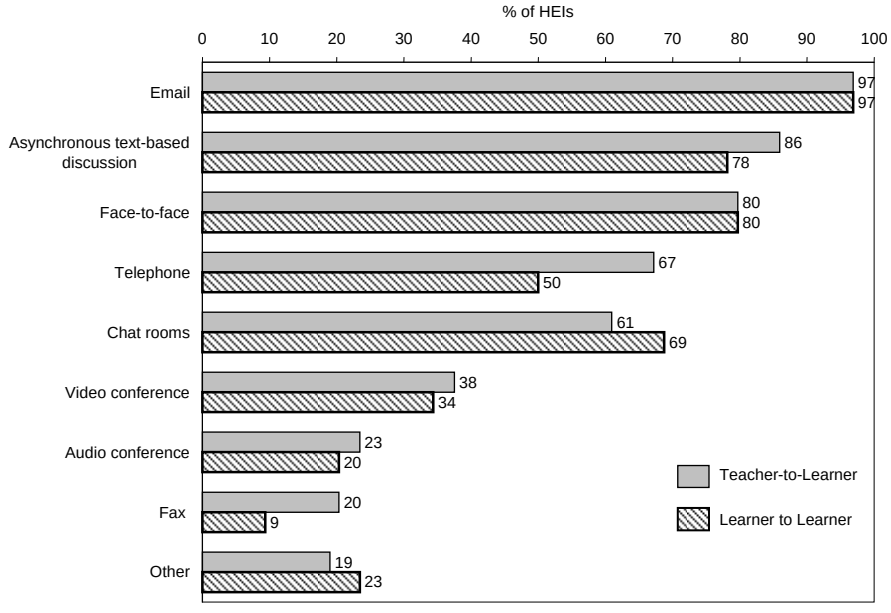

Figure 12: What communications technologies are used in Teacher-to-Learner and Learner-to-learner interactions?

Table 3 shows the existence of various online services at the respondent HEIs, with some variations between countries. So, for example, it is clear that the UK concentrates on online library and database services (100% of HEIs) rather than online enrolment (50%); whereas for HEIs in Austria, online enrolment is much more important than online assessment; and the HEIs in Portugal are strong in all online services.

% of HEIs	**All**	**AT**	**FR**	**HU**	**PT**	**UK**
library & database	88	80	90	57	86	100
news	78	60	90	57	100	75
student administration	78	80	70	100	86	75
assessment	75	30	80	71	100	85
enrolment	70	90	75	57	100	50
scheduling	58	40	90	71	86	20
other	36	20	50	57	14	30

Table 3: What online services exist at your institution?

Amongst other eLearning technologies, CD-ROMs were used by about half the HEIs altogether (Figure 13), while DVDs and eBooks were each used by just over a quarter. The use of mobile devices appears still small across Europe.

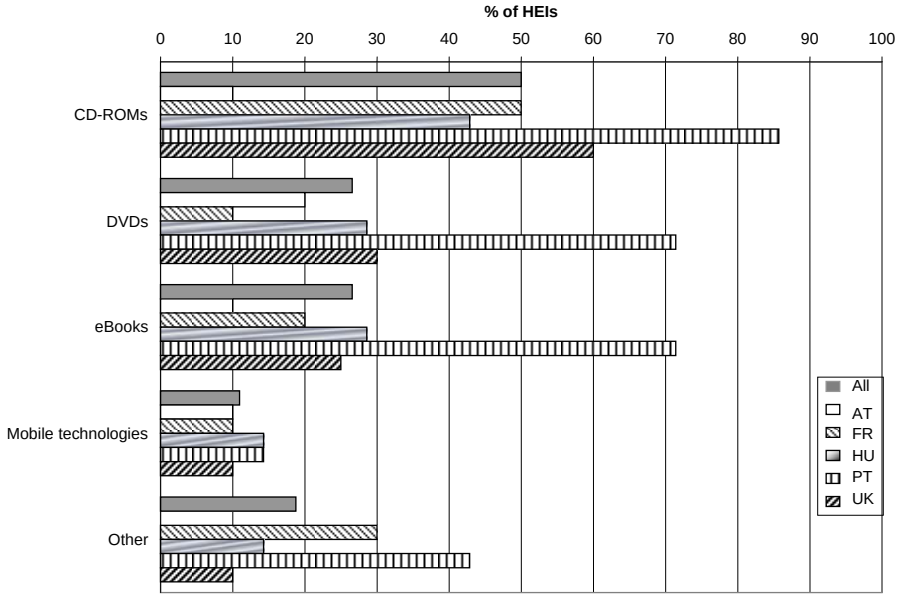

Figure 13: Other eLearning technologies used for teaching

The survey also asked HEIs to identify all the services, from a list, that "exist in your institution's eLearning environment to make it accessible for learners with visual, hearing, manual problems". The results (Table 4) suggest there is still some way to go in enabling higher education for all. Almost 40% of respondents indicated either that no such services exist or that they don't know if such services exist.

% of HEIs	All	AT	FR	HU	PT	UK
subtitling	13	0	10	14	14	20
text descriptions of visual material	34	10	20	43	29	60
audio versions	23	0	15	29	43	35
transcripts	20	0	0	71	29	30
accessible telephone services	9	10	10	14	14	5
resizable fonts	36	20	25	57	29	50
other	30	10	30	29	14	45
don't know	16	20	15	0	14	20
None	23	50	35	0	43	0

Table 4: Accessibility services

In terms of student assessment, about two-thirds of HEIs use paper-based assignments, projects, reports and dissertations to assess students; and about the same proportion use online forms of these assessments (Table 5). However, while 77% of HEIs use paper-based exams, just 34% use online exams.

% of HEIs	Paper	Online
Exams	77	34
Assignments	64	66
Projects, reports, dissertations	61	61

Table 5: Forms of assessment

Support for Students

92% of HEIs display details of course technology requirements online. The different types of training available for students to become proficient with the technologies used in their courses are shown in Table 6.

% of HEIs	All	AT	FR	HU	PT	UK
Classroom-based	56	30	70	57	57	55
Computer-based	34	40	20	29	29	50
Web-based	50	40	60	43	29	55
Other	38	40	40	29	57	30
None	9	10	5	29	14	5

Table 6: Types of technology training available for students

Respondents found it difficult to estimate how often lecturers interact with each student per term; however it was generally more than five times. 71% of Portuguese HEIs estimated "More than 10 times per term". Similarly, respondents found it difficult to estimate how long lecturers take to respond. Most HEIs estimated 1-3 days.

Just over half of the HEIs used paper-based surveys to determine learner satisfaction; whereas 83% used online surveys for this purpose. Typically learner feedback is sought once a term; 44% of HEIs store the survey results in a database. 72% of HEIs have open discussion forums for learners to give their opinions on courses.

Support for Staff

The most popular type of training for those staff responsible for content development is classroom-based (Table 7). The survey also showed that during course development 86% of HEIs offer email support and 77% offer phone support to these staff. The survey also asked about the training and support available for those staff responsible for conducting eLearning classes; similar results were obtained.

Type of training	% of HEIs
Classroom-based	78
Web-based	58
Computer-based	42
Other	30
None	8

Table 7: Training available for staff responsible for content development

However, during course *presentation*, 25% of HEIs have no staff available to support changes to course content. There are sizeable country variations (Figure 4)

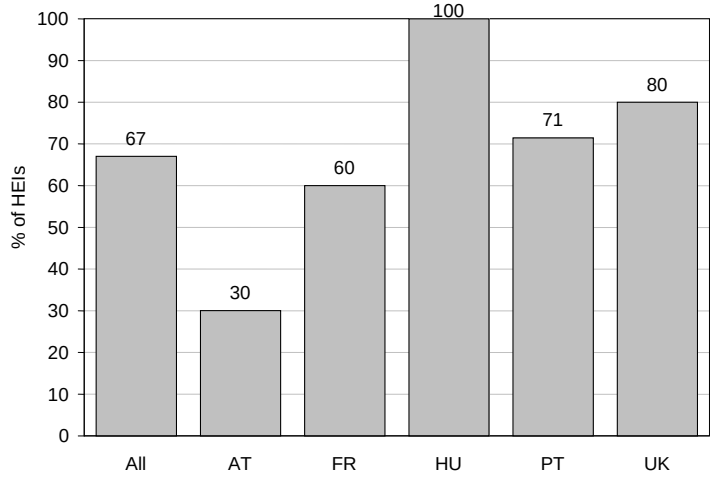

Figure 14: Proportion of HEIs indicating that there are staff available to support changes to course content during the course presentation (by country)

Methodology: Phase 2

The aim of the next phase of the research was to obtain fuller detail about eLearning strategies in selected HEIs, particular in relation to the student experience and course development processes, to start to identify factors critical to the success of the strategies.

How well the perceptions of eLearning advocates completing a questionnaire match reality is difficult to tell. Moreover, as noted above, some larger HEIs found it difficult to accurately represent the totality of their eLearning activities. 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.

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.

Results from Phase 2

Some 43 interviews were conducted, and the detailed findings from the 25 highlighted HEIs are given in the "Noteworthy eLearning Programmes Report" on the project website. Some highlights are given here.

- The study confirmed 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.
- In 20 of the 25 HEIs, the scope of e-learning application is institution wide or at faculty level.
- 13 HEIs use a proprietary VLE or Learning Management System; 9 HEIs use an open source or freely distributed system; 2 HEIs use a mix of proprietary and open source systems.
- Some newer technologies – such as podcasting, blogs, wikis, and social bookmarking – were the subject of trials by isolated innovators. Some HEIs also had plans for e-portfolio systems.
- Several institutions have chosen to target niche markets, such as international postgraduate professional programmes in particular departments; others have aimed for whole-institution strategies.
- The most important aspects to interviewees are clearly customer-focused:
  - providing students with timely and constructive feedback on assignments and questions;
  - providing quick and accurate responses to student support requests; and
  - facilitating student interaction with tutors and peers.
- 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.

Methodology: Phase 3

In Phase 3, eight HEIs were selected for detailed eLearning strategy case studies. The aim of these case studies was to obtain rich data on the strategies, so as to document factors critical to the success of these strategies.

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. The inclusion of the student perspective and of all available evidence of educational impact were seen as particularly important. Clegg, Hudson and Steel (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.

The case studies were written up and placed on the project website, where they can be downloaded as files or accessed via web-based module. Each case study provides an overview of the institution, its educational structure, curriculum needs, and eLearning strategies. A recorded video conference also provides presentations of each of the case studies.

Findings from Phase 3

The case study data lends support to the idea of two distinct types of strategies: 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.

While there are differences between these types of strategy 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 and interoperability (e.g. VLE-library integration).

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. It could be argued that these pedagogic developments have synergies with recent developments in technologies, such as powerful mobile devices; multiple means for web-based synchronous communication; and lightweight, socially focused online tools that encourage the sharing and collaborative creation of rich content.

Discussion

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.

Nevertheless, it was clear from at least some of the interviews that whereas senior managers at an HEI might be pushing ahead with standards-based institution-wide systems such as VLE upgrades, e-portfolio systems, firewalls, and VLE-library integration, there are going to be enthusiastic innovators amongst its students and staff who are rapidly and informally exploiting the latest mobile devices, beta versions of social tools and diverse open content to support teaching and learning, on their own initiative and on their own terms. Capturing this kind of innovation, which appears to be on the increase, calls for very different kinds of methods to surveys and campus-based interviews.

At the same time, it is easy to confuse either personal technological explorations or institution-wide technological rollouts with genuine success without careful collection of evidence. In relation to success factors, 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 has at least provided 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.

Some further questions arise based on what our interviewees told us about these success factors.

1. To what extent can the chosen strategies generalise to all students, staff and subject areas? Some of the easiest targets have been picked off first; and the lessons learned might not be universal.
2. Can technical growth be continued? Not all systems are equally open to upgrading and interoperability, and it is not easy to predict to what extent future technological innovation will render existing systems obsolete. Moreover, many HEIs have not seen the returns that would make further large investments in technology an automatically compelling choice.
3. Can the pace of innovation be sustained? While there is no doubt that eLearning has changed some aspects of the ways that many HEIs operate, there is no reason to suppose that further profound changes will occur.
4. Is there over-confidence that the repetition of past mistakes can be avoided? It is always easier to jump on bandwagons than to hone sustainable business plans, robust systems, good student support, and a workplace that motivates innovation.

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ULF-DANIEL EHLERS

Making the Difference in E-Learning: Towards Competence Development and E-Irritation

Abstract

The article argues that the challenge for e-learning in higher education is to support competence development rather than knowledge transfer. This is often difficult for e-learning in higher education scenarios because so far the way it is used in many cases is not designed to support competence development but rather to distribute learning materials. Two different modes of e-learning organisation are established and described: a distributive and the collaborative e-learning mode. It is argued that a collaborative mode stimulates more potentials for competence development than the distributive mode.

1. Introduction: Moving From a Technological to a Pedagogical Innovation

Since Russel compared the effectiveness of e-learning and non "e" learning scenarios and then declared his "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 different educational scenarios – like the organisation of education over the distance and/or the use of media for education[2] – do not only change the educational organisation but also bring along a changed pedagogy and carry meaning itself.[3] The focus in today's e-learning research has changed. To compare if e-learning or traditional learning is more effective/efficient is not considered any longer seriously.

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[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, p. 17). However, it is argued that many e-learning scenarios are rather focussing on only one side of this definition – namely the connection of learners to resources and not so much the connection of learners to other learners in order to learn in a collaborative way.

[2]Distance education and e-earning is not used synonymously in this article. Distance learning as a form to organise education over a distance can also be organised without the use of media while e-learning can also be organised in a traditional classroom scenario or as blended learning, and not over a distance. However, the article advocates for using an appropriate response in the didactical scenario to any educational organisation be it distant or present, media-use or non-media use.

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). This work – especially the early studies – did not only focus on e-learning but also focussed on distance education. However, it made clear that changes in educational effectives are rather due to the nature of the different didactical concepts used than due to the media which were used.

[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.

The focus in the discussion about how one can make a difference with e-learning moved from e-learning as a *technological innovation* to e-learning for 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 & Anderson 2003), including economical questions of sustainability and business models, pedagogical and technological questions as well as organisational and cultural questions. However, in the heart of today's discussion about e-learning is the pedagogical 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, p. 89, Seufert & Euler 2005).

Electronic communication and digital networks are transforming the way we work and are reshaping personal communication and entertainment. This transformation has had a tremendous effect on the need and opportunity to learn. Unfortunately the *transmission model* that still dominates education has changed little. This model focuses on education as a transfer of knowledge from an expert/a teacher to the student. For the field of e-learning this equals a pure distribution of learning materials without taking the opportunity of communication technology in order to ask learners to collaborate with each other, to connect themselves, discuss, and together enter into a knowledge co-construction and competence development process rather than a knowledge reception process. This view is also supported by Schulmeister (2005, p. 487). He differentiates two worlds of e-learning between which there are gradual intermediate levels (Fig. 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.

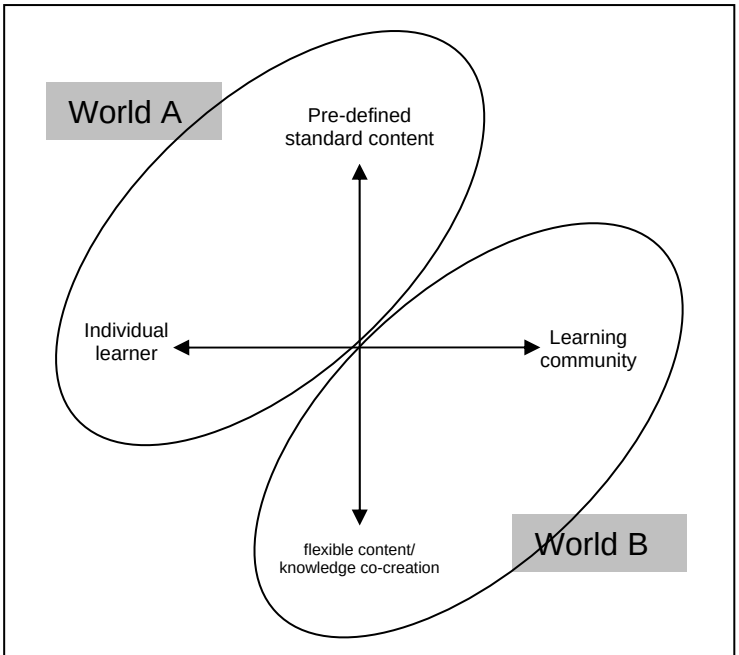

Fig. 1: E-Learning Worlds (Schulmeister 2005)

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 *competences* rather than with subject matter knowledge. It is clear that today's 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[4] 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 2006). 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 e-learning in the sector of higher education and suggests that today's 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 need of achieving competence development through e-learning is argued for. 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 diverse defined concept. Within the scientific debate different theoretical meanings of competence can be identified. A definition of Franz Weinert (Weinert 1999, p. 44) shows the different components: „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 prerequisites for meaningful activities and which are influenced through practical experience and learning processes (ibid.).

[4] 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.

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 also plays an important role in Schneckenberg, in this volume). 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 stressed, and competences can not be taught through a purely transmissive and distributional 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. Although there is an important role for an *instructional* component for competence oriented learning scenarios as well, it has to be emphasized that learning has to be organised in a way that it leads to active knowledge co-construction processes of learners in authentic and interactive learning environments. The instructional component is then more and more reduced throughout the course of study and the student enters the drivers seat to deepen him/herself into their own learning paths whereas the teachers just follows and guides – but not steers – this development (Mandl & Krause 2001).

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 & Rosenstiel 2003, p. 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, p. 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 become visible and manifest only if they are "realised" in an action – i.e. they represent *dispositions* for a future 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.

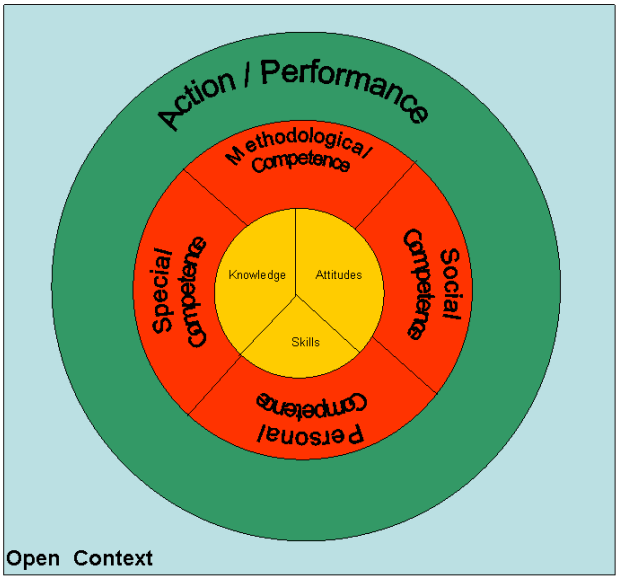

Fig. 2: Action Competence (adapted from Ehlers, Lazarz, Schneckenberg 2006)

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 2004, p. 231). If 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 – they are not supportive of competence development specifically. Privateer (1999 in Garrison 2003, 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. These kinds of learning environments have their strength especially in the support of information and presentation which support the gain of methodological and subject matter knowledge and job-related qualifications (ibid.). In such kind of models teachers have the role of the sage on the stage rather than the guide by the side – as it is promoted for in interactive and socio-constructive learning models, as they are represented in collaborative learning methodology.

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.

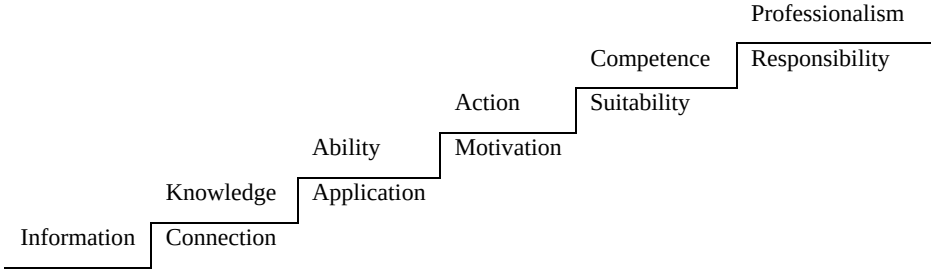

Fig. 3: Steps to professional competence (translated from Wildt 2006)

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).

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 Erpenbeck views as difficult to be realised through e-learning. He emphasizes that e-learning often fails to perform when it comes to creating learning opportunities which aim to develop competencies and allow learners to make own experiences or participate in social interactions. Erpenbeck introduces another distinction which is helpful to understand what is necessary to acquire competences. He differentiates between competence and qualification. *Qualification* as a concept concerning skills to perform, predefined, externally required actions and reactions by using certain means and procedures which can be directly learned. *Competency* on the other hand is a concept which relates dispositions and skills which are in principal unlimited and enable individuals to act self organised in a principally undetermined future (Arnold 1998). Competences therefore are dispositions of self-organisation (Erpenbeck & Heyse 1999).

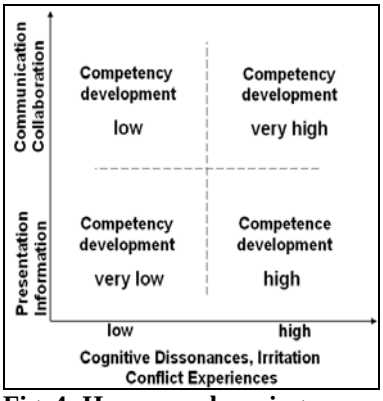

Fig. 4: How can e-learning support competence development?

Erpenbeck (2005) emphasizes that e-learning can be used efficiently for teaching but has difficulties to provide a learning environment in which learners solve authentic problems in social interaction with other learners – and thus acquire value and knowledge; this is especially true for experiences. This constitutes a principal contradiction: On the one hand e-learning and information technology is more and more introduced to educational scenarios at all levels. This can be seen as an irreversible process. On the other hand the transition from a transmissive educational model to a competence oriented one is also not reversible. The problem is, that didactical concepts for existing educational technologies often do not meet the needs of modern competence development.

The conclusion for e-learning is evident: Since experiences, interaction and interiorisation of values, norms and rules is necessary for competence development, it becomes important in e-learning to focus on elements of irritation and cognitive dissonances. Erpenbeck (2004) puts forth that e-learning has great difficulties in creating such 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 (Heyse & Erpenbeck 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 title of this article e-learning has to carry elements of irritation in order to labialise. E-*irritation* emerges as a necessary element 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

The shift from a distributive mode (or paradigm as elaborated above) 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 *material-distribution* mode, have difficulties to stimulate students' competence development. This is especially true for personal, socio-communicative and action related competencies. The ever growing demand for a competence oriented educational process on the one hand, and the use of e-learning models which hardly are made to stimulate competence development on the other hand, can be seen as a *basic contradiction* in the field e-learning, since its introduction.

CSCL is a social and interactive form of learning which follows the objective to support the development of different competences. Table 1 presents an overview of the shift from distributive to collaborative learning. CSCL 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 constructivist learning theories. 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, p. 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, p. 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, p. 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, p. 263).

Table 1: Characteristics of the Distributive and Collaborative E-Learning Model

e-learning model / Characteristics	Distribution Model	Collaboration Model
Goal of teaching/ learning	Knowledge, Qualification	Competence
Knowledge is	Stored, Processed	Constructed
Paradigm	Reproduction, Problem solving, Understanding Remember	Reflection 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 suggests that CSCL follows indeed new underlying principles. It goes back to Timothy Koschmann, who in 1996 published a book with the title: "CSCL – Theory and Practice of a new Emerging Paradigm". He argued that the change 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)[5]. 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 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" (2001) Gerry Stahl states that a paradigm shift from a rather individualistic to a more group oriented cognition has not (yet) taken place. Too 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 (2002) 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 and de Witt (2002) 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 does not 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 and de Witt (2003) are clearly emphasising that the search for the one and only

[5] 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, p. 289). 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.

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 paradigms of e-learning organisation are differentiated and described: distributive e-learning, following a transmissive pedagogical model, and collaborative e-learning, following a constructivist pedagogical model. It is argued that the collaborative mode stimulates more potentials for development than the distributive mode. Therefore computer supported collaborative learning (CSCL) is introduced and suggested as a way to support competence development in e-learning. To 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 show 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. Several questions are connected to this issues and are coming to the foreground:

- How can the process of competence development be formulated into analysis categories for different competences (teamwork, task solving capacity, communication, etc.) and in different domains (mathematics, languages, etc.) in order to be observed and analysed?
- How can a competence model be formulated which allows to diagnose the level of competence the student has reached in a learning scenario?
- How can such a model be built in a way that it helps students to assess their own learning process?

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

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LUCA BOTTURI & MONICA DEL PERCIO

Involvement, Institutional Roles and Design Models in E-learning

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 produce a huge amount of literature about e-learning. Papers and books are available, which focus on the institutional, organizational, economical, 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 – contains very few 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 (e.g., Cox & Osguthorpe, 2003; Kenny, Zhang, Schwier & Campbell, 2005).

The largest part of e-learning projects actually involves an interdisciplinary team (Bates, 1999; Bates & Poole, 2003; Brown & Voltz, 2005; Botturi, 2006a), and there is evidence that the overall quality of student experience improves when teachers are supported by instructional designers and other specialists (Brown, Myers & Roy, 2003).

On the one hand, this implies that 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 (cf. 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 & Goodson, 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 by bringing useful data for discussion and by formulating sensible research hypotheses for future work. The study focuses 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 e-learning design and development teams from the University of Lugano (USI, www.unisi.ch) and three from the Open University of Catalunya (UOC, www.uoc.edu). 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 study collected data from 3 teams at USI and 3 teams at UOC. 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 structures are different at USI (where each team 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* – we will use these labels throughout the text. At USI, teams also include a Web programmer and a graphic designer. The delimitation of teams did not follow official project descriptions, as they often included faculty members who signed documents without being actually involved in the design and development. For the purposes of this study, a team included all those who actually contributed to making decisions or to developing artefacts that influenced the final instructional product, i.e., the courseware delivered by the team.

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 was developed in order to enhance team communication through fast prototyping in large e-learning projects in higher education (Botturi, Cantoni, Lepori & Tardini, 2006). At UOC, the design team applied the standard institutional design process (Sangrà, Guàrdia, Mas, & Girona, 2005).

The study delivered a number of interesting insights (more fully reported in (Botturi, 2006 b). In this paper, we will focus on three key elements:

1. The tension between personal involvement and institutional roles, which is a feature 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.
3. The evolution of team shared knowledge over time.

The next section outlines the research method developed and applied for this study. The following three sections present the main results concerning the three key elements, while the last section provides some conclusions.

Method

This study followed an empirical method (Botturi, 2006 b), 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 concept 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 the team members involved in the six projects. For data elaboration, names were coded in order to ensure privacy. The interview protocol, which took about 1 hour, was composed of two parts: structured interview and the graphic interview.

Structured Interview Questions

Questions included items that probed personal information and background, along with a description of the interviewee's previous experiences with e-learning as student, teacher/ instructor or member of a design team. Some questions addressed the project and the project team, asking the interviewee to state project goals and to describe her/his role in the project. Finally, the last questions addressed team communication.

As all interviewees gave their consent, this part of the interview was recorded and later transcribed. While the interview was being conducted, the interviewer also took notes, which were also digitally transcribed for elaboration.

Graphic Interview

During the graphic interview, participants were asked to represent the project and the project team in three ways: through an individual sociogram, through a process map, and through a concept map.

1. Individual sociogram: the interviewee was shown a map which reported the name of all team members in a circle, including her/his own (which was highlighted). S/he was then

asked to indicate on the map with which ones s/he communicates the most and collaborates with the most. Participants were also free to add other "external members" not included in the interviews. For the purposes of this study, communication and collaboration are defined in the sociograms as follows:

   a. The communication sociogram measures the volume of messages and interactions among team members (with whom did you talk or exchange messages the most?)
   b. The collaboration sociogram measures the quantity of decisions made together or work done together by pairs of team members (with whom did you make more decisions, or actually sit together to solve specific problems?).

2. Process map: the participant was asked to draw a linear timeline indicating the main phases and events in the project, with relative durations and, if possible, important dates. The participant was then asked to highlight the phases or moments in which there was a peak in communication within the team.

3. Concept map: starting from the main phases indicated in the process map, the participant was asked to draw a concept map which contained all the important elements of the project, including events, tools, products, issues, etc. S/he was given a list of possible items to start from, or to use as inspiration, but none really used it. The participant was then asked to draw all important connections among the concepts. The interviewer facilitated the process with questions, also recalling sentences that the interviewee had used earlier.

At the end of the interview, participants were asked to review their diagrams and to check that all important elements were included.

Data Elaboration

Individual sociograms were combined in order to create team sociograms. A team sociogram is a simple social network represented as a directed and valued graph that has team members as nodes and relationships among them as arcs (Berkowitz, 1982; Scott, 1991). Each arc has a value that indicates the strength or degree of the relationships, as expressed during the interview on a 5-point scale. The example in Figure 1 indicates that Esteban declared that he communicates a lot with Anna (oriented arrow from Esteban to Anna, red indicating a high value); Beatrice indicated she does not communicate directly with Carl – in fact there is no arrow between them. The values of all incoming arcs in each node (or *indegree*) are then summed to produce the personal score of an individual team member, which represents the degree to which that person is important in the collaboration and communication activities of others. Individual scores were normalized in order to make sociograms from different teams comparable, and colour-coded. All personal weights in a single team sociogram give a sum of 100.

For each team, two sociograms were produced: the first one representing the distribution of communication (talking to, messages); the second the collaboration (working together with, depend on) within the team. A sample of a communication sociogram is reported in Figure 1.

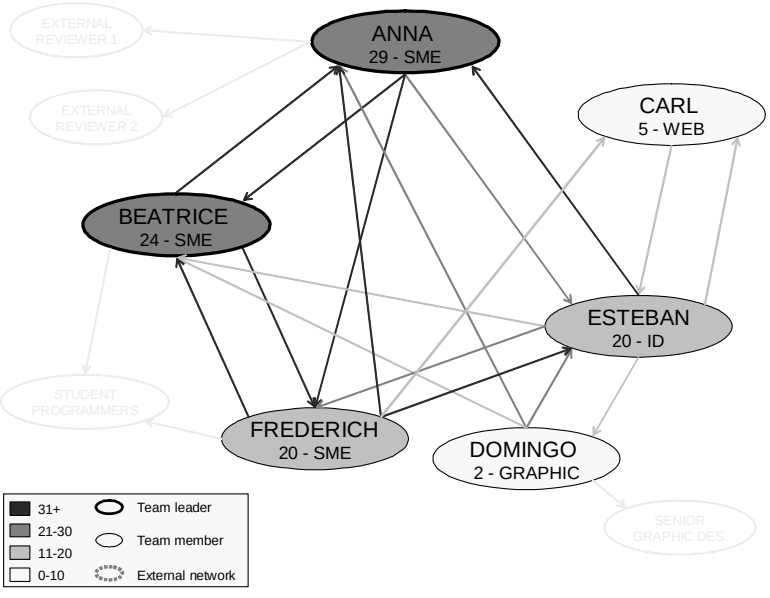

Figure 15 - Sample communication sociogram

Concept maps were digitized according to specific guidelines, in order to make them comparable without losing information. They were then used as Individually-Constructed Mental Models (ICMM) in the analysis process described below. An example of an individual concept map is shown in Figure 2.

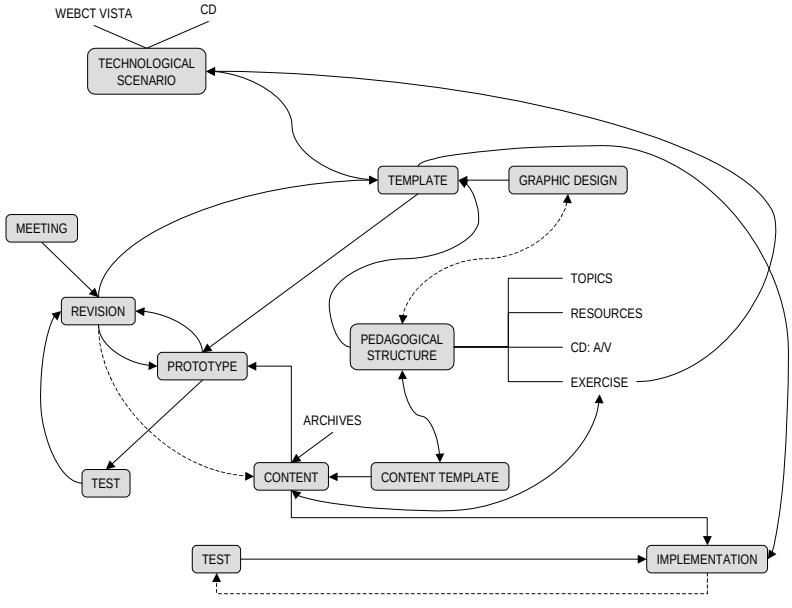

Figure 16 - Sample of individual concept map (ICMM)

The Analysis-Constructed Shared Mental Model method (AC-SMM) was applied in order to create a concept map that represented the shared view of each team, or *team SMM*. This method provides a standard procedure for identifying shared team cognitive constructs related to a specific task (Johnson, O'Connor & Darabi, 2005; O'Connor & Johnson, 2004). AC-SMM was tested for reliability with positive results (O'Connor, Johnson, Khalil, Lee & Huang, 2004).

All ICMMs were then put together into a unique sheet, and a *global SMM* was generated, as the shared mental model of all projects. In this case the threshold value was set to 8 (out of 15 ICMMs) with at least one count for each project team. The global SMM can be considered as the generic shared mental model of real implementations of the fast prototyping model, and will be discussed later on.

Finally, in order to allow a more formal comparison, a specific *sharedness index* was calculated for each team. This number varies between 0 and 1 and expresses the degree of similarity of single ICMM to the SMM.

Personal Involvement and Institutional Roles

The first perspective through which we introduce the results of this study concern the distinction between personal involvement and institutional, or official, roles. It is known that only seldom team members exactly stick to what they are supposed to do by contract or assignment: some do less, others do more. Also, some seem to have a global insight of the project, while others seem to float on the surface. What happens in a team designing e-learning?

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 that 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, 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., about 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 staffs behave 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 3 shows the SMM for the two groups.

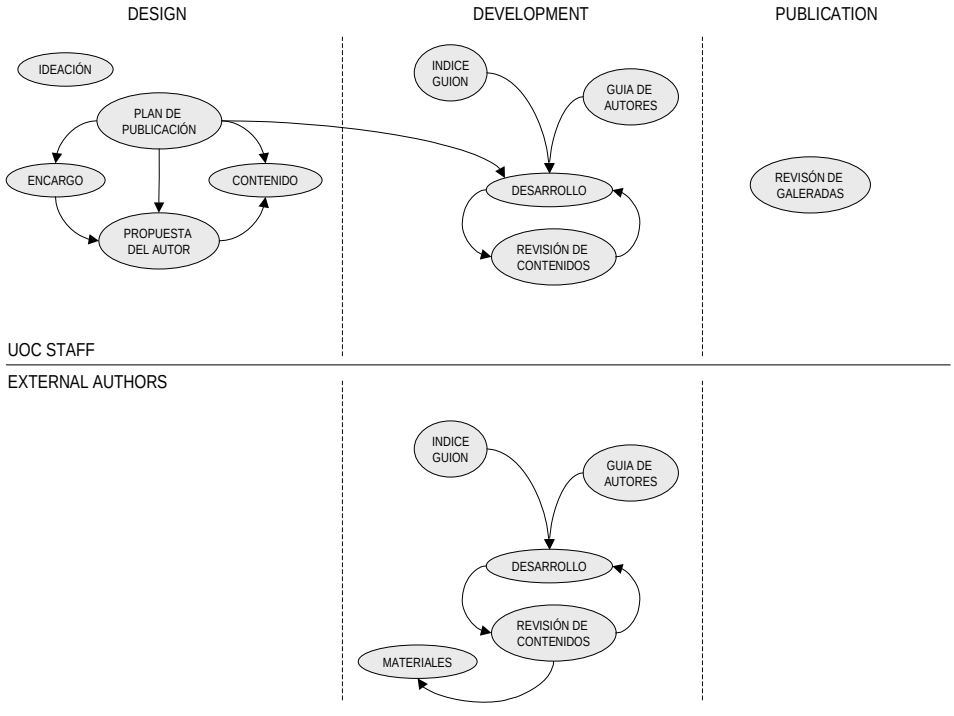

Figure 17 - SMM for staff and external authors

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 4 is shown with color labels for concept type (rendered in tones of grey).

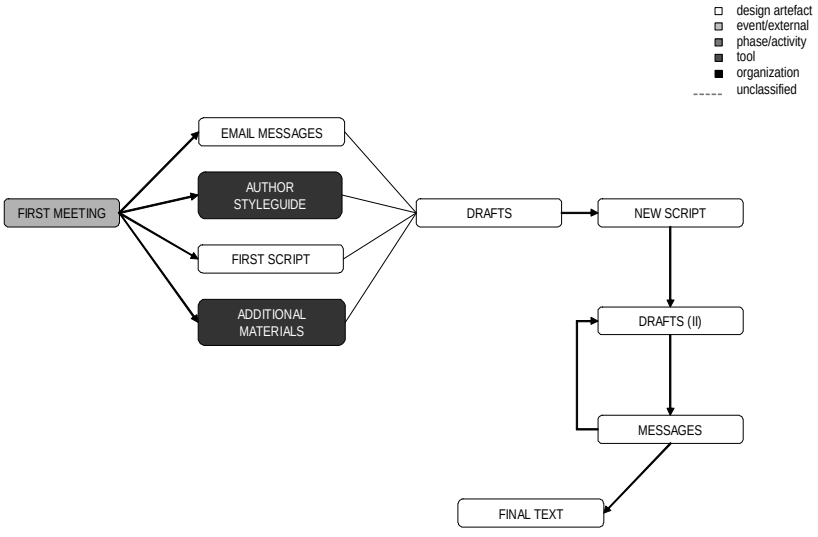

Figure 18 - Sample of labelled ICMM

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 staffs 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 we 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 their actual value for the practice? This issue was investigated through observing team SMMs and confronting them with the official design model at the two institutions.

ELab Theory and Practice

The eLab fast-prototyping model (Botturi, Cantoni, Lepori & Tardini, 2006) was developed in order to enhance team communication through fast prototyping in large e-learning projects in higher education. The model is structured in two cycles: (a) the inner or *product cycle*, and (b) the outer or *process cycle*, as shown in Figure 5.

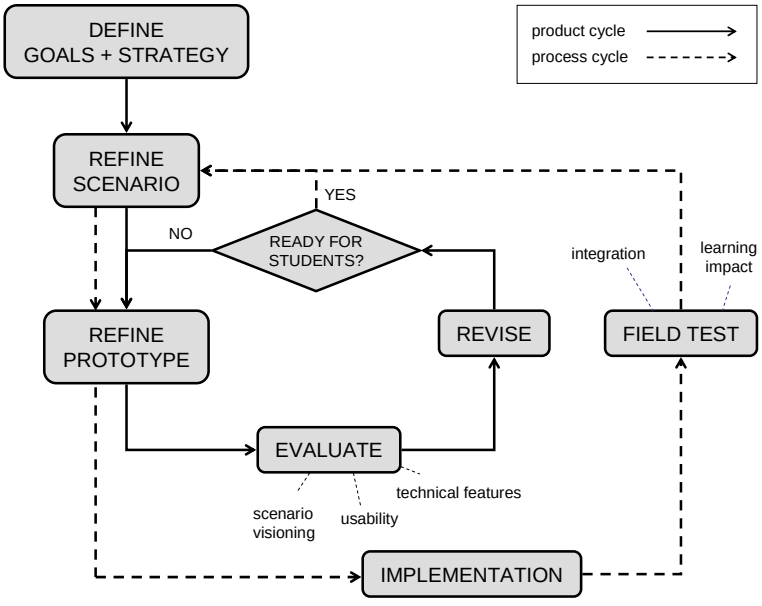

Figure 19 – The eLab fast prototyping model

Ideally, the design and development process starts with the identification of high level learning goals and of a specific strategy, where the model recommends this is done as a team effort in order to create a common vision. These elements are embedded in a scenario, a narrative and semi-formal description of the instruction, which sets some parameters such as target students, support, the schedule, etc. The development of a shared scenario, guided by the instructional designer, is in itself an important activity for the project: its writing requires team members to discuss the main issues in the project in practice and to imagine the final product from the student's eyes. The scenario is the initiating point for the product cycle, which starts with prototype development and is aimed at developing a product that fits the scenario. The project team internally evaluates the prototype in two ways: (a) the technical staff evaluates it with standard procedures which assess its technical features and usability; (b) other non-technical team members proof the prototype's fit to the scenario description, in a focus group in which they envision its use, still without involving real users. After the evaluation, the prototype is consequently revised, and a decision is made if it is ready for real testing. If the prototype is deemed ready for user testing, the process moves on to the process cycle that is basically a field test with real users. The testing is constantly monitored, leading to the final evaluation of the process.

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.

The diagrams show that there is indeed a relation between the fast prototyping model and SMMs: they can be mapped to the eLab model, as shown in Figure 6. The *refine prototype*, *implementation* and *field test* items only correspond between theory and practice. Moreover, the SMMs include other items (*graphic design*, *structure*) which do not appear in the eLab model.

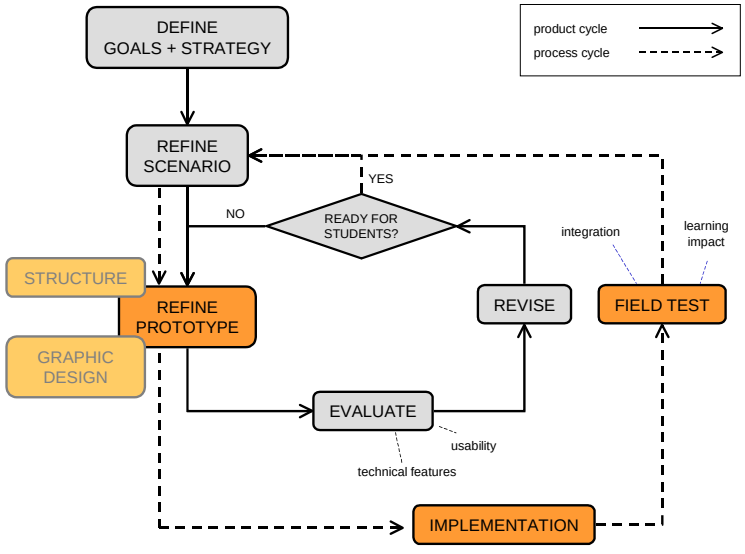

Figure 20 - Mapping of the global SMM on the eLab model

UOC Theory and Practice

The UOC official design model (Sangrà, Guàrdia, Mas, & Girona, 2005), sketched in Figure 7, is different from the eLab's, and is aligned with the basic functioning of Open Universities: content production and course delivery are divided and sequenced.

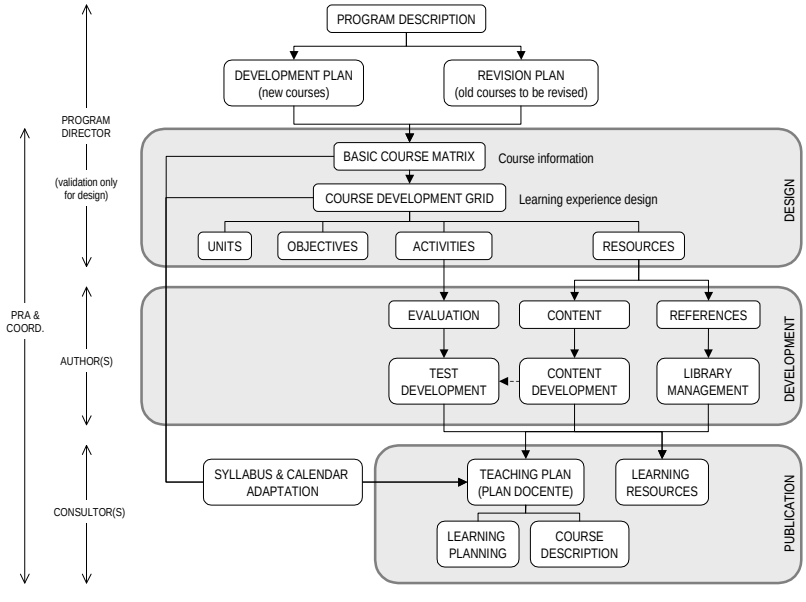

Figure 21 - UOC design model

The design of an online course here follows a linear and well-structured pattern moving through design, development of content, evaluation items and references, and the actual publication of the learning materials within an actual course. The whole process is managed by the PRA, while each phase sees a different role on the foreground: the program director that validates the design, the course authors during the development phase, and *consultores* (or instructors) for publication and delivery.

Despite the differences in the two universities, which were evident in the results presented above, at the UOC the relationship between the practice – as emerged in team SMM – and the official model is very similar to that at the eLab: only *some* theoretical elements actually appear in the practice, and not all the element relevant in SMM are considered by the theory. This situation is illustrated in Figure 8, which shows the results for PRAs. The clear focus is on the course *development grid* during the design phase, and not on its sub-elements; during development, *content* is the focus, and this is strictly related with the use of some practical tools: the author style-guide (*guía de autores*), the table of content (*índice guion*), the reviews (*revisiones*) and the prototype reviews (*revisión de galeradas*). The publication phase is off the field for PRA, which at this point leave the course in the hands of instructors.

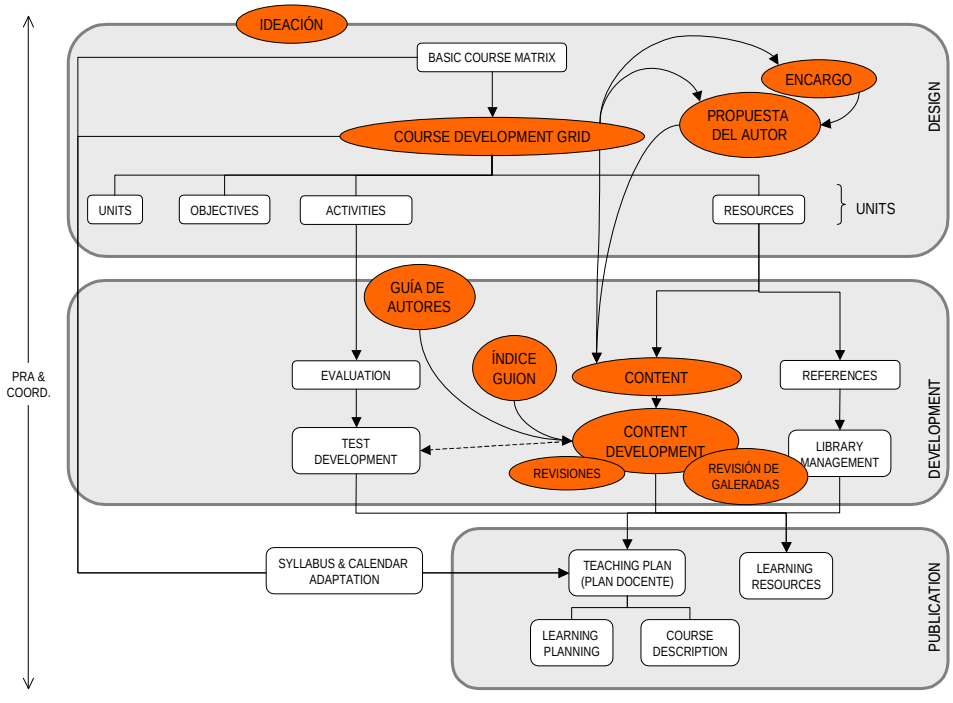

Figure 22 - Mapping of the global SMM on the UOC model

How should these results be interpreted? At a first sight it is clear that shared items (activities or artefacts) are where a team comes together and shares the job done up to that point. Also, the fact that an activity is not shared does not mean that it is not carried

out. More likely, activities such as assessment, technology selection, etc., are performed by individual members and are actually present in ICMMs.

Meeting Points in Team Work

The distribution of individual and shared activities observed in this study could be generalized as a research hypothesis that we 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 and Campbell (2005), it also means including other activities, such as project management.

Shared Knowledge Over Time

A final interesting remark comes from a follow-up observation conducted at the eLab: the same three project teams, originally interviewed at month 6 in their project, were interviewed again, with the same protocol, one year later, at month 18. The projects were now close to their end, and their success was the proof that all teams had found a sustainable and effective way of working together. The hypothesis that drew the follow up observation was to measure the evolution of SMM over time, expecting that they would have extended in number of shared items and sharedness index. Surprisingly the results disconfirmed such expectation.

Actually, two general trends can be observed for all teams:

1. After one year, SMM tend to be reduced in number of items and sharedness index value;
2. After one year, the concept present in SMM converge toward those central in the official design model.

Figure 9 and 10 present the team SMM of the same project for years 2005 and 2006. It is the team in which the two trends can be observed more clearly, and the difference is astonishing. Two concepts remain fixed: *prototype* and *AV materials* (actually, the main distinctive feature of this project); a lot of the elements present in the first SMM disappear, and two new come in: *other modules* and *reviews*.

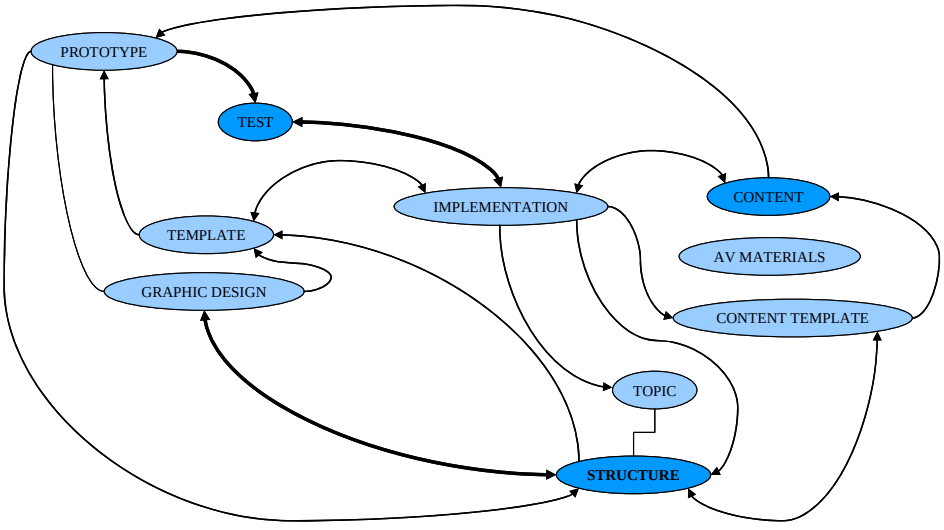

Figure 9 - Team SMM of 2005 for a project

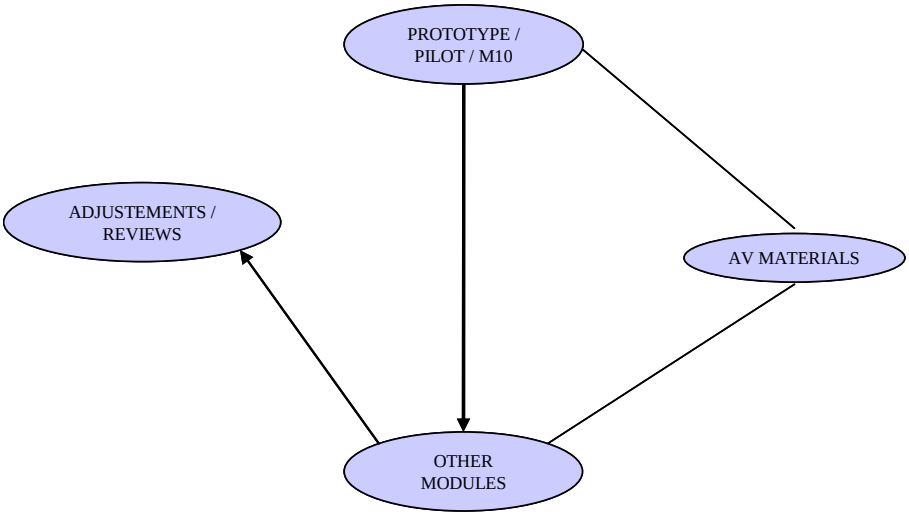

Figure 10 - Team SMM of 2006 for the same project

In other words, team members view their practice more differently, and with less shared elements. On the other hand, these elements are those present in theoretical design models. The concepts that disappear are those "other" concepts already described above.

Given the success of the teams, this counterintuitive finding indicates that effective collaboration is not dependent on sharing the largest number of concepts, but it is rather a

matter of quality: shared concepts should be few but, so to say, *salient*. This can be formulated into a new hypothesis as follows:

> *Salient concepts Hypothesis*
> The effectiveness of an eLearning design and development process is not a matter of quantity (number of concepts, or common ground), rather of quality. Mental models change over time depending on the specific project's phase and team members are able to adapt their perspective to the current situation. Some concepts are present in the project vision of team members only in specific phases; while others remain stable throughout the whole process.

And, as it appears, ID models can be far from the practice, but still their value resides in indicating the main items that can make collaboration salient.

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 three 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. Third, the evolution over time of shared mental models follows a counterintuitive reduction pattern that indicates that quality of shared views, or salience, and not quantity is the key to effective teamwork.

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. Indeed, design model and practices fall within the influence of the overall institutional eLearning strategy (Aczel et al. in this volume). 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.

This study tried to bring useful data for discussion and to formulate sensible research hypotheses for future work. 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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PART 4:
DEVELOPING COMPETENCIES THROUGH CURRICULUM DEVELOPMENT, INSTRUCTIONAL DESIGN, AND ASSESSMENT IN ONLINE LEARNING ENVIRONMENTS

LOURDES GUÀRDIA, ALBERT SANGRÀ & MARCELO MAINA

Case-based Learning in VTLE: An Effective Strategy for Improving Learning Design

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 Virtual Teaching and Learning Environment (VTLE) are identified, considering the requirements of the European Higher Education Area (EHEA) for a competence-based curricula design. Implications of this findings into a 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 EHEA. 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, p. 225).

This concept is similar to that proposed by The International Board of Standards for Training, Performance and Instruction (IBSTPI)[1] and used by Richey, Fields and Foxon (2001) to establish the core competences for instructional designers. 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" (p. 31). To extend and complete the concept of competence, see Schneckenberg as well as Ehlers in this volume.

The design of a competence-based curriculum demands to rethink and redesign programs and courses and stimulates the application of social-constructivist pedagogical approaches that are learner and community-centred. Chickering and Gamson (1987) – cited by Bonwell and 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." (p. 2).

One of the teaching and learning methodologies that better could fit in this scenario is the case method.

[1]IBSTPI: The International Board of Standards for Training, Performance and Instruction: http://www.ibstpi.org/ competencies.htm

2. 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 from the real messiness of contradictory and complicated information." (Golich et al., p.1).

In expert literature we find case-based learning, case study, case-based reasoning and case method as the most used 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. In another dimension, cases are also related to the problem-based learning or problem solving, not as the same strategy but as resource or element that is used as a story.

Jonassen and Hernàndez-Serrano (2002) define the concept as a case-based reasoning in terms of using stories to support problem solving; "Stories are the most natural and powerful formalism for storing and describing experiential knowledge that is essential to problem solving. The rationale and means for analyzing, organizing, and presenting stories to support problem solving are defined by case-based reasoning. Problems are solved by retrieving similar past experiences in the form of stories and applying the lessons learned from those stories to the new problems."(p. 65). In the same article, the authors mention the need of new methods for task analysis and models for designing instruction because the emphasis on problem-based learning in the instructional design field has increased in the past years.

Also Nelson's (1999) approach is interesting, because one of the main competences that we want to promote through the case method is to work collaboratively. For him the use of cases and problems allows teachers to offer richer and more realistic learning experiences: "…an important feature of the CPS (collaborative problem solving) instructional theory is that it supports the most powerful types of problem-solving activity that learners can engage in – those that are based on their own natural collaborative processes." (p. 245).

For the purpose of our research we define case-based learning (CBL) 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.

In this sense, the theoretical discussion also examines the relationship between the case-based reasoning (CBR) model and the Problem Based Learning (PBL) model.

According to Eshach and Bitterman (2003) "CBR indicates that the knowledge source one uses while solving a new problem includes not only generalized rules or general cases, but often a memory of stored cases recording specific prior episodes. CBR enables the reasoner to recommend solutions to problems quickly and to propose solutions in domains that are not completely understood ...". (p. 491).

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." (p. 2).

Different types of case-based learning have been classified using different criteria. Hebert, Barbeau, Leclerc and Routhier (2005) elaborated a typology based on learning objectives summarizing the work of Van Stappen (1989), Guilbert and Ouellet (1997), Proulx (1994) and Martínez and Musitu (1995) distinguishing the methodological purposes they followed, and also some internal guidelines for teacher training like that from UOC, which distinguishes between closed (restricted answers) and open cases (multiple solutions), or the Instituto Tecnológico Superior de Monterrey (TEC) focusing whether on the case subject, the realistic basis, the subjective/objective possibilities or the values it stands (DIDE, 2001).

Another approach of the case-based learning is the use of "transfer" as a capability to reuse knowledge and skills in a context that differs from the one in which they have been acquired. Haack and Mischke (2005) contribute in that direction; "case and problem based learning environment support learners both, in the active process of self-directed learning as well as in the consolidation of new knowledge. Especially case-based learning fosters the usage of transfer by providing appropriate stimuli to recall previous knowledge".(p. 1). Mauri, Coll, Colomina, Mayordomo and Onrubia (2004), cited by Guàrdia, Sangrà and Maina (2006) describe two main approaches: one that according to the learning objectives promotes the capacity of analysis, identification and description of the key aspects constitutive of an usual professional situation, and another that focuses on the study of the practice process applied, on generating alternatives, on justifying different decision making to the original one. But in both cases the authors propose helping to learn from a constructivist vision, using the educational scaffolding concept.

In this sense the work did Owensby and Kolodner (2002) is essential; "since case-based reasoning provides a computational model of the process of not only selecting, analyzing, and applying cases, but also of promoting transfer, we begin with a discussion of the suggestions that case-based reasoning makes for promoting good case application in the context of promoting transfer. We then focus on Learning by Design TM[2], which has its foundations in case-based reasoning, problem based learning, constructivist approaches to education, and communities of learning ...".

Application of this methodology usually goes on a common cycle (Lynn, 1999): individual reading and preparation, small-group discussion, a plenary session for discussion and

[2] Learning By Design:
http://web.archive.org/web/20051128121056/ ; http://www.cc.gatech.edu/projects/lbd/htmlpubs/caseapp.html

individual reflections. Some variants explained by Romm and Mahler (1991), cited by Buffington and 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. Case-based Learning as a Driver for Competence Acquisition

The CBL is not intended to provide answers. It raises reasonable and deductible questions compelling the students through a decision-making process that ends up in a logical, coherent and sustainable solution. From a pedagogical perspective the case should let the students meet the course's learning objectives.

Case studies can help the student develop the following generic competences (some of them adapted from Roper & Millar, 1999):

1. identifying and recognising problems,
2. searching, understanding and interpreting data,
3. understanding and recognising assumptions and inferences, as opposed to concrete facts,
4. thinking analytically and critically,
5. understanding and assessing interpersonal relationships,
6. exercising and making judgments,
7. communicating ideas and opinions,
8. sharing and contrasting opinions and assumptions,
9. negotiating with different actors,
10. making, defending and justifying decisions,
11. working with teams (collaboratively),
12. applying social an ethical skills.

Other than these competences, we focus on the development of specific professional and research competences for our e-Learning master's[3] students based on a program competency map built upon worldwide recognized competences standards as the IBSTPI, as previously mentioned which defines the instructional designer (Richey, Fields & Foxon, 2001), the training manager (Foxon, Richey, Roberts & Spannaus., 2003) and the instructor (Klein, Spector, Grabowski & de la Teja, 2004) competency frameworks together with the efforts of the AECT (2000) for Instructional System Design (ISD) management and development process competences and the Eiffel[4] group for teacher/trainer and e-Learner competences.

4. Research Approach

Although the use of case studies 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 it. Much less has been documented about the use of this method in virtual environments and online teaching and learning.

[3] E-learning Master's Degree at UOC: http://www.uoc.edu/masters/oficiales/general/index.html
[4] EIfEL: European Institute for E-Learning. The eLearning Competency Framework for Teachers and Trainers: http://www.eife-l.org/publications/competencies/ttframework/

In the last years, many experiences around the use of case studies in virtual learning environments have been developed, some interesting examples of them are: UNCLE[5], SMILE[6], CASEmaker[7], ICON[8] and others.

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 competence-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 it brings on case design, development and implementation.

5. 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.

In addition, qualitative methods allow the researcher to study deeper particular issues, cases or events and data collection is not constrained by presupposed categories of analysis, and this help us to deepen on these qualitative data (Patton, 1987), so we can create these categories depending on the research focus and its importance.

Nevertheless, a literature review on the case-based learning 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 its use, generic competences enabled, typologies, guidelines for writing the case study and the teaching notes, teaching and learning methodology and experiences, classroom and online applications and implementations and developments in the learning object trend.

At the same time 12 case studies of different programs developed in the last six years at UOC were also analyzed in order to identify the design, the structure and the educational purpose of these cases. The models, guidelines and recommendations that the UOC itself has been using during this period were also checked. Using this approach, a comprehensive evaluation through interpretation of experiential knowledge was developed (Stake, 2004) and criteria, good results, needs and improvements for a new proposal were identified too.

This previous analysis and the literature review allowed us to identify criteria to be applied to the analysis of the semi-structured interviews. These were organized in some

[5] UNCLE (Using notes for a case-based learning environment): http://www.emeraldinsight.com/Insight/ViewContentServlet?Filename=Published/EmeraldFullTextArticle/Articles/0860140104.html
[6] SMILE (Solution Mapping Intelligent Learning Environment): http://eric.ed.gov/ERICDocs/data/ericdocs2/content_storage_01/0000000b/80/24/53/df.pdf
[7] CASEmaker: http://www.casemaker.com/
[8] ICON (Interactive Case-based Online Network): http://icon.hms.harvard.edu/

main dimensions of analysis that facilitated the subsequent analysis of the data, in order to know how those professors who are using the case method in their teaching are considering how an interactive case-based methodology should be developed and which features are the most important ones.

Interviews provide mechanisms to develop new elaborations, explanations, meanings and ideas (Patton, 1987). Thus, they were applied to faculty from different disciplines (educational sciences, information technologies, industrial engineering and labour and social sciences) from two different universities (UOC and UPC – The Catalonian Polytechnics University) that use the case method into their online, blended or face-to-face teaching.

The interview, as we mentioned above, focused not only on the case method implementation but also on how it is embedded into a whole course pedagogical strategy. Contextual information was also gathered for better interpretation of the data. Course selection was based on two common criteria: graduate level and online mode.

Questions raised information about the course discipline, program, theoretical and/or practical orientation, number of students, use of technology, type and support of learning materials and applied pedagogical strategies.

Specific information about the case method was acknowledged:

1. *design and implementation*: we explore the teacher's design or redesign of the case study and teaching notes, the process of creation and implementation including an individual or team work approach, the teacher experience in design and implementation of the case approach;
2. *type*: no typology was proposed, we wanted a free explanation of how the teacher understood it;
3. *relevance*: the case as the main pedagogical approach, as an "activity" into the course, number of cases employed in the course;
4. *targeted learning objectives* and *competences development*.

Finally, the analysis was described in a final report which allowed us to establish the criteria that would gauge the decision making about the typology of cases to propose and the type of tools and models to develop.

6. Results

6.1. Dimensions of Analysis

As we mentioned above, a previous analysis of different data collected from the different experiences carried out in our university during more than six years allow us to identify interesting dimensions to be included in the semi-structured interviews. These were organized in four fundamental dimensions of analysis: 1) the description and typology of the matter, 2) the pedagogical and theoretical approach, 3) the instructional process proposed by the professor through the teaching plan, and finally, 4) the instructional design support received to do that.

6.2. Considerations to Take Into Account After the Analysis of the Interviews

From the professors' interviews, a number of items were also highlighted in order to take them into consideration when developing the final version of an interactive case study:

- The use of an interactive case-based methodology positively influences in a positive way student's satisfaction – especially course methodological issues – because it leads to a perception of a more practice-based learning approach.
- It also makes knowledge of individual learning to progress easier.
- Learning application, critical analysis, situations and settings comparison and decision making are very relevant kinds of objectives that can 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.

6.3. Characteristics of the Prototype

A prototype of the interactive case-based learning has been developed considering a number of issues we identified 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, & 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).

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);
- teaching and learning process implementation.

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 expresses 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, supports any kind of case complexity or objectives and lets us introduce some variables for case personalisation. We understand the personalisation at two different levels (Mor, Minguillón, Santanach & Guàrdia, 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, p.31), 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[9] generic process, from the analysis for arguing in favour of its use until the evaluation for the improving of the learning. An analysis of communication issues related to the role of the instructional designer in the process of designing resources for learning can also be found in Botturi and Del Percio's article (2007) in this volume. We are talking about more than just how to distribute content. It's clear that designers must take into account the kind of learning they would like to foster and for whom the materials are intended, taking into consideration what roles the instructor, the learner, and the contents or resources play in the learning process (Sangrà, Guàrdia & Gonzalez-Sanmamed, 2007).

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 overcome 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 *Development-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 *Implementation-phase* we have differentiated the technical aspects of case integration into a LMS from the teaching-learning moment; and finally, from the *Evaluation-phase* we will 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 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)[10] compliant form.

[9] ADDIE: Analysis, Design, Development, Implementation and Evaluation. See at: http://www.e-learningguru.com/articles/art2_1.htm

[10] IMS LD: http://www.imsproject.org/learningdesign/index.html

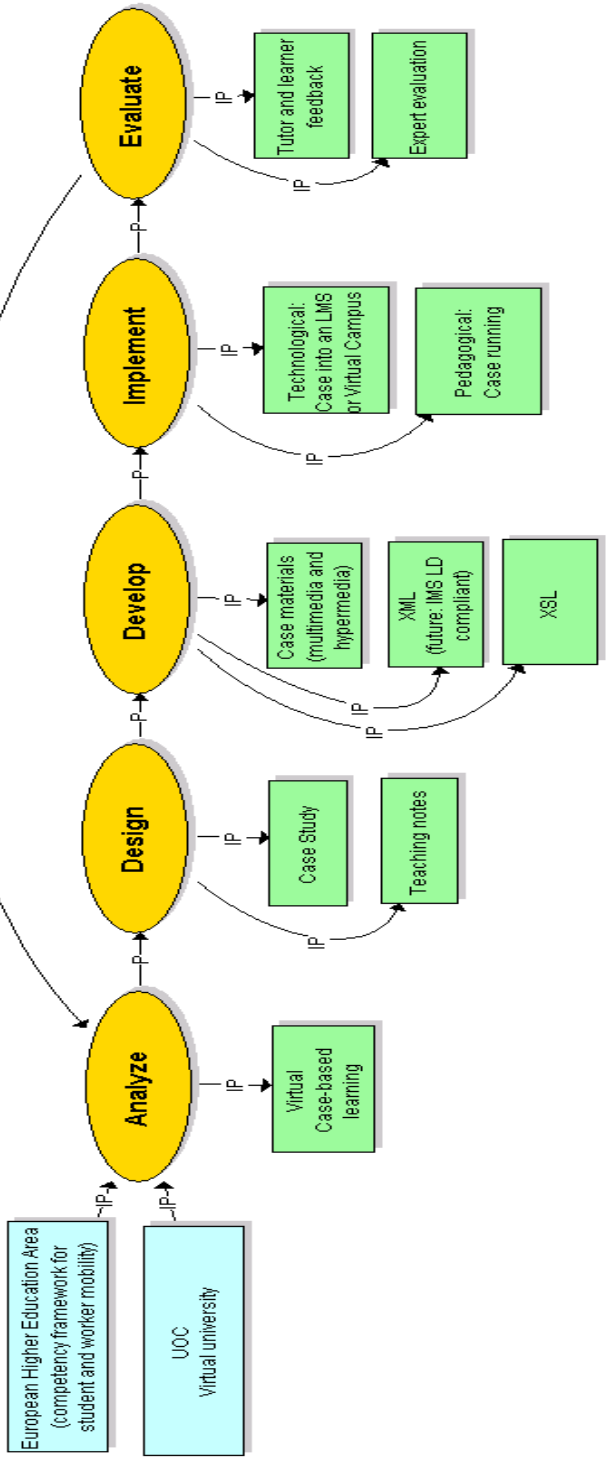


Fig. 1. "…an organized procedure that includes the steps of analyzing, designing, developing, implementing, and evaluating instruction"(ADDIE Model).

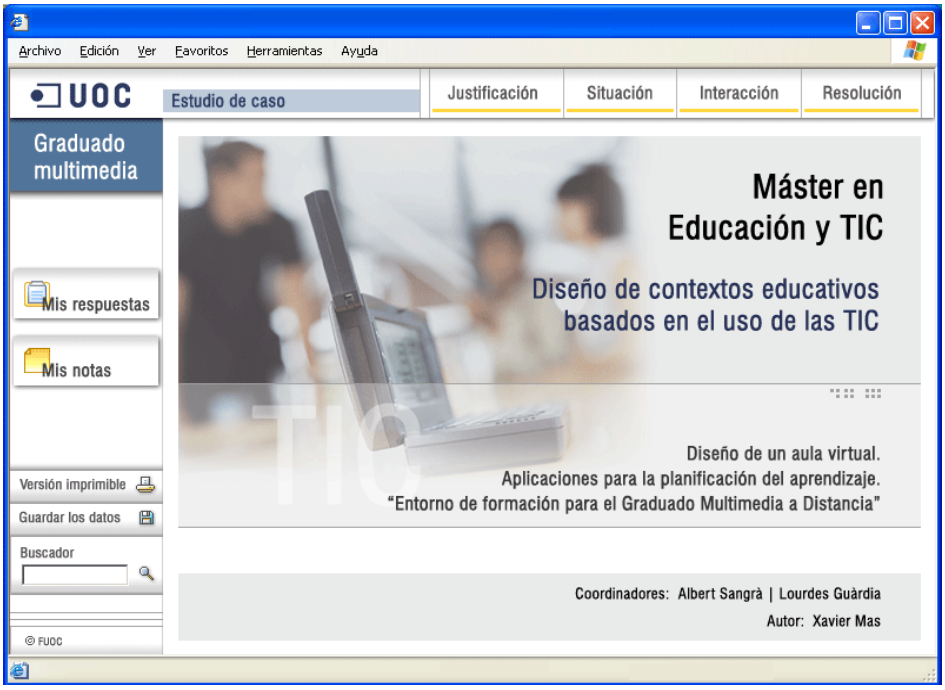


Fig. 2. Snapshot of a prototype for cases to be implemented at the Máster en Educación y TIC (e-learning) at UOC.

6.4. The Four Component Case Model

The case study model has been based on four main components: justification, situation, interaction and resolution.

1. The *Justification* focuses on the pedagogical aspects of the case. It presents the case learning objectives and corollary competences to be developed through the case exercise. It also includes the main characteristics of the case in terms of the interaction required and the itinerary to follow.

2. The *Situation* introduces the general definition of the case problem and its parameters and limitations. It includes the descriptive elements of the context, the organization, the main and secondary characters or other particularities. This section is informative, mainly for reading or consultation on the part of the student.

3. The *Interaction* component is crucial because it 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 has to answer some specific questions that will let him gather more information in this way. Thus the student receives additional information at the same time as he actively takes part in this search, making decisions and taking notes as a way to build a more complete picture of the situation. While the case is going on, the student uses the "electronic notebook" to describe the decisions and documents related with the case. The notes are permanently accessible and can be edited and e-mailed to the virtual classroom, where collaborative tools and forums are used by professors and

students. The activities can have individual or collective character. In this section the student has access to both synchronous and asynchronous communication tools and to a repository of shared documents. This section is more dynamic and at the same time constitutes a space for participation and deepening of the information.

4. The last one, the *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. This component shows the individual or collective resolution of the activities that will be evaluated by the teacher and that are suggested from the teaching plan presented at the very beginning of the course. Through reading and reflection, the previous sections will allow the student to have all the available information about the case and the direction it should take. These activities consist in solving another type of problems that the case can give rise to. This section also intends to reach the personalization of the learning either recording the type of subject or level of difficulty. The need to give access to additional information in any support can be foreseen.

6.5. Case-based Learning and LO Approach

As we have stated, our main purpose is to develop tools for the case method design, development and implementation in virtual environments. As mentioned, the UOC is a virtual university working through its own virtual campus that supports administrative, management, teaching and learning tasks for all the actors involved. Thus, a development team together with professors and university staff work on continuous improvement and innovations of the Campus. Some institutional R&D projects are exploring the Learning Object approach in order to allow reusing of learning content. There are some learning technology standards that assure reusability and interoperability of compliant content. The LOM (for Learning object meta-data) is an international recognized standard that adopts the IEEE[1] (2002) LO definition of "any entity, digital or non-digital, that may be used for learning, education or training". In the same line, SCORM (Sharable Content Object Reference Model)[2], an Advanced Distributed Leaning initiative, presents itself as a collection of standards and specifications that provide a suite of e-learning capabilities in order to enable interoperability, accessibility and reusability of Web-based learning content. These standards define a number of meta-data for content description using the XML (Extensible Markup Language) language, a text based language increasingly used for web data exchange.

Even the UOC courses developments are described with an XML structure. Through the project Myway[3] UOC developed a system that puts availably of every person the format of contents that needs methodologies of centred design in every moment, through techniques of interaction of human beings and computers, in the user and applying transformations XML standard. From only one base document in this system voice – there is the possibility to unload the material in an iPod or a CD to listen to it – web, books in paper, digital books or Daisy (a system used by blind persons) – is generated by formats of exit. As the LO field is relatively new and expanding, the UOC learning materials do not still adjust to any standard that could let them be interoperable with other LMS (Learning Management Systems).

[1] IEEE-LTSC: ltsc.ieee.org
[2] SCORM: http://www.adlnet.org/index.cfm?fuseaction=scormabt
[3] Myway: http://www.uoc.edu/in3/myway/

Encouraged by the LO development we wanted to explore also the possibilities opened by this approach to the case-based learning. The case method as a pedagogical strategy can be interpreted as a teaching/learning scenario. The content-driven LO paradigm does not present the best suitable solution for our purpose. Studying other initiatives into this field we found that the IMS LD specification could better fulfil our requirements of building a generic high level case method capable of reusability and eventually interoperability.

IMS-LD, for IMS Learning design, is a specification for the description of teaching/learning strategies. This educational modelling language (EML)[4] was proposed by some researchers at the Open University of the Netherlands and it was released by the IMS technical board in 2003. Koper and Olivier (2004) expose seven requirements for the development of a UoL (Units of Learning):

- completeness for fully describing a teaching-learning process,
- pedagogical expressiveness of sound pedagogical approaches,
- personalization based on different criteria,
- compatibility with other specifications and standards,
- reusability of the UoL or parts of it in other contexts,
- formalization through a formal language that is machine readable,
- reproducibility for repeated execution in different settings.

IMS-LD is based in a theatre play metaphor to describe a pedagogical metamodel capable to express the new pedagogical approaches. The main element is a Unit of Leaning (UoL) that decomposes into a series of Plays, which themselves split into a series of Acts that can be, in turn, divided into activities (learner and staff) organized as activity structures. Different roles are established to perform the activities using resources (as learning objects) and services, the whole composing a learning flow. There are three levels in the Specification, levels A, B and C, where level B adds Properties and Conditions and where level C completes the scenario by adding Notifications. These levels are important as they allow collaboration and personalization of the learning process.

Based on our four-component-case-model we made an exercise of modelling it as a Learning Design. We have used the MOT+LD[5] software tool for graphical IMS LD modelling of level A. This approach lets us built a generic model than can be personalized at the Play level and deploys in four Acts (Justification, Situation, Interaction and Resolution: Fig 3), where the first two are individual and the rest may allow collaboration depending on the case method adopted by the teacher (Fig. 4).

[4] EML (Educational Modelling Language): http://eml.ou.nl/introduction/explanation.htm
[5] MOT+LD is a tool developed by LICEF-TELUQ; it is a graphic editor that allows the edition of learning Units

Fig. 3. Generic structure of four Acts

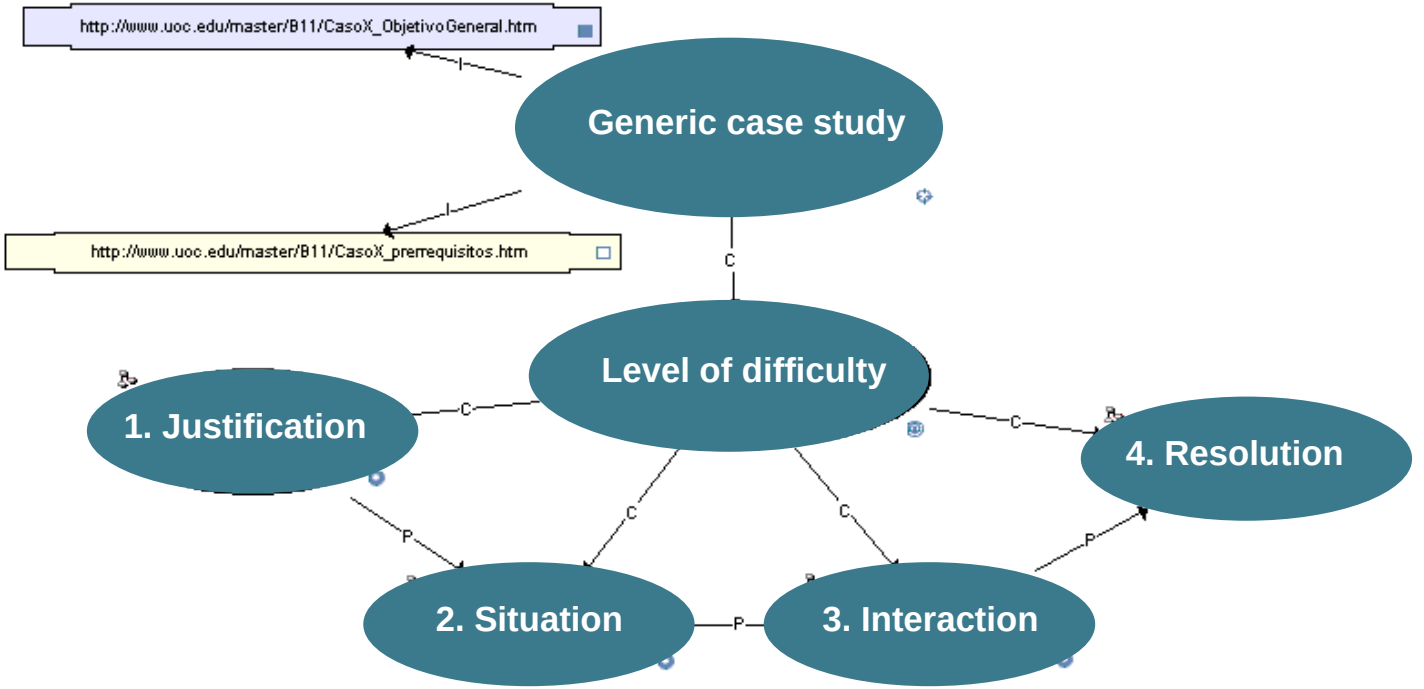
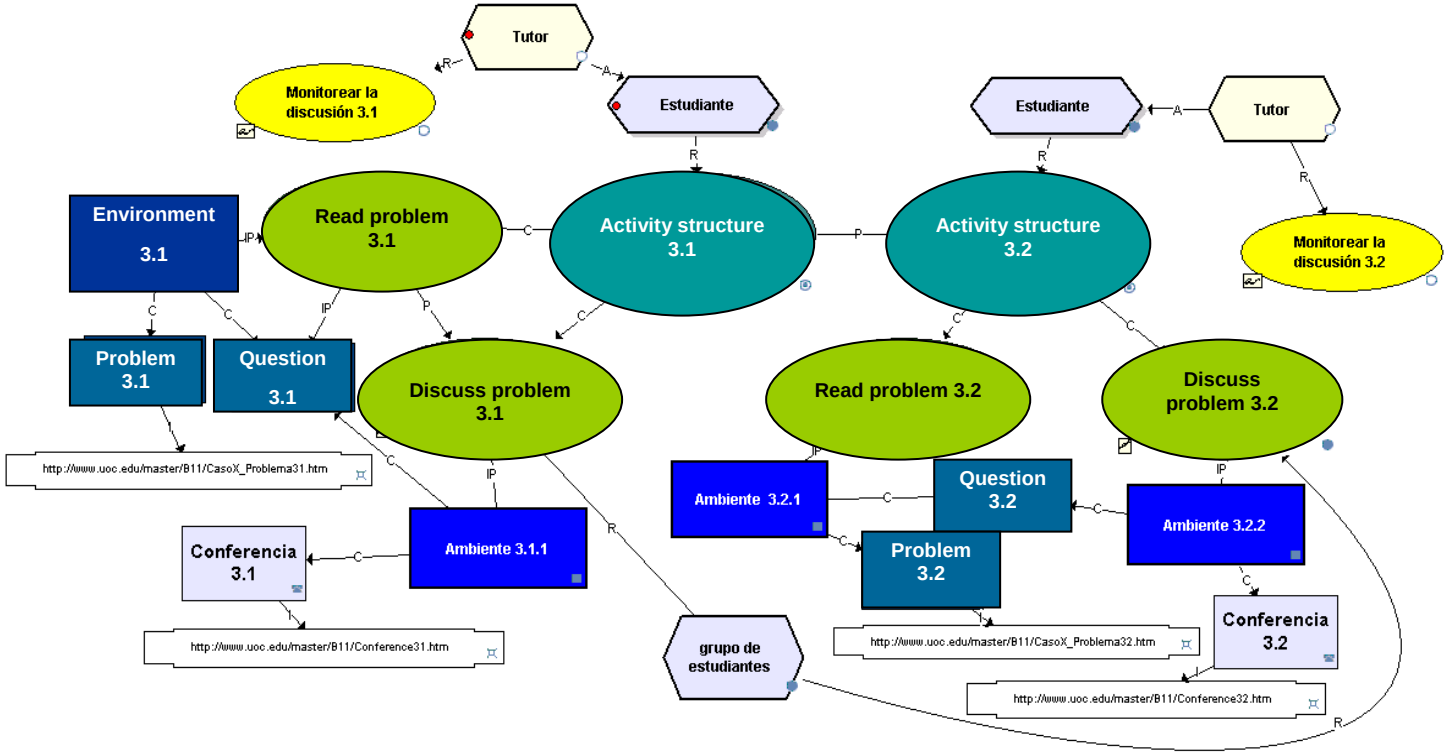


Fig. 4: Example of activity structure of collaborative activity for Act 3, Interaction.



The learning flow scenario was exported as an XML (compliant with the IMS LD specification) and run into the Reload Learning Design Player[1] to test its appearance and functionality. Even at the test level we found results encouraging letting us envision the capabilities opened by this approach whether at the implementation and the designing stages. Even yet at the level of speculation, we can foresee a better integration of design/ development/implementation processes with this kind of tools. Some further development and refinement is needed to provide assistance and guidance to teachers/designer to help them create and develop the case method from this new perspective.

7. Conclusions and Further Research Possibilities

Interactive case-based learning is an appropriate educational strategy that responds to two main current 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 considers there is a need of having tools to facilitate interactive case-based studies design and implementation. Also guidelines and training 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. In this sense IMS-Learning Design specification is adequate for CBL pedagogical richness implementation.

This perspective demands the creation of a series of handbooks to assure coherence and respect of principles guiding different processes executed by different actors. In this sense the development of a handbook for competence-based learning design through case studies for teachers is needed. Provision of a technical handbook for the creation of learning specification compliant case structures and front end style sheets is also compulsory.

Regarding the evaluation of the learning based on the acquisition of competences, the project has not allowed us to deep on this, because of its short duration. But we have been able to see initiatives and experiences that might fit to the dynamics of the case method that we propose. We have found interesting the approach that Barberà and Ahumada in this volume applied in their experience using the e-portfolio as a strategy of competences evaluation, because we also believe that "we can agree that an assessment process implies the selection, collection, analysis, interpretation, and use of information that fosters decision-making, and we know that within a university context these decisions must be focused on learning and

[1] The Reload Learning Design Editor (LDE) is an Open Source, close-to-specification, tree-based Learning Design (LD) editor written in Java using the Eclipse platform.

the development of professional competences in the students. The relationship between competence, learning and assessment is central to any possible scenario."(p. 234). From this point of view, the learning that is promoted using the case method could be evaluated through the e-portfolio. For us also should be a crucial aspect to explore in the early future.

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 if it responds to their needs in terms of teaching strategy.

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MANEL AGUIRRE RAYA

Argumentation in Problem Solving Based Online Discussions as a Way of Achieving Meaningful Learning

Abstract

In this paper we describe an action research project focused on online discussions as they are conceived at the Open University of Catalonia, (UOC): as formal evaluated activities. We designed a set of actions that altogether comprise a complete strategy to improve the design, implementation and evaluation of online discussions. In this innovation we took ill-structured problems as a starting point, created a Discussion Guide with the purpose of generating different problem spaces and promoting debate and controversial, real discussion. We taught students the Toulmin Argumentation Model (Toulmin, 1958) so that they could use it to structure their contributions and so that the participants could use it as a meta-linguistic and meta-cognitive tool to describe and analyze the development of the discussions. This development was monitored by the teacher using "post it notes", marking colours, and moderation messages. We analyzed the results of a two-week discussion forum to better know how Education Post Degree Graduate university students appreciate this kind of discussion organization and its consequences in learning. Results showed a significant effect of this innovation on conceptual change and meaningful learning. Furthermore, students rated the innovation very positively, especially the Discussion Guide, the moderator role, the monitoring system and the use of an explicit argumentation structure. Innovation dissemination and further research should be undertaken.

1. Introduction

Nowadays, it is quite easy to notice a steady spread of the practice of collaborative and cooperative teaching and learning through e-learning environments where learners work online using ICT. This action research deals with such activities as they are understood at the Open University of Catalonia (UOC).

In this paper we assume that meaningful learning should be one of the most important goals for schools and universities, that it has to be focused on solving everyday problems and that technology can help to achieve such learning.

From this starting point, we not only pay homage to our admired professor David Jonassen, but we contextualize this small contribution among what some would call the "Philosophy in practice" (Kanuka, 2005a)[1].

Online discussion activities are an increasingly common feature of university and school course planning. Computer-Supported Collaborative Argumentation (CSCA) software proliferates. Are we beginning to have some clues about the key to teaching and learning online? Let's try within this small but important scope and field: formal online discussions based on argumentation about ill-structured problems.

This paper hypothesizes that teaching the use of argumentation in online problem-solving discussions is a powerful strategy to achieve meaningful learning and even conceptual

[1] Heather Kanuka is an associate professor of Athabasca University who demonstrates how to apply action research in post secondary education in this field. See i.e. http://cde.athabascau.ca/faculty/heatherk.htm

change in learners. Our research will try to demonstrate that trying to solve dilemma problems deletion made using an explicit argumentation model in online discussions is an effective and efficient teaching strategy if it is well designed and implemented.

This strategy, which is based on formal discussion of ill-structured problems, may be useful to increase both students' meaningful learning and students' perceptions of the quality of the discussions.

A problem is something unknown that is worth solving or finding because of its perceived social, cultural or intellectual value. Finding the unknown is the process of problem-solving.

Jonassen (1997, 2000) has repeatedly demonstrated the importance of problem solving as a process for achieving meaningful learning by requiring a) the mental representation of the situation in the world (problem space) and b) active manipulation of the problem space (components and dimensions representation).

In this research we can identify three problems. One is the problem that the learner finds with the discussion activity, while another is the problem that the e-teacher/moderator has when trying to encourage every one of his students to meet at the virtual space discussion and learn a set of competences from a specific field of knowledge. Finally, the problem that the scientific community interested on e-learning wants to better understand the link between activities and situations designed on purpose for teaching and learning and this translucent box called learning and knowledge construction.

On a wider scale, let us say that democracy is based on the confrontation of ideas, which means that understanding and producing arguments are skills that should be acquired.

2. Theoretical Framework

Why Teach Argumentation?

One reason for teaching argumentation is that it has been shown to be a kind of "macro-competence" that is not always developed through the daily university activities that students experience. More specifically, it has been shown that not everybody learns spontaneously to argue and that some secondary and undergraduate students show difficulties with argumentation (Cerbin, 1988; Silvestri, 1998; Jonassen, 1997).

On the other hand it has been stated that argumentation activities can promote conceptual change and meaningful learning (Hemmerich & Wiley, 2001; Wiley, & Voss, 1999). There is evidence that CM Conferences and CSCA tools can stimulate it (Jonassen, 1997). Let us add that OUC's first pilot experiences with this innovation with students from different knowledge fields (Education, Psychology, Sociology, and Business Intelligence) had shown interesting results.

Argumentation is a core competence in many professional areas. Lawyers, politicians, scientists, medical staff, and responsible professionals of any technological process are required to argue their decisions.

And finally the relevance of the problem is shown by its own increasing scope: online discussion activities are familiar among universities and school course planning.

Why an Online Discussion Without Specialised Software?

When OUC was taking its first steps, Morten F. Paulsen (1995) published one of the first articles asserting that discussions could be effectively facilitated using text-based

Internet communication tools. As research in face to face environments suggested that students who wrote arguments seemed to gain a better understanding of the subject matter (Wiley & Voss, 1999) the focus on online discussions argumentation was gaining in depth (Andriessen, Baker & Suthers, 2003). Qualitative and quantitative research is being undertaken nowadays that shows how these assumptions cannot be taken for granted and all the implications have to be taken in to account (Jeong, 2005; Kanuka, 2005b; Kenny, Bullen & Loftus 2006, for instance).

While online discussion interest widens it seems that the efforts of the scientific community in the first five years of the century in the area of CSCA software projects seem to decrease and applications like *Sense Maker* http://www.kie.berkeley.edu/ sensemaker/, ReasonAble http://www.goreason.com/, *Belvedere*, http://belvedere.sourceforge.net/, *Convince me* http://dewey.soe.berkeley.edu/~schank/convinceme/, De3 http://d3e. sourceforge.net/ and others have not attracted interest or not been used any more, perhaps with few exceptions as the experience GlobalArgument.net shows[2]

Consequently, we decided to use our own e-learning conference system with its own technical resources.

Why Toulmin's Model?

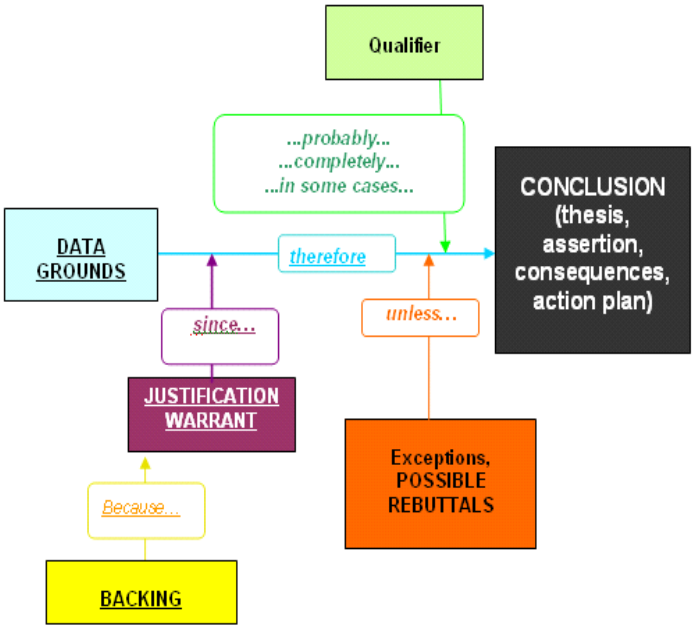


Figure1: Toulmin Model

[2] GlobalArgument.net http://www.globalargument.net/ in 2005 tried to evaluate different Computer-Supported Argumentation approaches: both the technologies, and the 'craft skill' of using them effectively. There we can see the results with Compendium http://www.compendiuminstitute.org/tools/compendium.htm , ClaiMaker http://kmi.open.ac.uk/projects/scholonto/ Rationale, previously Reason!Able http://www.austhink. org/ products/ among others.

Toulmin's model (Toulmin, 1958; Toulmin, Rieke & Janik, 1979) has been found useful for teaching how to plan writing (Rodríguez Bello, 2004), for policy analysis and reasoning (Gasper, 2000), for analyzing public argument in medical controversies, political articles and speeches, legal argumentation, governmental decisions or educational investigation. "In short, much of the research using Toulmin's theory has explored naturally occurring argument in particular fields or areas of study." (Soukup & Titsworth, 1998). Figure 1 shows the Toulmin's model representation that we used.

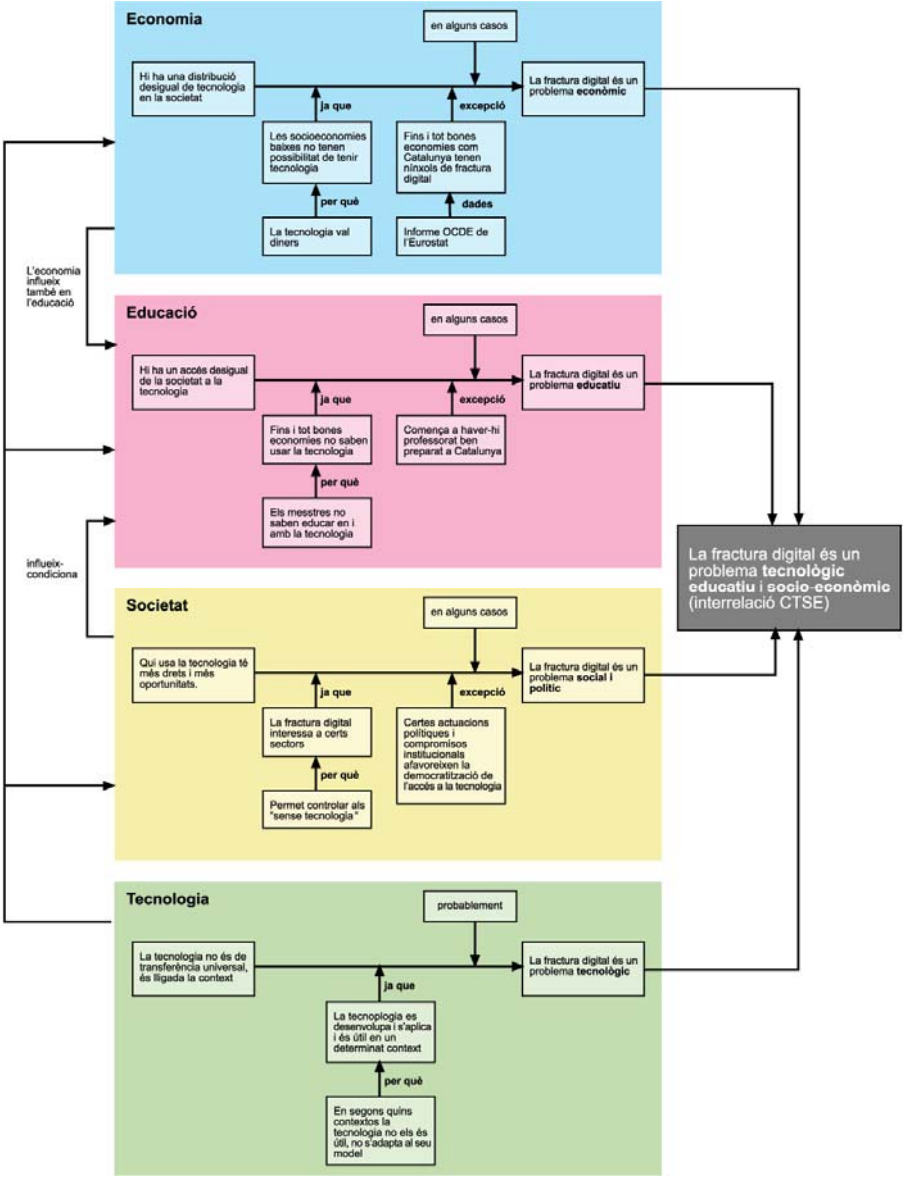


Figure 2: Toulmin adaption to represent a set of related arguments made by a student

Although the visual representation of complex cooperative argumentations, discussion or dialogue mapping still attracts many researchers (see for example Yoshimi, 2004), and is far from being solved. Toulmin's model can be easily used to link different variations of an argument by linking different structures. See Figure 2 as an example provided by one student.

Ill-structured Problems for Discussion Generation

We take for granted that human beings find what we defined before as "problems" everywhere and they are one means if not "the mean" for improving our own learning development.

Problem-solving as a process has two critical attributes that have been clearly summarized by Jonassen (1997). First, human problem-solvers construct a mental representation of the problem, known as the problem space. Second, problem-solving requires some active manipulation of the problem space: represent the components and dimensions of the problem, generate hypotheses about how to find the unknown, test those solutions, and draw conclusions. This manipulation of the problem space can be an internal mental representation or an external physical manipulation but always engages conscious activity.

Still following David Jonassen (1997) we can distinguish between well and ill-structure problems. Well-structured problems are those that require the application of a finite number of concepts, rules, and principles being studied to a constrained problem situation. They are familiar in educational situations because they present all elements of the problem and involve a limited number of rules and principles organized in a predictive and a more or less prescriptive arrangement.

Ill-structured problems are found in everyday practice, so they typically emerge from the context. Because they are not constrained by the content domains being studied in classrooms, their solutions are not predictable or convergent. They often require an interdisciplinary approximation to be understood and solved. For example, the problems of waste products, pollution, world poorness, technology transference, digital divide etc. multiple possible solutions, solution paths, or no solutions at all; they have multiple criteria for evaluating solutions; and, they require learners to express personal opinions or beliefs about the problem (Jonassen, 1997).

Since the System Approach in the 1970s (Churchman, for instance) it is well understood that ill -structured problems are dialectical in nature and two or more opposing conceptualizations of the problem (different problem spaces) can be used to support different arguments with opposing assumptions underlying them. This kind of problem requires from the learner the competence of articulating the differing assumptions in support of arguments for whatever solution that they examine and recommend. The structure of an argumentation provides a kind of scaffolding to build and share this knowledge. This tool seems to engage not only cognition but meta-cognition of the process to "solve" the problem or to examine different solutions. "Requiring students to develop an argument for their choice is tantamount to problem solving" (Jonassen, 1997) and provides the teacher with clues about how much the learners know.

Ill-structured problems allow us to stress a learning oriented discussion while quality of performance is not forgotten in search of intrinsic motivation. Dilemmas, decision making and case studies seem good points of departure that generate discussion.

However, other research oriented to analyze students' text-based online discussions has taken ill-structured problems as the starting point of the debates in the context of online Problem-Based Learning (PBL) (Kenny; Bullen; Loftus, 2006) showing that from an exploratory view the instructional design of the course can constrain problem solving process in students.

3. Research Approach and Methodology

Context

This action research is developed at the Open University of Catalonia (UOC[3], an online University, www.uoc.edu), in the Department of Education Studies (that we call Psycho pedagogy). The subject is "ICT and Education" (which we name Educational Technology). We worked on the concept, scope, foundations and history of Educational Technology, specifically the complex relationship between Science, Technology and Society (STS) applied to Education.

Design

We designed a possible solution to the challenge of teaching argumentation skills using the following outline:

Ask learners to construct an argument instead of just giving an opinion.

- Ensure they can identify and produce arguments first.
- Teach the Toulmin Model of six elements in argumentation (see Image 1 in previous section)

Facilitate ill structured problems that invite students to take a position and support it.

- The teacher-moderator builds a Discussion Guide that proposes problems and a way to discuss them in the virtual discussion space. The problems included in our Discussion Guide are described in the next section.

Monitor and help to monitor the discussion process.

- Encourage participants to make an effort, so students emphasize his or her own argumentation structure by using simple typography marks as **boldface** (thesis) and underlined (most important words of their premises) so as to facilitate the group's perception of the argument structure.
- The teacher-moderator uses extensive technical resources to highlight the argumentation process: "meta-marking" the kind of messages in the thread (initial, moderation, interesting, etc.) with a colour ball, linking the discussion of the same thesis or premises in a same thread, using post-it digital notes to moderate how these elements are being discussed or how the thread is developing.

[3] For a description of our university see Guitert & Romeu (2006).

Change the evaluation criteria of the discussion activity.

- Make the evaluation criteria explicit in the Discussion Guide. For instance value quality not quantity and restrict students to only 3 or 4 interventions/posts each.

Ask the learners about their own learning process.

- Evaluate whether the new approach is worthwhile.

Ill-structured Problems in the Discussion Guide

In this study, we used five types of poorly structured problems:

- Small case studies (based on situations or films). For example Langdon Winner's explanations about Long Island bridges design in New York.
- Dilemmas. For example the Education minister has to take a decision: ICT in primary and secondary education has to be a proper subject, like Maths or Social studies or just a transversal curriculum axis present in all the other subjects. As the person responsible for a kindergarten, would you buy computers with your first budget?
- Emotional experiences taken as a point of personal acceptance or rejection. "Technolabour": The experience of Robbie Davis-Floyd first labour: nature and identity or technocratic pact for protection?
- Closed questions: Is the teacher an artist, a technician, a scientist or a technologist?

These problems were contextualized in four situations: school, sociology analysis, medical techno-power and situations or international cooperation and the digital divide.

Our Discussion Planning

Following Walton (1989 and 2006), we orientated our discussion planning towards persuasion, finding proofs, exposing self positions and operative decision making. Following Beltran's (2005) adaptation of van Eemeren, Grootendorst and Snoeck Henkemans' (1996) phases of the discussion, our Guide describes most of the confrontation and opening stages while argumentation and closing phases take place mostly on the electronic conference.

Research Methods

We combined a qualitative and quantitative methodology in this action-research so as to try to understand and assess whether our innovation is changing points of views and producing meaningful learning. Qualitative analysis was obtained from the students' self-description regarding their own learning. Quantitative analysis is taken from the questionnaires.

Schedule

September 2005. First week: Mind Map. We evaluated the students' initial model of the complex STS relationship by asking them to complete a questionnaire and to construct a mind map (see http://www.xtec.es/~maguirre/Ava_ini_NTICEDU.doc). This was mandatory for all 190 students

September 2005 Third week: Pre-questionnaire. Before the discussion started, we distributed a voluntary pre-questionnaire about students' perception of online discussions (77 answers). We sent a questionnaire to an informal conference (that we call "forum") in three virtual classrooms on the subject "ICT and Education" in the Education Studies

department. Completion of this pre-questionnaire was completely voluntary. Among 190 students only 77 completed this first questionnaire. Most of them (about 90%) were already education professionals in formal and non formal education organizations in Spain, most of them in Catalonia. They responded to questions about their own perception of online discussions and how they would describe the worst and the best online discussion they had ever seen. (c.f. http://www.xtec.es/~maguirre/PREquestionari _plantilla.doc).

October 2005. First week: Discussion. The students, in their own virtual classroom, participated in the discussion that was designed, implemented and evaluated as described in this paper. They had to read one article about the subject and the material related to that item.

October 2005 Third week. Using the discussion results and the different materials, including Jonassen's dossier about meaningful learning and ICT, each of the 190 students wrote a brief report on their own experience of the discussion, describing whether it had facilitated meaningful learning or not, and if it had caused a conceptual change or not. They had to justify each answer using examples.

February 2006. Post-questionnaire. Five months the discussion process ended, we sent the 77 students who completed the pre-questionnaire a post-questionnaire to evaluate their performance and their opinions of the innovation. 35 students answered the second questionnaire (see sample post-questionnaire at http://www.xtec.es/~maguirre/POST questionari_plantilla.doc). The 35 answers have been analyzed and compared with their classroom performance, their previous evaluation and their pre-questionnaire.

4. Results

The results are presented in three sections:

- sample demographics taken from the pre-questionnaire the third week in September and grades for both their participation in the argumentation process and the final mark in the course,
- a comparison of the mind map they drew the first week of September and the self-reported learning at the end of the third week of October, and
- the results of the post-questionnaire administered in February 2006.

The Sample

We can summarize the sample process as follows:

a) mandatory initial evaluation: 190 students from 3 virtual classrooms;
b) voluntary pre-questionnaire: 77 students;
c) voluntary post-questionnaire and final sample: 35 students;
d) students that finally qualified: 112;
e) students from the sample that finally qualified: 35.

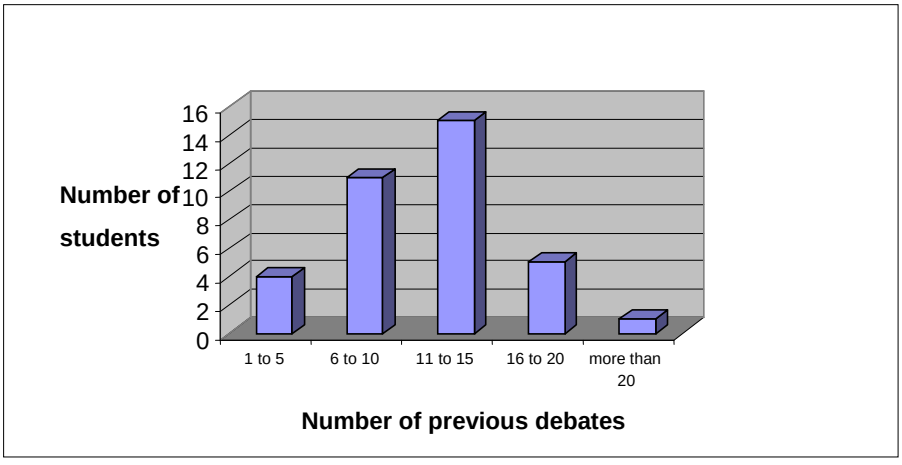


Figure 3: Number of Previous Debates

The 35 students are experts in discussions. Figure 3 shows that they have solid experience in online discussions at UOC (mean of 12 previous discussions, mode of 15). 25% held online discussions at other sites (most education related) and 42 %, at least, had moderated one online discussion (usually in a Social Psychology subject where they held different roles).

Most were women students. As shown in Figure 4, 86 % of the sample students were women. Gender has been found significant to some other experiences (Jeong, 2005).

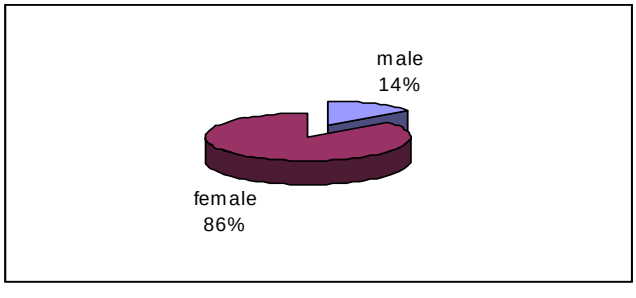


Figure 4: Gender distribution

*The student sample had immense experience in Education***.** Figure 5 shows that 97% of the sample has studied pedagogy or psychology related subjects before their post degree studies, usually during their teacher instruction. 97% had formal education and 72 were teachers.

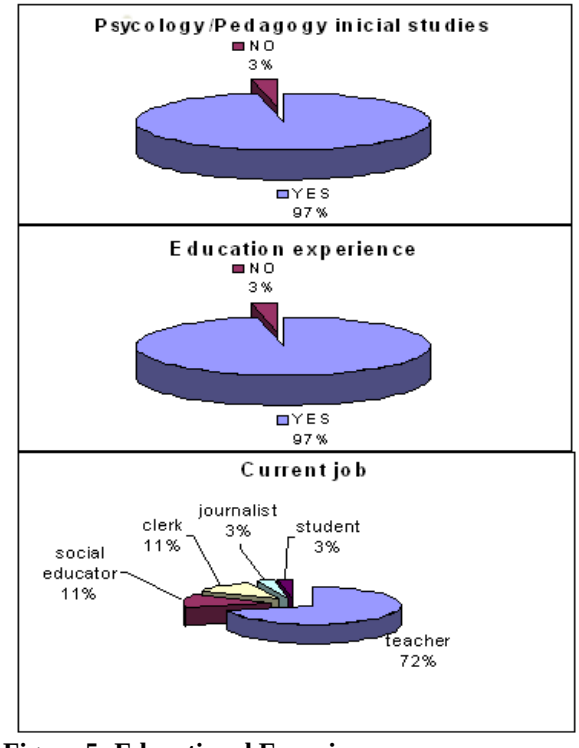


Figure 5: Educational Experience

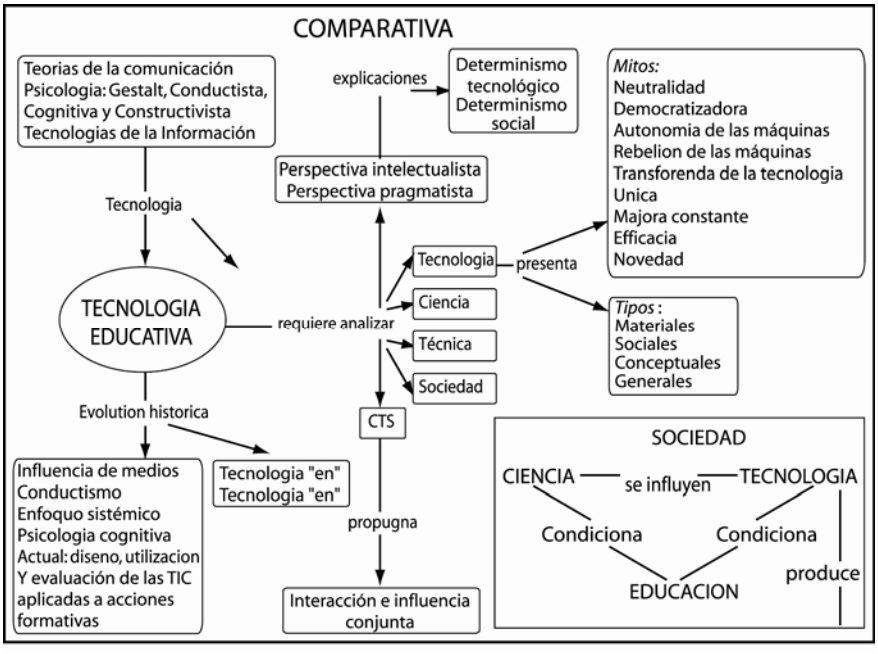
Results regarding qualifications in the sample are similar to those obtained by the entire qualified students. Among the 112 students that finally qualified 78 % were in A while in the sample 74% qualified with A as seen at table 1.

A	**87**	78%
B	**21**	19%
C+	**4**	4%
TOTAL	**112**	**100%**

Table 1: Final Global Qualifications

Results Dealing with own learning

Students were asked whether they had a conceptual change regarding the relationship among Science, Technology and Society applied to Education or experienced only incremental learning and if this learning was meaningful or not. 84% of students described having a conceptual change, while 16% had only incremental learning. In addition, students were asked to justify their answer, especially if a conceptual change was reported. Figures 6 and 7 show how students used a mind map comparative analysis as one way to justify saying that they had experienced conceptual, and not only incremental, change.



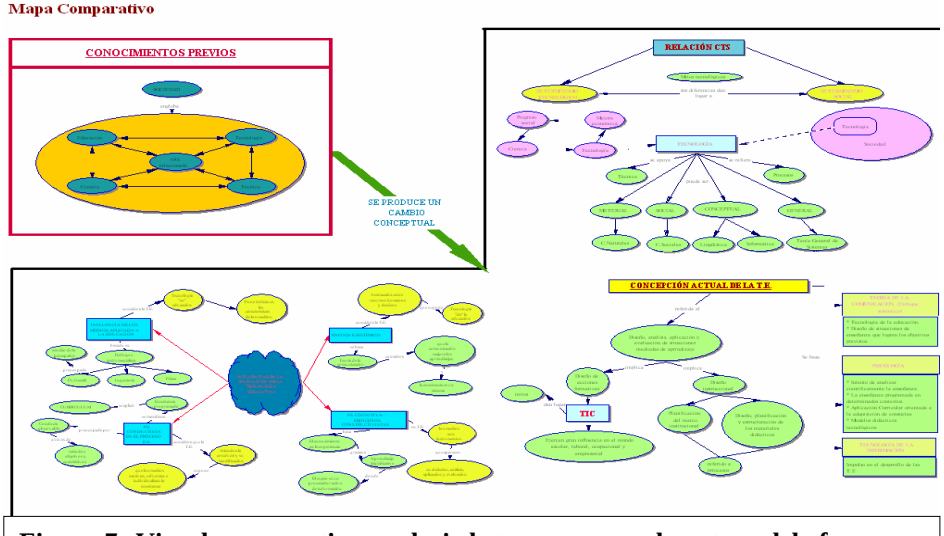


Figure 7: Visual comparative analysis between pre and post models from one student using Inspiration

Five Month Follow-up Results

Five months after the discussion ended, 94% of the students sampled remembered their own contributions together with those of some of their colleagues, (Figure 8), implying that 100% of the students who received an A grade remembered specific contents of the discussion.

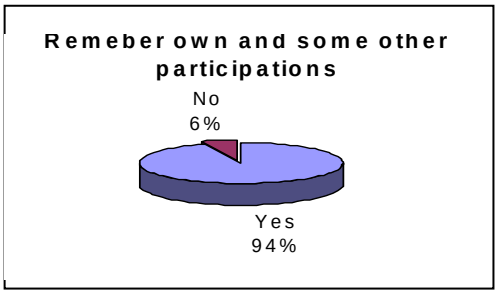


Figure 8: Self-Reported Retained Learning

When asked for the most vivid memories, 54% selected specific content discussed, 51% mentioned the use of argumentation and 34% used meta-language ("thesis", "argument", "premises", "Toulmin", etc.) when referring to his or her memories (multiple responses to the same question were permitted because it was an open question).

Figure 9 presents these results visually, classifying answers as Spe**c**ific contents, referencing the Inno**v**ation and using Meta-language .

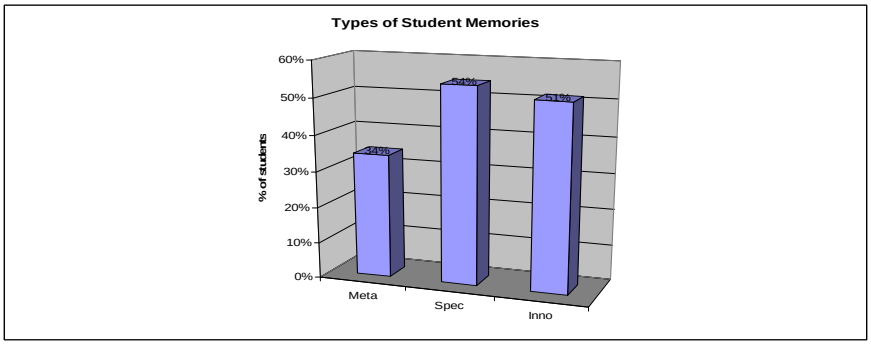


Figure 9: Types of Student Memories

As mentioned the discussion was organized in four different topics or sub-discussions, each of which provided a different context for the discussions: schools, sociology analysis, medical techno-power situations, and international cooperation and digital divide. We also asked for the reasons why the students had chosen one or other focus of the discussion (see Figure 10).

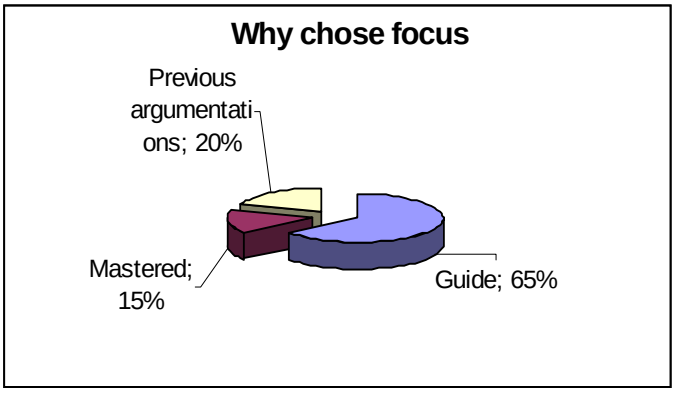


Figure 10: Reasons for Choosing Problem Context

65% decided their focus based on the Guide while 20% chose their context from previous participations of the students and 15% chose previously mastered content.

The research shows improved student attitudes towards online discussions after the experience.

We asked students to rate themselves as follows;

- I learn from discussions.
- I am anti-discussions.
- Some discussions are useful while others are not.

Comparison of the pre and post questionnaires (September to February) reveals differences in all categories of attitude change (see Figure 11).

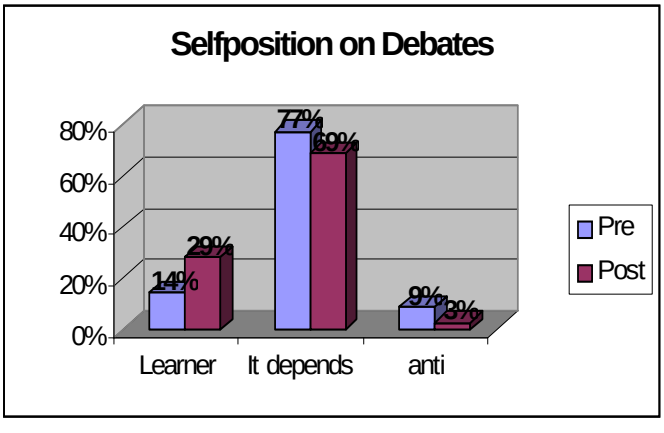


Figure 11: Student Attitudes to Online Discussion.

Similar changes were observed when they were asked to rate the online discussions on a 10-point scale along a number of dimensions. The average ratings before and after are shown as follows:

Qualify online discussions

- Before: 6,25 / 10
- After: 6,94 / 10

Qualify our discussion[4]

- After: 8,54 / 10

To assess the value of the different strategies and resources used, the February evaluation asked students to rate the discussions held and different innovations used some months previously.

Innovation	Qualification
 Focus. The discussion was held in four different sub-discussions with different context of the problem.	8,83 / 10
 Threads. The discussion asked to be careful with the different discussion threads that ensured cohesion in the cooperative argumentation process.	8,60 / 10
 The guide set the contexts and the problems for discussion and the basic rules to follow.	9,26 / 10
 Argumentation Structure constrictions in the production of contributions.	8,94 / 10
Post it marks to give specific feedback dealing with the content or structure of the argumentation.	9,14 / 10
Balls use to "meta-mark" the different kind of messages posted: thread starting, recommended message, moderation message...	9,09 / 10
GLOBAL discussion qualification	8,54 / 10

Table 2: Student Assessment of Different Innovative Elements

Among the learning activities we asked the students to classify (and justify by writing and graphically comparing both mind maps as showed in Figures 6 and 7) the learning obtained with the discussion combined with the reading materials about Science, Technology, Society and Education.

[4]We asked for previously rating online discussions based on their own experience in online debates in our university and others. Of course we did not ask previously to rate our innovative debate.

100% reported meaningful learning. However, while 85% reported having experienced a conceptual change, 15% reported having obtained conceptual enrichment rather than conceptual change.

Results seem to show a significant conceptual change, meaningful learning and a high evaluation of the innovation. Students who experienced conceptual change stressed the importance of the group discussion, especially the way colleagues defended their thesis and the controversies over premises. These results support Paulsen's (2007) assertion, as outlined in his theory of Cooperative Freedom. (c.f. in this volume), that this type of online discussion constitutes collaborative learning.

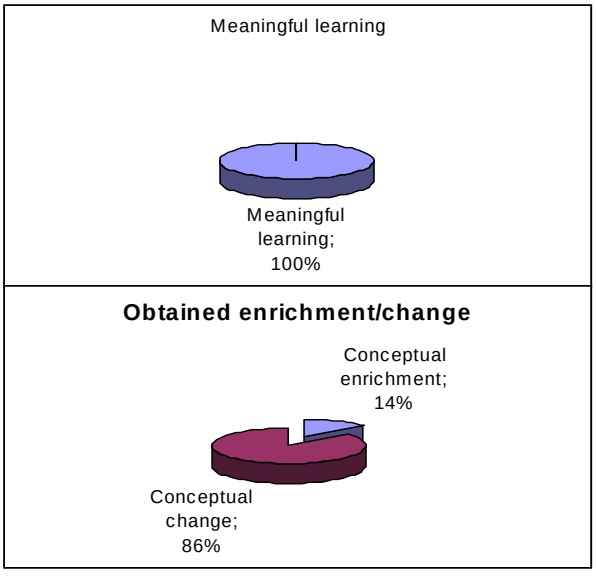


Figure 12: Own Learning Classification

7. Contribution, Implications and Further Challenges

This strategy of design, implementation and evaluation of online discussions has been well accepted with good learning results and high knowledge exchange. However there are implications that must be considered.

Firstly there is the effort required by students and moderator. The new discussion organization requires that the students understand and integrate some competences about argumentation. This content is part of the subject the students were studying. It is the case of "ICT and Education" as reported in this article, or "Introduction to Knowledge Management" in some other similar pilot experiences that we previously held. However the question must be asked as to whether these results justify the use of argumentation within other knowledge areas. Our experience answers affirmatively but further research is required as well as a corporate decision about the competencies map showing the distribution of competences in the different subjects cycles, that compose study programmes. Fortunately the European Bologna Process pilot projects count argumentation among the core competencies that must be acquired (González & Wagenaar, 2003).

Secondly, during the discussion period the teacher's/moderator's reading of student comments and supplying of feedback should be time limited, (in less than 24 – 48 hours if possible) so as to be effective. As reported in other studies, the teacher/moderator role has been perceived as one of the most decisive factors in the discussion success. However, as shown in this project, students can significantly facilitate the task of tracking the discussion by marking his or her argumentation structure.

In terms of the students' perspective on the problem-solving process, it seems that neither the Guide nor the Toulmin structure has constrained the process as Kenny, Bullen, and Loftus (2006) reported. However this process has to be analysed in much more detail because this research has not studied the different conscious steps taken by the students nor was a content analysis undertaken of the messages posted or the argumentation of the kind of learning and changed experienced.

This perspective could be useful with specific tools and designs like the one presented by Guàrdia, Sangrà and Maina (c.f. in this volume) because the case study approach as a semi-structured problem can be used to generate online discussions deletion made that might generate interesting argumentations-based interactions.

During this study other research questions worth exploring have been revealed. For example;

1. Which type of problems best generates discussions?
2. What kind of feedback is best for each situation?
3. How can knowledge construction be drawn to describe the learning community that is discussing and building arguments? Can Toulmin's model be useful for that purpose?
4. Does the same process and results occur with multicultural students?
5. Can similar designs be used in other e-learning environments, such as Moodle and its discussion capabilities? [5]

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ELENA BARBERÀ & MERCEDES AHUMADA

Assessment of Research Competences Using e-Portfolio

Abstract

The challenges posed by the assessment of distance learning is a topic that requires, on the one hand, evolution with new trends and, on the other improving evaluative processes, to promote good practices. This demand becomes more imperative when we are dealing with a formative scenario based on distance assessment of competence-based learning.

The Open University of Catalonia has begun to work with these formative tools, promoting new practices for online education. A very clear example of these educational practices is the assessment of research competences using the e-portfolio system. To meet this aim a profound and solid process has been developed over recent years, with the intention of making this tool an assessment alternative, and providing the opportunity to use it in a formative context. The objective is to study its strengths and limitations keeping in mind the final goal of offering the higher education community a validated assessment system.

Introduction

In the past decade the information society has brought with it new challenges that are generating transcendental changes on the international educational stage. An outstanding component of this, which enables us to materialise the transformation, is the inclusion of the electronic portfolio as a tool to support learning processes linked to personal development (professional, private, artistic, civil, etc.) and, of course, with even greater impetus, in the field of formal education, which is where we will focus our attention from now on.

The e-portfolio emerges as an instrument that enriches the teaching and learning processes, enabling a more profound approach to the types of knowledge the students develop in a given learning context. Many authors and studies argue that the electronic portfolio helps in the construction of knowledge, and promotes a critical and reflexive process in the students. This has overall repercussions for the richness of the learning experience (Cambrigde & Williams, 1998; Bostock, 2000; Richards, 2005; Stevenson, 2006).

In the field of on-line learning, the use of an e-portfolio offers more effective pedagogic resources, as the technology generates processes that are extremely interesting for the construction of formal knowledge. Some of these processes relate to the ease of organising and meaningful storage of the student's documents and studies, as well as the capacity to interrelate them in a personalised manner, creating an idiosyncratic map of an individual student's learning. The presence of the e-portfolio presents the need to redefine important aspects such as the pedagogic concept applied to the formative process and the roles of teachers and students. This requires, among other things, the proposal of more meaningful and pertinent evaluation practices, based on socio-constructive focuses for teaching and learning (Barberà, 2002; 2005)

Situated within this theoretical framework, we can say that all good educational practice requires shifting the focus of the educative process from the teacher to the student. In

this way, responsibility and control are transferred to the student, creating a more meaningful involvement with the proposed aims. For Ash (2000), this increased student commitment, through assessment experiences specifically based on the e-portfolio, is an essential component of their learning success. Without a doubt, it strengthens the development of new attitudes and practices in the students, and empowers them to successfully meet the academic challenges. Defined in this way, the proposed concept for using the e-portfolio in a formative context pivots around the met-cognitive processes of students' regulation of their own learning. The process of communicating their results online plays a key role in this concept, with the feedback provided by the teacher, and the use made of that feedback by the student reflected in the sequence of improved versions of the work.

This chapter aims to show some theoretical and practical elements of an experience that could potentially be considered current good educational practice, within the framework of assessment. The first section looks at conceptual aspects of the terminology, and at the contributions of the electronic portfolio as a system for formative assessment, by examining some of the principles that sustain it. In the second section, the e-portfolio is contextualised as a tool for supporting and monitoring learning in a university environment, defining its essential aspects and the phases that promote profound and high level learning. In the third part, the technical-pedagogical design of the electronic portfolio is explained, and we attempt to make clear the theoretical requirements we have established, and finally, in the fourth section, the e-portfolio is introduced into a specific educational practice – research competences – which supposes the testing and practical of the e-portfolio as an assessment tool.

1. e-Portfolio in Education

1.1. Approaches to the Concept of e-Portfolio in Education

In the commencement, the educational portfolio was only used so that students could display their work to a very restricted audience, generally just the professor who had accompanied them in their learning process. The ultimate end, which is maintained today in many educational contexts, was to publish the progress of their work in these folders, and in this way give clear samples of their achievements. The portfolio as a strategy for assessment emerged in the 1980s when it was conceived as a tool to enable more effective assessment, and at the same time to transfer control and responsibilities to the students. From this perspective, for some authors, the use of the e-portfolio means the specific reconsideration of various aspects. For example, Barret (2005) shows that it implies determining, among other things, the pedagogic-philosophical field that underlies its conception, the nature of the aims that drive it, and the audience to which it is directed. The reconsideration of these elements, among the many aspects that must be considered, brings us to an inevitable terminological delimitation of what we understand by e-portfolio as an evaluation strategy with an eminently formative character.

In a more essential definition from an educational basis, 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 the learning process. Based on this premise the critical component of the educational e-portfolio is the student's own reflections about the tasks that have been proposed to show their degree of achievement and determine their learning.

The e-portfolio concept is directly linked to the work a student must do when faced with a set of objectives to reach or competences to develop. That is to say, the system should facilitate the clear demonstration of their progress when faced with specific challenges. However, the value of the system does not only reside in this. Perhaps more importantly, it should facilitate the guidance and educational support necessary for the student to really make progress at different levels. From this double perspective (of both publishing achievements and providing support for further progress) the electronic portfolio emerges with the intention of offering continuous learning support and the capacity to assume a number of different roles: favouring collaborative learning, promoting communication of the student's finished products, and facilitating the assessment of the results of the learning, among others. For Schneckenberg (2006) the practice of e-portfolio could be understood as a form of self-assessment of individual competences.

The electronic portfolio is a digital collection of the student's work, selected according to well-defined criteria, which facilitate a pertinent understanding of the efforts, progress and successes attained during a period of training or study. In this way, the electronic portfolio is a means to facilitate educative communication about what the student learns and how they learn it. While these elements may be shared with other evaluation methods, there is, nonetheless, an idiosyncratic aspect to the use of the e-portfolio that goes beyond common assessment practices. This is the process of producing the evidence presented for assessment, as this demands that the student evaluate and justify the content that will be subject to assessment, accompanying it with the criteria that outline its inclusion, the reasoning behind the products shown, and evidence of their own self-reflection about the entire process.

The theoretical and practical bases that underlie the design of an e-portfolio for training purposes are geared towards promoting improvements in the students' learning. An essential part of its conception is the pertinent, pedagogic definition of its different aspects. In this sense, it is worth highlighting that it is up to the teacher to establish the central nuclei that make up an electronic portfolio, and for that he or she must have a very clear understanding of and support the final goals that drives the decision to work with this tool. From this perspective, some important considerations to keep in mind when producing an e-portfolio are (among others):

- the context into which it is being inserted
- the proposed aims
- the processes that the students should carry out
- the phases that will enlighten the products produced by the students
- the types of learning expected
- the type of feedback that will be contemplated.

With this dynamic, the definition, planning and organisation of each of these aspects is a *sine qua non* condition for the successful development of the tool.

As is clearly shown, the e-portfolio demands that the student take responsibility for both the process and the resultant product. For Walti (2004) the student requires more guidance of the teacher for e-portfolio development, in more detail and with more consistency with the purpose of facilitating the construction of your progresses of learning across the electronic portfolio. Not all electronic portfolios can be understood

from the perspective we are presenting here. This means it is necessary to introduce approximate classifications that, on the one hand allow us to situate ourselves within the basic typology of the different electronic portfolios that can be found, and on the other hand, avoid possible confusion in practice.

1.2. Typology of the Educational e-Portfolio

Producing a classification that includes all types of e-portfolio used in the field of education is no easy task, as it requires a collection of elements to be taken into account that help us to discern the uses and focuses of a given e-portfolio. The classification of electronic portfolios is currently determined by the final use that is made of it. So the nature of the evidences included within it allows us to categorize it under one or other e-portfolio type. There is a wide range of formal electronic portfolios typologies, proposed by different authors (Siemens, 2004; Lorenzo & Ittelson, 2005). We include here the definitions proposed by Ash (2000) as it brings together and synthesises many other classifications.

- *Instructional e-portfolio*: aims to including the intermediary and final products of the teaching and learning assignments and processes carried out by both teacher and students, meeting a set of objectives for developing competences that must then be demonstrated. It generally promotes the capacity for reflection about the products included in the portfolio and allows the progress made to be exchanged with peers. It does not necessarily aim to carry out processes of assessment, as the principal focus consists of supporting the process of instruction, linking the students and providing the skills to accumulate evidence of a diverse nature, to complement the classroom experience.
- *Professional development e-portfolio*: this type of electronic portfolio allows the public demonstration of a set of professional skills, products and competences. The aim is simply to promote these aspects to a given public for a specific end, in this case, learning, accreditation and the expertise related to ongoing training and the professional career. The aim is to display the efforts and achievements of the e-portfolio's author at different levels, following personal criteria (similar to curriculum vitae, for example) or institutional criteria, if it is a specific job requirement (for promotion, assessment of performance, control of achievements, etc.)
- *Assessment e-portfolio*: this is a more precise tool with the aim of qualitatively and quantitatively evaluating the evidence of achievements presented by students, according to institutional accreditation requirements. This e-portfolio type includes, in broad strokes, accumulative e-portfolios that aim to evaluate a student's final products over an academic period and formative e-portfolios that are centred on the support and assessment of the learning process. We will look at this last example in more detail in the next section, as this chapter deals with the practice of this kind of assessment.

1.3. The e-portfolio for Assessment

The electronic portfolio geared towards formative evaluation is one of the many alternative strategies for assessment learning progress in a given field. It implies the production on the part of the student of a series of works that are placed in the e-portfolio according to clearly defined criteria which later help in their assessment. The flexibility facilitates progress in the student's academic efforts, to the point where the level of

expertise is such that the proposed objectives can be considered achieved and consolidated.

The experience of using the e-portfolio as an assessment tool supposes advocating authentic evaluation in which the process and results are linked in a specific context and promote achieving the academic aims (Mueller, 2005; Chang, 2005). From this perspective the practical application of the electronic portfolio as an assessment strategy opens the way for progressive improvements in the students' performance, as they receive meaningful feedback produced by the teacher in the light of their evidences and of the evaluation rubric that has been designed.

Implementing the electronic portfolio within the authentic evaluation model means that the teacher must prioritise, among other things, a continuous and formative evaluation, which enriches the student's learning.

Within this framework of action, the teacher's task grows and becomes more dynamic. He or she must conceptualise all the elements that make up the assessment, define the criteria that will serve to evaluate the students' progress, design the evaluation rubric, establish the type of feedback he or she will give, and familiarise the students with all the production and assessment phases of their evidence. The teacher, as well as being a guide, becomes the facilitator of a genuinely authentic evaluation experience that is meaningful for the students. Some authors (Ahumada, 2005; Johnson, 2006; Nieveen & Dudink, in this volume) emphasise that when the teacher acquires a strategic role that gives the assessment processes dynamism, they encourage the student to undertake critical reflection on his or her own processes and products. This leads to real learning improvements. It follows that this sort of teaching practice, managed by the teacher, leads to substantial improvements in the learning achievements of the students as it effectively and actively involves them in the assessment process, thus making their academic and personal achievements more meaningful.

It is vital to clearly define the purpose of the process of evaluation through the e-portfolio (Stiggins, 2002). That is to say, we must be clear whether we *evaluate the learning* or focus on empowering the experience of the electronic portfolio as a strategy of *evaluating in order to learn*. The value of this second perspective lies in the fact that the students increase their learning as they prepare the evidence that will then be subject to assessment. The inclusion of reflexive processes is important here. The students must reflect on the product they will publish, and this allows them to sustain what they have learnt in a given phase. For Moritz and Christie (2005) this last point is the strategic axis, because if the student adequately applies their critical thought in the reflexive phases and in self-analysis of the process of producing the evidence, there is no doubt that this will produce an extremely meaningful learning process with real possibilities for success.

The practical application of the electronic portfolio also brings changes in terms of attitude that stimulate the effective involvement of the students and empowers them to continually evaluate their efforts. In this sense the formative e-portfolio facilitates meta-cognitive processes in terms of the self-regulation of learning (Boekaerts, 1999) in which the student plans, develops, and strategically evaluates his or her own processes and learning products. Using this framework, the next section deals with the specific application of the e-portfolio as a strategy for evaluating learning based on competence in a university environment. In order to do this we will look at some essential aspects that will enable us to better understand what was carried out in practice.

2. e-Portfolio as a Tool to Enhance Deep Learning of Competences in the University Context

In today's educational environment, the e-portfolio is becoming increasingly widespread, and more and more faculty members are considering its use. The electronic portfolios already widely used within the framework of some disciplines, as a learning and assessment tool of competences. Its inclusion is progressive and has a variety of different purposes (Hartnell-Young, 2006). If we seek to encourage regular implementation of the e-portfolio, it is very important to deal with its conceptualization, internal structuring and competence concept as well. Assessment of competences is very use in the European framework these after years in higher education. The concept of competence is complex, dynamic and implied the combination and mobilisation of different kind of resources (Cattaneo & Boldrini, in this volume) and combines knowledge, skills and action following six progressive steps from information to professionalism (Ehlers, in this volume).

We can agree that an assessment process implies the selection, collection, analysis, interpretation and use of the information that fosters decision-making, and we know that within a university context these decisions must be focused on learning and the development of professional competences in the students. The relationship between competence, learning and assessment is central to any possible scenario. It is therefore indispensable that the experiences of assessment meet two basic requirements, to the best of our capabilities: to assess competences, and to be beneficial on the learning process. Now we can advance our description of some of the reference points that help to clearly outline the university teaching context in which the evaluative practice of this e-portfolio is situated.

2.1. Aims and Elements of the e-Portfolio

The *raison d'etre* of a formative e-portfolio at university is understood in terms of the identification of a certain deficit in terms of the student's continued implication in their own learning, as well as being understood in terms of the ever more complex management of information coming from different sources and promoting well balanced learning.

The presence of tools such as the e-portfolio in the university aims to achieve:

a. Actively involving university students in the evaluation and continuous revision of their academic work. This demands self-evaluation of both the process and the product, often going beyond the academic year, and requires clear evaluation criteria that enable self-directed learning.
b. Demonstrating the students' achievements through authentic tasks, in many cases chosen by the students themselves. This requires teachers to reflect on their practices and narrow the gap between teaching and learning through the assessment practices they promote.

In our specific case, these two aspects have been taken into consideration from the very beginnings of the project of assessment of learning based on competences, in a research environment, in a university context.

Without prejudicing other aspects that could be included, we considered (and later translated into practice) three main theoretical axes, on which rest the effort of turning

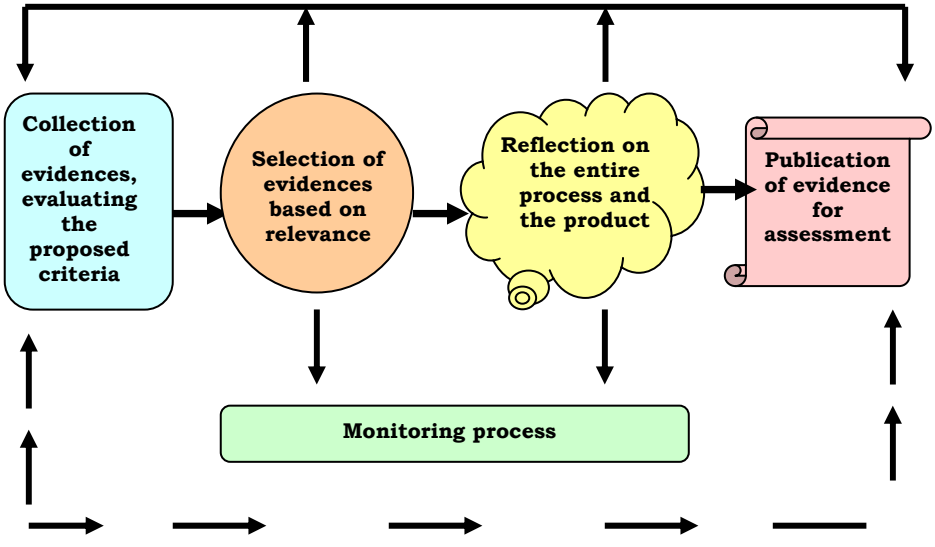
the university educational needs into evaluation material and tools for the meaningful construction of knowledge. These three axes were briefly as follows:

- The *competences*: those capacities to be achieved on the part of the students, which are very closely related to the professional context. In this specific case, five research competences were developed and evaluated in a pilot test.
- The *evidences*: documents selected by the student, reflected upon and presented in the e-portfolio, keeping in mind some established and explicit criteria that show 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) and that they are extracted from different contexts (academic, professional or everyday life).
- The *assessment criteria* described in a rubric understood as a matrix of the different levels of achievement and development, which enables the monitoring and assessment of the student.

Understanding how these elements of the e-portfolio develop leads us to a succinct display of the phases proposed by the students to carry out their e-portfolio work.

2.2. Phases

Among the different phases that should be contemplated in the developing an e-portfolio, it is possible to identify the following:



We will go on to present a brief description of the most important phases of the student's work in carrying out an effort of this nature, the aim of which is to assessment learning progress.

- *Collection of evidence*. The collection of one or more pieces of evidence by the student requires a significant amount of time, to organise and plan the work or

assignment requested by the teacher. In this sense, Ash (2000) shows the importance of opportune guidance from the teacher as to the products the student must prepare for later decisions about inclusion in the e-portfolio. She states that the criteria must be very specific, enlightening the planning process and structuring the collection evidence that the student will undertake, in such a way that the students are directly linked to the learning achievements they are trying to demonstrate.

- *Selection of the most suitable evidence of the competences being worked on.* This phase demands rigorous guidance from the teacher, which allows the students to apply criteria of quality and relevance to the selection of their evidence, taking into account the aims and competences that are the subject of the assessment. In this case, the selected material should be directly related with the evaluation criteria used to evaluate the students' progress in a given area of learning.
- *Reflection on the evidences chosen and the degree of relevance to the acquisition of the competence.* It is a commonly accepted premise that there is a relationship between profound learning and a process of reflection on what has been learnt. Niguidula (1997) proposes the importance of developing a serious and fundamental reflexive process on the part of the students, about what they have produced and selected for inclusion in their e-portfolio. Carrying out this critical and reflexive practice will allow further optimisation of their efforts. Without a doubt, this is an essential phase in the development of the evidence. It requires the student to go back over his or her processes and products and carry out improvements that bring them closer to the proposed aims.
- *Publication of the products in the individual e-portfolio accompanied by the elements that support the process.* At this point, the most important element is the presence of sufficiently solid evidence linked to the proposed area of learning. The nature of that evidence can be very varied and will depend on the criteria previously established by the student and the teacher. The evidence may include (among other things) written documents, images, videos, audio recordings, conceptual maps etc. This final phase provides the material required for a final evaluation of the student's achievements in terms of the competences proposed at the beginning of the process (Barberà et al., 2006).

All the previously mentioned aims and premises embodied in this chapter are based on a formative electronic portfolio, integrated into a virtual classroom, within the doctoral studies programme at the university. It was inserted into the framework of a specific programme of study, in the form of a pilot test.

3. The Practice of e-Portfolio

The Open University of Catalonia has been working on research that supports a competence-based learning assessment project using the e-portfolio within a completely online setting. Throughout the research process, efforts have been made, from a theoretical and practical point of view, to design and implement an e-portfolio within the university context.

This work aims to explain the experience of a term-long pilot test of the e-portfolio initiative in the aforementioned fully online university.

The study programme chosen was part of the doctorate on the Information and Knowledge Society, and the theme was the development of research competences in the educational

field. More specifically the e-portfolio was used to evaluate research competences in a group of 27 students. From this perspective, the essential parts of the final e-portfolio are as follows:

3.1. Presentation

In this section the student, includes a recent photograph to allow him or her to be identified by the classmates and the course faculty. They then publish a slogan to express their philosophy, whether from a professional, or a more personal point of view. This section includes a presentation of the more essential personal characteristics to foster a more personal approach in his or her peers and the faculty.

To conclude this section, two more aspects should be completed: the outstanding works to be shown before the rest of the group and evidence of relevant work experience.

3.2. Competences

The course develops five research competences (explained in detail below). A definition of each 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 were provided in this section. It is worth mentioning that each rubric was discussed with the students in a virtual workshop carried out before beginning the course, in an attempt to initially familiarize them with the tool and its fundamental components. We will speak briefly about this workshop later on.

3.3. Monitoring

In this section of the e-portfolio, it is possible to find the teacher's monitoring process that has taken place during the development of the course. In this space, every student's electronic portfolios is included, providing access for the teacher to their publications of evidences of the competences worked on throughout the semester, and to opportunely assess the process, or level of progress shown. It is important to emphasize that our goal was 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 training environment previously mentioned.

To adequately develop the e-portfolio pilot test, a virtual workshop was carried out in order to familiarize the students with two essential components: the tool and its operation, and the assessment of learning linked to competences, in this case for research. Before giving the workshop, a theoretical reader containing the conceptualization and purpose of the e-portfolio as tool for learning and assessment was distributed. The workshop took place over a 3-week period, the time in which one of the teachers successfully met the objectives initially established. It is also important to indicate that access to the virtual workshop for the students was maintained throughout the course to facilitate doubts or problem solving, whether by consulting the interventions of other classmates and the teacher in the workshop space, or sending a message directly to the consultant in charge.

A second element of central importance to this point is that during the virtual workshop the students received the instructions they needed to be familiarized with the tool and in more than one case we worked with some of them in synchronous modality to help them succeed in the tasks assigned. One of these assignments was to develop the opening section of the electronic portfolio of each student, for which the teacher designed her own, to be used as illustrative reference of the actions and product expected.

The e-portfolio's supporting platform is designed for general university teaching, taking into account all necessary aspects for its transfer to other education centres or environments. In the present case, it was tested within the framework of a content, (professional and research competences) that is universal enough for its application to enable us to extract conclusions and challenges for future application, as you can see below.

4. Specific Content of Assessment: Educational Research Competences

In the framework of the online classroom for teaching research competences, five forums were created, one for each competence. After the virtual workshop, the problem forums started, each with a general question. The intention was that students analyzed the information provided to identify the different components of the problem and display with clarity a fundamental resolution of the stated problem.

- Forum 1: **Problem**. The teacher presents a problem to be solved and the students have to collaboratively write a research question.
- Forum 2: **Hypothesis**. Students elaborate a preliminary and formal answer to the question with the help of the teacher.
- Forum 3: **Exploration**. Students search for articles and relevant documents to correctly support their final, individual answers.
- Forum 4: **Exchange**. Students exchange the documents and comments found in the exploration phase, through the virtual classroom.
- Forum 5: **Integration**. Students write a definitive answer to the question or problem, contrasting the hypothesis with relevant and shared documentation.

The forums were guided by a teacher with the aim of linking the students' learning experiences with the competence being worked on in the forum space. Each forum facilitated a direct and close monitoring process to foster the attainment of the goals and to clarify any doubts. It also provided the necessary feedback from both the teacher responsible for the forums and from the other classmates.

In the forums, there was also the opportunity for reflective discussion about issues related to the competence being worked on at that moment. At the end of each forum there was a global agreement phase among the participants with a view to future forums and allowing the group to move forward in the learning process.

It is interesting that the forums for "problem", "hypothesis" and "integration" were mostly carried out on individual basics, but collaborative processes took place in the "exploration" and "exchange" forums where participants must produce a common database based on the problem initially proposed and reach consensus by the end of the forum.

The students generated sufficient material in these forums to select a document as evidence of learning. The processes of revision and improvement of the versions of their evidence have led to self-regulated pieces of work, of a high enough level to demonstrate the development of the required research competences. The reflection and feedback process began with the students first contributions and formed a continuous regulatory axis to the process.

When a student starts working with the e-portfolio he or she should have an adequate understanding of the task: what is expected, and the formal aspect of its delivery. They

should also have the opportunity to propose it to the group of classmates and to exchange experiences.

This means:

- Having a clear definition of the competence to be evaluated and what was to be included in the e-portfolio.
- Explaining to the students the relevant types of possible evidence to be presented and the formality of their publication inside the electronic portfolio.
- Present the process and the tool to be used for the assessing the students' products: the rubric.
- Promote the exchange of products to improve and optimize their progress.
- Provide effective and pertinent feedback on the students' efforts.
- 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 student's progress, including emphasis on:
    - a *comprehensive presentation* of 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 in the competence being worked on.
    - *meta-cognitive reflection* about the learning process related to the competence. It is also recommended to develop a process of comprehensive and deep reflection, on the part of the students. All the actions and meta-cognitive reflections that are included should support and consolidate the evidence presented. (It would be a problem if efforts lacking comprehension of the process experienced by the student were submitted, given that evidence should be selected based on crucial issues, such as: 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 these four elements is the core of evidence presentation, to provide feedback based on the specific rubric and other comments. These are explicitly included in a display page on the e-portfolio including communication tools. In other words, it is a matter of fostering meta-cognitive questioning of the process as well as the product. Guide them to reflect on 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 in the form of a qualitative contribution, depending on what the specific electronic portfolio allows.

The production of the evidence requires a process of substantial improvement of their product in the light of feedback from the teacher (there were various versions of a single piece of evidence, what have been optimised over time until reaching the final version). This qualitative and quantitative progress in their efforts towards a given competence and the improvement of their published evidence was an aspect that the students appreciated by the students as it increased their expectations and involvement in their learning success.

Conclusions

One of the first conclusions is that the students received the introduction of this sort of new evaluation focus very well. In our specific case, the practice of the formative e-portfolio supposes a direct benefit for the students in terms of monitoring (receiving high quality information about their learning process, strengths and limitations) and this brings with it a more profound and permanent work, inside an environment that can be more unstable if it is unknown.

A second conclusion that we reached is that the initial stage of the virtual workshop in this pilot experience was 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 third conclusion is linked to how the teachers of the course in this pilot experience should assess the complexity it encompasses and how time consuming it can be. We are facing an experience that is different from traditional forms of assessment, and more so because in our case it was oriented towards the attainment of competences, which implies new roles for 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 fourth conclusion is that the feedback provided to the students was oriented to consolidate learning. They were therefore praised for their accomplishments and encouraged to reflect on what is yet to be achieved. Based on this premise, it is important to remember that we were working according to the system of formative and continuous assessment. Consequently, the feedback was framed to promote values such institutional guidelines at the moment of the evaluation.

The final conclusion is that this pilot experience has improved understanding of the student's efforts, directly geared towards emphasizing an assessment that promotes improvement of their learning. That is why we consider it essential to facilitate experiences and opportunities so that learning can be adequately consolidated.

We wish to make some proposals in the hope 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 reach an opportune consensus with the student. That is to say that both parties should know the terms on which the learning will take place, how the monitoring will be done, the type of accompaniment that will be given and which aspects will be emphasized by the professor in the development of the student's e-portfolio.

A second recommendation is geared to pointing out that we were in a virtual environment. The procedure for commenting on the progress therefore provided some examples that foster new challenges. The new ways of talking about those aspects still in process should be very clear so that the student understands what we intend to communicate.

We shouldn't forget that students always expect 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.

Emerging Proposals

On carefully revising the points that we have developed in this chapter, and taking into account the contributions of the external evaluation carried out by Dr. Helen Barret, and the feedback from the users themselves (the students) we can see that some aspects require improvement or inclusion in future proposals of this nature. We will mention on only a few of these, with the aim of showing that there is still a lot to do in the field of teaching and learning processes using the electronic portfolio.

- In the field of university education there is an urgent need to examine the nature and purpose of learning and the processes of assessment, taking into account that close links between the two processes. Re-examining these and other elements should happen in accordance with the current demands being made by society: incorporating the perspective of competences and the processes of evaluating the learning of said competences.
- It is vital to transfer an active and decisive role in the assessment process to the students. In this sense it is important that the student assumes the corresponding levels of responsibility for assessment of his or her learning throughout the training process: negotiating the criteria, evaluating time commitments and the quality of the work produced and the evidence selected.
- It remains to more clearly define the opportunities that come with evaluation experiences based on the e-portfolio in terms of the benefits of the tool which can help provide more immediate and relevant assessment experiences.
- It is necessary to invest in interoperable technological resources what enable the success of this type of learning evaluation experience, thus promoting meaningful improvements in the student's training experience.
- Given the nature of the implementation of the e-portfolio as an alternative strategy for evaluating learning progress, it is vital to reflect on the opportunity to integrate the experience within the formative curriculum of a given professional profile. That is to say that transversal conception and facilitates the registering of learning progress in the course of the study. In this way, we can avoid it becoming an isolated experience, lacking in meaning because it is not articulated, or conceived as structural or transversal part of their training.
- The feedback provided by the teacher, at both an individual and group level, should be a motivation and an effective opportunity to provoke participative discussion and learning for all the students participating in the experience.

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