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Fostering cyberlearning in European teacher education

1. Demands in new educational technologies

As higher education has experienced a massive expansion in recent years, teachers and learners will need to work in different ways. Especially education as a traditional activity has been fairly resistant to the integrated adoption of new educational technologies, despite the 'hype'. As a result its structures rarely make effective use of any new developments, no matter how good they are. On the other hand, neither have the possibilities of simple and well-known technologies been used to their fullest capacity (e.g. websites, Email, newsgroups). In education, organisations and in society (family, peer group etc.) the adoption of new approaches is not linear over time and threats to the status quo may dominate responses to new developments.

It is argued that there is a need for evolution of new pedagogy, more relevant to the 21st century. Failing to adapt to technological change is simply denial of the future, as technology, and particularly the Internet, would have the power to transform education. These arguments are most probably relevant, but we argue that teachers' existing pedagogical skills should not be underestimated when we study and make plans for the future. Also, we argue that when choosing technologies they should be appropriate for educational needs (e.g. Ojala, Siekkinen, Wright, 1996). In detail, the following requirements have been generally stated for the new pedagogy (e.g. Burge& Haughey, 2001):

- Remove barriers for open-ended learning.

- Make university learning available regardless of national and geographical location.

- The technology itself can make us aware of an experimental/tentative mode of learning, waiting not only to explore but also raise critical perspectives (e.g. lack of skills and unfamiliarity with new technology, because we all are trained in traditional classrooms)

- Supporting teachers turn into facilitators, and students into information gatherers

- By rejecting the business model of education where students are only customers and teachers are knowledge workers, we can accept a collaborative model where both students and teachers produce knowledge and change knowledge interactively and democratically

Furthermore, there are some critical arguments for the requirement for 'new pedagogy' (e.g. Tella; 2003, Karevaara & al., 2002)

- Although there are certain characteristics in web-based teaching, after all, the basic principles of teaching remain the same despite [] the environment

- If universities encourage teachers to develop cyberlearning, sufficient resources should be offered

What are teachers' new roles and responsibilities in the future, then? Teachers' new role is e.g. selecting and preparing learning materials rather than only delivering them, as students of all ages need to learn more independently. However, the positive incentive for teachers is that, as easily accessible technology puts the power in the hands of the user, a systematic use of technology ought

to enhance, not limit, the role of the teacher. In detail, teachers in cyber classroom learning (e.g. Burge& Haughey, 2001) should be prepared for:

- Uncertainty

- Willingness to experiment

- Sharing experiences

- Supporting students' understanding.

- They also need new skills for evaluating practice:-

- To take the roles of facilitators, managers, resource specialists, co-operators etc.

- Also the development of social skills including cooperative problem solving, teamwork and collaborative activities are essential.

Students also need new learning skills. It is recognized that they need to:

- Express personal needs and choices

- Accept their own strengths and weaknesses

- Willingness to communicate and participate fully

- Willingness to critically reflect on their own learning experiences etc.

Interestingly, in the 1990's it was argued that the chief beneficiaries have been non-traditional students or those with limited access to regular study programs. However, currently it could be argued that in the future, perhaps 2010 and onwards, all students should be beneficiaries of the new technologies. Namely, with a wider introduction of tuition fees, students will begin to demand cost-efficient and learner-centred higher education, focusing on their individual needs and demands. Delivery systems must therefore be open to giving access to new information and knowledge regardless of time and space and to developing lifelong learning skills, such as critical thinking and teamwork. It is likely that many higher education institutions will seek to offer online courses in the future to meet the educational needs of the newly computer-literate society.

However, we should remember also the following critical arguments when emphasising teachers' and students' new roles (e.g. Nevgi, 2003):

- The students cannot study wherever and whenever they want if there is a social aspect in studying

- Teachers' workload will not become lighter, on the contrary, students need a lot of tutoring

2. Experimentations

In the recent past some experimentations have been conducted aiming to implement information and communication technologies in traditional teaching practice in higher education. In the following we describe briefly three experimentations of which we have had first hand experience.

**Cooperative Inter-university European course**

The Cooperative Inter-university European course (1998-2000) for teacher education was established between participating universities in Finland, Germany, France, the UK, Italy, and

Norway. This electronic EU-supported product made it possible for students to study nine extensive units in themes like Language Awareness, Preschool Education in Europe (see Ojala, 2000), Material Wealth in Europe, Nation and Nationalism, Educational Systems and Market Logic, Prejudice and Stereotypes, and Identities in Europe. Each unit was available with monitorial support for students in all participating universities. The students were working and communicating with the Internet. At the end of their learning period there was the obligation to produce a shared essay which was evaluated by the author of original unit.

Preschool Teacher training in the University of Helsinki

The role of ICT (information and communication technology) is interesting when it is implemented in the most concrete part of student-teachers' studies; the practicum in kindergarten**.** For evaluating different aspects of ICT, Kairamo (1999) presents a useful tool (Figure 1).

Figure 1. Kairamo 1999. Teaching in the network.
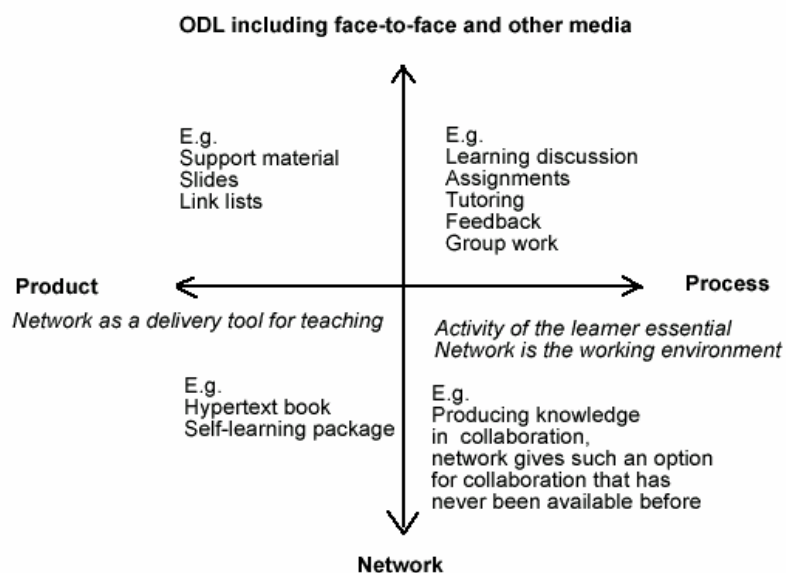
There are two axes in the model. The vertical axis is "open and distance learning (ODL) including face-to-face and other media" versus "network". The horizontal axis is "product" versus "process". These axes describe the possibilities of teaching in the network (note that sections can be overlapping and an e-learning course can contain aspects from one or more sections).

First, a network in e-learning could be seen as a delivery tool for teaching where the network is mainly supporting face-to-face teaching. This seemed to be an easy and helpful way to give access to information for student-teachers, practicum teachers and lecturers alike. The materials included instruction, forms and timetables.

Secondly, the network in e-learning is not only a delivery tool for teaching but the focus is more in studying in the network and individual learning. E.g. the lecturer puts interactive learning materials for student-teachers on the course website. (PRODUCT – NETWORK). The students had access to guides for collecting materials and doing observation in psychology, pedagogy and visual arts. This part of the implementation also seemed to be relevant, according to the student feedback.

Thirdly, the network is supporting face-to-face teaching but there are also interactive activities online, e.g. tutoring discussions with chat or newsgroup. The network is not only a delivery tool for materials. (ODL INCLUDING FACE-TO-FACE AND OTHER MEDIA – PROCESS). In the pilot study the students had the possibility to use chat and a discussion forum. The forum was meant for

exchange of ideas and experiences, but maybe the contacts during practicum in the kindergarten were more important, because only about one fifth of the students used the interactive possibilities provided.

Fourthly, the network is the working environment in e-learning where activity of the learner is essential. Producing knowledge in collaboration is possible in a way that has never been possible before. (PROCESS – NETWORK). Different intentions of using e-learning as a way to process the practicum experiences into a new collaborative understanding were discussed but not implemented. The work of a kindergarten teacher is often interaction face-to-face. With children the action is 'here and now' (see Reunamo, 2003). The work with co-workers is primarily group work happening in the same space and time. The processes include personal, intimate and private matters, which often are confidential and develop through a sustaining mutual understanding and trust. These conditions contrast with the characteristics of a virtual learning environment as it is often time and place independent, not face-to-face, and the group work happens through discussion groups, shared files etc. Developing enduring and trustworthy interaction is questionable. Virtuality has no absolute value, but it depends on the subject. The more the subject deals with delivering and producing knowledge, the better. For personal, social and emotional processes the virtual environment can not, at the time of writing, compete with face-to-face interaction.

Pedagogical problems and solutions at the Helsinki University of Technology

Technologies have been a natural part of everyday teaching at the Helsinki University of Technology from the 1960's -1970's. Thus, the use of technology itself indicates a certain pedagogical rationale just as much as does the use of any other teaching method selected. Therefore, based on the experiences of engineers, the aim of this paper is to encourage teachers from other disciplines to trust their pedagogical experience when selecting technologies for teaching.

Teachers' resistance towards tools in education is worrisome because teachers at all levels and in all sectors are key persons in shaping the "knowledge society". The possible reasons for teachers' low motivation for using teaching technology could be *obscure terms* with different prefixes like "e-learning" which is according to Tella (2003) a kind of cliché. Also, *technologies have been overemphasised* because especially during the 1990's, the development and testing of e-learning platforms was popular. On the other hand, the *overemphasised role of the constructivist approach* has perhaps been one obstacle. Finally, there may have been *lack of understanding what "technologies" mean* as according to Karevaara *et al*. (2002), presently the line between hardware and software technologies is obscure because of the multi-layered nature of the programming. The following experimentations from the Helsinki University of Technology will clarify these obstacles by showing that pedagogical aims should be the starting point for using technologies.

CASE	Educational problem	Solution
1 Support material for compulsory mathematical courses (MatTa)	How to reduce the high number of drop-outs in the basic courses in mathematics?	Support material for the students is collected on the Internet for mainly free use. The material is not the same as in the lectures, as [] 3-D moving visualisations and interactive tests will illustrate the most difficult content.
2 Self-study material for electromechanical engineering students (eOpetus)	How to develop educationally high quality material for electromechanical mathematics courses?	Support material with moving images and sound is created on an open website. The basic idea is to explore sustainable ways to produce easily and cheaply material on the web.
3 Visual art in Urban	How to present and evaluate students' visual	The professor and his assistant will start the production process of an open course website and virtual gallery

Planning and Design	assignments more effectively?	with a "learning by doing" mentality.
4 Light version of Problem Based Learning (PBL)– method on mass courses in programming	How to develop a mass course for hundreds of students but with challenging contents?	The PBL method was found to be not directly suitable for mass courses. An application of PBL will be put on the open course website. Students will study independently or in groups, but also regularly meet the assisting teacher.
5 Self-study material for developing studying skills (Teekkarin Tehopenaali)	How to develop engineering students' studying skills?	A freely available website for the students for practicing study skills will be created in the Teaching and Learning Unit. The website contains different kinds of tools, e.g. guidelines for making better notes, and how to prepare for exams.
6 Fully virtual in Industrial information technologies	How to develop an interactive course for open and distance learning students?	A fully virtual web-based course is implemented in WebCT –platform.

A lesson learned from engineering teachers is that realistic, creative, and meaningful use of existing, simple technologies like an open website in everyday teaching provides a sustainable change in all teachers' practice. After all, a successful course – be it virtual, semi-virtual or face-to-face – depends mostly on the teacher's pedagogical skills.

3. Research supported development

Based on pilot experimentations (e.g. Cooperative Interuniversity European course in1998-2000, teacher training experiences in Helsinki University, experimentations in the Helsinki University of Technology) we are planning with several European universities a comprehensive research project about cyberlearning. The project has two general aims:

1. Study and compare cyberlearning conditions, processes, and the results of evaluation studies across European teacher training institutes. (COMPARE THE EXISTING SITUATION)

2. Encourage the implementation of information and communication technologies in everyday teacher education in a meaningful and creative way. (INNOVATION AND DEVELOPMENT)

Important target groups are both teachers organizing training and learners under training. The teacher training programmes are at different levels of teacher training (preschool, primary, secondary, adult, open education, in-service training) In this way we can get a wide variety of experiences about conditions, processes, and contents in cyberlearning. The flexible setting gives room for pedagogical and theoretical experimentation.

Important target groups are both teachers organizing training and learners under training. The teacher training programmes at different levels of teacher training (preschool, primary, secondary, adult, open education, in-service training) are under focus. In this way we can get a wide variety of experiences about conditions, processes, and contents in cyberlearning. The flexible setting gives room for pedagogical and theoretical experimentation. When studying the cyberlearning following objectives and methods can be a special focus:

Objectives	Methods and activities
A. Learning conditions (BLOCK I) 1. What kind of personal experiences have teachers and students had about cyberlearning and what are their personal	Web-based survey and teacher interview Seminars and workshops

interests and motivation in different countries? 2. What kind of technological solutions do teachers use in cyberlearning and how do they explain their choices?	
B. Teaching practices and learning processes (BLOCK II) 3. What are the instructional aims, methods and contents teachers are stating for students in cyberlearning courses? 4. How do teachers and students use technological solutions to achieve pedagogical aims and contents? 5. How does the social interaction between teachers and students change during cyberlearning?	Web-based survey and content analysis Interaction analysis Case studies Country specific and targeted training Seminars and workshops
C. Learning experiences and knowledge construction (BLOCK III) 6. How do the teachers and students evaluate cyberlearning processes in relation to instructional goals, processes, and products? 7. How do students construct the knowledge during cyberlearning in relation to their individual as well as social condition? 8. Based on the findings (1-7), what are the strategies, methods, modules and examples of best practice to improve the implementation of cyberlearning across European teacher education?	Web-based survey Participant observations of students' knowledge construction and project working European training for cyberlearning Handbook for teachers and students Seminars and workshops European conferences and seminars

When implementing the project the following issues are important:

- We will put a great emphasis on training the teachers and supporting them in trying new ideas via project web-site, project meetings and workshops.

- Teachers are encouraged to trust their expertise and experience in pedagogy and to use their imagination, instead of us telling them which is the "right" way to carry out the courses. However, naturally most relevant results from previous cyberlearning research will be critically taken into account.

- Teachers are reminded that simple tools do not restrict and guide too much. In other words, it is permissable to start with simple technological solutions. 'Cyberlearning ' does not have to mean a fully virtual course, but that combinations of contact and web-based learning are possible.

- Teachers will be considered as active participants in developing the theory and practice of cyberlearning

References

Burge, E.J. & Haughey, M. (Eds) (2001). Using learning technologies. International perspective. London: Routledge

Kairamo, A-K. (1999). How to support faculty: experiences from the project Towards virtual HUT. Submitted paper for Online Educa Berlin –conference. Parallel session, theme 1. Designing and re-designing content and methodology for online delivery. Helsinki University of Technology. Espoo. Lifelong Learning Institute Dipoli.

Karevaara, K., & Thuss, F. (2002). A future of eLearning research? Introduction to some Finnish and Dutch perceptions about integrated or blended learning. In F. Buchberger, D. Baur, & K. Berghammer (Eds), @-*Learning in Higher Education*. Linz. Universitaetsverlag Trauner.

Nevgi, A. 2003. Network as a learning environment. Some experiences in from university teachers' point of view about web-based learning. Presentation in YOOP –course 8th January. Lifelong Learning Institute Dipoli. Helsinki University of Technology. Espoo, Finland.

Ojala, M., Siekkinen, M. & Wright, J. (1996). Developing a Multimedia Vision of Children's Learning Challenges fromTheory to Everday Practice. Paper to be presented at the Conference Matkalla tietoyhteiskuntaan. Interaktiivinen teknologia koulutuksessa. Hämeenlinna, Aulanko 19-20.4.1996, Finland.

Ojala, M. (2000). Preschool Education in Europa. Published within the Cooperative Inter-University European Course in Teacher Education. University of Ludwigsburg, Germany; University of Derby, UK; University of Freiburg, Germany; University of Joensuu, Finland; University of Kristiansand, Norway; University of Milan, Italy; University of Ripon, UK; University of St. Etienne, France. February 2000.

Reunamo, J. 2003. Lapsi tietoteknikkakulttuurin kehittäjänä. In Hytönen, J. (ed.) Educational Environment in Early Childhood in Estonia and Finland. University of Helsinki, Department of Teacher education. Research report 247.

Tella, S. 2003. M-learning-Cybertextuality or Mobile Nomadism? In Kynäslahti, H. & Seppälä, P. O. (eds.) Professional Mobile Learning. Helsinki: IT Press.