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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 by 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 any status quo may often be dominant.

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 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.
>
> To make university learning available regardless of national and geographical location.
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> The technology itself can make us aware of an experimental/tentative mode on learning waiting not only to explore but also rise 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 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 of 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
>
> Willing to experiment
>
> Share experiences
>
> Support students' understanding.

They also need new skills for evaluating practice.

To be in 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.

Also students need new learning skills. It is recognized that they need to:

Express personal needs and choices

Accept own strengths and weaknesses

Willingness to communicate and participate fully

Willingness to critically reflect own learning experiences etc.

Interestingly, in 1990's it was argued that 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. With a wider introduction of tuition fees, students will namely begin to demand cost-efficient and learner centered higher education, focusing on their individual needs and demands. Delivery systems must therefore be open to accessing new information and knowledge regardless of time and space and in 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 contrary, students need a lot of tutoring

2. Experimentations

In near past there have been conducted some experimentations aiming to implement information and communication technologies into traditional teaching practice in higher education. In following we describe shortly three experimentations in which we have had first hand experiences.

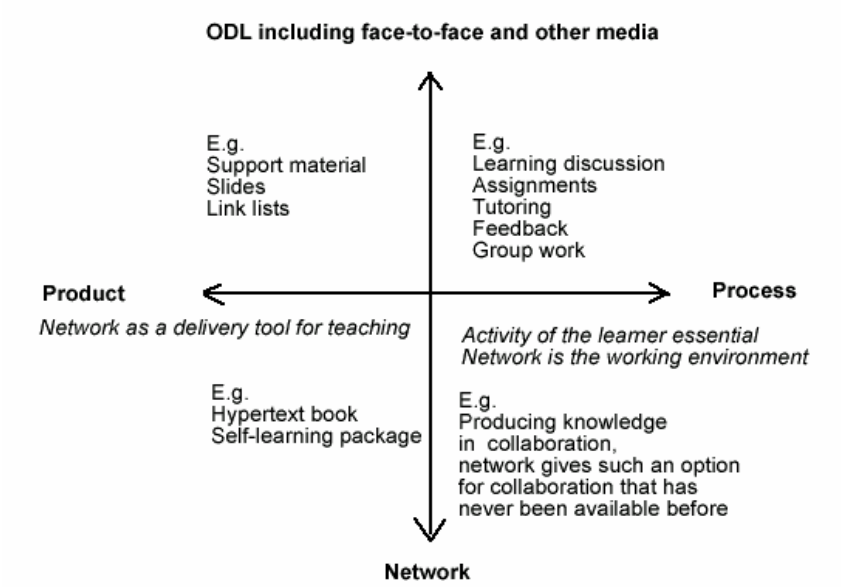
Cooperative Interuniversity European course

The Cooperative Interuniversity European course (1998-2000) for teacher education was established between participating universities in Finland, Germany, France, UK, Italy, and Norway. This electronic EU-supported product made possible for students to study nine extensive units in themes like Language Awareness, Preschool Education in Europe, 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 Internet. At the end of their learning period there was obligated to produce a shared essay which was also evaluated by the author of the selected essay.

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 students' studies, the practicum of kindergarten students. 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 axis in vertical line is "open and distance learning (ODL) including face-to-face and other media" versus "network". The dimension in horizontal axis is "product" versus "process". These axes describe the possibilities of teaching in the network (note that sections can be overlapping and e-learning course can contain aspects from one or more sections):

First, 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 students, practicum teachers and the staff alike. The materials included instruction, forms and timetables.

Secondly, 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. teacher puts interactive learning materials for students to 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 implementation also seemed to be relevant according to the student feedback.

Thirdly, network is supporting face-to-face teaching but there are also interactive activities online, e.g. tutoring discussions with chat or newsgroup. 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, 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 was 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 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. Virtual has no absolute value, but it depends on the subject. The more the subject deals with delivering and producing knowledge,

the better. It was concluded that for personal, social and emotional processes the virtual environment can not at the time of writing compete with actual interaction in the same time and place.

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 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 from engineers, the aim of this chapter 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 in* o*veremphasised role* because especially during 1990's, the development and testing of e-learning platforms was popular. On the other hand, *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 Matta. Support material for compulsory mathematical courses	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 some 3-D moving visualisations and interactive tests will illustrate the most difficult contents.
2 eOpetus. Self-study material for electromechanical engineering students	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 Planning and Design	How to present and evaluate student's visual assignments more effectively?	The professor and his assistant will start the production process of an open course website and virtual gallery with "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 Teekkarin Tehopenaali. Self-study material for developing studying skills	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 doing 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 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 new project named CETE (Cyberlearning in European teacher education). The project has two general aims:

1. Study and compare cyberlearning conditions, processes, and the results of evaluation studies across European teachers 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 as well as learners under training. The teacher training programmes are in different levels of teacher training (preschool, primary, secondary, adult, open education, in-service training) are under focus. In this way we can get a vide variety of experiences about conditions, processes, and contents in cyberlearning. The flexible setting gives room for pedagogical and theoretical experimenting.

When implementing the project following issues are important:

- We will put a great emphasis on training the teachers and supporting them in chancing 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 allowed to start with simple technological solutions. 'Cyberlearning ' does not have to mean 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

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

2. What kind of technological solutions teachers use in cyberlearning and how they explain their choices?	
B. Teaching practises 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 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 Participated observations for students knowledge construction and project working European training for cyberlearning Handbook for teachers and students Seminars and workshops European conferences and seminars

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