

# ICT in Finnish Initial Teacher Education

## Country report for the OECD/CERI New Millennium Learners Project ICT in Initial Teacher Training

Reports of the Ministry of Education and Culture, Finland 2010:25

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## Abstract

The goal of this study was to investigate the current status in Finland for the international comparative study and to present recommendations for facilitating fruitful development in this area. In Finland initial teacher education for primary and secondary schools is presently found at eight universities of which it was decided to choose, in present terms (spring 2010), the University of Helsinki (Department of Teacher Education) and the University of Eastern Finland (School of Applied Educational Sciences and Teacher Education in Joensuu) for this study. The teacher training schools associated with the respective Faculties also co-operated and participated in the study. The questionnaires were translated from the English original to Finnish in an iterative process of several rounds checking some details from the Swedish version to ensure correct interpretations. A request to fill in the forms on the Internet was sent by e-mail to about 200 student teachers enrolled in the final teaching practice period (systematic sampling). Similarly, about 30 teacher educators and 30 mentor teachers were asked to fill in the respective forms at both universities. Another request to participate in the study was sent to about 500 student teachers (the next-year group) and all teaching staff and mentor teachers in November. Persons responsible for teacher education programmes at the two departments filled in the respective forms assisted by several staff members during the first round. They as well as representative groups of teacher educators, mentor teachers, and students were also interviewed (convenience sampling).

We may interpret the survey data, combined with the interview, observation, and other data indicate that the motivation of teacher educators and mentor teachers to use information and communication technologies (ICT) in their teaching and guiding student teachers to use different technologies was high. Wishes for more co-operation of staff members at all involved institutions were expressed. Student teachers were also motivated to use modern equipment and innovative teaching methods, and reported help being available when needed. Peer support was deemed to be very important. Student teachers gave mainly positive feedback, but some saw a problem in the reality of practice teaching being more conservative than the expressed intentions of mentors and educators. Even if modern equipment and an Internet connection of high quality were generally easily available, some practical problems in the accessibility could be identified and rapid technological development was seen as a major challenge. The situation was altogether very dynamic. A few years earlier there had been complete absence of ICT use in some subject areas, but now there was a major effort to update the equipment and to offer possibilities for versatile ICT use throughout the teacher education programmes. Both

Departments involved in the study were active in research programmes focussing on ICT use in education and had a number of younger staff members enrolled in related doctoral studies. Based on the triangulation data including surveys and interviews, several recommendations for how ICT use in teacher education could be developed are given. The recommendations fall under the titles: Strategy level; Teacher education programme; Staff development programmes for teacher educators and mentor teachers; Research and development activities; and Monitoring and evaluation of the strategy implementation.

Tieto- ja viestintäteknikka opettajien peruskoulutuksessa.  
OECD/CERI New Millennium Learners -projektin  
ICT in Initial Teacher Training maaraportti Suomesta

## Tiivistelmä

Tutkimuksen tavoitteena oli selvittää Suomen osalta kansainvälisen, tieto- ja viestintäteknikan (TVT) käyttöä opettajankoulutuksessa vertailevan tutkimuksen edellyttämiä ajantasaisia tietoja ja esittää kehittämissuosituksia. Suomessa peruskoulun ja lukion opettajien peruskoulutusta on tätä kirjoitettaessa kahdeksassa yliopistossa, joista valittiin (vuoden 2010 terminologiaa käyttäen) Helsingin yliopisto (Opettajankoulutuslaitos) ja Itä-Suomen yliopisto (Soveltavan kasvatustieteen ja opettajankoulutuksen osasto, Joensuun kampus) tähän tutkimukseen. Myös yliopistojen normaalikoulut osallistuivat tutkimukseen. Kyselyt käännettiin suomeksi alkuperäisistä englanninkielisistä teksteistä iteratiivisessa usean kierroksen prosessissa käyttäen hyväksi myös ruotsinkielistä kyselyn versiota yksityiskohtaisen tarkkuuden varmistamiseksi. Kehotus osallistua tähän verkkokyselyyn lähetettiin keväällä 2008 sähköpostilla noin 200:lle opettajaksi opiskelevalle, jotka olivat päättöharjoitteluvaiheessa (systemaattinen otanta). Vastaavasti noin 30 opettajankouluttajaa ja 30 ohjaavaa opettajaa molemmista yliopistoista pyydettiin vastaamaan kyselyyn. Vastausten määrä kevään kyselyyn jäi vähäiseksi ja siksi marraskuussa lähetettiin kysely 500:lle opettajaksi opiskelevalle (seuraava ikäluokka) sekä kaikille opettajankouluttajille ja ohjaaville opettajille näillä laitoksilla. Opettajankoulutuksen vastuuhenkilöt näissä kahdessa yksikössä täyttivät avustajiensa tukemana laitosjohdolle tarkoitetut kyselylomakkeet tutkimuksen ensimmäisessä vaiheessa. Heitä samoin kuin muita opettajankouluttajia ja opiskelijoita myös haastateltiin (harkintavalinta).

Kyselytutkimuksen, haastattelujen ja muun kerätyn aineiston perusteella voidaan päätellä, että opettajankouluttajien ja ohjaavien opettajien motivaatio modernin teknologian (tieto- ja viestintäteknikka) hyväksikäyttämiseen omassa opetuksessaan ja opettajaksi opiskelevien ohjaaminen eri menetelmien ja TVT-välineiden käyttöön oli korkea. Myös opettajaksi opiskelevat olivat motivoituneita käyttämään moderneja laitteita ja innovatiivisia opetusmenetelmiä ja heidän mielestään tukea niiden käyttämiseen oli hyvin saatavilla ja tuki arvokasta. Henkilökunnan keskuudessa tuntui olevan tarvetta kehittää keskinäistä yhteistyötä ja vuorovaikutusta. Opettajaksi opiskelevat antoivat pääosin positiivista palautetta, joskin muutamat totesivat opetusharjoittelun arjen olevan konservatiivisempaa kuin opetussuunnitelmassa tai ohjaavien opettajien suullisissa kannanotoissa esille tulleet tavoitteet antoivat ymmärtää. Vaikkakin uudenaikaista laitteistoa oli yleensä helposti saatavilla, saatavuuden suhteen esiintyi kuitenkin joitakin käytännön ongelmia ja nopea teknologian kehitys synnytti suuria haasteita. Kaiken kaikkiaan tilanne koettiin hyvin dynaamiseksi. Muutama vuosi aikaisemmin saattoi

olla alueita, joissa tieto- ja viestintätekniikkaa ei käytetty lainkaan hyväksi, mutta nyt oli opettajankoulutuksessa kautta linjan nähtävissä vakava pyrkimys opetusvälineiden ajanmukaistamiseen sekä tieto- ja viestintätekniikan monipuoliseen hyväksikäyttöön opetuksessa. Molemmissa tutkimukseen osallistuneissa opettajankoulutusyksiköissä oli aktiivisia tieto- ja viestintätekniikan hyväksikäyttöön fokusoituvia tutkimusohjelmia ja niihin liittyen jatko-opintoja suoritti useita tohtoriopiskelijoita. Tutkimusaineiston perusteella voitiin tehdä johtopäätöksiä ja esittää suosituksia opettajankoulutuksen kehittämiseksi. Suositusten kohteena ovat useat asiat strategian formuloinnin tasosta niiden soveltamiseen, henkilöstön jatkuvaan koulutukseen sekä tutkimus- ja kehitystyöhön.

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# Foreword

In 2008, the Centre for Educational Research and Innovation (CERI) of the Organisation for Economic Co-operation and Development (OECD) launched in the context of the New Millennium Learners (NML) project a comparative study “ICT in Initial Teacher Training” (IITT) (for primary and secondary schools). The objectives of this study were to provide a detailed picture of how technology is used in initial teacher training in OECD countries from a comparative perspective, analysing the views of the main stakeholders. Furthermore, it was intended to issue a number of policy recommendations in this domain both for teacher training institutions and governments (a framework of the research plan is available at the OECD web page<sup>1</sup>). The IITT study includes an international review of the state of the art, new empirical data collected through surveys, and institutional case studies. Contributing countries have been Austria, Chile, Denmark, Finland, France, the Netherlands, Norway, Sweden, the United Kingdom and the United States. Except for the USA, all the countries have used the same survey instrument translated into local languages when necessary.

When Finland was invited to participate in this study, Prof. Jari Lavonen of the University of Helsinki (UH) participated as one of the invited speakers at the expert meeting organised by OECD in Paris, October 28th–29th, 2008. This meeting focussed on getting feedback from several countries on the planned implementation of the study. In Finland, the Ministry of Education and Culture (MEC), formerly the Ministry of Education, allocated funds for recruiting a part-time researcher as the co-ordinator of the national study. (We use in this report the present wording for the Ministry, although in several cases we refer to the time period when the older version was valid.) Further meetings of experts were organised on 23th-24th February, 5th-6th October, and 9th-10th December, 2009 at the OECD headquarters mainly for national co-ordinators Prof. Emer. Veijo Meisalo (UH) representing Finland in these meetings.

The questionnaires used in this study were originally formulated by OECD staff, but they were modified and refined on the basis of feedback from participating countries. When the project started, it was planned that the questionnaires would be available quite early in the beginning of 2009. However, for various reasons it was difficult to organise necessary feedback from participating countries in a short time, and the beginning of

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<sup>1</sup> [http://www.oecd.org/document/38/0,3343,en\\_2649\\_35845581\\_42418790\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/document/38/0,3343,en_2649_35845581_42418790_1_1_1_1,00.html)

the questionnaire study (final forms of the questionnaires are available at the OECD web page<sup>1</sup>) was delayed from early spring towards the end of the academic year. This caused major difficulties especially in Finland. It was also understood too late that the study could be continued during the fall term of 2009. We feel that the advance information for the project severely underestimated the time, funds, and all the effort needed.

The present report describes the outcome of the Finnish case study and surveys with some additions and amendments to the version available at the OECD/CERI Website. In the following we describe as requested in the original research plan also both recent developments of teacher education (TE) in Finland, as well as its organisation and structure to make some of our approaches more easily understandable to international readers. We have also contributed to the report of Caroline Rizza (2009) as to the Finnish system of TE (see <http://www.oecd.org/dataoecd/33/52/42031754.pdf>). We observe that the present study does not discuss problems related to vocational education, but focus on education of teachers of primary and secondary schools. The introductory and theoretical parts of this country report rely strongly on some of our previously published work (e.g., Lavonen, Juuti, Aksela, & Meisalo, 2006; Lavonen, Lattu, Juuti, & Meisalo, 2006; Meisalo, 2002; 2007; 2009; Meisalo, Lavonen, Juuti, & Aksela, 2007; Meisalo, Lavonen, Lattu, Juuti, & Lampiselkä, 2006).

This study has been a case of close collaboration between the authors at the University of Eastern Finland (UEF) Joensuu campus and UH. Prof. Lavonen has been the project leader responsible for e.g., contacts with the Ministry and different parties at UH as well as part of the analysis of the questionnaire data. Professor Sormunen has correspondingly been the local leader in Joensuu organising the contacts at UEF. Professor Meisalo has been the project co-ordinator and the principal researcher being responsible for data collection including the questionnaire study, interviews and observations as well as analysing the qualitative data and writing the main part of the report. Dr. Vesisenaho has been the local co-ordinator in Joensuu taking care of practical organisation of the study at the UEF Joensuu campus and he contributed to the analysis of the questionnaire data as well as writing the description of TE at the UEF for the report. All the authors have continuously commented on the running of the study including e.g., the different versions of the Finnish questionnaire forms and the preliminary Country Report, the final version and especially the recommendations which were accepted by all authors.

# Introduction

Centre for Educational Research and Innovation of OECD launched in the context of the *New Millennium Learners* project a global survey Information and Communication Technologies (ICT) in (initial) teacher education in autumn 2008. Austria, Chile, Denmark, Finland, France, Hungary, the Netherlands, Norway, Sweden, the United Kingdom (England) and the United States have contributed to the study with empirical work. Except for the United States, all the countries have used the same research instruments translated into local languages, if needed. We present here a preliminary report describing the outcome of the Finnish case study.

The literature survey starting the project (Rizza, 2009) recognised several paradoxes in the research literature considering the use of Information and Communication Technologies (ICT) at school as well as in teacher education (e.g., OECD, 2006; Younie, 2006):

- national level ICT-strategies and national curriculum guidelines for ICT use have been prepared during the last two decades in several countries which had only minor influence on the visions and practice of the teachers on their use of ICT in education;
- there is research evidence about the influence of ICT to learning and students' motivation, but teachers do not rely much on research-based evidence to identify good practices;
- students have rich experiences of the use of technology outside of school, but do not use technology for learning at school;
- teachers are skilled technology users, but they are unable to take advantage of their competence and to apply it to the way they teach in school.
- ICT is available in schools, but teachers' beliefs about teaching and learning (e.g., the belief about good practice in school) do not support the use of technology at school;
- a large amount of ICT material already exists, but teachers are not experienced in using these materials effectively within and outside regular classroom activities.

From research on policy implementation and reform in education, it is well known that change is either very slow or tends to fail. Implementation is a complex procedure, not a direct transfer from government policy to practice (Younie, 2006). There is also research-based knowledge about planning and implementing of ICT strategies in Finland and difficulties in this implementation (Lavonen, Lattu, Juuti, & Meisalo,

2006). Consequently, it is challenging to help student teachers or practicing teachers to adopt ICT in education. We will focus here mainly on initial teacher education (TE) according to the OECD *ICT in Initial Teacher Training* (IITT) project aims. The general framework of the research plan is presented at [http://www.oecd.org/document/38/0,3343,en\\_2649\\_35845581\\_42418790\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/document/38/0,3343,en_2649_35845581_42418790_1_1_1_1,00.html) and the OECD Website also includes other information on the international project.

In general, there is a broad agreement with the reasons and methods for why and how ICT should be integrated into TE. The importance of this area can be seen in that there are specific associations for promoting research in this area like the *Association for Information Technology in Teacher Education* and many more whose activities expend to this field like the *Finnish Association for Mathematics and Science Education Research* in Finland. Scientific journals devoted to ICT in education (see the references at the end of this report) have an important impact and an example of a modern approach the portal WikiEducator Teacher Education Portal ([www.wikieducator.org/Teacher\\_Collaboration](http://www.wikieducator.org/Teacher_Collaboration)), which is creating and maintaining teacher networking.

There have also been descriptions of best practices of staff development programmes (e.g., Epper & Bates, 2001; Rowley, Dusand, & Arnold, 2005). However, it is obvious that on one hand, there are many necessary differences due to local circumstances in the adopted approaches with different types of national programmes or strategies and on the other, it takes time to gain the full effects of the ideas and their implementations. The focus of the present study is to find evidence of teacher educators in Finland preparing student teachers enough in the use of ICT in education. Is there a lack of equipment, confidence, support, incentives, or knowledge of how to work with ICT in a pedagogical way? The questionnaire study includes questions about these factors and also to what extent teacher educators and mentor teachers use certain kinds of technology in their teaching and what kinds of help could enable them to increase the use of ICT in their teaching. There are also questions about the importance they attach to ICT in teaching. The interviews and observations are used to validate and concretize the findings through triangulation even utilizing similar data of student teachers on the one hand and deans or faculty administrators on the other. We understand that ICT use in TE is in a very dynamic situation and there may be major changes in the situation even during the implementation of the present study.

We shall proceed in the following first to theoretical considerations including a short description of ICT in Finnish TE analysing it from the viewpoints of learning and motivation as well as its introduction as a diffusion of innovations process. Thereafter we will give a general outline of the development of TE in Finland to help international readers to understand the present situation. The main part of the report presents the implementation of the 2009 OECD/CERI study on ICT in TE (the IITT Project) in Finland. Finally, there is an analysis of the outcomes of the study on the basis of triangulation data and recommendations for the development of this area in Finland.

# Theoretical Background

In this section we describe first different uses of ICT in learning activities to get an idea of how it can be analysed as an innovation for TE (cf. Meisalo & al., 2007). Thereafter, we discuss some ideas on production and use of digital learning resources (DLR), open and distance learning (ODL) approaches like the use of web-based learning environments and learning management systems (LMS), as well as other communication and teaching/learning tools. Furthermore, we discuss the promoting of their use in the diffusion of innovations process as well as adoption of innovations (cf. Lattu, Lavonen, Juuti, & Meisalo, 2004). The descriptions and analyses help the readers to understand the background behind the questionnaires and interviews in this research. These descriptions and analyses can be compared with the Chapter 'Systemic Innovation and ICT in Education' in the recent project report 'Beyond Textbooks' (OECD, 2009, 31-57). There the starting point in analysing factors in using ICT in TE is the Access, Competence, and Motivation (ACM) Model. This model focuses on the importance of user access to modern technologies, the needed competencies of users, and the motivation of users to learn and utilize technologies for ICT use to explain how much ICT is used within an educational system.

## **Use of ICT in teacher education – the point of view of learning**

ICT is used in education for supporting students' learning or for development of competences, in other words for helping to reach the goals of education. The quality of learning depends on how ICT is used in learning. These issues have been and are frequently discussed in the context of TE in Finland (Järvelä, Hakkarainen, Lipponen & Lehtinen, 2001; Löfström, Kanerva, Tuuttila, Lehtinen, & Nevgi, 2006). According to Bransford, Brown, & Cocking (1999) meaningful learning engages students in tackling the topic to be learnt in such a way that they create meaningful and understandable knowledge structures on the basis of a goal for learning. Based on them, it is possible to present an outline of learning with a specific focus on ICT use in learning (see also Järvelä, Veermans & Leinonen, 2008).

Learning represents each individual learner's own personal knowledge construction process which presupposes each learner's active, goal-oriented and feedback-seeking role. The constituents of meaningful learning are the following: activity, intention, contextualization, construction, collaboration, interaction, reflection, and transfer. These serve as development and selection criteria when choosing teaching and learning activities emphasising ICT use.

*Activity and intention* mean that students take responsibility over their own learning. Thus they set, together with a teacher, their learning goals and proceed according to the plan to reach the goals they set. This process may be facilitated, for example, by guiding students to plan by themselves or in small co-operative groups. On the other hand, students neither master the logical structure of the subject nor recognise their own biased preconceptions, and therefore students' goal setting needs to be supported and guided by the teachers. Thus, activities that support co-operative planning and evaluating learning are important for learning.

Learning could also be enhanced by *self-evaluating* activities. Bransford and Donovan (2005) emphasise the role of self-evaluation in learning. They suggest that a teacher should provide support for students' self-evaluating for example by giving them opportunities to test their ideas by building things or making investigations, which enable them to check whether their preliminary ideas were working. Feedback is important for learning.

*Reflection* means that students examine their own learning and develop metacognitive skills to guide and regulate their learning. Metacognitive skills are necessary for planning and evaluating one's own work. These skills also make learning a self-regulatory process in which the student becomes less dependent on the teacher. For example, self-evaluating or evaluating in a small group, taking multiple-choice tests, doing exercises and consulting answer keys support developing reflective and, moreover, metacognitive skills.

*Collaboration and interaction* mean that students actively take part in group activities and support each other by discussing and sharing knowledge. Learning new concepts presupposes a dialogue both between the teacher and the students and amongst the students (explaining, debating, questioning). In addition to face-to-face interaction ICT offers several possibilities to share ideas through newsgroups, e-mail, a LMS, or through social media like Facebook.

*Construction* means that students combine their earlier knowledge with the new topics to be learnt and thereby tailor information structures that they can comprehend. Therefore, the teacher should encourage students to bring up their previous views and beliefs and thereby construct new knowledge on the basis of this shared information. For example, prior to starting reading or writing, students need to be guided to bring up their prior views on the subject to be dealt with. Respectively, before an investigation or other practical activity students should be encouraged to present his or her prediction or even supposition.

*Contextualization* means that learning takes place in real life situations or in situations simulating real-life instances. This in turn presupposes that the learning setting allows for authentic and real-life learning experiences. For example, when using a search engine (e.g., Google), students should be encouraged to look up information from different sources. This enables them to treat the concepts in various contexts and thereby deepen the meanings these concepts acquire. It pays off also to keep in mind that the quality of all Internet-based sources needs to be checked carefully to ensure that the facts are right (source criticism). From the point of view of what is interest, the context in which science ideas are learned, rather than the ideas themselves, has an important influence on learning. For example, when writing it is crucial that students write to prospective readers other than to their teacher (cf. also Sutinen & Vesisenaho, 2005; Vesisenaho, 2009).

Learning is *cumulative* and, therefore, students are aided in noticing how a new concept or skill is related to other already familiar concepts or a network of concepts or skills. The learning of science processes and ICT skills are similar. In both areas there are low level and high level skills. For example, before a student learns to use a LMS he or she should learn to use word-processing and a search engine. Consequently, students should

be supported in learning new skills and in internalising the new concepts and in building conceptual networks in the given field.

The previous characteristics of learning activity may be realized through the use of ICT. For example, by employing the Internet in inquiry-based learning, students have access to meaningful information on the topic. When looking up information in varied sources, students at the same time actively structure the flow of information they encounter into meaningful entities in order to be able to complete tasks. Similarly, this exploration of information in varied sources forces students to evaluate the reliability of both the information and the sources they use. Within an activity students could be encouraged to work together and also to systematically evaluate their activities. Several studies have indicated that information processing, inquiry-based learning, and exploring resources via networks, are beneficial for education (Linn, 2003).

### Use of ICT in teacher education – the point of view of motivation

ICT could be used in education for supporting the development of students' motivation. The concept 'motivation' in TE is by no means trivial, it has been used here to describe the factors within an individual (including an interaction with the environment) which arise, maintain and channel behaviour towards the aims of the developed DLRs. We note that the project report 'Beyond Textbooks' (OECD, 2009) does not include a definition or an analysis of this concept.

There are many concepts that can be used to describe *motivational aspects of teaching and learning*. Here we base our analysis on Self Determination Theory (SDT) (Ryan & Deci, 2000) and Theory of Interest (Krapp, 2007). According to SDT, a student's way of thinking has an important role in the process of motivation. Motivated behaviour may be (i) *self-determined* or (ii) *controlled* and they involve different reasons for behaving. Self-determined or autonomous behaviour is behaviour which arises freely from one's self. Controlled behaviour, in contrast, means that the behaviour is controlled by some interpersonal or intrapsychic force, like a curriculum or a task. The motivation styles in SDT are: (i) *amotivation*, (ii) *extrinsic motivation* and (iii) *intrinsic motivation*. Intrinsic motivation has positive effects on learning, in particular, on the quality of learning. Intrinsically motivated behaviours are based on the need to feel competent and self-determined (Deci & Ryan, 2000). Extrinsically motivated behaviour is instrumental in nature. Such action is performed for the sake of some expected outcome or extrinsic reward or in order to comply with a demand.

Central to SDT is the concept of basic psychological needs assumed to be innate and universal. These needs are the *need for autonomy*, the *need for competence*, and the *need for relatedness (need to belong to a group)*. The fulfilment of the need for competence is especially problematic in the case of ICT because the required studies are perceived as being difficult. This perceived lack of competence has an effect on interest and motivation. Furthermore, the *interest* of the student in a learning activity has an effect on motivation. Consequently, the features of a learning activity and behaviour of a teacher (trainer) could increase the motivation of a learner (student teacher). This is because self-determined learning occurs when a learning activity itself supports fulfilment of basic psychological needs or the development of interest. A closer analysis of motivational aspects is based on SDT: ICT is used for motivating or for increasing students' interest for learning. How motivating learning with ICT is for students depends on how ICT is used

in this context. Next these issues, which have an influence on the students' motivation and interest, are briefly described as they are presented in TE.

Interest is a content-specific motivational variable (Krapp, 2007). Interest is approached from two major points of view. One is interest as a characteristic of a person (personal interest) and the other is interest as a psychological state aroused by specific characteristics of the learning environment (*situational interest*). Personal interest is topic specific, persists over time, develops slowly and tends to have long-lasting effects on a person's knowledge and values (Hidi, 1990). Pre-existing knowledge, personal experiences and emotions are the basis of personal interest (Schiefele, 1991). Situational interest is spontaneous, fleeting, and shared among individuals. It is an emotional state that is evoked by something in the immediate environment and it may have only a short-term effect on an individual's knowledge and values. *Situational interest* is aroused as a function of the interest of the topic or an event and is also changeable and partially under the control of teachers (Schraw & Lehman, 2001).

Although students themselves primarily produce their motivation, it can be enhanced and learned. In practice, a teacher can offer optimal challenges and rich sources of motivating stimulations through choosing the learning activities. Therefore, in addition to the previously discussed features of self-determined and controlled behaviour of a learner, it is also appropriate to analyse features of a learning activity that could increase motivation of a learner. This is because self-determined learning occurs when the learning activity itself is considered as interesting, enjoyable, or personally important by a learner. From the point of view of the SDT and interest research, the motivational features of a learning activity could be classified into five categories:

**1 autonomy-supporting activities/teacher, through**

- choosing student-centred learning methods like “open ended” inquiry and other tasks where students have some choice of how to plan or study,
- collaborative learning activities which support the feeling of autonomy,
- co-planning of the learning activities.

**2 Use of ICT where students have**

- choices, possibilities for planning and evaluating ones own activities, and
- support to the feeling of effectiveness and the importance of working.

**3 Support for students' feeling of competency, through**

- choosing inquiry and other tasks, which are not overly difficult for the student to solve (optimal goals);
- choosing and using constructive evaluation methods, like self assessment, portfolio evaluation, and informal discussions, which help students to recognise that they are good at an activity or do the activity well, and
- giving support to the feeling that the activity has some value or use for the student.

**4 Support to students' social relatedness, through**

- choosing tasks, collaborative learning activities, co-planning, and ICT use which help students to feel close to peers, and
- giving support to the feeling that the students can trust each other and feel close to each other, as well as



- supporting the formation of learning communities over social media and various forms of networking.

##### **5 Support to interest and enjoyment, through**

- waking up curiosity by choosing surprise-evoking inquiry and other activities or tasks,
- organising enjoyable, fun-evoking and interesting activities, such as choosing interesting web pages or simulations,
- choosing activities which hold the students' attention, as well as
- *interesting content* (new materials or new knowledge) and context (human being, occupations, technology, or history).

To summarize, it is important for motivation to promote autonomous learning activities in TE, related even to the attainment of competence in ICT use, but also to support learning communities and other forms of positive social networking.

### **Classification of ICT use and ICT use as an innovation**

The concept *ICT use* can be considered here as the crucial innovation to be analysed and e.g., the qualities of innovation including the needed competence will be related to it. We categorise ICT use here into (A) *tool applications or tool software* and (B) *ICT use in study and learning (learning through ICT)* (cf. Webb, 2002) as well as in more recent literature also into *social media* or *social communication media* (C).

In the *tool category* (A), ICT is treated as a set of available software enabling students and teachers to accomplish their tasks in a more efficient way. Typical examples of tool software are related to school or course administration or to office software (text processing, spreadsheets, graphics, etc.). A teacher can use tool applications in several ways. In addition to the previously mentioned, he or she can prepare assignments, tests, and other resources for teaching and learning. A video- or data-projector can be used as a tool in several ways for classroom presentations and it can be connected for example to a document camera or a microscope. A new interesting tool teachers have started to use in Finnish schools as well as elsewhere in Europe is an *interactive whiteboard* (numerous commercial brands like Cleverboard, AKTIVboard, SMART Board, etc.) although there have been controversial opinions even among the present researchers e.g., due to needed high investment expenses. The touch-sensitive display can be connected to a computer and digital projector and then computer applications can be controlled directly from the display. It is possible to write notes in digital ink and save one's work to continue working on or to share later. Most interactive whiteboards also have specially designed software that includes a range of useful tools. The advantages of the interactive whiteboard are: documents and software can be accessed from the screen without having to move away to a laptop, it is easy to move between screens to return to earlier work and furthermore, the drag and drop facility can be used to move contents across windows. The advantages including the positive motivational effect of modern equipment have proved more important than associated problems when interactive whiteboards have been made available. However, it seems that too little effort has often been put into teacher training in this context.

The main uses of *ICT in studies and learning in TE* (B) can be divided into three different uses for directly supported learning: (B1) Computer-assisted learning (CAL) is any interaction between a student and a computer system designed to help the student

learn. CAL includes, for example, simulations (Applets on the Internet) and virtual-reality environments. (B2) Computer-assisted research is the use of ICT as an aid in collecting information and data from various information sources with the emphasis on the use of ICT in data analysis supporting scientific reasoning. Typically, these investigative activities are conducted in small collaborative groups where ICT is used as an agent for interaction with an information source, like the Internet or nature, or in schools and in TE, often in Microcomputer-Based Laboratories (MBL). (B3) Computer-assisted interaction: ODL has evolved in a natural way from using only regular mail to using all available IT services adjusted to fully facilitate student learning. Thus, modern ODL solutions are based on a wide range of communication technologies, such as course management systems (e.g., Blackboard, WebCT, or moodle), and two-way audio/video conferencing.

ICT use as *social media or social communication media (C)* is a concept referring to media for social interaction using highly accessible and scalable publishing techniques. It involves in all school life more and more ICT-based interaction channels including e-mail, chat, Facebook, wikis, etc. Indeed, the Web 2.0 ideology is being implemented in TE for example through wikis and blogs which are growing even on a day-to-day basis in some projects. Social media use Web-based technologies to transform and broadcast media monologues into social dialogues. Kaplan and Haenlein (2010) have defined social media as “a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user-generated content”. The wide definition of DLR (OECD, 2009) adopted in the *NML Project* is obviously supposed to cover all the above uses of ICT, but it is quite easy to focus on some limited aspect only if further refined analysis is neglected. It is no more necessary to speculate on claims that ICT use has been able to make learning more versatile, goal and investigative oriented as well as to activate students in acquiring, handling and evaluating information and, furthermore, to increase collaboration, contextuality and creativity in TE. ICT use is an integral part of life of the New Millennium Generation (NMG) and teachers must be prepared to use these tools (cf. e.g., Sardone & Devlin-Scherer, 2008). The above interpretation has been challenged by several researchers (e.g., OECD 2009, p. 34), we however note the obvious need of the NMG to be able to utilize in school versatile facilities offered by a modern learning environment. It is also to be noted that the NMG frequently uses mobile technologies in ways that were not thought possible only a few years earlier. Altogether, new social media offer here many possibilities not yet fully activated in learning.

Furthermore, our societies are presently evolving at a faster pace than ever before, challenging both individuals and organisations to deal with changes and this is most critical in teacher education. As a consequence of this ongoing transformation is the development of new cognitive, communicative and collaborative forms of organizing interactions and their use by especially the new generations. We have a growing trend pointing to life publishing and life logging using mobile devices and social mobile media to enrich and support innovative ways of interaction and learning, shifting the focus away from the computer screen to other places of interest. Social mobile media refers to the use of rich digital content as well as Web and mobile based tools for the purpose of creating spaces and opportunities for sharing and discussing information and experiences with other people in new ways that may differ from earlier forms of communication. These situations may happen across locations and devices, using both mobile and wired Internet access. Lankshear and Knobel (2006) as well as Buckingham and Willett (2006) claim that many educational institutions ignore some of these developments and argue that

mobile technology and social media might be integrated into current school educational activities since they are transforming and defining new literacies outside traditional education. It is our opinion that these arguments are valid also for TE.

## Diffusion and adoption of ICT innovations

In practice, diffusion of ICT use into teacher educators' daily practice is difficult. Wiesenmayer and Koul (1999) suggested that implementation of ICT strategies must be organized based on research. Agreeing with this, we maintain that general research-based knowledge about diffusion and adoption of innovations has to be taken into consideration. It is known that there may be many barriers: an ICT use might be too complicated for beginners and new features are developed all the time (difficulty), staff do not easily collaborate or network with each other or with experts (lack of communication), they feel that they do not have enough time for experimenting, they might have negative attitudes towards innovations (no motivation to adopt them), there may be no support available and, furthermore, people are naturally resistant to new ideas or innovations. Variables that influence the uses of ICT in education are consistent with other research findings regarding innovations and diffusion or adoption of innovations. In our study, the diffusion is a process by which the versatile uses of ICT in TE (*innovation*), is communicated when implementing the ICT strategy, the staff development programme and development of ICT facilities (*communication channels*) over a period of several years (*time*) among the staff of the TE unit (*social system*) (cf. Rogers 2003). Rogers differentiates the *adoption process* from the *diffusion process* and defines the former as an individual's mental process through which he or she passes from first hearing about an innovation to final adoption. We may also interpret these as analyses of the same process, the former with a grassroots level view and the latter with a top-down view. The adoption process can be divided into several stages, for example: awareness, interest, evaluation, trial, and adoption. Individuals who are members of the society adopting the innovation can be categorized in adopter categories: innovators, early adopters, early majority, late majority, and laggards.

Fullan (2001) categorized the properties of educational innovations that affect their acceptance into two general classes: Firstly, there are the properties of the innovation; in this case, the properties of the 'ICT use in TE' itself (e.g., different ways of ICT use practiced in TE, usability of ICT, and ease of ICT use). However, the nature of this innovation is not simple. For example Watson (2001) argued that its adoption requires change in teaching style, change in learning approaches, and change in access to information. Secondly, Fullan emphasized that there are local characteristics, such as the pedagogical orientation of the staff, nature of collaboration and reflection between staff members, their beliefs about the usability of educational technology, administrative leadership, technical and pedagogical support available, and external factors such as funding, nature of training or staff development, as well as the nature of development projects in ICT use (Matthew, & al., 2002). Furthermore, external factors like a national ICT strategy and other different strategies in the institute (e.g., strategy development for teaching and training, library strategy, and research strategy) have an effect on the adoption of the innovation. Different kinds of networking may foster the integration of ICT in education like collaboration with schools, with other departments and universities, as well as with working life (Moonen & Voogt, 1998). The contextuality of the implementation is another important aspect in this research.

In the recent project report 'Beyond Textbooks' there is an analysis of innovation (and diffusion of innovations) processes. It includes four phases: Initiation, Implementation, Scale-up, and Monitoring and Evaluation (OECD, 2009, 47–50). Furthermore, there are related issues like the knowledge base utilised in the innovation process as well as the stakeholders in innovation. This analysis focuses on the innovating process, less on the problems of adopting new innovations. We found in a number of cases producing DLRs it was deemed important not to consider these processes as linear but iterative. We refer here to the tradition of design-based research (DBR). It can be considered as a methodology aiming to bridge the gap between educational research and praxis. It is a general framework for design, development, implementation and evaluation of learning resources and it uses a pragmatic frame (Juuti & Lavonen, 2006). DBR emphasises an iterative design process, producing an artefact, and novel educational knowledge (Design-Based Research Collective, 2003), which all fits well in the process of designing DLRs.

## Access

Access can be considered to be a concept associated with little or no controversy. Access to good quality DLRs is obviously most important to the advancement of ICT use in schools as well as in TE. However, too often related studies have been interested only in the technical aspects of access, i.e. in the number of students per computer or in the quality of the available Internet connection, on the societal level this approach is evident in the recent report of the International Telecommunication Union ITU (2010). For example, in 1999 in some countries one in five teachers only used ICT in teaching to a significant degree (Hakkarainen et al., 2000). Respectively, there was of the order of one computer for every ten students in lower secondary schools (Pelgrum & Anderson, 1999). In most industrialized countries, schools have had already for a long time had access to the Internet (Russell and Bradley, 1997). These are necessary but not sufficient conditions. A crucial problem of access is often the cost of learning materials as e.g., Finnish student teachers are not nowadays willing to invest in purchasing textbooks but expect course materials to be available as open educational on over the Internet. There is great pedagogical value in having student teachers develop DLRs themselves, but it is not feasible to expect to produce most of the required course materials in this way. There is also a question whether the needed DLRs could be of the nature of PowerPoint slides, textbook chapters, or even teaching-learning sequences with detailed instructions to the learner. Anyway, materials accumulated over several years under the supervision of professional experts and being updated systematically may solve quite a number of access problems in TE.

## Competence, ICT skills

In many countries the development of mainstream initial teacher education has been slowed down by inadequate ICT skills of teacher educators and the fact that only a few units providing teacher education have drafted a strategy for the educational uses of ICT. Consequently, even many young schoolteachers have felt unprepared to use ICT in their classrooms. There has been a worldwide discussion about challenges set to teacher education concerning how to help teacher educators in using ICT in teacher education (e.g., Epper & Bates, 2001; Judge & O'Bannon, 2008). These challenges have been approached by developing ICT strategies to TE units and by implementing these strategies.

The development of teacher educators' competence could be promoted by developing up-to-date information and communication strategies, organizing and developing possibilities for studying in different environments including ODL and in general innovative approaches to ICT use in TE. National strategy goals have been in Finland, e.g., that more than half of the teachers should have a good competence in the educational use of ICT or that they can use a text processor, e-mail and an Internet browser well, make web-pages, use distance learning tools and that they also know the pedagogical principles for using ICT. Such an educational policy has been quite common in all countries. However, the situation is more complex in practice and the implementation of ICT strategies for TE is more difficult than educational policy discourse implies (Kay, 2006). Especially, organizing an effective staff development programme, adequate guidance, and promoting ICT in education are not easy tasks. McFarlane and Sakellariou (2002) have already taken a critical look at oversimplified strategies. They suggested that the planning of ICT uses should be based on addressing questions of what and for whom the TE programme is designed for and what successful navigation through that programme might look like. Kay (2006) pointed out that often strategies are issued, but there is little evaluation and follow-up of the impact of ICT strategies on TE. We shall analyse Finnish ICT strategies from the viewpoint of TE later in this study. Finally, we note that the problem of staff competence and skills is challenging due to the rapid technical development in this field necessitating massive continuous brushing up of knowledge and skills.

## **The development of teacher education at universities in Finland**

### **The road up to research-based teacher education**

The major upgrading of TE was implemented in Finland starting in the 1974-1975 academic year. During the first year it meant integrating these studies with the university system (home economics and textile handicraft teacher education following one year later). Primary school TE for Master's level started 1979 in the context of the general renewal of university studies in Finland. (Kindergarten teacher education joined the development in the mid eighties, but it is not discussed in the present context.) This development can be described as the Finnish road towards research-based TE. Research-based teaching is the key issue on the university level and it brought challenges demanding essential upgrading of staff competences. There are several indicators pointing to the benefits of this development. They include the high standards of recruited students in TE programmes – they are among the best of each age group. Also, the good results of Finnish students in international comparative studies like PISA have been accredited at least partly to competent teachers.

To understand the renewal of TE in the seventies, we first have to consider the planning processes of the renewal of the TE systems and of the introduction of the TE institutions within the previously existing university structure. The political decision (Law 844/71) was made in the Parliament of Finland after a preparation process involving several committees in parallel or in the aftermath of introducing the comprehensive school system. The general framework and common grounds for the design process and decisionmaking were planned on the national level with much vivid discussion on possible alternatives. Important aspects were the personnel structure

and staff qualifications as well as integration into the traditions of research-oriented universities.

All pre-service TE for schools in the general education sector was assigned with these decisions in mind to seven previously existing autonomous universities (eleven localities). The TE units were formed as Faculties of Education including departments of TE with teacher training schools for organising teaching practice. This development has been summarized in a compendium edited by Tella (1996). Finnish universities have had autonomy in designing their curricula, thus no detailed “curriculum of TE” covering all universities in Finland has developed. The process of integrating pedagogical studies in subject teacher education with more traditional university studies began in the renewal of 1970's. Pedagogical studies were now included in the university degrees, but only as extraordinary studies, not equivalent with studies at subject departments. Other faculties and the whole university administration were rather critical of the practical orientation and the lack of a research tradition at the new and rather large departments of teacher education.

Further integration of educational studies and teaching practice was implemented in the reform of the academic degree system after 1978, when also the Master's degree became the basis for teacher qualification even in primary and lower secondary schools. It is to be noted that in spite of their academic freedom, there are some principles and general outlines that have been followed by all TE institutions in curricular development. These have been partly due to recommendations by the MEC and partly due to an agreement of the Deans of the Faculties of Education and the Directors of the Departments of TE, who are supposed to have regular contact with the Ministry and with each other. The MEC has had full confidence in the departments and faculties involved in TE so that there have been no external examinations for teacher qualification. On the other hand, there are differences in pedagogical studies between subject areas and especially in arts-oriented universities there have been special features differing from the curricula followed in most other faculties and universities. During the last decade there has been active development of different kind of ODL and mobile solutions to teacher education (Häkkinen & Järvelä, 2006; Kynäslahti, Kansanen, Jyrhämä, Krokfors, Maaranen, & Toom, 2006; Meisalo, Lavonen, & Juuti, 2006; Koskimaa, Lehtonen, Heinonen, Ruokamo, Tissari, Vahtivuori-Hänninen, & Tella, 2007; Vesisenaho & Dillon, 2009; Vesisenaho & Valtonen, 2010).

### **Strategies guiding the development of TE**

Although the universities in Finland are autonomous, their development has been guided by national strategies. These strategies have generally emphasised a research orientation and teaching based on research. Universities have planned and implemented their own strategies based on the national framework.

When TE became part of the university system, there were many difficulties in the process of fusion. However, gradually the universities clearly saw the importance of (especially subject) teacher education in their mission and this was seen as one of the important means of contributing to the welfare of society (a new task given to universities). For instance, the importance of subject teacher education was expressly indicated in the General Strategy of the University of Helsinki for 2004-2006. The strategy listed subject teacher education as one of the key areas of development and stated that ‘subject teacher education will be remodelled by organising jointly planned pedagogical and subject-related studies and by creating a continuum from basic teaching

**Table 1.** The objectives and implementation approaches of the national ICT strategies in Finland.

Year	Strategy	Objectives	Implementation approaches
1986,	Computer in Education	- Students as active workers of the information society:	- Funding the production of software suitable for computer-assisted learning
1989	TOP, 1986; 1989	- IT as a school subject -basic IT skills for all -advanced IT skills for IT teachers	- Large in-service programme for all teachers at school - Training of IT teachers
1995	Education, Training and Research in the Information Society	- Students active in information processing - ICT as an intercurricular subject - Promote the use of ICT in learning	- Funding the production of Web pages and Web-based learning environments - Funding of an in-service programme for all teachers at schools
2000	The Second Strategy for Education Training and Research in the Information Society (SETRIS, 2000)	- Students active in information processing and in use of communication technology - ICT as a part of an intercurricular subject “Human Being and Technology” - Promote the pedagogical use of ICT, emphasising ODL solutions; Teachers to have not only technical but also pedagogical ICT competences. - All teachers on all levels should have at least moderate ICT competence, 50% good ICT and ODL competence, and 15% excellent	- Funding virtual schools and designing of new learning environments that relate to future operational environments - Funding of ICT infrastructure of schools and libraries - Funding of an in-service programme for all teachers at schools and universities
2004	Information Society Programme for Education and Research 2004-2006 (OPM, 2004)	It should be taken care in TE that students get necessary knowledge and skills in utilising ICT, knowledge on digital learning materials and services, as well as on teaching, and school – home interaction.	Recommendation to universities and polytechnics
2006	Information Society Programme 2007-2015	Teachers should have outstanding information society skills, and ICT should be a part of multiform teaching at all levels of education.	Close integration of the use of ICT in teaching with basic and further education of teachers. Encouraging institutions to implement new, innovative learning styles and methods.

through teacher training schools and field schools to in-service training' (Strategy, 2004, p. 28). Somewhat earlier TE strategies had been published at the University of Turku (Strategy Turku, 2000), the University of Oulu (Strategy Oulu, 2000) and the University of Helsinki (Strategy, 2002).

### **The National ICT strategies in Finland**

There have been so far four official national strategies for the information society or national ICT strategies, and before these one national educational ICT development project in Finland. The recommendations of the TOP Project (TOP, 1986; 1989) in the eighties can be seen as the first, although it was an unofficial or semi-official national ICT strategy. A summary of these strategies is presented in Table 1 (cf. e.g., Meisalo, 2007; 2009; OECD, 2009, 132-133).

Each University was supposed to formulate strategies of their own in harmony with the national strategies, and even though they have not necessarily been updated recently, they do have continuous obvious effects on the planning of curricula as well as TE programmes. An example of these strategies is the Information Technology Strategy developed at UH (Strategy, 1996) right after the publication of the first official national strategy in 1995. The latest development in this field is that the teacher training schools attached to universities have co-operated nationally in formulating their own strategies (Strategy, 2009).

The Ministry of Education and Culture has financed teacher educators' in-service training courses or staff development projects supporting ICT use in TE from the mid 90s until the end of year 2007. These in-service courses and projects have aimed to develop teacher educators' ICT-competence and they have been designed based on the ICT strategies in each Finnish university. As an example of this type of staff development project, one at UH is shortly described below (for more detail see Lavonen, Lattu, Juuti, & Meisalo, 2006).

A project at UH is an example of a university level ICT strategy development project for TE. An ICT strategy and an implementation plan for TE were created in a co-operative process during the two academic years 2000-2001 and 2001-2002 at the Faculty of Behavioural Sciences in UH. Visions and expectations of staff members and students were registered by questionnaires and by making notes during co-operative sessions in which the strategy was created. Thereafter, an implementation document, where the staff development programme and plans of how to develop ICT infrastructure and to integrate ICT in TE, was created. A large programme for staff ICT skills development was implemented and a new infrastructure (a new domain and websites etc.) was developed. Altogether 53 one or two credit point in-service courses were organised on the use of basic ICT tools and learning management tools, web publishing, and ODL solutions. As many as 505 staff members participated in these ICT courses. On the basis of staff self-evaluation data we may evaluate that staff ICT skills developed substantially and ICT use in TE grew more versatile.

On the basis of the data collected during the staff development project, a list of properties needed for a successful staff development project was created. The main facilitator for development of ICT skills was the co-operative local ICT strategy planning and implementation process where staff became aware of the possibilities of ICT use as a part of teaching and learning and how ICT use and ODL solutions can make teaching and learning in TE more versatile. Secondly, the development of an ICT infrastructure,



especially web publishing and the use of ODL solutions, reduced the constraints usually associated with versatile ICT use. Thirdly, organising multiform and versatile courses, which were co-operative, reflective and contextual, helped staff members to improve their ICT competence. The courses demonstrated how ICT and ODL solutions could be used in TE and staff members could easily try and evaluate different ICT uses. Consequently, there are some basic conditions that should be realised before staff members use ICT in TE: They should have an ability to control ICT use in teaching and learning, and ICT use should maximise the effectiveness for achievement of higher level goals of TE and not interfere with achieving other higher order goals.

After the systematic staff development project described above, several ICT courses have been organised for staff members annually. These courses have been partly financed with the resources allocated by the MEC specifically for this purpose. It is not clear how these types of courses could be financed in future. Moreover, there have been available ICT-courses offered by the Educational Centre for ICT at UH. These courses are generally offered to all staff members of the university without any special orientation to TE.

The final comment on the effects of steering through strategies is that there seems to be too little co-ordination and harmony between different types of national and local level strategies. When there are too many, too different, and too often changing strategies, their implementation in the formulation of goals or in teaching practice is very difficult. Perhaps the most important effects of different evaluation processes can be accredited to the self-evaluation phase. However, there have been so many and frequent efforts to implement new strategies and recommendations for various types of evaluations which have had little connection with these strategies that most members of staff are totally exhausted and reluctant to make further efforts. Furthermore, there have been indications that the adopted top-down approach to strategy implementation may be problematic (Lavonen & al., 2006).

In addition to implementation of the ICT strategies through seminars, training and tutorials organised for teacher educators, the academic curriculum is an important tool for strategy implementation focussing on the development of skills of student teachers. For example, at the Department of Teacher Education at UH, goals for learning the use of ICT in education are described in the aims of TE courses and teaching practice.

In the primary school TE programme, there is an ICT driving licence course and test that aims to introduce basic ICT tools and university ICT services, like databases and library services. In addition, there is a media education course to introduce different types of ICT use in school education. More specific competences to use ICT, for example, in the analysis of research data are learned within courses designed for research methodology. Moreover, there are goals for ICT use in teaching and learning within the aims for teaching practice.

Student teachers in the subject teacher education programme learn to use basic ICT tools at their home departments. The goals for learning pedagogical use of ICT are described among the aims for specific pedagogical courses. For example, in the course "*Theoretical, psychological, and didactical basis related to teaching and learning particular subject*" these student teachers should learn to use versatile teaching methods and ICT in the teaching of their subject. During their teaching practice, student teachers should learn to use as a support the theories of education, pedagogy and learning while analysing and developing their own pedagogical approaches for teaching the subjects.

## The tripartite co-operation in Finnish teacher education

In the Finnish system of subject teacher education there are three partners who participate in the programme and make important contributions. The subject departments at various faculties have focussed traditionally on educating future researchers (or artists) and little on the future needs of those students studying for teaching careers. However, this situation has been and is changing as the importance of TE is now quite generally recognized. This is at least partly due to the societal role of universities being at the forefront of discussions on the budgetary needs of universities and the major impact of teachers in forming the new generations, the future of the whole society (Lavonen, Krzywacki-Vainio, Aksela, Krokfors, Oikkonen, & Saarikko, 2007).

Some subject departments have had chairs with the responsibility to supervise TE at the department. The crucial role of subject departments is in ascertaining the high level of content area knowledge for subject teachers is highlighted by their writing their Masters' theses at the department of their major subject. The thesis facilitates the future teacher's access to research-oriented work, and emphasises the understanding of the creation process of new scientific knowledge in their field of teaching and learning. What is most important is the goal of preparing future teachers to autonomously understand and utilize new achievements in scientific research. One of the interests of subject departments is in recruiting new talented students. The departments therefore maintain contacts with schools and urge student teachers to meet with young people, even in their free time (e.g., at shopping malls) to introduce them to interesting science phenomena. The interaction with pupils not only at school but also in their leisure time also provides student teachers with valuable experience of working with young people. We may note an important role of subject departments had in the implementation of the very successful LUMA Project (LUMA, 2006) on advancing mathematics and science education in Finland in organising Master-level courses for unqualified substitute teachers working at schools. In primary teacher education, at least in Helsinki, professors of subject area take responsibility for the quality control of specialization courses in their subject.

The second partner in TE is the Department of Teacher Education at the Faculty of Education (or equivalent). These institutions are responsible for organising and developing the Master's level primary school TE programme and the pedagogical studies of a subject TE programme. In these institutions, there are professors of general education, educational psychology, etc., but also several specialised in educational problems of certain subject areas. It has been important that there has been a development towards full professor status for even the latter. Their focus has been on introducing students to research into teaching and learning and on how to implement research outcomes in teachers' daily work but also in further education including even international doctoral schools. Consequently, they have over the years played an important role in the development of research in these areas.

Pedagogical content knowledge has been one of the crucial issues in training of subject teachers, but the shift from *syllabus* type of thinking (emphasising organisation of contents) to *curriculum*-oriented ideas has put more importance on the goals of education at the student level and on the teaching-studying-learning process. Among other things, the pedagogical studies in TE introduce student teachers to the idea of *a teacher as a co-operative professional* who is able to develop him/herself while working as a formally competent academic teacher. This kind of professional is able to put forward arguments for the decisions that s/he makes regarding his/her own teaching.

The third partner in TE in Finland is the teacher training school. Teacher training schools were transferred into the university structure in 1974. This system of Normal Schools (practice schools) attached administratively to universities has many unique features as almost all other schools in Finland are run and financed by local authorities. The Normal Schools are state schools and their teachers have a different status than teachers in other schools. They have a dual role: on one hand to teach their pupils and on the other, to supervise and mentor student teachers. Many mentor teachers are active in research and development work and/or are members of teams producing learning materials for schools. They have good contacts with different university departments that offer visits and study opportunities even for school students. Altogether, these schools want to offer a multi-faceted environment for teaching practice extending even outside the schools. They have close contacts with different educational establishments, civic associations and organizations. In addition to study in the classroom, their students also visit different places of employment (with a possibility of internships), as well as museums and theatres. Learning by researching is supposed to be a natural way of approaching an issue, often with co-operative supervision by university professors and other experts. Herewith, the student teachers can put into practice their knowledge of theory as well as their experience and skill in doing research. Being able to guide others to learn is one of the central aims of the practical training. The above features are described as goals of teacher training schools, but there is frequent critique based on the demand of having at least a substantial part of the teaching practice in more typical schools. Actually, parallel to the Normal Schools there have been so-called field schools which have made an important contribution to the capacity and volume of TE in times of high demand for qualified teachers. There has been a three-year project financed by the MEC to study their contributions to the field of TE. The ongoing reform of the Finnish university system will most probably have an effect on the status of Normal Schools, but at the time of writing this text there is little information on which way the development will proceed.

There are many challenges in taking advantage of all the positive features of the described system above. Recruiting competent personnel and talented students is essential for the successful functioning of research-based TE. There has been much effort towards these goals and the outcomes have grown gradually rather good in both respects. In Finland, TE programmes attract students of the highest ability groups, which is different from many other OECD countries. Also, competent staff with high academic standards has been easier to recruit when the integration of TE into the traditional research-oriented university culture has proceeded.

There have been efforts over long periods of time to apply creative approaches in TE at all levels. A demand for creativity has been obvious in areas like arts, music or literature, but creative problem solving has been a key issue, say, in mathematics and science education. Here even contacts with researchers in different areas as well as innovators in industry and business have been utilised. Altogether, the chair holders are key persons in networking both locally with several subject departments and nationally with teachers' organisations or scientific associations, and even globally in their research contacts. Many staff members have been active in teams producing teaching/learning materials for teacher education and for schools. European co-operation within e.g., Socrates and other programmes has also been important for the staff. Quite many of them have also influenced the designing of the national core curricula for schools in their specialty subject area.

Co-operation of all the partners is important and many universities have founded councils of co-operation in TE. These councils have been active in formulating strategies for TE, and organising seminars to bring together all the partners in TE; their work has proved to be most valuable. It has also been possible to establish resource centres for TE and school contacts in different faculties like the LUMA Centre at the Faculty of Mathematics and Sciences (co-operating with the Department of Teacher Education, Faculty of Behavioural Sciences) and the AINO Centre at the Faculty of Humanities, both at the University of Helsinki, but recognising relevant needs at the national level. Similar activities are emerging at least at the Aalto University, the University of Oulu, and the University of Eastern Finland.

## The study system in teacher education

### Master-level teacher qualification as a basis for orientation to research and development

The first degree to be studied at university level is *kandidaatti/kandidat* (Bachelor, B.A./B.Sc./B.Ed.), which became compulsory in the Bologna process as the first formal step towards academic qualification. The second, higher degree is *maisteri/magister* (Master, M.A./M.Sc./M.Ed.) and is presently the basis for teacher qualification in general education. The *lisensiaatti/licentiat* (Licentiate) degree is usually considered as the first (non-compulsory) post-graduate degree while the doctorate (*tohtori/doktor*) is a very formal and internationally highly esteemed degree. Since the Master's degree is the basis of qualification, postgraduate studies are not beyond the reach of practicing teachers. The work to renew once more the system of TE, this time along the guidelines of the Bologna process, was started efficiently with a national steering group (Jakku-Sihvonen & Niemi, 2006a). The new system has been implemented since 2005 and the transition period has now ended.

The Bachelor degree is divided into intermediate and minor level subjects: there is no major subject level, but a dissertation at the intermediate level is included (see e.g., Jakku-Sihvonen & Niemi, 2007). This degree is the common first degree while the Master's degree including the major part of pedagogical studies qualifies for teacher profession. In subject teacher education a Master's degree usually includes studies in one major and two minor subjects. Studies in the major subject are further divided into intermediate subject studies and advanced studies. The core of advanced studies is comprised of the Master's dissertation project, which alone gives about 40 credits. It is also possible to take more than the minimum number of credits in teacher studies to get a wider competence.

Primary school teachers (grades 1–6) major in educational sciences (M.Ed. degree) and take the intermediate level multi-subject didactical course of (60 credits). These studies qualify for teaching all subjects at primary level. One of the “minor subjects” in subject TE programmes covers pedagogical studies for 60 credits (intermediate level). These pedagogical studies are divided into three roughly equal parts: courses in general pedagogy, subject didactics, and teaching practice. In the Finnish system teachers who take the Master's degree including these pedagogical studies get full formal competence for teaching in secondary schools for those subjects included in their degree studies with more than 60 credits. There are no further examinations or other accrediting authorities in the qualifying process, but local authorities and schools recruiting teachers may have their own preferences regarding the combination of subjects and/or practical experience.

A rather recent idea that has an effect on TE is the political goal of having a more unified (comprehensive school) TE harmonising class teacher education and subject teacher education. This has become feasible as both types of teachers take a Master's degree. There are obviously many practical problems in pursuing this goal, but it has already been put into practice by primary school student teachers who may study a minor subject such as Mathematics or English for 60 credits and thus qualify to teach the subject concerned in lower secondary schools. It is also possible for student teachers in subject teacher education to study the multi-subject didactical courses of 60 credits designed for primary teacher education. However, courses of this type have seldom been opened due to problems in financing them. It seems that the access may be gradually growing more open, though depending on political decisions and the availability of necessary funds. Another unification, which has happened already, is the opening of the vocational education sector to teachers qualified in general education and vice versa.

There have been frequent evaluations of TE over recent years in different contexts. The Committee on the Development of Teacher Training (1989) was assigned to analyse the need for reforms in TE and soon afterwards, teacher education was subjected to further scrutiny by a national and international evaluation process in the context of evaluation of Faculties of Humanities, Mathematics and Sciences, and Education (OPM, 1994). Another evaluation process covering all faculties active in TE was arranged in 1999 (Jussila & Saari, 1999). Soon thereafter the national programme for developing TE was published (OPM, 2001). At the University of Helsinki there were, moreover, further evaluation processes by international groups of experts (Lahtinen, 2003; Kaivola, Kärpijoki, & Saarikko, 2004; Niemi & Jakku-Sihvonen, 2006). The next step was the Bologna Process, which has been implemented quite successfully in TE in Finland (see e.g., Jakku-Sihvonen & Niemi, 2006a). It should be noted that the above evaluations have put little emphasis on the progress of ICT use in TE. However, there has been a national working group analysing challenges of ICT in Finnish education under the auspices of the Finnish Parliament and SITRA, the Finnish Innovation Fund (Sinko & Lehtinen, 1999). Their recommendations have helped in promoting ICT use even in TE.

### **Teacher education programmes in Finland**

As we begin 2010, there is a big and rapid change towards an even more independent system of higher education. All Finnish universities have been state universities being autonomous as to what they teach and research, but their finances depend on the State Budget. These financial ties are being loosened and the status of the university staff as state officers is being discontinued. It will be seen how much these and other current changes will affect curricular development. As mentioned before, even now no detailed "curriculum of subject teacher education" covering all universities in Finland can be presented. Their large variation in pedagogical studies is illustrated e.g., by Jakku-Sihvonen, Tissari, and Uusiautti (2008). The general features of the curriculum have been described e.g., by Niemi and Jakku-Sihvonen (2006) and Jakku-Sihvonen and Niemi (2006b). The curricula are usually revised every second year and they are published on the web pages of the faculties. Secondly, TE is diversified in that subject departments design their own curricula and the respective faculties make decisions about these. Special profiling of courses given to student teachers has become more common in recent years. This profiling has increased the possibility of getting the themes of Master's thesis projects closer to the problems of subject teachers' work.

In primary TE much emphasis has been put on the development of the graduate research seminar as well as the interaction of teaching practice and data acquisition for Master's thesis projects. Furthermore, the recently emphasized possibilities for combining classroom teacher and subject teacher competences have become attractive as it opens up new professional flexibility and sometimes even gives higher salary to graduating teachers. Much emphasis in secondary TE has been focussed on subject didactics at Departments of TE. This does not necessarily mean that the share of subject didactics in credit points has increased, but student teachers are more motivated to do study general education courses when these courses are tailored to account for topics relevant to the specific subject area and the age level of their future pupils. Since subject teachers teach all children in several age groups and particularly due to the principle of inclusive education implemented in the comprehensive school, there has been a growing need for courses in educational psychology and special needs education tailored for student teachers. Problems of multicultural education need more emphasis in TE, too, since there are increasing numbers of immigrant students in the Finnish school system. Here teaching of official domestic languages (Finnish and Swedish) to immigrants of all ages is also crucial.

During recent years, much effort has been expended on promoting the interaction and co-operation of different departments and faculties involved in TE. Furthermore, co-operation with institutions outside universities has grown in importance. It may be said that the emphasis on goal setting has gradually changed from teaching different content areas to educating top-quality teachers. Professional growth is a long process. It is important that student teachers receive orientation to their future work even during their first study years. This has been especially challenging for subject teacher studies at the subject departments. This should not mean only some school contacts during the first study years but also, among others, balancing critical scientific thinking and creativity in the goals of teacher studies. There is a significant motivational factor for student teachers in seeing the relevance of their studies to their future profession. Similarly, the curriculum covering pedagogical studies in subject TE has been processed at the Departments of Teacher Education and at the Faculties of Education. It has been important to harmonise the approaches and terminology in courses of general education and subject didactics. Offering experiences of teamwork during studies has been considered important in both primary and secondary TE as teachers can be seen as members of multi-professional teams when they work in schools.

The challenge of having to satisfy the demands of the whole extent of student teachers' future career has brought up the need for applying futurological research in the planning of TE and even including methods of futurological research in the TE curriculum. The relevant time span in a teacher's career is at least thirty years, possibly fifty years or even more into the future. These challenges have been accentuated in the rapid development of ICT use in schools. Already in the 80's, this has led even to researching values as well as moral and ethical aspects in TE (e.g., Niemi, 1988). Such an interest has continued to focus on current critical issues in different disciplines, especially on problems associated with computer science and computer applications in schools (see Tirri, 2000; Meisalo, Sutinen, & Tarhio, 2003, 194-216), but also nanoscience and gene technology have lately perhaps been the most problematic areas. Careless copying in the Internet seems to be a serious problem not only in relation with TE and even globally. Professional ethics have become in Finland during recent years an important focus area for teachers' organisations<sup>2</sup> as well as study and research ethics at universities and research institutions.

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<sup>2</sup> e.g., [http://extra.oaj.fi/portal/page?\\_pageid=515,447767&\\_dad=portal&\\_schema=PORTAL](http://extra.oaj.fi/portal/page?_pageid=515,447767&_dad=portal&_schema=PORTAL)

The general objective of a teacher as *a researcher and developer of his/her own work* has a long tradition and was originally described as a 'pedagogically-thinking teacher' in Finland. This is considered to be a definitely more powerful approach than that of *reflective teacher*, since only personal experiences are less valid and reliable than research outcomes as the basis of pedagogical decision-making. There is a strong tradition of research into teacher thinking in Finland (e.g., Kansanen, 1991; 2002). Ideas of Problem-Based Learning (PBL) have been under intensive discussion and several models of implementation have been suggested and tested. However, it has also become most evident that the principles of ultimate constructivism cannot be successfully applied in subject areas with well-developed theoretical structures like mathematics or physics. MEC has emphasised the development and implementation of the strategy of the information society in TE and this has even influenced the curricula. It is interesting to note that at some stage the formal goal of having at least one third of the TE courses in virtual form was suggested, but now the goal-setting even here focuses more on the skills and motivation of student teachers. There has been a solid research (and development) effort covering a wide field of computer applications from using e-mail in modern language education (Tella, 1991) to developing computer-assisted piano lessons for student teachers (Oksanen, 2003) and different applications of microcomputer-assisted school science laboratories (Lavonen, 1996) as well as interactions in Web-based communities of student teachers (Meisalo, Lavonen, & Juuti, 2006), and activating mobile-based learning in science and other subjects in the field and in laboratories (Vesisenaho & Valtonen, 2010). Further important projects have been recently described in an OECD (2009) publication from the viewpoint of researchers at the University of Jyväskylä.

## Continuing Professional Development of Teachers in Finland

### In-service Education

In-service training is considered to be training to update the knowledge and skills of teachers who are already working in schools, during the course of their employment. This 'brushing up' of professional skills covers all kinds of effort towards teacher professional development delivered within the school sector, but also often by external training providers. The definition of in-service education covers all activities intended to update teachers' skills and knowledge. In Finland there is little on the level of laws about the professional development of teachers. The focus is on in-service education, which is considered to be the responsibility of employers. (i.e., municipalities which are the local school authorities in Finland.) However, the National Board of Education (NBE) co-ordinates national in-service programmes. It is important that, as we can see in Table 1 above as an example of these efforts, all listed ICT strategies have included some kind of in-service training effort for teachers.

It may be noted, indeed, that while pre-service TE of teachers for general education has been assigned to universities, they have a minor role only in in-service education. The general approach has been that the NBE yearly puts a number of in-service courses on tender and university staff and educational enterprises may make offers to run them. A positive case of interaction of national authorities responsible for curricular reform in schools (NBE) and teacher educators was in the context of the 2003 reform, when physics and chemistry were given subject status for grades 5 and 6 in Comprehensive Schools having earlier been integrated into general science with little emphasis. It meant

that primary school teachers who previously had marginal training only in these subjects were supposed to start teaching them. In this situation, there was a call for a major push for in-service education of teachers working at this school level. While already in the period when the curricular reform was designed, the science education experts at the university department of teacher education were well informed on the renewal process and were strongly in favour of it, they had the major challenge of renewing the pre-service education curricula of primary school teachers. Finnish industrial organisations had supported the curriculum reform and the Information Office of Finnish Industry found it important to support the production of materials for in-service training (DLRs at [www.tat.fi/Aineistot/Verkko-oppimateriaalit](http://www.tat.fi/Aineistot/Verkko-oppimateriaalit)) as well as materials for classroom use. The NBE has the overall responsibility for organising in-service education, but the City of Helsinki also had a massive task of training essentially all primary school teachers to cope with this renewal and was willing to co-operate. All these parties joined forces and created Web materials in co-operation with experts at HU for grades 5 and 6 teachers and these materials were widely used both in pre-service and in-service courses. Both teachers' and students' materials produced in the framework of the ASTEL Project emerging from this co-operation are available on the Internet (in Finnish and most of it also in Swedish) at the Web pages [www2.edu.fi/astel/index.php](http://www2.edu.fi/astel/index.php) of NBE.

### **Further education**

Further education of teachers gives new qualifications and higher competence levels. It is often considered to be of the type of postgraduate education and is usually organized at universities; research-based TE can be seen to benefit greatly from the system of further education. There has also been available some resources for doctoral schools in this area and there has been important international co-operation recently between doctoral schools in several countries. The implementation of modern technologies both in the daily work of teachers and in the research projects has been among the goals of doctoral schools following the official goals of the information society. Their research is supposed to focus on the development of teaching practise, new learning materials, etc. Postgraduate studies are assigned to the partner universities; the doctoral schools organise seminars mainly on relevant research methods. There is also interaction over the Internet on the problems of research projects in the meantime. An important feature of these schools has been their international co-operation offering doctoral students contacts across borders as well as broader views on the key issues in their research area. The doctoral school makes it possible for schoolteachers who get full-time researcher positions to finish their doctorate in three to five years. However, it is not uncommon that most of the doctoral work is done while working full-time as a teacher and only the final stages of the thesis project are accomplished with the aid of a scholarship. Many teachers studying in postgraduate schools have long teaching experience. They have high competence in applying their research outcomes in school practice both for themselves and through being active in in-service training. These doctoral students are not young and there are demands that the median age of doctors should be lower in the future.



# Implementation of the OECD/CERI study in Finland

## Selection of the target groups

In Finland, initial teacher education for primary and secondary school is presently at eight universities of which it was decided to choose for practical reasons only the University of Helsinki (UH), the Department of Teacher Education and the University of Eastern Finland (UEF), the School of Applied Educational Sciences, Joensuu campus, for this study (as two institutions with rather different profiles). Also the teacher training schools associated with the respective Faculties co-operated and participated in the study. A specialist group with experts from the MEC/NBE (Jari Koivisto), the Ministry of Traffic and Communications (Sanna Vahtivuori-Hänninen), the IT Department of University Administration of UH (Matti Lattu) as well as the representatives of the Departments of TE were consulted for the planning of the study. The University of Helsinki is situated at Helsinki metropolitan area and while all Finnish institutions active in TE can be considered to be quality providers, at this multidisciplinary university the number of possible subject specialisations is larger than at other universities. Joensuu is a smaller town in eastern Finland, which has made a major effort to develop ICT uses in education and related research. There is a short description of the selected Departments below.

The target group of this study represents over 40% of all student teachers in Finland. This percentage value has been estimated using the intake figures to teacher education (OPM, 2007, pp. 22-23) and is rather high due to the large number of student teachers enrolled in subject teacher education programmes at University of Helsinki. It was not possible to extend this study to all institutions active in TE in Finland due to the limited resources allocated for this project.

## University of Helsinki

### General description

The University of Helsinki is a traditional research-oriented university (founded 1640) with 12 faculties (Theology, Law, Medicine, Arts, Science, Pharmacy, Biological and Environmental Sciences, Behavioural Sciences, Social Sciences, Agriculture and Forestry, and Veterinary Medicine as well as the Swedish School of Social Science). It is a member

of the League of European Research Universities (LERU) and has been the best Finnish university on international ranking lists. The present Department of Teacher Education was established in 1974 following a thorough reform of the system of general education in the late sixties. (The Department was for some years been called the Department of Applied Sciences of Education, but adopted again its original name from 1st January, 2010.) Tasks of the University include research, teaching and interaction with society. UH is bi-lingual (Finnish and Swedish), which also teaches many courses in English. However, according to the national TE policy primary TE and pedagogical courses in secondary TE for Swedish-language schools have been assigned to Åbo Akademi University. There are 35,300 degree students actively enrolled at UH, as well as 47,000 continuing education and Open University students. The University has 7,900 employees, 3,900 of whom are researchers and teachers. UH operates on four campuses in Helsinki and in 19 other localities in Finland. It aims to establish its position among the leading multidisciplinary research universities in Europe. The organisational structure of the University has been renewed at the end of 2009 to be more efficient and to cope with the new legislation covering higher education in Finland as well as the financial challenges of the current tight economical situation.

#### **Central administration and ICT**

UH has an IT Department, which makes it easier for staff and students to work in the university by offering high quality ICT services. The services of the department support the execution of the basic tasks of the University. The IT services in campuses are provided by Campus Service Centres of the University Administration. They coordinate IT activities, standardize the technical solutions and take care of the local maintenance of the information network. They also provide IT classrooms and service points as well as local support by local teams. The Helpdesk service deals with all requests for help and support from both staff and students. The Educational Centre for ICT offers support for the teaching personnel in the pedagogical use of tools and services for e-learning. The library staff provides free advice and guidance to its customers, helping them find the information they need. Departments and faculties use ICT services extensively for administrative purposes so that e.g., all registers are on-line. Locally produced learning materials are expected to be available for student teachers on the web pages of the Departments.

#### **Activities at the faculty and departmental levels**

One of the strengths of UH is subject teacher education with a rather large volume by national standards, 622 students entering the secondary school TE programme yearly (OPM, 2007, 23). Furthermore, there are 120 students entering correspondingly the primary school TE programme at the Department of TE (OPM, 2007, 22). The evaluation report for subject TE (Kaivola & al., 2004) describes in more detail these joint activities of several departments at six faculties at the University as well as co-operation with Sibelius Academy (music teachers), Aalto University, the School of Art and Design (visual arts teachers), and the Theatre Academy (training in the pedagogy of dance and theatre arts). Subject teacher studies at UH can be done in 27 different disciplines. There are two teacher training schools attached to the University and a varying number of field schools for the teaching practice of student teachers.

There has been a definite upgrading of staff competence at departments active in TE during the last years. UH has requested that all permanent staff must have a doctorate in their field of teaching to promote the idea of research-based teaching. Several younger staff members have enrolled in doctoral studies, most of their research themes having at least some connection to ICT use and TE. There has also been a specific focus on the ICT skills of staff members at the Faculty. A specific working group of the Faculty of Education in the mid nineties analysed the status and future needs in ICT skills in the field of education (Meisalo & Lavonen, 1995). Furthermore, the implementation of the first national ICT strategies had been planned carefully with a co-operative approach and their impacts were followed in detail (Lattu, Lavonen, Juuti, & Meisalo, 2004; Meisalo & al., 2006). At several university departments there has been a tradition of research into the educational uses of ICT. In the following we are able to mention only a few examples of related research and development effort at UH.

We list here as an example some recent EU-funded projects where Science-related teacher educators at UH have been active and which are related to ICT use in TE. The following examples are EU-funded projects where science teacher educators at HU have been active:

- The GRID project to create a network for the exchange of best practices in the field of Science teaching in Europe.
- Effective Use of ICT in Science Education (EU-ISE)  
[http://www.fizyka.umk.pl/~pdf/EU\\_ISE/](http://www.fizyka.umk.pl/~pdf/EU_ISE/)
- The European Teachers Professional Development for Science Teaching in a Web-based Environment (EuSTD-web, <http://cms.ua.pt/eustd-web/>)
- MaterialsScience: University-school partnerships for the design and implementation of research-based ICT-enhanced modules on Material Properties  
<http://lsg.ucy.ac.cy/MaterialsScience/>
- The Effective Use of Computer Aided Teaching and Learning Materials in Science Teaching: a teacher training course with a European perspective CAT (<http://cat.upatras.gr/>)

Another example of a group with related interests at the same Department is the *Media Education Centre*. The general aim of this Centre is to conduct research and developmental work on media education. In addition, it aims e.g., at organising media education courses in initial as well as in in-service TE co-ordinating and taking part in national and international projects connected with media education. Furthermore, it contributes to international consultancy operations and disseminates information and knowledge with respect to rapidly evolving media education systems. Summing up, the Centre specialises in different kinds of activities connected with media education, such as MICT (modern ICT), ODL, CMHCS (computer-mediated human communication systems) and even the Virtual School concept and virtual learning environments. The international projects where the Centre is active include:

- Project Gender Awareness in Media Education <http://www.project-game.eu/partners.php>
- Project Characteristics of Volition in Media Literacy  
<http://www.helsinki.fi/sokla/media/volition.html>
- Project Interactive Tracing and Graphical Annotation in Pen-based E-Learning  
<http://www.helsinki.fi/sokla/media/itrace.html>

Similar projects have been organised in other disciplines, like in foreign language education. Interesting projects related to concept mapping are organised by Mauri Åhlberg at the Department of Teacher Education and by Ismo Koponen at the Department of Physics. Neither should we forget the research and development work on learning materials for TE. Examples of materials related to ICT use in TE include research-based materials by Hakkarainen, Lonka, & Lipponen (2004) and Meisalo et al. (2003), which are closely related to the creative uses of ICT in TE. Anyway, we emphasize that the above list is by no means to be considered as a full documentation of all related research-oriented projects, but only as some ad hoc examples. We may also note that the organisation of research centres at the Department of Teacher Education will undergo substantial changes in spring 2010.

At UH there are also the resource centres AINO and LUMA mentioned above. We describe here the latter in more detail: The nationally active LUMA Centre headed by Prof. Maija Aksela focuses on continuous teacher education in natural sciences, mathematics, computer science, and technology. The activities bring together different subjects, institutions as well as industrial and educational levels from primary education to higher education. This also provides a breeding ground for interdisciplinary co-operation. Continuous teacher training is the core activity of the centre. The activities of the centre are planned, drafted and implemented by a working group made up of twenty expert members and a coordinator acting as the leader of the group. Most of them are teacher training professionals. They are responsible for the visibility of their own discipline in the activities of the centre. The centre also provides Internet materials for schools and for professional development of teachers in Finnish, Swedish, and English (e.g., [www.myscience.fi](http://www.myscience.fi)).

Resource centres have been set up in subject departments in order to support their activities. BIOPOP supports biology teaching at the Viikki campus. The researchers of subject didactics at the Department of Teacher Education are responsible for researching and developing Science teaching and there is also the LUMO resource centre focussing on didactical resources. Several resource centres exist at the Kumpula campus: GEOPISTE (geography), KEMMA (chemistry), KONDENSAATTORI (physics) and SUMMAMUTIKKA (mathematics). Student teachers occupy the roles of both actors and learners in the activities of the centre. The forms the activities take vary according to the subject. The activities are either integrated into degree studies and research in TE, or student teachers take part in them in conjunction with their studies and acquire valuable work experience at the same time. The contact persons for the resource centres are usually student teachers about to finish their studies or postgraduate students in subject departments. Student teachers are actively involved in organising different kinds of events. For example, dozens of them have volunteered as group leaders for children and families during the annual science fair.

## University of Eastern Finland

### General description

University of Joensuu is from the beginning of 2010 a part of the University of Eastern Finland (UEF), but it had already previously been a multidisciplinary research university, which celebrated its 40th anniversary in 2009. The university has grown in Joensuu around a Teacher Training College and the Faculty of Education. One of its strengths is

TE with a rather large volume by national standards, 140 students (80 in Joensuu and 60 in the Savonlinna campus) entering the primary school teacher education programme yearly and 202 entering the secondary school teacher education programme (OPM, 2007, 22–23).

The University of Joensuu and the University of Kuopio merged to constitute UEF, which began its operations on 1st January 2010. UEF seeks to be an internationally recognized research and teaching university, which is among the top three most significant universities in Finland and among the leading 200 universities in the world. Due to its high standards of teaching and competitive research, UEF is striving to be a prominent player in the Finnish and international innovation systems. The merger of the two strong universities into UEF was a response to the recent changes in the global research and innovation environment. The goal is to create a sufficiently large and operational unit, which is efficient in research, education, and societal impact. The operational integration of the campuses will lay the foundations for a strong and competitive, research-based competence cluster in eastern Finland.

UEF comprises four faculties: the Faculty of Philosophy, the Faculty of Science and Forestry, the Faculty of Health Sciences, and the Faculty of Economics and Social Sciences. The University of Eastern Finland has its main campuses in Joensuu and Kuopio, and there is also a satellite campus in Savonlinna. The new university has over 14,000 students and some 3000 members of staff. The IT Centre of the University takes care of the ICT infrastructure at the university and the Learning Centre for support in ICT in education.

The university has five areas of expertise: natural sciences and new technologies; teacher training, education and culture; borders, European border areas and Russia; health sciences, molecular medicine and welfare research; and environmental research and renewable natural resources. *One of the new emerging fields of the University of Eastern Finland is educational and development technology.*

### **Teacher education, research, and ICT**

The School of Applied Educational Sciences and Teacher Education of the Faculty of Philosophy at UEF in Joensuu has more than a 20-year tradition of teaching, development, and research into computer supported learning and the pedagogy of ICT, which is included in all degree programmes in the Faculty. The co-ordinating research group is called Research and Development Centre in Information Technology in Education (TOTY) led by Prof. Patrick Dillon and Dr. Mikko Vesisenaho. The group has intensive collaboration with e.g., University of Nottingham (UK). Several younger staff members are enrolled in related doctoral studies. There have also been important developments using a design-based research approach for introducing modern learning environments in science teaching (especially the biological sciences).

The latest research and development projects of the TOTY are e.g., Multidimensional Learning Environments, Net Generation, Responses to ICT, Personal Learning Environments, Continuing Teacher Training, and E-Learning and Pedagogy of ICT in General.

- **The Multidimensional Learning Environments Project** focuses on the flexible use of ICT in education. The ICT can be seen as a component that enriches the learning environment in contact and distance teaching. The main output is the use of ubiquitous technology, which can support everyone even in rural and technologically inadequate environments. The approach also includes the nearby communities and companies. (Vesisenaho, 2009)
- **The Net Generation** theme focuses mainly on secondary level students and student teachers as people of the net generation. The aim is to describe these students and

their ways of using ICT. The further aim is to find ways for schools and teachers to take advantage of students' skills when designing learning environments. (Valtonen, Kukkonen, Dillon, & Väisänen, 2009)

- One branch of the **Responses to ICT** is in combining the ecological theory of learning and contextualization in learning ICT with student teachers. (Vesisenaho & Dillon, 2009)
- **The Personal learning environments project** has the linkages to the development of teacher's pedagogical skills on polytechnic level. One part of the development is the development of combined technological solutions for educational purposes.
- Development and implementation of **Continuing Teacher Training in Integrating ICT** has been carried out for more than 10 years with the support of NBE.
- **E-learning and Pedagogy of ICT in General** focuses mainly on teachers' ways of using online learning environments for supporting learning. This area is based on teachers' conceptions of learning and technological pedagogical content knowledge (Valtonen, Kukkonen, & Wulff, 2006).

In addition, the Department of Computer Science and Statistics has a strong focus on Educational technology research. The Educational Technology Research Group (<http://cs.joensuu.fi/edtech>) is led by Prof. Erkki Sutinen and has significant expertise in the design methodologies of e-learning. The group is internationally recognized for its unique and pioneering work in e.g., ethnocomputing and ICT education for development. The concrete research themes of the group include e.g.,

- **ICT for development (ICT4D)**: the group is actively developing activating and relevant educational systems and materials for developing countries in ICT (e.g., Sutinen & Vesisenaho, 2006; Tedre, Bangu, & Nyagava, 2009; Vesisenaho, 2009; Vesisenaho & Sutinen, 2010).
- **Design methods for educational technology**: the group is researching the use of agile and participatory design methods for educational technology (Suhonen & Sutinen, 2006).
- **Visualization tools for learning programming**. The tools developed by the group include, for instance, Jeliot (<http://cs.joensuu.fi/jeliot/>) and Woven Stories.
- The unit has several years experience on **designing, implementing and running an online study programme ViSCoS**. In ViSCoS (<http://cs.joensuu.fi/viscos/cms/>), digital learning content and various learning systems have been developed to support the studying of University level basic and intermediate studies in Computer Science.
- **Technologies for children (Kids Club)** including games, robotics and tangible technologies in learning (<http://cs.joensuu.fi/~kidsclub/>).

*International Multidisciplinary PhD Studies in Educational Technology (IMPDET)* (<http://www.impdet.org/>) is a joint PhD program between computer science and education with online courses, intensive face-to-face workshops and summer schools, an international pool of supervisors and carefully planned study counselling and mentoring environment. The LUMA centre for Eastern Finland, established in 2009, focuses mainly on being the technology-in-education centre in Finland and organising the international annual science and technology education festival SciFest (<http://www.scifest.fi/>) for pupils and students. It will also combine the multidisciplinary expertise found in ICT education.

# Data acquisition

The general framework for implementing national IITT studies is presented in the OECD web page<sup>3</sup>. It is important that there are several data acquisition methods in use to allow triangulation. Our approach differs in some respects from the recommendations in the general OECD plan due to local circumstances. A description of a researcher visit in this context is presented in Appendix 5 to give an idea of the practicalities of data acquisition in this project. The questionnaire data were collected at the Faculty level with only minor technical difficulties and the responsible staff members showed true dedication in helping with data collection during both the interviews and the survey. However, these are not referred to in detail below.

## Questionnaires

There were four different questionnaires in use, one for student teachers, the second for teacher educators, and the third for mentor teachers. The fourth questionnaire was for universities (teacher training institutions). All the questionnaires were translated from the English original to Finnish in iterative processes of several rounds checking some details from the Swedish version to ensure correct interpretations. Some terms in the Finnish version differ from the original due to different national usage. For example the terms 'teacher education' and 'teacher educator' were used systematically instead of 'teacher training' and 'teacher trainer', since the latter terms had been interpreted as overly old-fashioned. The questionnaires in the final version (see Appendixes 1-4) were made accessible to the participants of the study over the Internet by putting them on the OECD mainframe computer in Paris. The fifth questionnaire for young teachers was not distributed in Finland.

The rationale behind the questionnaires was to ascertain the common situation in OECD countries. According to a literature review (Enochsson & Rizza, 2009), teacher trainers do not prepare student teachers enough in the field of ICT use in education. There is lack of equipment, confidence, support, incentives, and the knowledge of how to work with ICT in a pedagogical way. This is quite opposite to national strategies and their implementation plans. The questionnaires have questions about these factors and also to what extent teacher trainers use certain kinds of technology in their teaching and what kinds of help could enable them to increase the use of ICT in their teaching. There

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<sup>3</sup> [http://www.oecd.org/document/38/0,3343,en\\_2649\\_35845581\\_42418790\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/document/38/0,3343,en_2649_35845581_42418790_1_1_1_1,00.html)

are also questions about the importance they attach to ICT in teaching. The questionnaires were looking for answers to the questions:

- To what extent and in what ways is technology used in institutions of teacher education in OECD countries?
- In what ways are student teachers prepared to integrate technology in teaching in institutions of teacher education in OECD countries?
- If student teachers are not satisfactorily prepared, what are the main obstacles according to the stakeholders?

We saw in advance that it would be difficult to persuade the institutions and persons in the sample to be active as we had experiences of similar Web questionnaires. The members of the target groups wonder what they would gain by participating. How they could allocate time for responding? The problems resulted in a low activity rate, as we shall see later.

In the first round, requests to fill in the forms on the Internet were sent in April 2009 by e-mail to 118 students enrolled in Helsinki and 111 in Joensuu. These students were taken by systematic sampling from those participating in the final teaching practice period. Similarly, by early May a sample of 16 selected teacher educators working at both Departments and 16 mentor teachers at associated teacher training schools in Helsinki and 18 in Joensuu were asked to fill in the respective questionnaires. A reminder was sent to all those who had not responded by mid May. Persons responsible for TE programmes at the Departments filled in the respective questionnaires assisted by several staff members during this first round.

It is regrettable that only a few persons in the target groups initially filled in the questionnaires. During the interviews several reasons, like closeness to summer holiday, for the low activity were given, but giving reasons did not solve the problem. It is a detail that perhaps for teacher educators and mentor teachers the remainder was sent too soon after the original request to participate and some commented that it might have been useful to send more than one reminder. Several of those who participated in the study indicated that they participated more for reasons like 'I am a good girl/boy' or 'I am such a conscientious person' and only one message was received that the person was glad to participate because she considered herself to be an expert in this field.

Due to the above problems it was found advisable to reopen the survey in November 2009 for a new group of student teachers and a larger number of teacher educators and mentor teachers. Requests to fill in the questionnaires on the Internet were sent in November by e-mail to 270 student teachers enrolled in Helsinki and 136 in Joensuu. These were student teachers who did not participate in the study in the first round, the selected student teachers were all those participating in the next-to-final teaching practice period this academic year. It was also decided to call all teacher educators working at both Departments and all mentor teachers at associated teacher training schools and ask them to fill in the respective questionnaires. There were 31 staff members and 89 mentor teachers in Joensuu. It is more difficult to tell exactly the size of these target groups in Helsinki, while the mailing list included persons who were not in the target group and they were asked not to respond. Similarly, those who had already responded in the first round were asked to ignore the e-mail. A reminder was sent to all on 23rd or 24th November, again with the request to ignore the e-mail, if they had already responded.



The response rate of teacher educators and mentor teachers can be considered to be satisfactory after the second round.

## Interviews

The groups of the ICT experts responsible for the development of ICT use for teacher education were interviewed (semi-structured interview) on the 19<sup>th</sup> May in Joensuu and 25<sup>th</sup> May in Helsinki using an interview guide prepared by OECD staff for the IITT study (see <http://www.oecd.org/dataoecd/3/2/42419175.pdf>). Both groups consisted of the best available local experts in the field and they were committed to work as hard as needed to find adequate responses. In the same context the university questionnaire data (their responses to the Web questionnaire) were discussed. There seemed to be a very good teamwork in the groups being interviewed and the interviewed persons had obviously quite a wide spectrum of different competence and experience profiles. Both of these interviews took about one hour, they were video-recorded, and the recordings as well as all the other interview recordings reported below were analysed using a variant of the Critical Incident Method (see e.g., <http://www.usabilitynet.org/tools/criticalincidents.htm>). This method is based on identifying critical factors in a variety of processes and in this case for identifying incidents having positive or negative influence on the use of ICT in TE. (Other examples of the use of this approach are Cummings, Murray & Martin, 1989; Lavonen, Meisalo, & Lattu, 2002; Nakhleh & Krajcik, 1993, and Steffler, Varnhagen, Friesen, & Treiman, 1998).

Furthermore, representative groups of teacher educators, mentor teachers, and student teachers were also interviewed (convenience sampling) using the respective interview guides. The interviews were recorded on video and then the recordings were analysed following the Critical Incident Method. Some information on the themes discussed during the interview sessions could be later confirmed or added to on the basis of informal discussions with the interviewees. At UEF, Joensuu campus, interviews of student teachers were organised during a researcher visit on April 20<sup>th</sup> and staff/mentor interviews on May 18<sup>th</sup>, 2009. At UH most interviews could be organised only somewhat later at the end of May and in early June. This timing caused major difficulties especially when trying to persuade students to participate in the study. However, altogether 20 sessions were recorded the average time being about 45 to 50 minutes for group interviews and 30 to 40 minutes for individual ones.

### Teacher educators and mentor teachers

In Joensuu, two groups of teacher educators (2+3 persons) were interviewed, one in the morning and the other in the afternoon of May 18<sup>th</sup>, 2009. In between there were interviews of mentor teachers. They were from two schools, one group of three mentors from a secondary school and another of two mentors from a primary school. All the participants in the group interviews showed commitment to express honestly their feelings and facts about ICT use in teacher education.

In Helsinki also two groups of teacher educators (2+3 persons) were interviewed, on June 4<sup>th</sup>, 2009. There was a wide range of specialties of the staff members from mathematics and sciences to the humanities and educational sciences. Furthermore, there were two groups of three mentor teachers each, both from a secondary school training subject teachers (May 27<sup>th</sup>). At another teacher training school there were two groups of

two mentors, one group from the primary and the other from the secondary school level (May 25<sup>th</sup>).

### **Student teachers**

Student teacher interviews were organised at UEF in Joensuu campus during a researcher visit on April 20<sup>th</sup>, 2009. Three groups of 2–4 student teachers were interviewed using an interview guide prepared by OECD and the coverage of subject areas in these groups was as intended. The first group consisted of two student teachers in the subject teacher education programme. One of them was enrolled in the Foreign Language TE programme and the other in the Science TE (Biological sciences) programme. The second group of two student teachers in Primary school TE programme was heterogeneous while one of them was getting a double competence also as a subject teacher in social sciences. The third group was of four student teachers enrolled in the Subject Teacher Education programme, one majoring in Mother Tongue (Finnish), two in Mathematics, and the fourth in Geography.

At UH most interviews could be organised only somewhat later by the end of May and in early June. This caused major difficulties especially when trying to persuade student teachers to participate in the study. It appeared that most of them had some summer job over the university holidays and they were just dropping in for quick visits to the campus. So an interview of a group of 3-4 student teachers (Mathematics and Sciences) was organised, but then we had to be satisfied with individual interviews of four student teachers (one enrolled in the primary school, three in the secondary school TE programme) due to the late timing by the end of semester (May 27<sup>th</sup>–June 2<sup>nd</sup>). Furthermore, we found out that there was a large variation in the background and in the study paths of the interviewed students so that some interviewees could only marginally belong to the target group in one way or another.

# Results

The interview and questionnaire data collected at the Faculty level has been used mainly for international comparisons and is not referred to below in detail. However, some information included both in the UH and UEF data are used in triangulation for supporting the conclusions. Due to the low numbers of student, mentor, and teacher educator participation in the first round of the questionnaire study no analysis of the data was considered advisable on that basis only. All the analyses of the questionnaire data below are based on combined data of first and second rounds. No advanced statistical analysis was considered advisable even on the basis of the combined data due to problems in the sampling procedure. However, some descriptive graphics are included in Section *Questionnaire data*. There were few comments only as reactions to open-ended questions. These did not give significant new information. This outcome has been common experience as to similar Web questionnaires.

## Interview data

### Student teachers

It appeared that the majority of students had a clearly positive attitude towards ICT use, but there was also some variation in their opinions. All interviewed student teachers in Joensuu were satisfied with their acquisition of ICT skills. However, the ICT courses in different years and in different training programmes and even for different subject majors varied quite a lot especially at UH. Courses for attaining basic ICT skills had been recommended for student teachers, but they were not always compulsory. One student teacher commented: *“It is so, that it [ICT training] has esteem but it is not compulsory.”* Some students who had school teaching experience over several years (returning to MEd studies after a lower degree obtained a few years earlier) reported that there has been a huge positive development in ICT use in TE during these years. For instance: *“It was a surprise that in the lessons slides were shown, and then the students asked when these [slides] will be available on the Net, this expectation had come in those two and half years!”* A student who had taken the ICT course some years earlier could be quite frustrated: *“I was quite anxious and felt that the teachers overestimated my skills.”* On the other hand, student teachers were according to their responses generally well motivated to use modern equipment and innovative teaching methods, and they reported that help was available when they needed it. They found it positive that the teacher training schools had been

renovated recently and the newest equipment were available. This allowed them to use new and interesting technologies in their teaching practice. Peer support was thought to be very important when technical problems were encountered, but peer groups were also seen as valuable forums for discussing the pedagogical aspects of ICT use. Student teachers generally felt confident of getting help from mentor teachers when they needed, but even *“there was such a feeling that pupils [of the teacher training school] should come and help the [student] teacher”*.

There was, indeed, a general positive opinion of the possibilities to use modern technologies when in teacher education, e.g., *“Teacher educators and mentor teachers do their best and if you have an idea and ask if you can do some experiments, it will be allowed.”* However, some student teachers thought there was a problem in the reality of practice teaching, in that it was far more conservative than the orally expressed intentions of mentor teachers and teacher educators. Even if student teachers felt that modern equipment and an Internet connection of high quality were generally easily available for all, some practical problems in the accessibility of computer labs to student teachers (locked doors) could be identified and rectified immediately by agreeing on contact persons who would be present practically all the time. A generally expressed problem was lack of time to concentrate on learning something new as the student teachers felt they were always overloaded with work.

The problematic examples discussed by student teachers included information searches on the Internet (problematic due to the dangers of misusing unreliable information and of plagiarism). Especially positive examples mentioned included the availability of MBL equipment for Science experiments as well as many simulations based on Applets. Even the use of concept mapping with the aid of Freeware available on the Internet (CMapTools) received positive comments. There were some wishes regarding the availability of interactive whiteboards in teacher training schools (where these were installed during the period of implementation of this survey), but also one student teacher commented that *“perhaps the most negative example of misuse of modern technologies in teaching I saw was associated with the use of a Smartboard”*.

### **Teacher educators**

The interviews disclosed the high motivation of teacher educators to use ICT in their teaching and showing student teachers how to use modern technologies, even if they expressed being overloaded with routine work all the time. Altogether, the interviews indicated a most serious effort to promote ICT use in TE. The interviewed teacher educators did not report major problems in their ICT skills or those of student teachers: *“[We can say that] at least in this house [at Department of Teacher Education] ICT skills have been excellently taken care of; during the courses there has been no need to tackle any problems.”* *“There is much that is in everyday use [for student teachers].”* But also that *“Student teachers have the knowhow already from comprehensive school, there is no need to actually teach them, they learn at home, in their hobbies, etc.”* And another comment: *“They [students and student teachers] are in the Internet, they do not go there.”* The common attitude was quite critical if they were presented the goal of maximising ICT use in teacher education. They accepted that there are many benefits in using learning platforms for independence of time and site, etc. However, *“it is not so sure if there is more learning”*. They thought that modern technology offers valuable tools, but *“one has to have a look if this [ICT use] is a clever approach”*. Altogether, teacher educators were reluctant to

evaluate how ICT in general is integrated into teacher education: *“I think that it depends more on the individual teacher than on how systematic ICT use is integrated in TE.”*

All the teacher educators were quite modest when evaluating their own contributions to creative research-and-development work so that they had to be persuaded to give examples of ICT use they had developed. Research orientation was not always obvious, but research-based design was apparently often used for creating new learning materials. There was a clearly indicated need for more time and resources for serious research. Both departments were active in research programmes focussing on educational ICT uses as is required by the idea of research-based teacher education. Research activities as described under the descriptions of the institutions were rather weakly communicated during the interviews.

Many staff members were very active, indeed, and they had creative ideas for ICT use in their classes. Some of them readily presented examples of the teaching materials they had developed for Internet use. Ideas were of a wide range and often showed quite original thinking, even if some could be said to be on a rather modest level of creativity. Even here collegial support was seen to be very important to deal with any technical problems encountered, but peer groups were also seen as valuable forums for discussing the pedagogical aspects of ICT use also by student teachers. Peer groups even at subject departments were seen as valuable forums for discussing different aspects of ICT use. Wishes for all kinds of co-operation of staff members at all involved institutions including mentor – teacher educator contacts were expressed. Altogether, a major problem seemed to be the need for more co-operation and teamwork, especially across subject area boundaries or over bureaucratic borderlines. Administrative use of ICT was thought to be more crucial by teacher educators than in the other groups of interviewees. Their workload caused by implementation of different strategies, related to ICT use or to more general goals, and being subjected to frequent evaluations of so many aspects of their work was felt to be a real problem. Some staff members expressed their views that the approach in implementing the ICT strategy of the University could be less top-down in nature. This can be interpreted as a wish for a more open interaction with the central administration of the University and especially with their IT Department.

### **Mentor teachers**

The interviewed mentor teachers were obviously highly motivated to use ICT in their teaching in school and in supervising, as well as to guide student teachers to use modern technologies. They showed this motivation even if they felt (like the teacher educators) overloaded with routine work all the time. The teacher training schools in both Faculties had had their premises renovated recently and they had been able to get a largely new set of ICT equipment for use in their learning environments. Even if modern equipment and a wideband Internet connection were generally easily available for all at the teacher training schools, it was also obvious that more new equipment like interactive whiteboards were in the process of being installed just before the case study period or during it, and few mentor teachers (practically no student teachers) were familiar with their technical or pedagogical use to any extent. The mentor teachers pointed out that they needed time to learn the necessary technical and pedagogical skills. (About using new software: *“It was possible to succeed with the help of the software provider, but it took a lot of time!”*)

Anyway, by the time the interviews took place the mentor teachers were looking forward to more easy access to classrooms equipped with interactive whiteboards and to

computer laboratory classrooms where each student/pupil could have access to a personal computer. Another example although not such an impressive one of gradual change in technology quoted as a positive development was that overhead projectors were being replaced by document cameras. Mentor teachers indicated that they could find prompt technical help when they needed it, either from their peers or from the technical ICT experts of their school.

The mentor teachers claimed that they had to have a facilitator role in promoting ICT integration in teaching practice. They suggested that the best approach was small-group discussions where they could tell student teachers about their own goals for ICT use and support each student teacher in forming her/his own personal goals. *“What is most needed is encouragement.”* In the scaffolding process they felt that meeting face-to-face with student teachers is of primary importance while virtual communication channels have a supporting role.

Many mentor teachers were quite active users of different types of ICT and they had creative ideas for ICT use in their classes. The first rather obvious comment on the benefits of ICT was the power of process writing. A mentor teacher (Mother Tongue) said that *“The writing process is so different with the aid of a computer”* and another (Mathematics and Physics teacher) continued with: *“The same is true in Physics when writing reports.”* Teaching materials can often be found on the Internet, e.g., *“nowadays we take all our pictures from the Internet.”* or *“There [on the Internet] one can find all kinds of materials for Physics: pictures, video-clips, information about planets, ...”* Apparently all lesson plans of student teachers were submitted in digital form and they were commented on by e-mail, and in rare cases using a learning platform. Some mentor teachers regularly followed Internet sources to find digital learning materials, e.g., teachers’ programmes from the BBC, and also helping student teachers to utilize them. One of mentor teachers commented that: *“One should be able to give positive experiences [on ICT use in teaching] to them.”* Mentor teachers in general felt confident about the ICT skills of student teachers, but there was some worry about equality: *“Students [student teachers] may be in unequal positions when it comes to whether they have had a computer [Internet access] at home or not.”*

All interviewee mentors were quite modest when evaluating their own contributions so that they had to be persuaded to give examples of the ICT use they had developed. However, the submitted examples covered a wide range of original ideas, even if the implementation sometimes showed a rather modest level of technical expertise. They also quoted several interesting applications designed by student teachers. These included the creation of a three-dimensional video-clip presentation for learning spatial vision (using red/green spectacles), video-recording and analysing creative lessons during teaching practice, and collecting a library of Applets for science lessons or using multiple original sources on the Internet for foreign language teaching. On the other hand, some mentor teachers complained that most often student teachers mechanically prepared PowerPoint presentations with little if any originality.

The ethical and moral aspects of ICT use were also discussed spontaneously in general terms. *“I do not like to control [Internet access of students/pupils].”* *“This [responsible behaviour when using ICT] should be integrated in the whole curriculum.”* Anyway, while in this respect no major problems were indicated in the discussions, all mentor teachers seemed to be alert to it.

Peer groups were seen as valuable forums for discussing pedagogical aspects of ICT use by student teachers. Again, a major problem seemed to be the lack of co-operation and teamwork, especially across subject area boundaries or over bureaucratic borderlines.

A younger mentor teacher suggested using discussion forums on an intranet as he had had positive experiences of this during his student teacher period at the Department. This has been in routine use for student teachers only, but could have important potential also for teacher educators and mentor teachers.

## Questionnaire data

Here questionnaire data for teacher educators, mentor teachers, and student teachers are presented and analysed. There were altogether 149 teacher educators, 60 mentor teachers, and 178 student teachers that answered the questionnaires. Background information of the respondents is presented in Table 2.

**Table 2.** Background information for teacher trainers, mentor teachers, and student teachers.

	Female	Male	Total	Age, mean
<b>Teacher trainers</b>	92	57	149	48.0
<b>Mentor teachers</b>	44	16	60	47.5
<b>Student teachers</b>	128	50	178	27.1

The teacher trainers had been working as a teacher trainer for a total of 14 years in average and they were teaching the following subjects:

- Educational science 64
- Mathematics 18
- National language 24
- Foreign language 9
- Social studies 14
- Science 24
- ICT 6
- Other 25

The mentor teachers had an average teaching experience of 20 years and they had been working as mentors for 13 years. The subjects they were teaching were:

- Mathematics 16
- National language 18
- Foreign language 18
- Social studies 9
- Science 21
- ICT 4
- Other 15

Student teachers were mainly (all but 31) studying in a subject teacher education programme and they were studying the following subjects:

- Mathematics 42
- National language 16
- Foreign language 28
- Social studies: History 10, Religion 9, Philosophy 4, Psychology 8
- Science: Biology 9, Physics 18, Chemistry 22, Geography 14

Teacher educators were asked self-evaluate their expertise in ICT use. Altogether, 69% of the teacher educators felt that they are fairly or very comfortable using ICT in their homes. On the other hand, 77% of the teacher educators felt that they were fairly or very comfortable using technology in their classrooms. Mentor teachers were also asked to self-evaluate their expertise in ICT use. Altogether, 77% of the mentor teachers felt that they are fairly or very comfortable using ICT in their homes. On the other hand, 78% of the mentor teachers felt that they were fairly or very comfortable using technology in their classrooms.

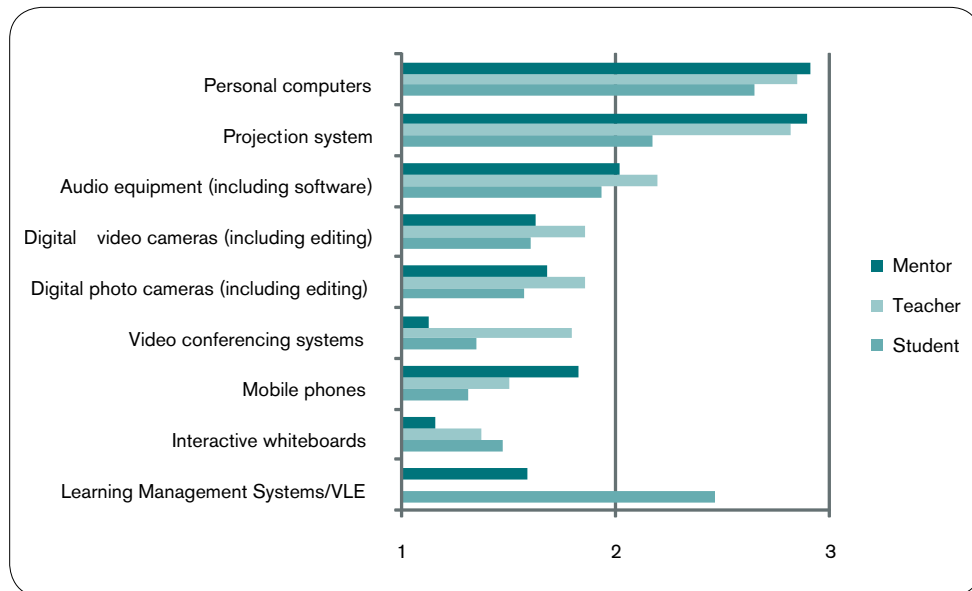
The teacher educators and student teachers were asked to evaluate the technological and pedagogical support in the institute. Altogether 71% of the teacher educators thought that the institute has a policy to foster and sustain ICT-based innovations in teaching and 58% of them had personally been engaged in a project aimed at using ICT in new and innovative ways. In the open responses there were several descriptions of projects teacher educators had participated in. Some of the projects were financed by their own university (ICT unit, faculty or department), some by the Ministry of Education and Culture (MEC) or the National Board of Education (NBE). There were also several EU-financed projects and projects with research funding. Altogether, 96% of the teacher educators and 95% of mentor teachers thought that there is technological support available for them and 77% of the former and 84% of the latter thought that there is also support available for pedagogical use of ICT. Correspondingly, 80% of the student teachers thought that there is technological support and 30% of them thought that there is pedagogical support available for them at their institution. Altogether, 63% of the teacher educators, 80% of mentor teachers, and 61% of the student teachers thought that the quality of the technological support is good or very good. About 60% of teacher educators and student teachers and 72% of mentor teachers who thought that there is pedagogical support available estimated that this support was good or very good.

The teacher educators were asked in the questionnaire to evaluate what kinds of technological equipment are available in the classrooms where they taught. The student teachers were asked to evaluate what kinds of technical equipment are accessible for them as student teachers at their institutions. We can see that personal computers are accessible both to teacher educators and student teachers. Student teachers do not feel projection systems to be equally accessible, we interpret this as probably being due to a problem of communication, the same is also true with video conferencing systems. These data can be compared with the evaluations of mentors of the availability of equipment at teacher training schools. The results are presented in Figure 1a. In Figure 1b these are compared with data of the mentor teacher questionnaire where the previous 1 to 3 scale is modified to a 1 to 4 scale to make the comparison possible. Although one must be very cautious in the comparison due to the different wordings in the questionnaires, we can see that mentor teachers estimate their use of computers and projection systems to be far more frequent than teacher educators and student teachers find them to be accessible. Our observations suggest that the rather pessimistic evaluations of accessibility by the latter do not reflect the actual situation of whether these equipment are used in learning environments but rather the respondents' psychological readiness to introduce new technology into their teaching.

The questionnaire data indicate that there is almost no accessibility to mobile phones although mobile learning is one of the rising areas. This must be interpreted that while practically everybody has a personal mobile phone, this reaction means that there are seldom if ever school-owned ones available (or needed). Anyway, mentor teachers use



mobile phones occasionally according to the survey and there has been after the survey a public discussion on the benefits of the use of mobile technology in schools. Interactive whiteboards were in the process of being installed in the practice schools and in the demonstration laboratories of the departments during the time of the survey in spring 2009, so that the situation would have been very different if the survey had already been run at the beginning of the next academic year.



**Figure 1.** Comparison of teacher educators', mentor teachers', and student teachers' evaluations through mean bars:

**Mentor teachers (Mentor):** How often do you use the technological devices listed below in your teaching? N= 51...53. Scale 1 = Never ... 4 Weekly. This is reduced to scale 1 ... 3 in the diagram

**Teacher educator (Teacher):** What kind of technological equipment is available in the classrooms you use? N = 119 ...136, Scale: 1 = In no class-room ... 3 = In all classrooms. Observe missing data for the last item.

**Student teachers (Student):** What kind of technical equipment is accessible for you as a student teacher at the institution? N = 103 ...106, Scale: 1 = Not accessible ... 3 = Free access

The student teachers were also asked to evaluate what technological devices they had used in the courses they had taken. On average they had used personal computers, projection systems and learning management systems during less than half of the courses. They typically never used other equipment.

The teacher educators were asked in the questionnaire to evaluate to what extent they thought the use of technology in different areas of education is important for a student teacher to acquire. Respectively, the student teachers were asked to evaluate to what extent they feel confident to integrate technology in education in different areas. The results are presented in Figure 2a. Missing data are due to each questionnaire having some different items than the others.

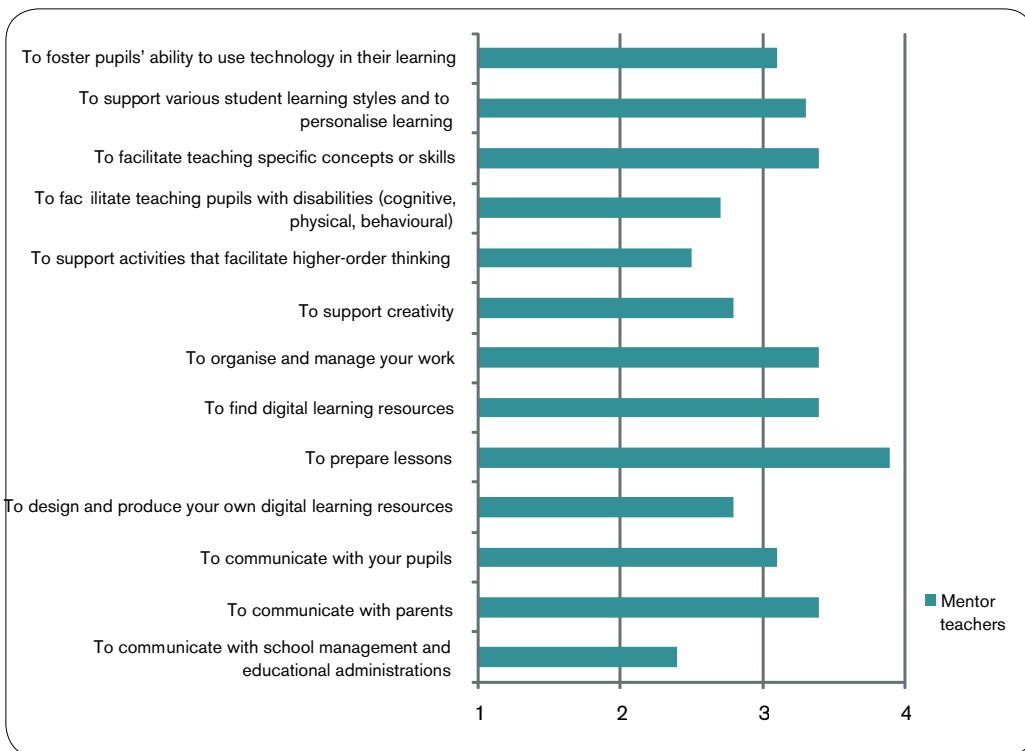
Mentor teachers were asked, on the other hand, for which purposes they use modern technologies in their teaching. These data are presented in Figure 2b.



**Figure 2a.** Comparison through mean bars of teacher educators' and student teachers' evaluations of the importance of the use of technology in different areas of education for student teachers:

**Teacher educators:** To what extent do you think the use of technology is important for a student teacher to acquire? Scale: 1 = Not important at all, 2 = Little important, 3 = Quite important, 4 = Very important

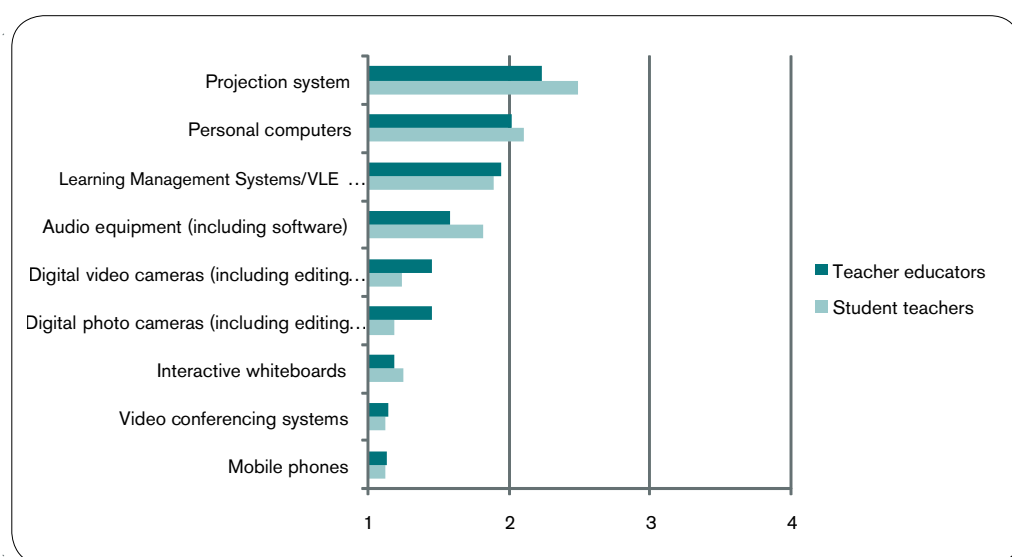
**Student teachers:** To what extent do you (a student teacher) feel confident to integrate technology. N = 88, Scale: 1 = Not confident at all, 2 = Somewhat confident, 3 = Confident, 4 = Very confident. Observe missing data for three items.



**Figure 2b.** Mean bars of mentor teachers' evaluations of how often they use technology in different areas of education. Scale 1 = Never ... 4 Weekly

It is perhaps natural that mentor teachers put much more importance into communication with parents, but it is noteworthy that they also find it more important than the other groups to use technology as a management tool or for preparing lessons. The differences in the evaluation of teacher educators and mentor teachers on one hand, and student teachers on the other of the importance of supporting different learning styles and to personalize learning is somewhat astonishing. It can be interpreted that here is a topic where much more emphasis has to be put in the training of student teachers. A somewhat similar situation seems to be present in using modern technologies to help students with disabilities. To some extent finding the importance of ICT in preparing learning resources was highest for the teacher educators and of finding these was highest for mentor teachers and both somewhat lower by student teachers as expected. Perhaps it could be speculated that student teachers have not learned about the power of ICT tools even here. The same could be speculated about contacts with pupils, parents, and administration for both teacher educators and student teachers. We have to observe that the wording of the items was somewhat different for teacher educators and mentor teachers than for student teachers so that statistical testing of the significance of the differences was not advisable and the differences have to be interpreted cautiously. However, it can be noted that all student teachers' evaluations are essentially always lower than those of teacher educators or mentor teachers.

The teacher educators were asked in the questionnaire to evaluate how much they teach the use of the technological devices to student teachers. Respectively, the student teachers were asked to evaluate how often they have used technological devices in the courses they had taken. The results are presented in Figure 3.



**Figure 3.** Comparison of teacher educators' and student teachers' evaluations of the use of technological devices through mean bars:

**Teacher educator:** Do you teach the use of the technological devices to student teachers?

N = 129 ...132, Scale: 1 = Never ... 4 = In every class

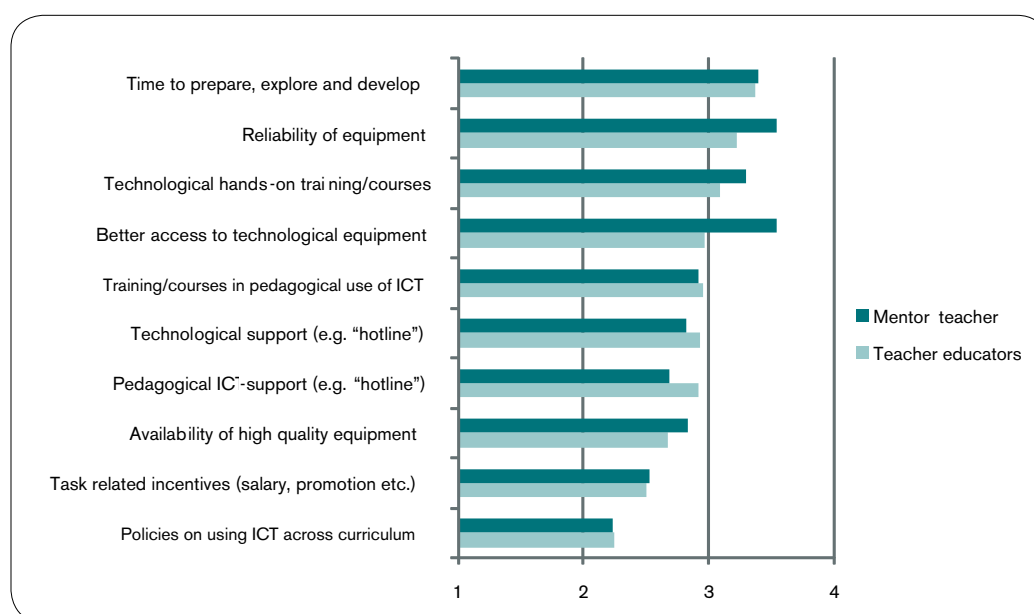
**Student teacher:** What technological devices have you used in the courses you have taken? N = 107 ...112,

Scale: 1 = Never ... 4 = Almost always (The scale has been modified to fit with the teacher educator scale)

Here we do not see any major discrepancies between the evaluations of teacher educators and student teachers. The wording of the questions was not identical, so that even here statistical testing of the significance of the differences was not advisable and the differences have to be interpreted with caution. However, the low frequencies of the use

of modern technologies in the evaluations are indications of something which should be investigated, it could lead to the identification of a substantial problem, indeed. We must try and find an interpretation by triangulation in the context of the combined data.

The different ways suggested to help increase the integration of technology in TE receive positive evaluation except for 'policies using ICT across the curriculum'. Indeed, such policies may appear to individual teacher educator or mentor teacher only as quite weak recommendations. It is to be noted that contrary to some expectations, task related incentives do not appear here to be very attractive. Allocation of time is the most prominent problem to be solved. The reliability of equipment is more a problem than the availability of high quality equipment as such, but in general there could be better access to equipment especially in teacher training schools. Hands-on training seems to be evaluated higher than pedagogical training courses or technological/pedagogical support (hotlines). Altogether, all suggested approaches were evaluated as offering some help, but it seems that preferably all or many of them should be developed and not just some of them.



**Figure 4.** What importance do you attach to the following suggestions to help in increasing the integration of technology in your courses?  
**Mentor teachers:** Mean bars. N = 51 ... 53.  
**Teacher educators:** Mean bars. N = 131 ... 133,  
 Scale: 1 = No importance at all, 2 = Little importance, 3 = Quite great importance, 4 = Very great importance

## General Observations

The overall picture has to be based on multiple sources of information (the triangulation principle): questionnaires, interviews, informal discussions, observations, as well as earlier research and reports. The time for organising the survey and when the researcher stayed at the teacher training institutions was very dynamic. Technical development within this area has been very rapid and both the hardware and the necessary software were changing all the time so that the staff and mentors had to continuously brush up their knowhow and skills. Also, the transfer to new technical standards apparently took quite a lot of time and it was seen that even the researcher staff was using much time in mechanical tasks such as transferring videos on VHS cassettes to digital files for the Internet. It was also reported that there are difficulties in using in parallel different 'year models' of hardware or software especially in multiuser situations such as a video workshop.

It was obvious that for University (Faculty) the problems were with strategy level and (partly consequently) on finding resources for keeping ICT use up-to-date. In the Finnish system decision-making on curricular issues is the responsibility of Faculties, but the planning and implementation processes are allocated to the departments. It is also natural that while TE is integrated in the university structure, it is very difficult to identify the resources used specifically for student teachers and which are used for other university student groups. The representatives of the Universities/Faculties were in general quite worried about the financial situation. They also shared the feeling of frustration about the different strategies where ICT use was treated in inconsistent ways. They felt that the workload caused by frequent internal and external evaluation processes one after another on all aspects of university activities was excessive.

There were many contradictory opinions identified in the interviews. These appear to be due to the quite varying study paths of student teachers and the large variation of interests and expertise profiles of teacher educators and mentor teachers. There are quite different cultures in relation to ICT use e.g., in different subject areas, but it cannot be said stereotypically that the relation with ICT is negative in the humanities/arts and positive in mathematics/science. As a general feature we may identify a strong mission of ICT use by some respondents who feel that ICT is offering tools for reaching valuable goals and too many others being on the other hand cautious of the possible overwhelming influence of technology in pedagogical culture.

The survey data indicate that there are more optimistic evaluations by mentor teachers of the importance of the training in ICT use in teacher education than by teacher educators or student teachers. This reflects positive attitudes as the mentor teachers reported less satisfaction with access to or the reliability of the equipment. There was interest in using modern LE:s, but the reality shown in the survey indicates that there is much to be improved. There was also knowledge about social media, but they were used only marginally at the time of the survey. The differences in the wording of the items of the questionnaires for different participant groups made it difficult to compare the results, but it was, anyway, possible to get a general view of the problems of ICT use in TE at both departments and teacher training schools. There were also an indication of the future needs and a basis for suggestions for promoting ICT use in TE in the future.

We may note that our study did not extend to so-called 'field schools' which are co-operating with university departments of teacher education, but have no formal connection to these universities. Anyway, in Finland a definitely major part of teaching practice of student teachers takes place at teacher training schools attached to universities. Thus, we may claim that this does not distort our picture of ICT use in TE too seriously. On one hand, we may interpret the above-described wide variances in opinions reflects the true experiences of the target group. On the other hand, the cogent impression of activity and creativity of teacher educators and mentor teachers as well as the majority of student teachers may be speculated to be due to these kinds of special persons being more easily available for interviews than more passive individuals. However, it appears that a more comprehensive study would have been very difficult to perform with the available resources.

## Summary and Conclusions

From research on reform and policy implementation, it is well known that change in education is very slow and often tends to fail and this general observation seems to be especially true for complex innovations like *ICT use in teacher education*. Diffusion and adoption of innovations are complex processes altogether, there is no direct transfer from strategies to practice. Thus all effort to facilitate these processes is important and our study in the context of the IITT and the global OECD/CERI New Millennium Learners projects strives to analyse and provide suggestions for reaching relevant goals in Finland. Alongside documentary analysis of national and local strategies our analysis strives also to provide a framework for understanding the implementation processes of these strategies. This national case study was undertaken with the empirical phase starting in the spring term 2009 with an extension of the collection of questionnaire data during the following fall term. Our study was on three levels: a strategy analysis on national level, an analysis of curricula, course descriptions and infrastructure on institutional level, as well as observations and interviews collecting experiences on actual learning situations on individual level. We can compare the above approach with Fullan's (2001) recommendations on how to analyse innovations. Firstly, the general level for discussing the educational innovations is at the national or strategy level. Secondly, circumstances in local level concretize in teacher educators' competencies and ICT infrastructure at a TE institution. Thirdly, there are the properties of the innovation; in this case, the properties of 'ICT use in TE' itself, like different ways of ICT use practised in TE, usability of ICT and ease of ICT use. The first two levels are essentially identical with ours, but the properties of an innovation are replaced in our analysis with personal use of innovations, which is of course related to the properties of innovations.

The study began with an analysis of the development of the present system of teacher education and the efforts to implement national ICT strategies in TE. The conclusion was that there has been much success, but the promotion of ICT use in education has not been systematically in the focus of its various strategies. Although the teacher educators and student teachers reported that national level teacher education strategies and ICT strategies having a minor influence only to the adoption of ICT use in education, these strategies certainly have a role. However, it is apparently not enough that the strategies have been implemented in writing the curricula and formulating the goals of different courses and teaching practice but it has to be ascertained that their influence is brought down to the level of the teaching-learning processes.

It seems that the key problem in implementing the strategies has often been that the request to introduce new technologies has not been accompanied with allocating necessary resources. For instance, the teacher training schools participating in this study received up-to-date technology they had long been waiting for, in the context of renovating the school buildings only. There had been interesting efforts to experiment with interactive whiteboards especially at UEF, but this technology was earlier deemed to be too expensive to be implemented more widely. However, some municipalities decided to equip all the classrooms in their schools with interactive whiteboards challenging departments of teacher education to introduce this technology more widely. This can be seen as an interesting case of bottom-up influence. By the time of this survey staff members were concerned about the consequences of the current very tight financial situation at the universities. They were afraid that the positive development of equipment as well as continuous professional development programmes might be in serious danger especially due to reductions in related earmarked funds allocated in earlier years by the Ministry of Education and Culture to TE institutions.

Our empirical study was based on the questionnaires, interview guides, and data collecting forms originally formulated in the context of the international project. Four different questionnaires (translated into Finnish by the authors) were used in Finland, one for student teachers, the second for teacher trainers, and the third for mentor teachers. The fourth questionnaire was for universities (TE institutions). There were two rounds in the questionnaire study, the first round in the spring term and the second round in fall 2009 with adequate participation when the combined data were utilized. However, no advanced statistical analysis could be considered advisable due to problems in sampling. The respondents could be a biased group because most of them feel fairly comfortable using technology in their classroom and many of them have been engaged personally in a project aimed at using ICT in new and innovative ways. However, the descriptive representation of these data allowed interpretations that when complemented with the interviews, observations, and other information enabled the utilization of the triangulation principle. The triangulation data combine all the information to increase reliability and validity while it can be interpreted that the situation in this field is rapidly changing and any collected data will soon be obsolete.

On the basis of our combined data we could analyse the local characteristics, such as the pedagogical orientation of the staff, nature of collaboration and reflection between staff members, staff members' beliefs about the usability of educational technology, administrative leadership, technical and pedagogical support available, as well as external factors such as funding, nature of training or staff development, and the nature of development projects in ICT use.

The triangulation data indicate that there are no major obstacles to the use of ICT in TE. For example, almost all teacher educators, mentor teachers and student thought that there are enough computers and high quality technological support available for them. The most frequently expressed problem was a lack of time to concentrate on learning something new or doing relevant research. Lack of time has been identified also in other countries as a reason for staff not being up-to-date in the field of technology (Enochsson & Rizza, 2009, 13). In Finland this may be at least partly due to the staff structure at the teacher training institutions or departments of teacher education as staff members have here more teaching hours and less time allocated for research than the average at subject departments (OPM, 2007, 41). This seems to be due to the long time needed for TE to fully integrate in the structure of research universities. There are indications of serious

effort to rectify this problem by a working group of the MEC (OPM, 2007). On the other hand, we can see already presently true commitment to research of international standards in research groups at teacher training institutions of the University of Helsinki and University of Eastern Finland. This can be seen in the descriptions of the activities of the participating departments and it was also concretely evidenced during discussions with teacher educator researchers at the participating departments. Research-based teaching as an academic pedagogical approach means that teacher educators base their teaching on their active roles as researchers and on their expertise in their area of teaching. As another valuable perspective active teaching and learning in TE means that student teachers are guided and involved in (collaborative) learning processes and the staff moves the responsibility for learning to them. These approaches were obviously appreciated and gave many possibilities for versatile ICT use.

A minor obstacle, considering use of ICT, which is restricting the use of ICT in TE is the ICT competence of the teacher trainers and mentor teachers. One fourth of the trainers and mentors do not feel comfortable using technology in their classroom. On the other hand there are several innovators among the teacher trainers and several research and development projects considering the use of ICT in teacher education are ongoing at the participating departments. Other obstacles that are restricting the use of ICT in TE include a lack of advanced ICT tools, like digital cameras and whiteboards, and pedagogical support. On the other hand in general there was, indeed, a general positive opinion on the possibilities to use modern technologies in teacher education. However, the actual use depended on individual initiative and there were no strict rules to be obeyed. Thus, some student teachers saw a problem in the reality of practice teaching being more conservative than the orally expressed intentions of mentor teachers and teacher educators although the weekly use of personal computers and projection systems reported by mentor teachers in the survey was impressive. These differences in opinions may also be due to the teachers participating in the interviews and the survey being more advanced in their ICT skills than the average and perhaps the interviewed student teachers were rather demanding in this respect, as there was a convenience sampling in all of these groups. There are also indications in other countries that student teachers expect more active ICT use by mentor teachers (Enochsson & Rizza, 2009, 14). The technical development within this area has been very rapid and both the hardware and the necessary software were changing all the time so that the staff and mentors had to brush up their knowhow all the time. Also transfer to new standards took quite a lot of time and researcher staff members were using much time in rectifying problems of mixed standards of older and newer software or hardware.

There was a generally expressed need for more collegial co-operation within the staff of the departments of teacher education and at practice schools. This problem may be for some part solved by the expected development of staff structure, but most of it may be solved with better leadership by the directors of the departments and school rectors. Services of the IT Department at the central administration were generally appreciated. However, more easy interaction was indicated to be desirable even here. Co-operative approaches in implementing the ICT strategies on the departmental level could also rectify some problems (cf. Lavonen & al., 2006). There were indications of international co-operation both in European projects and in the form of visiting professors and students as well as in participation in international conferences. However, there is certainly a need for more active international co-operation, which would be mutually beneficial in many respects. It is also hoped that the present study would be useful



in international comparisons of ICT use in teacher education even if there have been problems in the survey as to data acquisition, as described above.

We gave a classification of ICT use in the chapter “Classification of ICT use and ICT use as an innovation” and categorise ICT use into (A) *tool applications or tool software*, (B) *ICT use in study and learning (learning through ICT)* and into *social media or social communication media* (C). According to Figures 2 and 3 teacher educators’ ICT use was focusing on the designing of learning sequences and in administrative duties or focusing on tool applications. Student teachers were not developing their confidence in the use of modern ODL solutions and social media. Furthermore, mobile-based tools were neither introduced nor used in TE. In the section “Use of ICT in teacher education – the point of view of learning” we described and analysed the characteristics of a learning activity which may be realized through the use of ICT. Figure 2a demonstrates that teacher trainers think that the use of technology in a way that supports meaningful learning, like student activities, collaboration and knowledge construction is important for a student teacher to acquire. However, the same figure demonstrates that student teachers are not confident enough to integrate ICT in meaningful learning activities. Very similar conclusions could be drawn also from the point of view of integration of ICT to supporting of students’ interest and motivation. In the section “Use of ICT in teacher education from the point of view of motivation” we described the potentials of ICT use. Teacher trainers think that using technology in a way that supports the students’ autonomous or personalised learning is important for a student teacher to acquire but student teachers are not confident doing this.

The advantages of modern equipment including positive motivational effects have appeared to decision makers more important than the associated problems when e.g., interactive whiteboards have been made available. However, it seems that too little effort has often been put into teacher training in these contexts. From the point of view of the individual staff member, before he or she will integrate ICT to teacher education he or she has to believe that (i) ICT use can effectively support students to achieve or maintain higher-level goals (“effectiveness”); (ii) ICT use will not interfere other higher-level goals that staff members think to be more important than the one being maintained (“disturbances”); and (iii) staff members have the ability and resources to use ICT (“control”). Therefore, the training of staff members has to be in conjunction with the technical and pedagogical development of ICT use. Training and other guidance should be contextual, connected to real teaching and learning situations. Training should also support collaboration between teaching staff members as well as between teaching staff and those who are developing and giving guidance. Staff members can if left without necessary support, for example, just try to add ICT use to teacher education and guide students to do only traditional tasks with ICT while ICT use can create totally new ways of teaching and learning. For example, Watson (2001) has argued that the adoption of this innovation requires a complete change in teaching style, a change in learning approaches, and a change in access to information. For New Millennium Learners it is also important that there is proper bridging of school and life in the sense of observing youth culture with access to social media etc.

There are somewhat contradictory results on the confidence of student teachers for using ICT in classroom situations. It seems that the majority do not have any problems although they would need encouragement for more comprehensive use. On the other hand, there are some student teachers with problems in critical ICT literacy and who are rather anxious about using ICT, and even if during the survey they seemed to be those

with delayed graduation, their problems need specifically focused attention. However, we are not recommending the kind of compulsory driving licence on student teachers as is already used in the UK, it would most probably strongly add to the frustration of the anxious student teachers. Since May 2002, all student teachers in England have been required to pass detailed tests in ICT skills as part of their teacher qualification. The tests cover a large number of core skills teachers need to fulfil their wider professional role in schools, rather than the subject knowledge required for teaching (TTA, 1999).

Teacher education in Finland is more research-oriented than in many other countries with all teachers in general education needing a Master's degree for qualification. ICT in computer-assisted research is used in collecting and handling information and data from various sources, with the emphasis on the use of ICT in supporting scientific reasoning (e.g., data analysis and search on the Internet), ODL solutions and their use in teaching and learning, such as course management systems (e.g., moodle), two-way audio/video teleconferencing, and Internet lectures. It must be noted that this kind of technology-oriented approach to analyse the properties of ICT use in teacher education is not easy to approach if the focus of the discussion is in how to help student teachers to learn the principles of education and to develop different skills needed in the teaching profession. Therefore, discussion about ICT use and its development has to be understood as a part of the development of the whole of teacher education. Successful processes of implementation of strategies and diffusion of innovations necessitate an understanding of the fact that these are fluid, non-linear, reiterative processes in which key factors are dynamically inter-related: namely, ICT needs to be implemented on multiple fronts, both materially in terms of an ICT infrastructure and culturally in terms of generating an ethos that values ICT for classroom practice. Taking the multidimensionality of ICT policy implementation into account, aids the management of the change process at the local level of the school. This allows for an understanding of the ways in which teachers interpret policy and engage in implementation of ICT at the local level. Our previous analysis can be compared with these ideas from the paper by Younie (2006), which examines lessons learnt from national research and evaluation studies of ICT in schools in the UK. Overall, we emphasise that it is most important that both teacher educators and student teachers get positive experiences of ICT use and feeling of empowerment in using modern technologies in teaching. This can be achieved using multiple approaches. However, it seems that more systematic setting of goals and ascertaining that these goals are reached would be needed in further development of TE in Finland. We summarise a number of our observations in the following.

Recommendations for promoting ICT use in TE in Finland:

### **Strategy level**

- There should be better coherence of different strategies like general teacher education strategy and ICT strategy
- Research based knowledge, including knowledge based on the quantitative and qualitative data, on the current use of ICT in education and the competence of teacher educators and mentor teachers and, moreover, evaluation of the previous strategy and its implementation should be used in strategy development
- Implementation of strategies should start from the grassroots level through identifying ongoing research and development projects and through allocation of resources according to the aims of the strategies, not top-down

- There should be an implementation plan of the strategy included in the strategy which contain information, for example, about the resources allocated to the implementation and guidelines – it is not appropriate to allocate resources for example ICT tools or infrastructure without connection to the implementation plan of the strategy
- Dynamical situation: priorities should be established for keeping abreast of the development

### **Teacher education programme**

- There should be an implementation plan of the strategy about how it will be implemented in the teacher education programmes
- There should be clear indication in the goal descriptions related to ICT use when learning, motivation, or doing is in focus.
- ICT should be integrated to all courses and teaching practices in teacher education programmes and, moreover, well planned courses or activities supporting the use of ICT in teaching and learning at school should be offered. There should be a plan for how different use of ICT, including tool applications, ICT use in learning, ODL-solutions and social media, could be introduced for student teachers in contextual situations.
- The courses and activities where ICT is used should demonstrate how learning with ICT is emphasising activity, intentions, reflection, collaboration and interaction, knowledge construction, contextualization of the learning and moreover, increase motivation and interest on learning.
- ICT use and skills as learning outcomes should be made more clearly visible and concrete in the description of goals of all courses and learning programmes
- Student teachers should be shown more clearly that ICT use facilitates reaching the goals for learning
- Teacher trainers should use to their advantage youth culture including social media to facilitate the formation of learning communities etc.

### **Staff development programmes for teacher educators and mentor teachers**

- There should be an implementation plan of the strategy about how it will be implemented in the staff development programmes
- Staff development programme should take into account the following aspects:
  - Co-operative and communication aspects, like co-planning, versatile face-to face and mediated communication, shared purpose and internalisation of the goals of the programme, shared expertise and dissemination.
  - Reflection in small groups support the belief that staff members can learn from each other
  - Aspects of context include the necessity to start from the situation where the staff members are. Secondly, courses and guidance should be integrated into everyday activities where ICT is used in TE.
  - Development of ICT tools and infrastructure at the same time as staff ICT skills are developed. It is crucial to give staff members a possibility to use all the tools and pedagogical approaches studied during the ICT courses. Skills not applied immediately will be lost.

- Evaluation data should be continually collected and discussed
- Staff development programmes should be more systematic allowing less possibilities for dropping out
- The staff development programme should facilitate an atmosphere where teacher trainers should have an ethos for introducing the newest innovative tools in their teaching not being overly cautious about possible overdose of technological culture

#### **Research and development activities**

- There should be an implementation plan of the strategy about how it will be implemented in the research and development activities.
- There is need for research and development work for the implementation of new innovations, like whiteboards, mobile learning and social media, to teacher education.
- Locally developed innovations and research outcomes should be marketed even to colleagues locally, nationally and internationally
- International co-operation in developing modern approaches of ICT use in teacher education has to be maintained and strengthened

#### **Monitoring and evaluation of the strategy implementation**

- The strategy should contain a plan for monitoring and evaluation of the strategy and its implementation. There is a need for evaluation data about the current strategy before the launching of the next strategy

We may sum up that there is a need for university departments of teacher education to design the ICT-related goals of the programmes of teacher education and related courses on a more concrete level and to create a systematic way for systematic follow-up for reaching these goals. Also, ways to ascertain necessary resources for TE institutions should be identified and utilised. The recognised dynamical situation would suggest further follow-up research on the effects of measures to promote an adequate level for the use of modern technologies in teacher education.

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## QUESTIONNAIRE FOR UNIVERSITIES

### A.

OECD CERI:n "New Millenium Learners" –hankkeen tutkimus TVT:n käyttö opettajankoulutuksessa kevätlukukaudella 2009

#### *Aloitussivu*

**Kyselylomake yliopistolle**

Weblink: <http://www2.oecd.org/Survey/Survey.aspx?surveyid=3214&ForceNew=true>

#### **Kyselytutkimuksen tavoitteet:**

Tässä opettajankoulutusyksiköille suunnatussa kyselyssä selvitetään tieto- ja viestintäteknologian (TVT) käyttöä opetuksessa. Kyselytutkimuksen tavoitteena on löytää omalta osaltaan vastaukset seuraaviin tutkimuskysymyksiin:

- Millaisissa opiskeluympäristöissä OECD-maiden opettajankoulutusyksiköissä opiskellaan ja harjoitellaan ja mitä vaatimuksia TVT:n käytölle opettajankoulutusohjelmissa on asetettu?
- Millä tavoin opettajaksi OECD-maiden opettajankoulutusyksiköissä opiskelevat valmistautuvat integroimaan tieto- ja viestintäteknikkaa opetukseensa?

Kyselyssä tiedustellaan TVT:n käyttöön liittyviä seikkoja useasta näkökulmasta: minkälaisia laitteita on käytettävissä, minkälaista tukea on saatavilla ja minkälaisia kurseja järjestetään sekä millaisia muodollisia vaatimuksia kohdistuu opettajiin, ohjaajiin ja opiskelijoihin. Kyselyyn vastaa mahdollisesti usean asiantuntijan ryhmä. Tieto- ja viestintäteknikka käsitetään tässä laajasti sisältäen esimerkiksi tietokoneet, ohjelmistot, matkapuhelimet, digitaaliset kamerat ja opintohallintojärjestelmät. Mikäli terminologia tai kyselylomakkeen jokin kohta muutoin on jollakin tavalla epäselvä, toivomme siitä kommenttia asianomaiseen kohtaan.

**Suuret kiitokset ajastanne!**

## Taustatietoa

- 1 Minkä opettajankoulutusyksikön puolesta täytätte kyselylomakkeen?
- 2 Mitä opettajankoulutusohjelmia on kyseisessä yksikössä? Merkitse kaikki!  
Mainitse myös mahdolliset suuntautumisvaihtoehdot ja poikkeavat ikäryhmät.

Lastentarhanopettajakoulutus  
Luokanopettajakoulutus  
Aineenopettajakoulutus  
Muu(t) (tarkenna, mi(t)kä)

- 3 Mitä aineita aineenopettajat päteväytyvät opettamaan?  
Merkitse kaikki kysymykseen tulevat aineet.

Matematiikkaa  
Äidinkieltä  
Vieraita kieliä (täsmennä, mitä)  
Yhteiskuntatieteitä (täsmennä, mitä)  
Luonnontieteitä (täsmennä, mitä)  
Tietotekniikkaa  
Muuta (täsmennä, mitä)

- 4 Kuinka monta opettajaksi opiskelevaa on yksikössäsi läsnä olevana tällä hetkellä (osa-aikaiset opiskelijat mukaan luettuina)? Numeerinen vastaus:

## Teknologiasta, laitteista

- 5 Kuinka monta tietokonetta opettajaksi opiskelevilla on käytettävissään? Jos myös muut opiskelijat voivat käyttää kyseisiä tietokoneita, anna sekä tietokoneiden että niitä käyttämään oikeutettujen opiskelijoiden lukumäärät.
- 6 Kuinka paljon budjettivaroja käytettiin vuonna 2008 näiden laitteiden hankintaan ja ylläpitoon?  
Arvioi, kuten yllä.
- 7 Käytetäänkö yksikössäne opetuksenhallintajärjestelmää (WebCT, moodle, tms.), virtuaalisia oppimisympäristöjä, e-portfoliojärjestelmää tai vastaavaa?  
Kyllä/Ei (Jos vastaatte 'Ei', siirrykää kysymykseen 11)
- 8 Mitä edellä tarkoitettuja järjestelmiä yksikössäne on käytössä?
- 9 Arvioikaa, kuinka monella prosentilla järjestettävistä kursseista nämä järjestelmät ovat aktiivikäytössä.
- 10 Arvioikaa, kuinka monta prosenttia kurssien opettajista käyttää ainakin jotakin järjestelmää viikoittain.
- 11 Onko opettajaksi opiskelevilla laitoksen järjestämä Internet-yhteys?  
Kyllä/Ei/Muu
- 12 Onko yksikössäne laajakaistayhteys Internetiin?  
Kyllä/Ei/Muu
- 13 Onko yksikössäne langaton Internet-yhteys?  
Kyllä/Ei/Muu
- 14 Käytetäänkö yksikössäne teknisiä rajoittimia (kuten filttareita) estämään pääsy joihinkin sisältöihin?  
Kyllä/Ei/Muu

## TVT-taidoista

- 15 Kuinka paljon opetushenkilökunnalle järjestetään teknisiä taitoja kartuttavia kursseja?
- Ei järjestetä
  - Vapaaehtoista koulutusta tai kursseja
  - Pakollisia kursseja tai koulutusta
  - Eri lähestymistapa eri koulutuksissa
  - Muuta (tarkenna, mitä):
- 16 Onko yksikössänne järjestetty merkittävää TVT-koulutusta henkilökunnalle viimeisen kymmenen vuoden aikana?
- Kyllä/Ei (Jos vastaatte 'Ei', siirtykää kysymykseen 18)
- 17 Minä vuonna järjestettiin viimeisin tällainen koulutus?
- Neljä numeroa vuosilukuun!
- 18 Kuinka paljon opettajaksi opiskeleville järjestetään teknisiä taitoja kartuttavia kursseja?
- Ei järjestetä
  - Vapaaehtoista koulutusta tai kursseja järjestetään
  - Pakollista koulutusta tai kursseja järjestetään
  - Eri lähestymistapa eri koulutuksissa
  - Muuta (tarkenna, mitä):
- 19 Kuinka paljon opiskelijoille on tarjolla teknistä tukea yksikössänne?
- Ei lainkaan
  - Hyvin rajoitetusti
  - Virka-aikana
  - Kaikille ympärivuorokautisesti

## Tietotekniikan opetuskäytöstä

- 20 Kannustetaanko yksikössänne henkilökuntaa ottamaan käyttöön uusia teknologisia innovaatioita opetuksessaan?
- Kyllä/Ei
- 21 Onko yksikössänne erityinen tieteellinen laitos, laboratorio tai vastaava, jonka alana on tietotekniikan opetuskäyttö?
- Kyllä/Ei
- 22 Kuinka paljon henkilökunnallenne järjestetään tietotekniikan opetuskäytön taitoja kartuttavia kursseja tai koulutusta?
- Ei järjestetä
  - Vapaaehtoista koulutusta tai kursseja järjestetään
  - Pakollista koulutusta tai kursseja järjestetään
  - Eri lähestymistapa eri koulutuksissa
  - Muuta (tarkenna, mitä):
- 23 Kuinka usein kurssien tavoitteissa on selkeästi mainittu opettajaksi valmistuvien TVT:n pedagogisen käytön valmiudet?
- Ei lainkaan
  - Vähemmän kuin puolessa kursseista

Noin puolessa niistä  
Enemmän kuin puolessa niistä  
Kaikissa

24 Kuinka paljon opiskelijoille on tarjolla pedagogista tukea TVT:n käytössä yksikössänne?

Ei lainkaan  
Hyvin rajoitetusti  
Virka-aikana  
Kaikille ympärivuorokautisesti

25 Kuinka tärkeänä laitoksen henkilöstövalinnoissa pidetään pätevyyttä TVT:n soveltamiseen opetuksessa?

Ei vaikuta valintaan  
Vaikuttaa, mutta ei ratkaisevasti  
Ratkaiseva valintaperuste

26 Onko kenttäkoulujen valinnassa muodollisia vaatimuksia sille, että koulut sitoutuvat TVT:n integrointiin opetusharjoittelussa?

Kyllä/Ei/Muu

27 Onko ohjaavien opettajien valinnassa muodollisia vaatimuksia sille, että he sitoutuvat TVT:n integrointiin opetusharjoittelussa?

Kyllä/Ei/Muu

28 Saavatko opettajaksi opiskelevat virallisen suoritusmerkinnän osoittettuaan kykyä TVT:n integroimiseen opetukseensa tai suoritettuaan vastaavan kurssin?

Kyllä/Ei (Jos vastaatte 'Ei', siirytään kysymykseen 30)

29 Merkitse kaikki soveltuvat vaihtoehdot:

Joillakin kursseilla arvioidaan opiskelijoiden kykyä TVT:n integroimiseen opetukseensa.  
Opettajankoulutusohjelman päättöarvioinnissa arvioidaan opiskelijoiden kykyä TVT:n integroimiseen opetukseensa.  
Opettajan virallisiin pätevyysvaatimuksiin kuuluu kyky TVT:n integroimiseen opetukseen.

#### **Kyselyyn vastaajiin liittyviä tietoja**

30 Kyselyyn vastaavan henkilön ja avustavien henkilöiden työnkuvat yksilöiden tehtävien liittymistä opettajankoulutukseen tai TVT-opetukseen:

31 Muita mahdollisia kommentteja:

**Kiitos kyselyyn vastaamisesta!**

## A QUESTIONNAIRE FOR TEACHER TRAINERS

### B.

#### OECD CERl:n "New Millenium Learners" –hankkeen tutkimus TVT:n käyttö opettajankoulutuksessa kevätlukukaudella 2009

##### Kyselylomake opettajankouluttajille

Arvostamme halukkuuttanne osallistua kyselytutkimukseemme. Tämän kansainvälisen tutkimuksen verkkopohjaisessa kyselyssä ja haastattelututkimuksessa selvitetään tieto- ja viestintäteknikan (TVT) käyttöä opettajankoulutuksessa. Tavoitteena on löytää vastauksia seuraaviin tutkimuskysymyksiin:

- Missä määrin OECD-maiden opettajankoulutusyksiköissä tieto- ja viestintäteknikkaa käytetään eri opettajankoulutusohjelmissa?
- Millä tavoin opettajaksi OECD-maiden opettajankoulutusyksiköissä opiskelevat valmistautuvat integroimaan tieto- ja viestintäteknikkaa opetukseensa?
- Jos opettajaksi valmistuvat eivät saavuta riittävää pätevyyttä, mitkä ovat tähän vaikuttavat tärkeimmät esteet asianosaisten tahojen mielestä?

Tavoitteena on myös selvittää:

- Kuinka tähän alueeseen liittyvien tavoitteiden saavuttamista arvioidaan?

Tutkimukseen osallistuu OECD:n jäsenmaita eri puolilta maapalloa ja kyselylomake on laadittu kansainvälisenä yhteistyönä. Peruslomake on englanninkielinen ja siitä on muokattu kansalliset versiot useilla eri kielillä. Kyselyssä on osioita, jotka kartoittavat opettajankouluttajilla olevia esteitä TVT:n soveltamiseen, kuten laitteiden riittämättömyyttä tai puutteita, teknisen ja pedagogisen tuen saatavuutta, tarjolla olevaa koulutusta, palkkioita ja palkintoja mallikelpoisesta toiminnasta jne. Kysymykset kohdistuvat myös siihen, missä määrin TVT integroituu yksikön opetukseen, missä eri muodoissa sitä käytetään ja kuinka sen käyttöä voitaisi lisätä. Edellisen lisäksi kysytään, kuinka paljon TVT:n integroimista opetukseen arvostetaan.

Kysely toteutetaan OECD:n keskustietokoneella Pariisissa ja aineistoa käytetään ainoastaan tutkimustarkoituksiin niin, ettei vastaajan henkilöllisyys paljastu raportoinnissa. Tieto- ja viestintäteknikka käsitetään tässä laajasti sisältäen esimerkiksi tietokoneet, ohjelmistot, matkapuhelimet, digitaaliset kamerat ja opintohallintojärjestelmät. Mikäli terminologia tai kyselylomakkeen jokin kohta muutoin on jollakin tavalla epäselvä, toivomme siitä kommenttia asianomaiseen kohtaan. Kyselyssä on 22 osiota, joista muutamassa on useita alakohtia. Kyselyyn toivotaan vastattavan ajatuksella, mutta siihen voi vastata varsin ripeästi. Kyselyyn vastaamiseen tarvittava aika on varsin kohtuullinen.

Web link : <http://www2.oecd.org/Survey/Survey.aspx?surveyid=3174&ForceNew=true>



## Taustatietoa vastaajasta

- 1 Missä yliopistossa ja millä laitoksilla tai kouluissa ja missä koulutusohjelmassa opetat?
- 2 Sukupuolesi  
Nainen Mies
- 3 Ikäsi vuosissa (kokonaislukuna)
- 4 Mitä aineita opetat? Merkitse kaikki kysymykseen tulevat aineet.  
Kasvatustiedettä (ml. ainedidaktiikat, täsmennä, mitä):  
Matematiikkaa  
Äidinkieltä  
Vieraita kieliä (täsmennä, mitä)  
Yhteiskuntatieteitä (täsmennä, mitä)  
Luonnontieteitä (täsmennä, mitä)  
Tietotekniikkaa  
Muuta (täsmennä, mitä)
- 5 Kuinka monta vuotta olet toiminut opettajankouluttajana?  
Anna numeerinen vastaus, käytä tarvittaessa desimaalipistettä (.)

## Teknologiasta, laitteista

- 6 Onko työpaikalla käytössäsi oma tietokone?  
Kyllä, pöytäkone/Kyllä, kannettava/Kyllä, molemmat/Ei

7. Mitä teknisiä laitteita on käytettävissäsi opetustiloissa	Ei missään	Joissakin	Kaikissa	Etukäteen varattaessa
Mikrotietokoneita	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interaktiivisia valkotaluja (smartboard)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Videoneuvottelulaitteita	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Audiolaitteita (ml. ohjelmistot)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Digitaalisia valokuvauskameroita (ml. editointilaitteet)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Digitaalisia videokameroita (ml. editointilaitteet)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Matkapuhelin	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dataprojektori	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Muuta, mitä?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- 8 Onko saatavillasi teknistä tukea laitoksellasi?  
Kyllä/Ei
- 9 Kuinka hyvänä pidät teknistä tukea laitoksellasi?  
Huono/Keskinkertainen/Hyvä/Erinomainen
- 10 Mikä seuraavista vaihtoehtoista parhaiten kuvaa teknistä pätevyyttäsi TVT:n kotikäytössä?  
En hallitse TVT:n käyttöä  
Tunnen itseni epävarmaksi TVT:n käytössä  
Tunnen itseni varmaksi TVT:n käytössä  
Tunnen itseni hyvin varmaksi TVT:n käytössä

- 11 Mikä seuraavista vaihtoehtoista parhaiten kuvaa teknistä pätevyyttäsi opetustilanteessa?  
 Tunnen itseni hyvin epävarmaksi TVT:n käytössä opetustilanteissa  
 Tunnen itseni melko epävarmaksi TVT:n käytössä opetustilanteissa  
 Tunnen itseni melko varmaksi TVT:n käytössä opetustilanteissa  
 Tunnen itseni hyvin varmaksi TVT:n käytössä opetustilanteissa

### Tietotekniikan opetuskäytöstä

- 12 Kannustetaanko yksikössänne henkilökuntaa ottamaan käyttöön uusia teknologisia innovaatioita opetuksessaan?  
 Kyllä/Ei
- 13 Oletko ollut henkilökohtaisesti mukana jossakin projektissa, jonka tarkoituksena on ollut kehittää uusia innovatiivisia TVT:n käyttötapoja opetuksessa?  
 Kyllä/Ei
- 14 Mahdollisia kommentteja/Esimerkkejä:
- 15 Onko laitoksellasi saatavilla pedagogista tukea henkilökunnalle TVT:n käyttöön opetuksessa?  
 Kyllä/Ei
- 16 Kuinka hyvänä pidät tätä pedagogista tukea laitoksellasi/koulussasi?  
 Huono/Keskinkertainen/Hyvä/Erinomainen

17. Miten tärkeänä pidät, että opettajankoulutuksessa opitaan hallitsemaan seuraavat TVT-sovellukset?	Ei lainkaan tärkeä	Melko tärkeä	Tärkeä	Hyvin tärkeä
<i>a) Viestinnän ja verkottumisen välineenä</i>				
... oppilaitten kanssa	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... oppilaiden vanhempien kanssa	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... kouluhallinnon ja opetusviranomaisten kanssa	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<i>b) Opiskelijan kehityksen ja opiskelun apuvälineenä</i>				
<i>c) Käytännöllisenä apuvälineenä</i>				
... työn organisoinnissa ja tulosten tallentamisessa	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... oppituntien valmistelussa	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... digitaalisen oppimateriaalin hankkimisessa	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... oman digitaalisen oppimateriaalin suunnittelussa ja valmistamisessa	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<i>d) Opettajan ammatissa tulevaisuudessa toimiessa kyetään käyttämään modernia teknologiaa</i>				
... opettaessa tiettyjä käsitteitä tai taitoja	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... tukemaan erilaisia oppimistyyylejä ja yksilöllistämään opetusta	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... auttamaan oppimisvaikeuksien, fyysisten ongelmien ja käyttäytymishäiriöiden voittamisessa	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... tukemaan korkeamman tason ajatteluun tähtäviä toimintoja	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... tukemaan luovuutta	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... kehittämään oppilaiden valmiuksia käyttää teknologiaa avuksi opiskellessaan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... jotakin muuta (täsmennä, mitä)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

18. Opetatko alla mainittujen laitteiden ja järjestelmien käyttöä opiskelijoillesi?	Ei koskaan	Satunnaisesti	Puolessa kursseista	Kaikissa kursseissa
Mikrotietokoneet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interaktiiviset valkotalut (smartboard)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Videoneuvottelulaitteet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Opetuksenhallintajärjestelmät (WebCT, moodle, tms.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Audiolaitteet (ml. ohjelmistot)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Digitaaliset valokuvauskamerat (ml. editointilaitteet)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Digitaaliset videokamerat (ml. editointilaitteet)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
(Matka)puhelimet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dataprojektorit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Muita, mitä?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

19 Mahdollisia kommentteja/Esimerkkejä:

20 Arvioidaanko kursseillasi opiskelijoiden kykyä TVT:n integroimiseen opetukseensa?

Kyllä/Ei/Muu

21. Missä määrin seuraavat asiat auttaisivat opettajankouluttajia integroimaan paremmin teknologiaa opetukseensa?	Ei lainkaan tärkeää	Melko tärkeää	Tärkeää	Hyvin tärkeää
Laitteiston parempi saatavuus	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Laitteiston luotettavampi toiminta	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Korkealuokkaisemman laitteiston saatavuus	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kurssit teknologian opetuskäytöstä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tuki teknologian opetuskäytössä (esim. puhelinneuvonta)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Käytännönläheisiä TVT-kursseja (hands on)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teknistä tukea (esim. puhelinneuvonta)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TVT:n käyttötaidot kaikkien kurssien tavoitteisiin	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Aikaa valmisteluun, ideointiin ja kehittämiseen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Palkkioita ja kannustimia opettajille	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Muita, mitä?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

22 Mahdollisia kommentteja/Esimerkkejä:

**Kiitos kyselyyn vastaamisesta!**

Jotta välttyisit tämän kyselyn karhuviesteiltä, kirjoita tähän sähköpostiosoitteesi:

## QUESTIONNAIRE FOR STUDENT TEACHERS

### C.

**OECD CERl:n "New Millenium Learners" –hankkeen tutkimus  
TVT:n käyttö opettajankoulutuksessa kevätlukukaudella 2009**

#### **Kyselylomake opettajaksi opiskeleville**

Arvostamme opiskelijoiden halukkuutta osallistua kyselytutkimukseemme. Tämän kansainvälisen tutkimuksen verkkopohjaisessa kyselyssä ja haastattelututkimuksessa selvitetään tieto- ja viestintä-tekniikan käyttöä opettajankoulutuksessa. Tutkimukseen osallistuu OECD:n jäsenmaita eri puolilta maapalloa ja kyselylomake on laadittu kansainvälisenä yhteistyönä. Peruslomake on englanninkielinen ja siitä on muokattu kansalliset versiot useilla eri kielillä. Kysely toteutetaan OECD:n keskustietokoneella Pariisissa ja aineistoa käytetään ainoastaan tutkimustarkoituksiin niin, ettei vastaajan henkilöllisyys paljastu raportoinnissa. Tieto- ja viestintätekniikka käsitetään tässä laajasti sisältäen esimerkiksi tietokoneet, ohjelmistot, matkapuhelimet, digitaaliset kamerat ja opintohallintojärjestelmät. Mikäli terminologia tai kyselylomakkeen jokin kohta muutoin on jollakin tavalla epäselvä, toivomme siitä kommenttia asianomaiseen kohtaan. Kyselyssä on 23 osiota, joista muutamassa on useita alakohtia. Kyselyyn toivotaan vastattavan ajatuksella, mutta siihen voi vastata varsin ripeästi. Vastaamiseen tarvittava aika on varsin kohtuullinen.

#### **Taustatietoa vastaajasta**

- 7 Missä yliopistossa ja millä laitoksilla tai kouluissa ja missä koulutusohjelmassa opiskelet/harjoittelet?
- 8 Sukupuolesi  
Nainen Mies
- 9 Ikäsi vuosissa (kokonaislukuna)
- 10 Milloin Sinulla on tavoitteena valmistua? Vastaus vuosiluku ja kuukausi (YYYYMM )
- 11 Mitä aineita pätevoidyt opettamaan? Merkitse kaikki kysymykseen tulevat aineet.  
Matematiikkaa  
Äidinkieltä  
Vieraita kieliä (täsmennä, mitä)  
Yhteiskuntatieteitä (täsmennä, mitä)  
Luonnontieteitä (täsmennä, mitä)  
Tietotekniikkaa  
Muuta (täsmennä, mitä)

6 Minkä ikäisiä oppilaita pätevidyt opettamaan? Rastita kaikki kysymykseen tulevat vaihtoehdot.

- alle 5 v.       11 v.       17 v.  
 6 v.       12 v.       18 v.  
 7 v.       13 v.       19 v.  
 8 v.       14 v.       Kaikkia luokkatasoja  
 9 v.       15 v.       Muita ikäryhmiä (täsmennä, mitä):  
 10 v.       16 v.

### Teknologiasta

12 Onko käytössäsi oma tietokone?

Kyllä, pöytäkone/Kyllä, kannettava/Kyllä, molemmat/Ei

13 Voisitko arvioida, kuinka paljon käytät tieto- ja viestintäteknikkaa (TVT) henkilökohtaisiin tarkoituksiin? tuntia viikossa

14 Voisitko arvioida, kuinka paljon käytät tieto- ja viestintäteknikkaa (TVT) opiskeluun ja opetukseen? tuntia viikossa

15. Mitä teknisiä laitteita on käytetty kursseilla, joihin olet osallistunut?	Ei koskaan	Harvoin	Ei puoltakaan ajasta	Puolet ajasta	Yli puolet ajasta	Melkein aina
Mikrotietokonetta	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interaktiivista valkotalua (smartboard)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Videoneuvottelulaitteita	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Opetushallintajärjestelmää (WebCT, moodle, tms.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Audiolaitteita (ml. ohjelmistot)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Digitaalisia valokuvauskameroita (ml. editointilaitteet)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Digitaalisia videokameroita (ml. editointilaitteet)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
(Matka)puhelin	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dataprojektori	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Muuta, mitä?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

16. Mitä teknisiä laitteita on opiskelijan käytettävissä laitoksellasi/koulussasi?	Ei käytettävissä	Rajoitetusti käytettävissä	Aina käytettävissä
Mikrotietokoneita	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interaktiivisia valkotaluja (smartboard)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Videoneuvottelulaitteita	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Opetushallintajärjestelmä (WebCT, moodle, tms.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Audiolaitteita (ml. ohjelmistot)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Digitaalisia valokuvauskameroita (ml. editointilaitteet)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Digitaalisia videokameroita (ml. editointilaitteet)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
(Matka)puhelin	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dataprojektori	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Muuta, mitä?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

17 Onko opiskelijoiden saatavilla teknistä tukea laitoksellasi/koulussasi?

Kyllä/Ei/En tiedä

18 Kuinka hyvänä pidät teknistä tukea laitoksellasi/koulussasi?

Huono/Keskinkertainen/Hyvä/Erinomainen

## Tietotekniikan opetuskäytöstä

19 Onko laitoksellasi/koulussasi opiskelijoiden saatavilla pedagogista tukea TVT:n käyttöön muuten kuin johonkin kurssiin sisältyvänä?

Kyllä/Ei/En tiedä

20 Kuinka hyvänä pidät tätä pedagogista tukea laitoksellasi/koulussasi?

Huono/Keskinkertainen/Hyvä/Erinomainen

21. Missä määrin teknologiaa on käytetty alla lueteltuihin tarkoituksiin kursseilla, joihin olet osallistunut?	Ei koskaan	Harvoin	Ei puoltakaan ajasta	Puolet ajasta	Yli puolet ajasta	Melkein aina
a) Viestinnän ja verkottumisen välineenä	o	o	o	o	o	o
b) Oman kehityksesi ja opiskelusi apuvälineenä	o	o	o	o	o	o
c) Käytännöllisenä apuvälineenä						
... työn organisoinnissa ja tulosten tallentamisessa	o	o	o	o	o	o
... oppituntien valmistelussa	o	o	o	o	o	o
... digitaalisen oppimateriaalin löytämisessä	o	o	o	o	o	o
... oman digitaalisen oppimateriaalin suunnittelussa ja valmistamisessa	o	o	o	o	o	o
d) Opettajana toimiessasi tulet käyttämään modernia teknologiaa						
... opettaessasi tiettyjä käsitteitä tai taitoja	o	o	o	o	o	o
... tukemaan erilaisia oppimistyyplejä ja yksilöllistämään opetusta	o	o	o	o	o	o
... auttamaan oppimisvaikeuksien, fyysisten ongelmien ja käyttäytymishäiriöiden voittamisessa	o	o	o	o	o	o
... tukemaan korkeamman tason ajatteluun tähtäviä toimintoja	o	o	o	o	o	o
... tukemaan luovuutta	o	o	o	o	o	o
... kehittämään oppilaiden valmiuksia käyttää teknologiaa avuksi opiskellessaan	o	o	o	o	o	o
... jotakin muuta (täsmennä, mitä)	o	o	o	o	o	o

22. Missä määrin teknologiaa on käytetty alla lueteltuihin tarkoituksiin opetusharjoittelusi aikana?	Ei koskaan	Harvoin	Ei puoltakaan ajasta	Puolet ajasta	Yli puolet ajasta	Melkein aina
a) Viestinnän ja verkottumisen välineenä	o	o	o	o	o	o
b) Oman kehityksesi ja opiskelusi apuvälineenä	o	o	o	o	o	o
c) Käytännöllisenä apuvälineenä						
... työn organisoinnissa ja tulosten tallentamisessa	o	o	o	o	o	o
... oppituntien valmistelussa	o	o	o	o	o	o
... digitaalisen oppimateriaalin hankkimisessa	o	o	o	o	o	o
... oman digitaalisen oppimateriaalin suunnittelussa ja valmistamisessa	o	o	o	o	o	o
d) Opettajana toimiessasi tulet käyttämään modernia teknologiaa						
... opettaessasi tiettyjä käsitteitä tai taitoja	o	o	o	o	o	o
... tukemaan erilaisia oppimistyyplejä ja yksilöllistämään opetusta	o	o	o	o	o	o
... auttamaan oppimisvaikeuksien, fyysisten ongelmien ja käyttäytymishäiriöiden voittamisessa	o	o	o	o	o	o
... tukemaan korkeamman tason ajatteluun tähtäviä toimintoja	o	o	o	o	o	o
... tukemaan luovuutta	o	o	o	o	o	o
... kehittämään oppilaiden valmiuksia käyttää teknologiaa avuksi opiskellessaan	o	o	o	o	o	o
... jotakin muuta (täsmennä, mitä)	o	o	o	o	o	o

23. Missä määrin tunnet olevasi pätevä käyttämään teknologiaa alla lueteltuihin tarkoituksiin?	En lainkaan pätevä	Melko pätevä	Pätevä	Hyvin pätevä
<i>a) Viestinnän ja verkottumisen välineenä</i>				
... oppilaittesi kanssa	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... oppilaiden vanhempien kanssa	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... kouluhallinnon ja opetusviranomaisten kanssa	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<i>b) Oman kehityksesi ja opiskelusi apuvälineenä</i>				
<i>c) Käytännöllisenä apuvälineenä</i>				
... työn organisoinnissa ja tulosten tallentamisessa	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... oppituntien valmistelussa	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... digitaalisen oppimateriaalin hankkimisessa	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... oman digitaalisen oppimateriaalin suunnittelussa ja valmistamisessa	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<i>d) Opettajana toimiessasi tulet käyttämään modernia teknologiaa</i>				
... opettaessasi tiettyjä käsitteitä tai taitoja	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... tukemaan erilaisia oppimistyyliä ja yksilöllistämään opetusta	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... auttamaan oppimisvaikeuksien, fyysisten ongelmien ja käyttäytymishäiriöiden voittamisessa	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... tukemaan korkeamman tason ajatteluun tähtääviä toimintoja	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... tukemaan luovuutta	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... kehittämään oppilaiden valmiuksia käyttää teknologiaa avuksi opiskellessaan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... jotakin muuta (täsmennä, mitä)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

24 Oletko ollut henkilökohtaisesti mukana jossakin opettajiesi/ohjaajiesi projektissa, jonka tarkoituksena on ollut kehittää uusia innovatiivisia TVT:n käyttötapoja?

Kyllä/Ei

25 Kuinka hyväksi arvioisit opettajiesi/ohjaajiesi keskimääräiset valmiudet käyttää tieto- ja viestintäteknikkaa eri tarkoituksiin?

Huono/Keskinkertainen/Hyvä/Erinomainen

26 Kuinka tärkeänä opettajasi/ohjaajasi keskimäärin pitävät TVT:n käyttöä eri tarkoituksiin?

Ei lainkaan tärkeänä/jossakin määrin tärkeänä/melko tärkeänä/erittäin tärkeänä

27. Missä määrin seuraavat asiat auttaisivat Sinua integroimaan paremmin teknologiaa opetukseesi?	Ei lainkaan tärkeä	Melko tärkeä	Tärkeä	Hyvin tärkeä
Laitteiston parempi saatavuus	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Laitteiston luotettavampi toiminta	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Korkealuokkaisemman laitteiston saatavuus	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kurssit teknologian opetuskäytöstä	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tuki teknologian opetuskäytössä (esim. puhelinneuvonta)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teknologian integrointi koko opetusohjelmassa	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kurssien kestäessä aikaa valmistella, tutkia ja kehittää	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Muu (mikä?)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

28 Mahdollisia kommentteja/Esimerkkejä:

**Kiitos kyselyyn vastaamisesta!**

Jotta välttyisit tämän kyselyn karhuviesteiltä, kirjoita tähän sähköpostiosoitteesi:

## QUESTIONNAIRE FOR MENTOR TEACHERS.

### D.

#### OECD CERI:n ”New Millenium Learners” –hankkeen tutkimus TVT:n käyttö opettajankoulutuksessa kevätlukukaudella 2009

##### Kyselylomake ohjaaville opettajille

Arvostamme halukkuuttanne osallistua kyselytutkimukseemme. Tämän kansainvälisen tutkimuksen verkkopohjaisessa kyselyssä ja haastattelututkimuksessa selvitetään tieto- ja viestintätekniiikan (TVT) käyttöä opettajankoulutuksessa. Tavoitteena on löytää vastauksia seuraaviin tutkimuskysymyksiin:

- Millä tavoin opettajaksi OECD-maiden opettajankoulutusyksiköissä opiskelevat valmistautuvat integroimaan tieto- ja viestintätekniiikkaa opetukseensa?
- Jos opettajaksi valmistuvat eivät saavuta riittävää pätevyyttä TVT:n käytössä, mitkä ovat tähän vaikuttavat tärkeimmät esteet asianosaisten tahojen mielestä?

Tutkimukseen osallistuu OECD:n jäsenmaita eri puolilta maapalloa ja kyselylomake on laadittu kansainvälisenä yhteistyönä. Peruslomake on englanninkielinen ja siitä on muokattu kansalliset versiot useilla eri kielillä. Kyselyssä on osioita, jotka kartoittavat esteitä TVT:n soveltamiseen, kuten laitteiden riittämättömyyttä tai puutteita, teknisen ja pedagogisen tuen saatavuutta, tarjolla olevaa koulutusta, palkkioita ja palkintoja mallikelpoisesta toiminnasta jne. Kysymykset kohdistuvat myös siihen, missä määrin TVT integroituu opetusharjoitteleluun, missä eri muodoissa sitä käytetään ja kuinka sen käyttöä voitaisi lisätä. Edellisen lisäksi kysytään, kuinka paljon TVT:n integroimista opetukseen arvostetaan.

Kysely toteutetaan OECD:n keskustietokoneella Pariisissa ja aineistoa käytetään ainoastaan tutkimustarkoituksiin niin, ettei vastaajan henkilöllisyys paljastu raportoinnissa. Tieto- ja viestintätekniiikka käsitetään tässä laajasti sisältäen esimerkiksi tietokoneet, ohjelmistot, matkapuhelimet, digitaaliset kamerat ja opintohallintojärjestelmät. Mikäli terminologia tai kyselylomakkeen jokin kohta muutoin on jollakin tavalla epäselvä, toivomme siitä kommenttia asianomaiseen kohtaan. Kyselyssä on 23 osiota, joista muutamassa on useita alakohtia. Kyselyyn toivotaan vastattavan ajatuksella, mutta siihen voi vastata varsin ripeästi ja vastaamiseen tarvittava aika on varsin kohtuullinen.

Web link: <http://www2.oecd.org/Survey/Survey.aspx?surveyid=3174&ForceNew=true>

##### Taustatietoa vastaajasta

- 1 Missä harjoittelukoulussa ja missä koulutusohjelmassa opetat?
- 2 Sukupuolesi  
Nainen                      Mies
- 3 Ikäsi vuosissa (kokonaislukuna)



- 4 Kuinka monta vuotta olet toiminut opettajana?  
Anna numeerinen vastaus, käytä tarvittaessa desimaalipistettä (.)
- 5 Kuinka monta vuotta olet toiminut ohjaavana opettajana?  
Anna numeerinen vastaus, käytä tarvittaessa desimaalipistettä (.)
- 6 Kuinka monta vuotta olet käyttänyt TVT:a opetuksessasi ?  
Anna numeerinen vastaus, käytä tarvittaessa desimaalipistettä (.)
- 7 Minkä ikäisiä oppilaita opetat? Rastita kaikki kysymykseen tulevat vaihtoehdot.
- alle 5 v.       6 v.       7 v.  
 8 v.       9 v.       10 v.  
 11 v.       12 v.       13 v.  
 14 v.       15 v.       16 v.  
 17 v.       18 v.       19 v.  
 Kaikkia luokkatasoja       Muita ikäryhmiä (täsmennä, mitä):
- 8 Mitä aineita opetat? Merkitse kaikki kysymykseen tulevat aineet
- |                                  |                                      |
|----------------------------------|--------------------------------------|
| Matematiikkaa                    | Äidinkieltä                          |
| Vieraita kieliä (täsmennä, mitä) | Yhteiskuntatieteitä (täsmennä, mitä) |
| Luonnontieteitä (täsmennä, mitä) | Tietotekniikkaa                      |
| Muuta (täsmennä, mitä)           |                                      |

### **Teknologiasta, laitteista**

- 9 Onko työpaikalla käytössäsi oma tietokone?  
Kyllä, pöytäkone/Kyllä, kannettava/Kyllä, molemmat/Ei
- 10 Onko saatavillasi teknistä tukea koulullasi?  
Kyllä/Ei/En tiedä
- 11 Kuinka hyvänä pidät tätä teknistä tukea?  
Huono/Keskinkertainen/Hyvä/Erinomainen
- 12 Mikä seuraavista vaihtoehdoista parhaiten kuvaa teknistä pätevyyttäsi TVT:n kotikäytössä?  
En hallitse TVT:n käyttöä  
Tunnen itseni epävarmaksi TVT:n käytössä  
Tunnen itseni varmaksi TVT:n käytössä  
Tunnen itseni hyvin varmaksi TVT:n käytössä
- 13 Mikä seuraavista vaihtoehdoista parhaiten kuvaa teknistä pätevyyttäsi opetustilanteissa?  
Tunnen itseni hyvin epävarmaksi TVT:n käytössä opetustilanteissa  
Tunnen itseni melko epävarmaksi TVT:n käytössä opetustilanteissa  
Tunnen itseni melko varmaksi TVT:n käytössä opetustilanteissa  
Tunnen itseni hyvin varmaksi TVT:n käytössä opetustilanteissa

### **Tietotekniikan opetuskäytöstä**

- 14 Onko koulullasi saatavilla pedagogista tukea opettajille TVT:n käyttöön opetuksessa?  
Kyllä/Ei
- 15 Kuinka hyvänä pidät tätä pedagogista tukea?  
Huono/Keskinkertainen/Hyvä/Erinomainen

<b>16. Kuinka usein käytät TVT:a alla lueteltuihin tarkoituksiin työssäsi?</b>	<b>Ei koskaan</b>	<b>Muutaman kerran vuodessa</b>	<b>Kuukausittain</b>	<b>Viikottain</b>
Organisoimaan ja järjestelemään työtehtäviäni	o	o	o	o
Tuntien valmisteluun	o	o	o	o
Digitaalisten oppimateriaalien hankkimiseen	o	o	o	o
Oman digitaalisen oppimateriaalin suunnitteluun ja tuottamiseen	o	o	o	o
Yhteydenpitoon kollegojen kanssa	o	o	o	o
Yhteydenpitoon oppilaiden kanssa	o	o	o	o
Yhteydenpitoon oppilaiden vanhempien kanssa	o	o	o	o
Yhteydenpitoon kouluhallinnon ja opetusviranomaisten kanssa	o	o	o	o
Oppilaitten suoritusten arviointiin ja oppimistulosten analysointiin	o	o	o	o

<b>17. Opettajana toimiessasi käytät modernia teknologiaa</b>				
... opettaessasi tiettyjä käsitteitä tai taitoja	o	o	o	o
... tukemaan erilaisia oppimistyyliä ja yksilöllistämään opetusta	o	o	o	o
... auttamaan oppimisvaikeuksien, fyysisten ongelmien ja käyttäytymishäiriöiden voittamisessa	o	o	o	o
... tukemaan korkeamman tason ajatteluun tähtäviä toimintoja	o	o	o	o
... tukemaan luovuutta	o	o	o	o
... kehittämään oppilaiden valmiuksia käyttää teknologiaa avuksi opiskellessaan	o	o	o	o
... jotakin muuta (täsmennä, mitä)	o	o	o	o

<b>18. Kuinka usein käytät alla lueteltuja TVT-laitteita opetuksessasi?</b>	<b>Ei koskaan</b>	<b>Muutaman kerran vuodessa</b>	<b>Kuukausittain</b>	<b>Viikottain</b>
Mikrotietokoneet	o	o	o	o
Interaktiiviset valkotalut (smartboard)	o	o	o	o
Videoneuvottelulaitteet	o	o	o	o
Opetuksenhallintajärjestelmät (WebCT, moodle, tms.)	o	o	o	o
Audiolaitteet (ml. ohjelmistot)	o	o	o	o
Digitaaliset valokuvauskamerat (ml. editointilaitteet)	o	o	o	o
Digitaaliset videokamerat (ml. editointilaitteet)	o	o	o	o
Matkapuhelimet	o	o	o	o
Dataprojektorit	o	o	o	o
Muita, mitä?	o	o	o	o

19 Mahdollisia kommentteja/Esimerkkejä:

20. Missä määrin seuraavat asiat auttaisivat ohjaavia opettajia integroimaan paremmin teknologiaa opetukseensa?	Ei lainkaan tärkeä	Melko tärkeä	Tärkeä	Hyvin tärkeä
Laitteiston parempi saatavuus	o	o	o	o
Laitteiston luotettavampi toiminta	o	o	o	o
Korkealuokkaisemman laitteiston saatavuus	o	o	o	o
Kurssit teknologian opetuskäytöstä	o	o	o	o
Tuki teknologian opetuskäytössä (esim. puhelinneuvonta)	o	o	o	o
Käytännönläheisiä TVT-kursseja (hands on)	o	o	o	o
Teknistä tukea (esim. puhelinneuvonta)	o	o	o	o
TVT:n käyttötaidot kaikkien kurssien tavoitteisiin	o	o	o	o
Aikaa valmisteluun, ideointiin ja kehittämiseen	o	o	o	o
Palkkioita ja kannustimia opettajille	o	o	o	o
Muita, mitä?	o	o	o	o

### Ohjaavien opettajien vastuita TVT:n opetuskäytössä

21 Onko ohjaaville opettajille esitetty muodollisia vaatimuksia siitä, miten TVT:a pitäisi integroida opetukseen?

Kyllä/Ei/Muuta

22 Kuinka tärkeäksi arvioisit ohjaavan opettajan roolin valmistuvien opettajien TVT:taitojen ja valmiuksien kartuttamisessa?

Ei tärkeä/melko tärkeä/hyvin tärkeä/erittäin tärkeä

23 Mahdollisia kommentteja/Esimerkkejä:

**Kiitos kyselyyn vastaamisesta!**

Jotta välttyisit tämän kyselyn karhuviesteiltä, kirjoita tähän sähköpostiosoitteesi:

### RESEARCHER VISIT TO UNIVERSITY OF JOENSUU 19.–20. APRIL, 2009

The contact person agreed in advance was not available due to illness. However, practical arrangements were not problematic due to the flexibility of local staff. The programme consisted of four sessions:

- 1 The visitor participated in a research seminar for staff professional development. The current status of two research projects on ICT applications in primary teacher education was reported. Both referred to using the virtual learning environment moodle and there was a solid theoretical analysis in the background. A British professor working at the faculty on the pedagogy of ICT was a significant contributor in the discussion even if local young researchers had the main role.
- 2 It was possible to follow two group-work sessions in a science education course for the primary school teacher education programme in Joensuu. The group-work was organised practical studies (biology) as the starting point. An optical microscope was the most often used instrument and a handbook was an important source of information while student worksheets guided the activities.
- 3 There was an interview session with the Head of the Department of Applied Education. It was agreed how to get the sampling of teacher educators' e-mail addresses for the questionnaire study. The headmaster of the nearby teacher training school dropped in and he promised to send the corresponding list of mentor teachers' e-mail addresses. It was agreed that the visit for interviewing staff would be organised 18.–19. May.
- 4 Group interviews of student teachers (cf. <http://www.oecd.org/dataoecd/3/2/42419175.pdf>). The first group consisted of two students in the Subject teacher education programme, one of them was enrolled in the Foreign language teacher education programme and the other in the Science education (biological sciences) programme. The second group of two student teachers in primary school teacher education programme was heterogeneous while one of them was getting a double competence also as a subject teacher in social sciences. The third group was of four subject teacher students, one majoring in Mother tongue (Finnish), two in Mathematics, and the fourth in Geography. It appeared that all student teachers were satisfied with their acquisition of ICT skills. However, the ICT courses in different training programmes and even for different subject majors varied quite a lot. The teacher training school had been renovated recently and the newest equipment was available offering the students new and interesting technologies to be implemented in their teaching practice.

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