ICT and learning in teacher education
The social construction of pedagogical ICT discourse and design

Carina Granberg
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Carina Granberg
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Abstract

Background In recent decades, system-wide policies and substantial resources have been directed towards enhancing the use of ICT in learning contexts. This development can be observed at international and national levels. However, reports have indicated a ‘slow uptake’ of the use of ICT for pedagogical purposes among compulsory schools and teacher education institutions. Although the teacher education at Umeå University follows this pattern, there have been several initiatives in using ICT for learning in the teacher education programmes. The aim of this study is to scrutinise the process in which ICT-supported methods for learning have been introduced, used and disseminated throughout teacher education.

Methods Three ICT-supported methods for teaching and learning were chosen for this study: digital individual development planning (IUP), blogs and e-portfolios. To capture teachers’ and students’ experiences of introducing the pedagogical use of ICT, 115 interviews were conducted and four questionnaires were administered over a four-year period (2006-2010). Course documents and observations of blogs and e-portfolios supplied additional data. Hermeneutics was chosen as the methodological approach. Thematic content analysis was carried out in the first three part-studies, and theoretical frameworks suited for the identified themes were chosen for the analyses. Since pedagogical discourses appeared to be important, discourse analysis was used in the fourth part-study. A final meta analysis has been carried out and is presented later in this thesis.

Results In Umeå, as in other countries, teacher education has been slow to adopt ICT for learning. Still, the use of ICT for learning has increased over time. ICT-supported methods such as IUP, blogs and e-portfolios have found their way into the context through a recontextualisation process in which ICT discourses and designs are socially constructed. However, the recontextualisation process could merely be found within sub-fields, such as teacher teams and project groups, since in the main-field (i.e. teacher education) traditional ways of teaching and learning have been internalised. These traditions hold symbolic capital, and teachers who have the means to do so will act according to their habitus and defend the traditions. The recontextualisation process will therefore be kept within the sub-fields, and the dissemination will be limited. Furthermore, the sub-fields are rather isolated from one another, and therefore pedagogical ICT discourses and designs are created in varied ways. However, none of them could be regarded as internalised, and the social construction of pedagogical ICT discourse and design has to be considered to be still ‘under construction’.
List of papers

This thesis is based on the following articles, which will be referred to in the text by Roman numerals.


Introduction

IMAGINE... that all pupils in schools could access computers and have immediate contact with all the knowledge of the world. (SOU, 1994)

These visionary words, written by the Swedish ICT Commission in 1994, are not a vision any more. Young people in Sweden have access to the Internet in schools and in their homes (Findahl, 2009). However, their main activity online is not information retrieval for school assignments, but rather social interactions with friends, online gaming, creative work, publishing and entertainment (Findahl, 2009.). This is one of several examples of technology introduction with a certain aim that, during the implementation process, develops into something more. In the same document, the ICT Commission presented visions for teacher education in Sweden:

Teacher education will prepare its graduates to show the way regarding the use of ICT for teaching and learning. (SOU, 1994:118)

However, national reports have shown a slow uptake, not of technology itself, but of the use of ICT for learning. Student teachers report low levels of ICT use for their own learning as well as for their future profession (CMA, 2005). The technology is put into service but is not yet used as the initiators intended. However, a process of using ICT for learning has been initiated, a process in which the rhetoric of ‘learning through ICT’ is to be manifested in the practice of teacher education. Since reports have pointed at the complexity of the integration process, that very process has been the focus of this study.

Aims and research questions

The aim of this thesis is to scrutinise the process in which ICT for learning is introduced into teacher education. This will be described as it relates to changes in society, school practice and educational policies regarding ICT. A further aim is to examine how theoretical frameworks may contribute to the understanding of such a process. The overall research questions for this thesis are:

- How can the process of change in relation to discourse, design and dissemination of ICT-supported methods for teaching and learning be described and understood?

- How can the roles of students, teachers, leaders and the context inside and outside teacher education in this process be described and understood?
Structure of the thesis

This thesis starts by introducing the reader to the structure of the study, which consists of four part-studies and a meta analysis. Then, a review of international policy and research concerning the introduction of the pedagogical use of ICT is presented. The review includes educational contexts in general and the context of teacher education in particular. An introduction of the national and the local context will follow. The presentation of the local context gives a brief historical retrospective on how ICT has found its way into the context of teacher education in Umeå. Thereafter, the role of the author within this context is discussed. The methodology, as a hermeneutic approach, is described along with an account of the choices of methods and theoretical frameworks. That is followed by a discussion of validity and ethical concerns, and after that, a summary of the results from each part-study is presented. Before the final meta analysis, the theoretical model is presented. This model has developed in parallel with the four part-studies and is based on concepts from Bernstein’s, Bourdieu’s and Fairclough’s theoretical frameworks. The aim of the meta analysis is to combine the contributions from all of the part-studies in order to bring some understanding to the process of change as well as to scrutinise how theoretical frameworks may contribute to the understanding to such a process. Finally, the research questions are presented and the results are discussed in relation to international circumstances.

Structure of the study

The study focuses on the pedagogical use of ICT in campus courses in teacher education at Umeå University. It is important to clarify that there are numerous departments all over the university that are involved with and make important contributions to teacher education in Umeå. However, to limit the scope of the thesis, the study includes only the five departments that, during the time of this study, were organised as a faculty of teacher education. Furthermore, among the ICT-supported methods for learning used within this context, only three were chosen for this study: digital individual development planning (IUP), blogs and e-portfolios (Table 1). These methods have all been discussed and used within campus pre-service courses during the period 2006-2009. ICT-supported methods such as video-conferencing, video-lessons and so forth are used in pre-service courses; however, they are used mainly in distance education and have therefore not been included in this study. The three selected methods were chosen to represent different backgrounds and the different ways in which they were introduced in teacher education campus courses. The term ‘IUP’ originates from the Swedish educational regulations for the nine-year school
and was introduced by the faculty board. Blogs represent the development of social software and have influenced the ICT department to introduce blogs in pre-service courses. Finally, e-portfolios emanate from teacher educators’ prior experiences using portfolios in school or creative work. They are also part of an international trend of portfolio use that has influenced the leaders and teachers to introduce e-portfolios into teacher education. An overview of the four part-studies is presented below and is also illustrated in Table 1. A summary of the results from each part-study is presented on page 28.

<table>
<thead>
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<th>Part-Study</th>
<th>Pedagogical method</th>
<th>Background</th>
<th>Data</th>
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<td>Digital IUP</td>
<td>Compulsory schools</td>
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In order to bring insights into the historical perspective of the use of ICT at the Umeå teacher education institution, 12 additional interviews were conducted.

**Table 1. A presentation of the four part-studies.** *Also used in part-study II

**Digital IUP**
The story of IUP started in 2006, when the Swedish government implemented IUP in compulsory schools. This initiative has influenced developments in teacher education. In the same year, the faculty board of teacher education introduced a project to try out digital IUP among pre-service and in-service students. Ten teacher educators volunteered; among them were three ICT teachers who had experience of using digital IUP, and they functioned as mentors during the project (2006-2007). The thesis’ first part-study focuses on the teachers’ perspective during this project. All of the participating teachers were interviewed twice; they were asked to share their experiences of working with digital IUP and to participate in development work in the context of teacher education.

**Blogs**
The blog, as a worldwide social software application, has been created, developed and used outside the educational context. However, educational blogs have been introduced by ICT teachers and other interested teachers in some courses and programs within teacher education at Umeå University. Three of these initiatives were selected for the second study (2007-2008).
This part-study focused on the student perspective; 38 student teachers were interviewed, during which they related their experiences of using ICT for learning in general and educational blogs in particular.

**E-portfolios**
The background of e-portfolios could be traced back to compulsory school and to professional contexts, such as writing CVs or compiling samples of creative work. The construction of e-portfolios for learning within teacher education has been led by interested teacher educators, the majority of them having had experience using portfolios with younger pupils or within their own creative profession. In addition to these teachers’ use of e-portfolios there has been a “top-down” initiative dating back to 2002, which aims to introduce all student teachers to e-portfolios. The third part-study investigated the development of e-portfolios within teacher education during the period 2002-2009. This part-study focused on the teachers’ perspectives; 25 teachers were interviewed and 42 teachers responded to a questionnaire asking for their understanding of and experiences with e-portfolios, and their knowledge about how e-portfolios are spread and used within the context of teacher education.

**Blended learning, using digital IUP, blogs and e-portfolios**
Finally, the fourth part-study looked at the construction of a blend of face-to-face and virtual learning activities within a pre-school teacher education programme during the period 2007-2009. This programme was the object of two projects, both aiming to introduce blended learning using, among other methods, digital IUP, blogs and e-portfolios. Blended learning, as a contemporary concept, could be seen as an emerging trend within higher education that aims to mix face-to-face and virtual activities with a view to maximising learning outcomes. This part-study focused on teacher as well as student perspectives, and entailed interviews of 20 teacher educators and 14 students. Additionally, three student questionnaires were used to gather data for this study. In the fourth paper, presenting this part-study, digital IUP is referred to as digital Personal Development Planning (PDP) in order to correspond with the international concept PDP.

Finally, all interviews of teacher educators included questions about ICT development within teacher education in general. In order to provide more specific data relevant to the local context (p. 17), 12 additional interviews, conducted during the same period, have been included.
Background – Policy and research

This section briefly sketches the problem area at an international level, presenting political and educational policies in relation to education in general and teacher education in particular. Following this, is a brief account of research into how political and educational policies can influence whether or not ICT-supported learning methods are introduced into teacher education.

ICT and educational policy

The political arena has, in recent decades, associated ICT with “unprecedented global flows of information, products, people, capital and ideas” (OECD, 2006, p. 3), and ICT has thereby become essential for the policy agendas relating to the national economy. System-wide policies regarding integrating ICT into society and educational systems have become commonplace, starting in 1993 with the US Congress’s adoption of the National Information Infrastructure Act (NII, 1993), and within one year 12 OECD governments followed the US example (Karlsson, 1996). This has had implications for educational contexts in that governments and other interested parties have directed substantial financial resources towards developing ICT in schools (OECD, 2006). Policies reflect the view that it is important for young people to learn how to use ICT, both for their future participation in society and to support their learning processes while they are in school. Even if countries have approached the issue in different ways and over different time scales, the rhetoric regarding ICT and the educational systems could be considered an international trend (Law, Pelgrum, & Plomp, 2008). For example, UNESCO (2008) has published a policy framework, ICT Competency Standards for Teachers, which emphasises the need for teachers to be information-competent and to become communicators, collaborators, producers and publishers, using ICT.

Within a society in continuous change, the question of lifelong learning arises; it is not so much a matter of learning about ICT, but rather learning through ICT. The pedagogical ICT discourse has concerned traditional educational contexts as well as distance education. The European Parliament has recommended eight key concepts for lifelong learning; among them, digital competence is identified as one important issue:

Digital competence involves the confident and critical use of Information Society Technology (IST) for work, leisure and communication. It is underpinned by basic skills in ICT: the use of computers to retrieve, assess, store, produce, present and exchange information, and to communicate and participate in collaborative networks via the Internet. (European Parliament, 2006)
In the educational arena, compulsory and upper secondary schools have been the focus of governmental investments and projects aiming to increase the use of ICT. However, reports on the implementation of ICT policies in educational settings indicate that schools have been slow to adopt ICT. Schools have naturally varied with respect to their adoption of national ICT guidelines; however, the picture of unsatisfactory levels of ICT use, from a policy perspective, is shared internationally (Enochsson & Rizza, 2009). Since research points at teachers’ lack of ICT experience as one of the obstacles, policy makers and national financiers have directed their attention to how ICT is used in teacher education, in order to prepare student teachers to use ICT-supported methods in their future classrooms.

ICT and teacher education

Cheng (2005) has described the development of ICT in teacher education as emerging in three waves. The use of ICT has gone from the storage and transfer of knowledge to the delivery of skills needed in a changing society, and finally to a tool for lifelong learning. The focus has moved from mainly learning about ICT to learning through ICT, a shift that corresponds with the policy intentions.

Teacher education institutions have chosen different strategies to introduce ICT into their pre-service training, for example, increasing access to ICT, offering ICT courses, integrating ICT into all courses, introducing multimedia approaches such as e-portfolios, staff in-service training, collaboration through developing communities of practice, modelling strategies such as showing good examples, and so forth. Usually a combination of strategies is used (Kay, 2006). However, studies have revealed that teacher education programs have been slow to adopt the pedagogical use of ICT. Despite the efforts made to encourage the use of ICT in teacher education, with few exceptions, student teachers seem generally disinclined to use ICT for their own coursework (Enochsson & Rizza, 2009).

Numerous studies have been carried out to identify the obstacles to the integration of ICT into teacher education. A range of difficulties have been discussed. For example, negative attitudes based on the experiences of ICT as merely fad and fashion (Maddux & Cummings, 2004) or as a reaction to the commercialised technology optimism (Robertsson, 2003), lack of organisational support (Adamy & Heinecke, 2005; Finley & Hartman, 2004), insufficient ICT competence (Kirschner & Selinger, 2003) and lack of vision regarding how to use ICT in relation to traditional methods (Finley & Hartman, 2004; Zisow, 2000). Along with these obstacles, the question of time, or rather the lack of time, is discussed. Teachers will need time to effect change, a process often described as consisting of phases or steps, in order to
overcome some of the above-mentioned obstacles (Buttner, 2006; Toledo, 2005; Wozney, Venkatesh, & Abrami, 2006).

On the other hand, there is research pointing out that solving these problems will not initiate the pedagogical use of ICT per se. Sufficient access to technology, ICT training and favourable policy contexts do not guarantee the pedagogical use of ICT (Ertmer, 2005). Furthermore, there are studies that have found no correlation between students’ competence with ICT and their use of ICT for pedagogical purposes (Sardone & Devlin-Scherer, 2008).

However, in spite of negative reports on policy implementation regarding ICT in teacher education, there are numerous initiatives on ICT use for teaching and learning in the international context of teacher education, both for professional and pedagogical purposes. The pedagogical aim of introducing ICT-supported methods could rhetorically be described by using concepts such as pedagogical documentation, supporting the learning process, reflective practice, collaborative learning, creativity and interaction, and student self-assessment. ICT-supported methods are thereby often considered more constructivistic, student-oriented and process-oriented than traditional ways of organising education (Drent & Meelissen, 2008). Such methods could include, for example, e-portfolios (Adamy & Milman, 2009; Strudler & Wetzel, 2005), educational blogs (Philip & Nicholls, 2009; Top, Yukselturk, & Inan, 2010), wikis for collaboration (Wheeler & Wheeler, 2009), video papers (Lazarus & Olivero, 2009) and process diaries (Bergström & Granberg, 2007). Some of these initiatives can be seen as influences from the distance education context, which adopted ICT more quickly in order to bridge physical distances. This merger of ICT-supported and face-to-face activities is often referred to as blended learning (Garrison & Kanuka, 2004). Successful initiatives are often described as good examples and are dependent on enthusiastic teachers or teacher teams. These teachers typically take a student-oriented pedagogical approach, they have a positive attitude to ICT and are comfortable using it (Drent & Meelissen, 2008). However, these good examples do not necessarily disseminate throughout the teacher education institutions.

The research accounted for here will, taken together, support the idea that the process of integrating ICT-supported methods into teacher education is a complex one. It is not simply a matter of providing teacher educators with technology and the ability to use it with competence, nor does it involve simply supplying innovative projects and good examples at a pace that will keep up with the changes outside the educational context. It is not about making teaching and learning more efficient by retooling the context of teacher education, digitalising the traditional way of organising education. It could, rather, be regarded as a matter of “enabling cultural change in the profession. /.../ ... to develop reflexive professionals capable of intelligent action in a fast-changing context” (Fisher, Higgins, & Loveless, 2006, p. 39).
The context of the study

This section presents a brief historical overview of ICT development in the Swedish political and educational contexts. Thereafter, it discusses how national policy, practice and development have interacted with developments in the local context. Finally, the author as an actor in the local context is introduced.

The national context

_in the political arena_, 1994 could be considered a milestone in the history of ICT in Sweden. In that year, the national ICT Commission, led by the prime minister, was founded and its first report, _ICT – Wings to human abilities_ (SOU, 1994:118) constitutes the first official ICT policy in Sweden, coming about 11 months after the US Infrastructure Act, NII (Karlsson, 1996). The 1994 policy is not the first political initiative concerning ICT; however, with the establishment of the ICT Commission, ICT became a point of focus related to all sectors of society: trade and industry, health care, the legal system, administration, research, and education. Among these, the commission highlighted education as the most important area on which to focus in order to turn Swedes into competent users of ICT (SOU, 1994:118). The commission’s subsequent reports and publications contributed to the Swedish political discourse on ICT, which could be described as visionary, pointing at a revolutionary process towards developing an information society (Hall, 2003/2004).

However, even if the ICT Commission has contributed to Sweden’s transformation into an ICT nation, 1994 cannot be considered the starting point; the process began much earlier. Technological development in ICT in Sweden can be traced back to the 1940s. Issues of ‘computer politics’ were discussed in the political arena during the 1970s (Henriksson, 1995), and the political ideas of bringing ICT into schools were already being discussed in the late 1960s (Riis, 2000). The understanding of ICT as important to national, social and financial development has grown during this process and has, in turn, influenced the government to act with a view to bringing ICT into the educational contexts.

_in the educational arena_, primary and secondary schools have been involved in a process of change led by political intentions, which have manifested in curricular and implementation projects. In the early 1970s the Swedish National Agency for Education was given the task of initiating an experiment in using ICT in schools; the project was titled _Computers in Schools_ (Riis, 2000). In the three decades that followed, a succession of projects aiming at
introducing computers, building networks, offering in-service teacher training and trying out ICT-supported methods were implemented in Swedish schools (see Table 2). Besides the government, the Ministry of Education and Science and the school agencies, there are stakeholders such as the KK Foundation (the Foundation of Competence and Knowledge) that have invested substantial resources to support the integration of ICT into Swedish schools. During the period 1999-2002, the Ministry of Education and Science initiated the largest-scale project in Swedish schools – *ICT in Schools* (ITiS). The ITiS-project provided 75 000 teachers with computers, mentors and ICT training to support their school projects (Chaib & Tebelius, 2004). In addition, the project funded the development of the municipal ICT infrastructure within schools (Table 2).

<table>
<thead>
<tr>
<th>Year</th>
<th>Project</th>
<th>Aim / Target group</th>
<th>Stakeholder</th>
</tr>
</thead>
<tbody>
<tr>
<td>1974</td>
<td>DIS (Swedish acronym for Computers in Schools)</td>
<td>A feasibility project, exploring the possibilities of using computers in schools</td>
<td>National Agency for Education</td>
</tr>
<tr>
<td>1984-1987</td>
<td>Computer training</td>
<td>Stimulation grant to motivate local education agencies to buy computers for use in their schools (grades 7–9)</td>
<td>The government</td>
</tr>
<tr>
<td>1988-1991</td>
<td>DOS (Swedish acronym for Computers and Schools)</td>
<td>Creating pedagogical software, centres to develop software (related to teacher education) and local computer projects in schools</td>
<td>National Agency for Education</td>
</tr>
<tr>
<td>1994</td>
<td>The Swedish SchoolNet</td>
<td>Online service for teachers</td>
<td>National Agency for Education</td>
</tr>
<tr>
<td>1996-1999</td>
<td>Lighthouse projects</td>
<td>Enable educators to practise and share their experiences with ICT, with a view to developing pupil-guided methods</td>
<td>KK Foundation</td>
</tr>
<tr>
<td>1999-2002</td>
<td>ITiS (Swedish acronym for ICT in Schools)</td>
<td>Develop the use of ICT in schools; provide teachers with computers, in-service education and ICT mentors; improve the ICT infrastructure</td>
<td>Ministry of Education and Science</td>
</tr>
<tr>
<td>2005-</td>
<td>ICT in teacher education</td>
<td>Develop student teachers’ and teacher educators’ digital competence</td>
<td>KK Foundation</td>
</tr>
</tbody>
</table>

Table 2. Examples of national Swedish ICT projects in schools and teacher education.
In 1980, national curricula for Swedish schools were revised, and computer knowledge was incorporated into course plans for mathematics, emphasising the importance of teaching pupils about computers.

All pupils ought to familiarize themselves with the use of computers within society and the rapid development within that area. In particular, pupils need to realize that computers are technical devices manoeuvred by humans. (LGR80:107)

Soon enough the idea of learning about computers was revised into learning with and through computers, and the references to ‘computers’ were eventually changed to ‘IT’ and, later, to ‘ICT’. In 1994 the national curriculum for compulsory schools was rewritten and computer knowledge was presented as information technology, and ICT became an issue not only within mathematics but as one of the general knowledge goals. This presentation of ICT as an overall resource for education was in accordance with the ideas of the ICT Commission (SOU, 1994:118).

The school is responsible for ensuring that all pupils completing compulsory school have knowledge about the media and their role and can use information technology as a tool in their search for knowledge and to develop their learning. (LPO94:10-11)

Reports of ICT use in Swedish schools indicate findings similar to those of international studies. Swedish schools are generally well equipped with both hardware and software, all schools are connected to the Internet, and a clear majority of young Swedes have computers and are online at home (Findahl, 2009). However, the pedagogical use of ICT in schools is generally reported as lower than the stakeholders intended, and, as in international studies, attention has been drawn to the role of teacher education in preparing pre-service teachers to use ICT.

The arena of teacher education and its use of ICT, during the past three decades, has not been given the same level of attention as compulsory schools have. However, within the Swedish higher education ordinance that specifies the skills and abilities student teachers must acquire, there are guidelines concerning the use of ICT.

... to attain a degree of bachelor or master of education the students must .../.../ demonstrate an ability to use information technology in educational activities and to recognise the significance of the role of different media for these activities. (SFS 1993:100)
Three years later the regulations concerning secondary school students were revised:

... a person who takes a [secondary school teacher] degree after 1 January 1998 must, however, possess the ability to use computers and other information technology aids in his/her own learning and knowledge about how these aids can be used in teaching children and young persons/pupils. (SFS 1996:913)

The government proposition, ‘a renewed teacher education’, was more ambitious:

Teacher education should constitute a good example regarding the use of media and ICT for teaching and learning and demonstrate the means they offer for learning and local development. (SOU, 1999/2000:135)

Evaluations have shown that Swedish teacher education is no exception to the international findings that pre-service teachers do not receive sufficient training in ICT practice. In a 2005 study in Sweden, only 20 percent of student teachers reported that their instructors were ICT-competent, that they were learning about the pedagogical uses of ICT, and that ICT was integrated in their subject courses (CMA, 2005).

However, teacher education has not to any greater extent been the subject of national investments and initiatives. Even though the ICT Commission highlighted teacher education as being essential to ICT development (1994:118), it was not until 2005 that the KK Foundation initiated a project to increase student teachers’ digital competence (KK-stiftelsen, 2005).

**The local context**

The history of educating teachers in Umeå goes back to 1879, but it was not until 1977 that the teacher education institution was incorporated into the university organisation. To date, this institution has undergone several reorganisations due to national teacher education reforms as well as local regulations and changes. One of many milestones was in 1992, when the teacher education institution was moved physically to the university campus, and at the same time reorganised into six (later, in 1995, into four) departments responsible for specific fields of school subjects. The teacher education ICT unit moved to campus and, in 2002, became an ICT department. A faculty board of teacher education was established in 2000 and became head of the five departments. This way of organising teacher education, with the inclusion of an ICT department, is not typical in Sweden; it was based on decisions made locally. However, further organisational changes were soon to occur. The faculty board of teacher education was
disbanded in 2009 and replaced by the board of School of Education, and the five departments were transferred to other faculties. These organisational changes took place in parallel with the introduction of ICT into teacher education.

The development of ICT within the teacher education institution up to the reorganisation in 2009 will be described here by the informants in this study: technicians, head teachers, and teacher educators working in the ICT department or in any of the other four teacher education departments (A, B, C and D). The short quotations are selected to be representative of informants’ comments.

The first computers

During the 1980s, due to the development of ICT in society, computers were introduced into the context of teacher education. The administrators were the first group of personnel to adopt the new technology. One of the former heads of the institution stated: “It was the administrators who started to use computers, first as a digital typewriter and then for e-mail. The teachers were generally not that interested.” The uptake of ICT among teacher educators during the 1980s is described as minimal. However, ever since 1992, when the teacher education departments were established, the use of ICT has developed in parallel within all these departments. The processes were driven by innovators – technicians, enthusiastic teachers, heads of departments etc. – and also by external changes in society. As one of the teachers (dep A) described it: “After the organisational changes in 1992, everything happened so quickly; our prefect was one of these ICT advocators, and suddenly I had replaced my typewriter at work with a computer, and then e-mail popped up.” A colleague (dep B) added: “I was forced by ‘reality’, I had a mailbox, and external and internal contacts sent e-mails that I had to read and answer.” Some teachers reported that they had participated in courses given by the ICT unit in order to learn how to handle word processing and e-mail; however, a majority described how they had been supported by more ICT-interested colleagues. As one of the teachers (dep C) described: “There have always been colleagues that I have turned to when I needed to learn something new regarding ICT. We have learnt from each other within our department.” These initiators, ICT-interested teachers and leaders, have played an important role in encouraging their colleagues to adopt the word processor, e-mail and the learning management system, FirstClass. As another teacher (dep D) explained, “There is a need for innovators, someone who takes the first step. If no one asks for a dance there will be no dancing.” Furthermore, some informants pointed out the importance of having a group of innovative teachers who can support one another in trying out and evaluating
contemporary technology. As a teacher (dep B) stated: “It is necessary that innovators are close to other innovators, making up a creative environment allowing new ideas to be realized – and the ICT unit [department] has constituted one of these environments.”

The ICT department and the technology

The ICT department started in the early 1970s as a unit (that later turned into an ICT unit) for production and teaching of technical teaching media. At that point, media used in the teacher education institution was based on analogue technology, and the change from analogue to digital technology during 1980 became a clash of traditions. In the words of one of the early ICT teachers:

_I had been teaching in an upper secondary school that in those days was one of the most well-equipped regarding computers in Sweden. Coming to teacher education was like walking into a wall; no one understood me when I was talking about computers. To buy a computer to use together with the student teachers was out of the question; I had to buy our first computer in small pieces and then put the smuggled goods together myself._

During the 1980s and 1990s the staff at the ICT unit worked as technicians, system developers and teachers, and created an ICT environment with computer labs, networks, Internet access, e-mail and LMS servers and so forth. One of the teachers (dep C) said: “I remember those guys in the 80s wiring the teacher education building using kilometres and kilometres of network cable.” From the beginning, the communicative and pedagogical use of ICT was of interest mainly to teachers in the ICT unit, who were giving pre-service lectures and in-service distance courses. However, the use of ICT spread among the teacher education departments. One of the ICT teachers recounted: “We [the ICT unit] used FirstClass for e-mail and to administrate our distance courses. Eventually, more and more people from other departments became interested, and in the middle of the 1990s FirstClass was offered as e-mail and LMS for all students and teachers within teacher education.” From then until 2009, the ICT department handled the ICT infrastructure and provided service and support to teacher educators as well as student teachers. In time, the pedagogical use of ICT became an issue, and from 2002 all student teachers were introduced to e-portfolios. One of the technicians stated: “We got a top-down decision to create e-portfolios to all student teachers, and since our LMS supported the creation of personal folders, we used FirstClass to host the e-portfolios. It was an instant technical implementation.”
As the technology developed, efforts were made to offer pre-service students ICT training and to meet national and local needs for in-service ICT training. Along with overseeing nationally funded ICT projects such as DIS, DOS, lighthouse projects and ITiS (Table 2, p. 15) together with a growing interest in ICT within schools, the ICT unit offered distance courses, teacher seminars and mentoring for in-service teachers who wanted to learn how to use ICT. At the same time, the ICT unit offered pre-service training and sought strategies to enable the integration of ICT training into regular courses. With support from the national guidelines and the dean at that time, ICT training started in the form of supplementary courses. Initially, these courses were given without any study-week points, but they were later transformed into a course with one and eventually two study-week points. One of the ICT teachers stated: “These national guidelines became essential to the development of ICT training for the pre-service students. Without them it would have been impossible to give us study points and thereby finance the students’ ICT training.” Later, in 2002, when the Swedish teacher education was reformed, these local supplementary courses were integrated into the regular courses in Umeå and were increased to three study weeks. However, the integration process was slow. As one of the ICT teachers described it: “I guess it was because we were a unit and not a department, but we were not included in the teacher team designing the courses and therefore it was still difficult to integrate the ICT assignments.”

However, even though the teacher education institution had been well equipped and had ICT-competent teachers and technicians, teacher education followed the national and international trend and was slow to adopt the pedagogical use of ICT. Two reports (Rehn, 2005a, 2005b) examining ICT training from 1998 to 2001 revealed students’ dissatisfaction and the fact that ICT was not integrated into any of the other courses. Some years later the education committee conducted a study in which 24 course plans were examined and compared with ICT study goals within the higher-education ordinance (SFS 1993:106), and they found that only four of the course plans contained study goals concerning ICT (Report, 2003, 2004). Course evaluations of the general courses have pointed in the same direction (Granberg, 2005b). A 2005 study of teacher educators reported low use of ICT in support of the learning process. The study also showed that, even though e-portfolios were introduced in 2002, not all of the teacher educators were aware of their existence three years later (Granberg, 2005a).

When this study began in 2006, teacher education at Umeå University was led by a faculty board. Besides engaging a variety of departments within the university to teach student teachers, the faculty board of teacher education was hosting five departments, each responsible for its own field of
school subjects. The ICT department was assigned to give pre-service ICT education, and to provide service and support for e-mail, LMS, computer labs etc. The ICT department was also engaged in system development, in-service distance courses and research in the area of ICT and learning. All pre-service student teachers were introduced to FirstClass and the use of e-portfolios during their first general course, and they obtained three study weeks of ICT training divided and integrated into four of the compulsory courses (later into two courses). In addition, through projects and local initiatives, groups of pre-service and in-service students were engaged in using educational blogs, digital IUP, wikis, video lessons and so forth.

**The researcher**

As my interests have always been in physics, mathematics and teaching, my choice of profession came naturally, and I graduated as a mathematics and physics teacher in 1990 at Umeå University. It was during this time that I first came in contact with computers; however, it was not within the context of teacher education, but during the first science course I took, in the physics department:

> “I do not accept handwritten lab reports! We have put together computer labs for you students to use! Use the word processor!” My physics teacher was unable to understand my request to be spared from using the computer, and he was enthusiastic: “It makes it much easier! Writing, saving, erasing, copying, cutting, pasting!” I returned to the computer lab, frustrated, questioning the teacher’s statement that it was possible to ‘cut’ or for that matter ‘paste’ anything at all on that screen…. That was in 1987. I was studying physics at the university, and being forced to use a computer for the first time – and I was literally crying for my old typewriter. (Granberg, 2007)

I took my computer frustration with me when I got my first position as a teacher at the secondary school and upper secondary school for adults. However, it was taken for granted that I, as a mathematics teacher, should teach in ‘computer knowledge’ classes, and after overcoming my hesitation I found myself teaching word processing, e-mail, Internet use, digital imaging multimedia and web design. At that time these activities were quite isolated and the pupils’ learning was not used to any great extent in other subjects. In 1996 my teacher team – a Swedish teacher, a social studies teacher and I – joined a KK-funded project, during which my interests in ICT-supported methods increased. Three years later, as the ITiS project started, I became an ITiS mentor, and during the following two years I guided teacher teams in their pedagogical development in using ICT in their classrooms. In 2000 I ended my employment as a teacher and became engaged in a two-year ICT project with the local school authorities in Umeå, to implement the software application FirstClass as the e-mail and learning management platform for
both the nine-year and upper secondary schools in the municipality. In 2002 I began working in the ICT department (described above), and I have been working ever since as a teacher educator. In 2006 I started my PhD studies. With my background both as an ICT sceptic and an ICT teacher, I became interested in the process in which ICT becomes a part of daily pedagogical life in the context of teacher education.

Methodology

This section presents the hermeneutic approach used in this study, followed by a discussion of chosen methods and theories. Finally, the validity of the study along with ethical considerations are examined.

A hermeneutic approach

A process of change that involves humans and human interactions could not be considered as an objective development. This process is interpreted and thereby constructed by its participants, such as teachers, students, managers and technicians. Taking constructivism as an epistemological starting point and seeking to understand a process from the participants’ perspectives, a hermeneutic approach (Ricoeur, 1976) has been used. To capture the participants’ experiences, semi-structured interviews were conducted with teachers and students who have participated in courses, projects or programmes that have used at least one of the methods chosen for study: digital IUP, blogs or e-portfolios. The first three part-studies scrutinised the use and understanding of each of these selected methods.

Hermeneutics deals with understanding and interpretation and allows the researcher to interpret and relate data to his or her prior knowledge. This process of interpretation can be described as a helix of circles. The researcher’s prior understanding is placed at the foundation of the helix and the increasing height of the helix indicates the process of developing knowledge of the subject (Ricoeur, 1976). Thematic content analysis was used for the first three part-studies in order to identify key concepts related to the aim of the thesis. The themes emerged through several readings and a process of condensing identified key concepts into categories, or themes. The identified themes and the author’s prior understanding of the process of introducing ICT-supported methods underlie the choices of suitable theoretical concepts. Thereafter, the chosen theories were used to analyse the themes in the helix of hermeneutics.

The teacher informants in the first part-studies described the difficulties they had in communicating pedagogical issues in general and ICT-supported methods in particular. The narratives pointed at difficulties they had
understanding each other, not sharing the same language and so forth. The theme of ‘discourse’ emerged in the third part-study as an important concept, related to the interactivity between our understandings of reality, our way of mediating those understandings, and the social construction of reality itself (Winther-Jørgensen & Phillips, 2000). Therefore, within the fourth part-study, the theme ‘discourse’ became refocused, and critical discourse analysis (Fairclough, 1989, 1995) was used to capture the present pedagogical discourses.

Finally, in order to relate the process of constructing pedagogical ICT discourses to its contextual circumstances, a final meta analysis was carried out as a part of this thesis. The final analysis includes all part-studies, and a theoretical model derived from theories used in the four part-studies was applied to respond to the overall research questions of this thesis.

Methods

This section describes and discusses the sampling and methods used to gather data in each part-study.

Data collection

Pre-service teacher education at Umeå University includes a large number of teachers from different departments all around the university, and the campus pre-service courses employ a variety of traditional and ICT-supported methods. However, in order to limit the study, only the teachers working at any of the five departments organised as a faculty of teacher education were included. The first part-study, concerning digital use of IUP, focused on a project initiated by the faculty board. To capture the teachers’ experiences of using IUP and participating in a developing project, all teachers, involved in the project, were invited to be interviewed and all of them chose to participate. During the second part-study, focusing on educational blogs, three campus pre-service courses were chosen based on information from the ICT teachers administrating the blog software. These blogs were introduced as a result of the ICT teachers’ initiative influenced by the creative use of blogs outside of teacher education. This study aimed to illuminate the students’ experiences using familiar social software for educational purposes. All students participating in any of the three courses that were using educational blogs were invited to be interviewed, and all students who volunteered were chosen as informants. The third part-study, scrutinising e-portfolios, had a broader scope. An inventory of e-portfolio use within the five departments was conducted using published documentation, e-mail or verbal inquiries and documentation from an earlier study (Granberg, 2005a). The aim of this part-study was to illuminate
teachers’ understanding of e-portfolios, how the method had developed over time and teachers’ role in the introduction of e-portfolios. All teachers involved in any of the e-portfolio initiatives that were found were invited for interviews, and 25 of them volunteered. To collect additional data, a questionnaire concerning e-portfolio use and experiences was distributed to 60 teachers who did not participate in the interviews; 42 responded, and some of them were familiar with e-portfolios. The fourth part-study followed a pre-school in-service programme for two years. All teachers and students involved were invited to participate, and 20 teachers and 14 students chose to do so. In addition, student questionnaires were administered after the first, second and fourth semesters.

Since the aim of the thesis has been to capture teachers’ and students’ experiences, semi-structured interviews were used to collect data in all four part-studies. The teacher interviews were organised around three themes: their understanding of the ICT-supported method, their experiences using the method, and their experiences with pedagogical development and change within teacher education in Umeå. The student interviews focused on two themes: the students’ understanding of the method and their experiences using the method. The questionnaires focused on the same themes as the interviews. All interviews were digitally recorded and transcribed word for word before analysis. In order to triangulate data and support the interpretations, in all part-studies additional information was collected from sources such as course plans, study guides, evaluations, software templates etc. (Table 3).

<table>
<thead>
<tr>
<th>Part-study</th>
<th>Pedagogical method</th>
<th>Data</th>
</tr>
</thead>
</table>
| I          | Digital IUP        | 20 interviews, teachers  
|            |                    | Course documents/IUP templates  
|            |                    | Observations, project meetings |
| II         | Blogs              | 38 interviews, students  
|            |                    | Course documents/blogs/evaluations |
| III        | E-portfolios       | 25 interviews, teachers  
|            |                    | Questionnaire, 42 teachers  
|            |                    | Course documents/evaluations/portfolio templates |
| IV         | Blended learning using digital IUP, blogs, e-portfolios | 20 interviews, teachers  
|            |                    | 14 interviews, students*  
|            |                    | 3 questionnaires, students  
|            |                    | IUP/portfolio templates, blogs |

Table 3. Presentation of data in each part-study  *Also used in part-study II
Critical considerations concerning method

The aim of the thesis is not to investigate whether and under what circumstances ICT could be used to support learning. However, considering the way interviewees were selected, it is likely that they will represent a more positive attitude to pedagogical change in relation to ICT-supported methods than would teacher educators in general. The aim of this study is to bring some understanding to a complex process of change, in which pedagogical use of ICT is integrated into teacher education. However, the study as a whole is based on limited data gathered by using the above-mentioned samples and methods. It is therefore important to bear in mind that the analysis of the collected data will generate ‘snapshots’ of the process rather than a complete narrative and understanding of the development. A broader study that includes all departments offering teacher education courses, and that has a larger number of informants and focuses on additional ICT initiatives for a longer period of time, would have provided a more valid picture. However, it was not possible to accomplish this within the time available for this thesis. Nevertheless, the theories used to analyse the selected data have been useful for putting the snapshots together to produce a more comprehensive survey of the process. This will be presented in the final meta analysis of this thesis.

Theoretical framework
The process of introducing new ideas into any environment has been of great interest to stakeholders and advocates of new ideas and new technology. This process is often described as an ‘implementation’, which implies that the innovation will be spread or to some extent forced, almost as it is, throughout an organisation. New technology and new ideas do not always spread as the initiators intend them to, and a variety of theories intended to explain the process of change have been developed (Ellsworth, 2000). My own experiences of being forced into using ICT and my later work introducing ICT in different learning environments underlie my understanding of this dissemination process. Due to that experience I have come to see the introduction of new ideas as a process that could be met with enthusiasm as well as resistance. Having that as the background, the first part-study (I) was analysed in the light of Rogers’ (2003) theory of diffusion of innovation. However, the diffusion of innovation theory could be seen as a rather instrumental way of describing an implementation process and, furthermore, it lacks some important perspectives, such as social interaction. Therefore, additional theories corresponding to the themes developed in the informants’ narratives were chosen (Table 4). These theories focus on different aspects of power relations (Bourdieu), the relation between humans
and technology (Greeno) and socio-cultural aspects of learning (Vygotsky, 1978).

Finally, all part-studies examined the construction process of ICT-supported methods rather than merely the implementation of a well-defined concept. The IUP project created a variety of IUP designs (I), the educational blogs were used in different ways (II) and e-portfolios ended up, during an eight-year process, in different portfolio genres (III). As my own understanding of the process of change moved towards a framework of social construction, the two last part-studies consider the process as socially constructed (Berger & Luckmann, 1966). At the same time, the need for another theory focusing on a process of change that agrees with social construction emerged. Therefore, Bernstein’s pedagogical device and his concepts of classification, framing and educational codes was chosen. An account of these theories is presented in the last chapters, along with a final meta analysis of all part-studies, using a combination of these theories.

<table>
<thead>
<tr>
<th>Part-study</th>
<th>Pedagogical method</th>
<th>Theoretical framework</th>
</tr>
</thead>
</table>
| I          | Digital IUP        | Diffusion of innovation (Rogers)  
Symbolic capital (Bourdieu) |
| II         | Blogs              | Affordances (Greeno)  
Socio-cultural theory (Vygotsky) |
| III        | E-portfolios       | Social construction (Berger & Luckmann)  
Educational codes (Bermstein) |
| IV         | Blended learning using digital  
IUP, blogs, e-portfolios | Social construction (Berger & Luckmann)  
Pedagogical device (Bernstein) |

Table 4. Presentation of the theories used for analysis

**Critical considerations on theory – social construction**

My choice of theories moved from a rather instrumental approach towards frameworks that consider the process of introducing the pedagogical use of ICT as socially constructed. However, it is not self-evident that the introduction of ICT in teacher education is socially constructed. It is, among other things, dependent on whether or not the process is considered inevitable, as an implementation or a construction, and as something individual or social.

However, sociologists as well as historians have proposed deterministic ideas claiming that human attitudes and actions will influence our decisions about whether or not to use technology (Bijker, Pinch, & Hughes, 1987; Silverstone & Hirsch, 1992). Furthermore, the arguments that present social
change as being effected mainly at the individual level are contradicted. Arguments that technology develops by means of negotiation between different agents, such as policy makers, investors and users are presented (Bijker & Law, 1992). Since we make our decisions in relation to other humans and adjust our interactions to suit our social context, social change is not to be understood as merely the sum of all individual participants. In other words, technology is considered to be shaped and constructed within its social context (Klein & Kleinman, 2002; Silverstone & Hirsch, 1992).

However, even if the pedagogical use of ICT within teacher education is to be understood as a social construction, the choice of framework may not be obvious. Social construction is generally used to unmask objects that we take for granted, revealing them as constructed rather than as natural and inevitable (Hacking, 1999; Wenneberg, 2001). Objects or institutions such as the monetary system and gender, which we have been socialised to regard as ‘normal’, are revealed to be socially constructed. However, this is not the case when it comes to the pedagogical use of ICT. Within the context of teacher education ICT-supported methods are not understood as being natural nor as something internalised. Instead, the use of ICT for learning purposes is considered as being ‘under construction’. Rather than revealing an internalised object looking back at the process of construction, this thesis places itself in the middle of that construction process. What, then, is to be revealed? Social construction sees the actors as crucial to the construction process. In this case, teachers, students and other stakeholders become interacting actors constructing pedagogical ICT discourses. However, they will act within a context that already includes embedded pedagogical discourses. Teachers and students are already socialised into an internalised understanding of how education is expected to be organised. Social construction may be used to reveal what is taken for granted in the context of teacher education, and what role the embedded understanding of education and the actors will play when a new pedagogical discourse is constructed, challenging the ideas that are considered as natural.

Validity

The validity and reliability of the part-studies are considered in each paper. The validity of the thesis as a whole will be discussed here in relation to hermeneutic features.

The hermeneutic process of analysis used in the first three part-studies and the meta analysis contribute to the validity of the thesis. The hermeneutic helix has included a variety of theories used for interpreting data from a range of perspectives. The fact that the results from each one of the circles of analysis do not contradict one another could be seen as an indication of satisfactory validity (Ödman, 1994). However, the results are
not a basis for making sweeping statements. The results represent interpretations of the informants’ experiences using ICT-supported methods, their understanding of the context of teacher education and their own roles in the process of change. The results do not necessarily coincide with the experiences of those teacher educators who did not participate in the interviews or answer questionnaires.

The hermeneutic approach allows researchers to use their prior understanding as a resource during the process of analysis. However, my prior knowledge of the context might affect my objectivity, and my role as a colleague will probably affect my informants during the interviews. In order to limit my involvement in the content of study, I chose not to take an active part in any of the courses or projects included in my study. The students I interviewed and those who answered my questionnaires have not participated in any of my courses.

**Ethical considerations**

All necessary ethical requirements set by the university and as outlined by the Swedish Research Council (2001) were followed in this study. Accordingly, the aspects of beneficence, non-malfeasance, informed consent and anonymity were taken into account in planning and carrying out the study, and approval for the research design was obtained at the appropriate level of the organisation.

**Results – The four part-studies**

The four part-studies together resulted in four papers focusing on different ICT-supported methods and perspectives. The following section presents a brief summary of the results from each of the four part-studies. These results will later be included in the final meta analysis.

**Digital IUP**

*Implementing digital individual development planning in teacher education: The challenges of communication in relation to the development of ICT-supported methods (Granberg, 2009)*

The aim of the first part-study was to illuminate teacher educators’ experiences developing, using and implementing digital personal development planning, or IUP (Swedish acronym). Data consisted of 20 interviews with teacher educators and ICT teachers working as mentors...
RESULTS

during the project. Project documents and observations during project meetings provided additional information to the study. Data was analysed using Rogers’ (2003) theoretical framework on diffusion of innovation and Bourdieu’s (1984) concept of symbolic capital.

The results showed that the teachers and mentors participating in the project found themselves in a situation with limited opportunities for discussing and advocating the use of digital-process-based assessment outside the project group. The lack of formal pedagogical discussions, the presence of opinion leaders among colleagues upholding the academic traditions and the participants’ sense of having low symbolic capital obstructed their role as change agents in the process of implementation. They became passive agents waiting for the change agency, the faculty board, to present some directives.

Among the positive experiences, the analysis revealed that digital IUP offered pedagogical possibilities to enhance learning by shifting focus to didactic issues and the process of learning. Furthermore, the teacher educators described how earlier difficulties in discussing ICT with ICT teachers were overcome by the development of a shared pedagogical vision.

Blogs

Educational blogs in teacher education – Blending face-to-face and virtual learning activities (Granberg, 2008)

The second part-study focused on student teachers’ experiences with the pedagogical use of blogs in their teacher training, as a blended learning initiative (Garrison & Kanuka, 2004). Data was based on 38 interviews, representing three groups of students who were using blogs for learning purposes. The interviews were analysed in the light of Greeno’s (1994) concept of affordances and socio-cultural theories by Vygotsky (1978).

The result of this study pointed at students’ difficulties in transforming their understanding of blogs as something to be used for personal and recreational purposes into an acceptance that they can also be useful as tools for learning in an educational environment. However, student groups that engaged long enough in their group blogs experienced a variety of blog affordances, such as not having to make one’s voice heard; having time to read, search for additional input and rewrite; being able to do reflective writing without the pressure of formal demands; and blending media. Regarding the blending of face-to-face and blog activities, students reported affordances such as digital documentation and reflection of face-to-face activities, encountering various learning styles and drawing advantages from different ways of communicating.
Furthermore, the study showed that, besides the fact that using the blogs was compulsory, the socio-cultural aspect was important to students' level of engagement in their group blogging. The social expectations from within the group made the students adjust to common goals and a shared level of engagement in their group blogs.

**E-portfolios**

*E-portfolios in teacher education 2002–2009: The social construction of discourse, design and dissemination (Granberg, 2010)*

The third part-study focused on teacher educators’ experiences with the development and use of e-portfolios from 2002 to 2009. Twenty-five teachers were interviewed and 42 teachers completed a questionnaire investigating how e-portfolios had been discussed, designed, used and disseminated. Basil Bernstein’s (1977, 2000) theoretical framework, particularly his concepts of classification, framing and educational codes, was used to analyse the narratives. Also, concepts of Berger and Luckmann’s (1966) social construction were used to illuminate the construction process of pedagogical discourses.

The paper discusses teacher education as a highly classified and weakly framed context that has affected the dissemination as well as the social construction of e-portfolio discourse and design. The e-portfolios challenge the traditional educational code and have not been disseminated throughout the teacher education programme. The results point to parallel processes resulting in a variety of discourses and designs of e-portfolios and highlighting the importance of the social construction of the e-portfolio rather than its implementation.

**Blended Learning**

*The social construction of blended learning design in teacher education – A struggle of discourses (Granberg, 2011)*

The final part-study investigated the social construction of a blended learning discourse and design in a pre-school programme from 2007 to 2009. The ICT-supported methods for learning – digital IUP, blogs and e-portfolios – investigated in the earlier four papers are discussed here as examples of a blended learning design. Twenty teacher educators and 14 student teachers were interviewed, and three student questionnaires were administered during these two years. Bernstein’s theories on classification, framing and pedagogical device, including pedagogical discourse, were used to analyse the data. Critical discourse analysis (Fairclough, 1989, 1992, 2001,
This study has examined three competing discourses used in the context of teacher education: the naturalised and embedded discourse of campus education, the marginalised discourse of distance education and the oppositional pedagogical ICT discourse. Along with significant struggles between discourses, the discursive process has been obstructed by strong classification and weak framing of the social practice. The concept of blended learning is considered to be in an early stage of construction, and without a shared pedagogical discourse, its design has become fragmentised.

**Theoretical model**

During this study a variety of theoretical frameworks have been chosen for interpreting the data (Table 4, p. 26). The way these various theories have been used could be described as loops, or circles, in a hermeneutic helix (Ricoeur, 1976). Step by step, a process of interpretation has increased the understanding of how ICT as a means for learning has, to some extent, been integrated into the practice of teacher education. In addition, alongside the hermeneutic process a theoretical model combining the various theoretical frameworks has been developed.

The following section will present the theoretical model that will be used later to perform an analysis of all four part-studies. The model has combined concepts from Bernstein’s, Bourdieu’s and Fairclough’s extensive theoretical frameworks.

**Bernstein and Fairclough**

Bernstein’s (2000) theory of pedagogical device highlights the process by which knowledge, competencies and practices from outside the school context transform into school subjects and school activities (e.g., how carpentry becomes woodworking). The process is described as a recontextualisation during which the actors construct a pedagogical discourse that constitutes the basis of a teaching practice. For example, the way ICT is discussed and used outside teacher education may be transformed into the pedagogical use of ICT within this context. According to Bernstein, the process of recontextualisation can take place within the official field as well as the pedagogical field. The official recontextualisation field is created and dominated by the state, and the pedagogical recontextualisation field consists of pedagogues in schools and departments of education. Depending on contextual circumstances the official recontextualisation may have a considerable or minor effect on the
recontextualisation within the pedagogical field. The following figure represents the pedagogical field and the recontextualisation that takes place at a local level. During this process, teachers, students and leaders will socially construct a pedagogical ICT discourse and, based on that, create a design for the pedagogical use of ICT (Figure 1).

![Figure 1. The recontextualisation of ICT knowledge, ICT use, ICT policy etc. outside teacher education into a pedagogical ICT discourse and design within teacher education](image)

The concept of discourse is central in the process of recontextualisation and will be defined as the way we understand and talk about reality, or a part of reality (Winther-Jørgensen & Phillips, 2000). This thesis focuses on the construction of pedagogical ICT discourse; that is, our way of understanding and talking about the pedagogical use of ICT. Fairclough (1992) describes the social construction of discourses using three interrelated concepts: the text, the discursive practice and the social practice (Figure 2). In this thesis, the text is the oral or written ‘wording’ communicating the constructed pedagogical ICT discourses. The social practice is represented by the context of teacher education, and the circumstances within teacher education that affect the social construction of discourse constitute the discursive practice (Figure 3).

![Figure 2. The social construction of discourses manifested in the oral or written ‘text’. The discursive practice producing these texts interacts with the social practice.](image)
These pedagogical discourses are not passive representations of reality – the social practice. On the contrary, the discursive practice, which interprets and produces texts, interacts with the social practice through a process of social construction and reconstruction (Fairclough, 1992; Winther-Jørgensen & Phillips, 2000). Our language, written or oral, creates representations of our reality, our social structures, and at the same time contributes to its construction (Fairclough, 1989). The process of construction aims to create common beliefs and thereby includes struggles between what should be regarded as truth. Some actions become natural and others unthinkable (Fairclough, 1989). A social practice such as teacher education, for example, generally includes more than one discourse, and there is an ‘order of discourses’. Within this order some discourses are dominant and natural while others are marginal or even oppositional. This order of discourses reveals the power relation between different ways of understanding a defined part of reality (Fairclough, 2001).

Bernstein (1977) used concepts such as ‘classification’ and ‘framing’ to describe and understand educational contexts. Classification describes the relationship between different categories, for example, subjects, teachers, departments and practices. Depending on the degree of insulation between these categories, Bernstein considers the classification as strong or weak. Strong classification between teachers implies little or no collaboration, whereas weak classification may initiate integration of subject as well as collaboration among teachers. The categories hold relative positions of power, and any attempt to change the degree of insulation will reveal the power relationship on which the classification is based (Bernstein, 2000). The notion of framing is about who controls what within the school context. For example, if the framing is strong, there are national and/or local

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**Figure 3.** The process of recontextualisation (dotted lines). Teacher education as a social practice interacts with the discursive practice, constructing the pedagogical discourse manifested in the text (unbroken lines – italics).
regulations that limit the possibilities for teachers to plan their teaching practice, whereas weak framing gives teachers freedom to choose their methods of teaching and learning.

**Bourdieu**

There is a range of circumstances that influence our social positions within a social system. Bourdieu (1984) uses interrelated concepts such as field, capital and habitus to describe the conditions of these positions. A social field, according to Bourdieu, is a structured social space in which individuals relate and struggle for something that they have in common, for example, a teacher education institution. A field, for its part, can consist of autonomous sub-fields. The field, that is, the main-field, of teacher education could, for example, be divided into sub-fields such as departments, subjects, autonomous teacher teams, and project groups. Sub-fields can collaborate with other fields, which implies weak classification, while others work on their own, somewhat isolated from other fields, implying strong classification. The pedagogical device, the recontextualisation of competences outside teacher education and the social construction of pedagogic discourses could therefore take place within teacher education as a main-field as well as within a sub-field, for example a project group, a teacher team or a department (Figure 4). *Note:* Bernstein and Bourdieu both included ‘fields’ in their theoretical frameworks. However, these are not identical concepts and are not used interchangeably in this study. However, a pedagogical recontextualising field (Bernstein) could be observed within a main-field or sub-field (Bourdieu).

Figure 4. The recontextualisation of ICT in teacher education as a main-field and/or within sub-fields, for example, departments, autonomous teacher teams or project groups
Within each of these fields individuals or institutions are given their social position depending on what resources are regarded as valuable – as capital. Bourdieu describes various types of capital that are related to social fields, such as economic capital, cultural capital and social capital. However, Bourdieu uses symbolic capital as the fundamental concept, described as any resource, asset or ability that is recognised as valuable. Symbolic capital is thereby always valued in relation to what is considered desirable within a certain field. Consequently, what is to be regarded as symbolic capital in one field, presenting the holder with a high-ranking position, might be of no value in another context. Depending on their prior experiences and social background, individuals have developed individual preparations, readiness or tendency to act in correspondence to the symbolic capital within their field. Bourdieu defines this individual quality as habitus.

In summary, introducing the pedagogical use of ICT in teacher education could be understood as a process of recontextualisation. This process can take place in the main-field of teacher education as well as within sub-fields such as teacher teams. During this process, pedagogical ICT discourses are socially constructed, and based on these discourses pedagogical ICT designs are created. Since pedagogical discourse is a core concept in this process, the discursive practice and the social practice become essential. These practices interact with one another and are affected by contextual circumstances, such as classification and framing.

**Meta analysis**

The following section will present a meta analysis of the social construction of pedagogical ICT discourse within teacher education based on the four part-studies and the theoretical concepts presented above. The analysis starts with an examination of the teacher education institution as a social practice, and how framing, symbolic capital and the order of discourses will affect the discursive practice. Thereafter, sub-fields identified as discursive practices are scrutinised. Last is a discussion of the recontextualisation process, in which pedagogical ICT discourses and designs are socially constructed. The research questions posed in this thesis (p. 7) will be addressed by this process throughout the analysis in general and in the final discussion in particular.
Main-field – Social and discursive practice

The teachers’ narratives describe the difficulties in discussing and initiating methods such as IUP, blogs and e-portfolios in the context of teacher education (I, III, IV). The following section will discuss these circumstances by examining the main-field, that is, the context of teacher education, as social and discursive practices in relation to framing.

Weak formal framing – academic freedom

The context of teacher education in the four part-studies is generally described as having weak formal framing. There are no national or local guidelines on how to teach or assess, and it is therefore very much up to the teacher and teacher teams to choose their pedagogical methods (I, III, IV). The weak formal framing regarding pedagogical issues could be described as ‘academic freedom’. Teachers are free to introduce new ideas and methods from contexts outside teacher education and, in doing so, initiate a process of recontextualisation (I, III, IV). On the other hand, teachers are free to do the opposite. Teachers may, individually or collectively, choose to refrain from introducing pedagogical innovations, even those suggested by the management (I, III).

Strong informal framing – the symbolic capital of academic tradition

The way campus teacher education is organised and how the traditional teaching practice is identified varies among departments. However, the part-studies have shown that, within this academic context, campus teacher training is mainly situated in classrooms, conducted face-to-face and mediated by teachers (I, III, IV). The teaching practice on campus, the pedagogical design that is considered traditional, is based on campus pedagogical discourses that have developed over a long period of time. These pedagogical discourses have, over time, become embedded, dominant and perceived as natural.

The teacher education institution could be described as a field, a main-field. Within this main-field various types of capital, or resources, have been recognised as valuable, as symbolic capital. Theoretical subjects are described as holding higher symbolic capital than practical subjects. For example, ICT as an academic subject has low symbolic capital since it is generally regarded as merely technology (I). The valued ‘resource’ that was pointed out as significant is the symbolic capital of ‘educational tradition’. The dominant pedagogical campus discourse focusing on face-to-face lectures and assessing final products holds symbolic capital within this field of education (I, III, IV). Traditional courses are valued as well by the
students (II) who, in the fourth part-study, agreed with the teachers and defined campus courses as the ‘regular courses’ (IV).

The weak formal framing, the academic freedom, will enable the teachers who are in positions that hold symbolic capital to hold on to what is valued and to keep it valuable. They will act according to their habitus and defend traditional ways of teaching when these are challenged. In this way the symbolic capital of educational tradition is reconstructed, and the pedagogical campus discourse will continue to be dominant and regarded as natural. The social practice and the discursive practice will interact and reconstruct one another. These circumstances will act as informal framing that will exert an influence on the teachers to hold on to traditions.

Consequently, the context of teacher education as a social practice and its discursive practice will not facilitate the social construction of pedagogical ICT discourses. Advocating methods for teaching and learning that challenge the dominant discourse will become difficult within the main-field. One strategy for becoming engaged in designing ICT-supported methods for learning is to act within smaller groups along with colleagues who share similar pedagogical interests. Teachers can choose to participate in development work within project groups, teacher teams, the ICT department and so forth. These groups will perform the functions of sub-fields within the main-field, (Figure 4, p. 34).

Sub-fields – Social and discursive practices

Teachers report on their development work and experiences within their sub-fields. The following will discuss sub-fields as social and discursive practices in relation to classification.

Strong classification – free discursive practice

The study has shown that the context of teacher education could be described as strongly classified regarding a variety of categories, among them departments, courses and teacher teams (III, IV). Besides courses in which teachers from different departments are assigned to collaborate, there is little insight into other departments’ or teacher teams’ work. The interpretation of the students’ narratives coincides with the description of strong classification between courses and teacher teams (IV). Consequently, and in accordance with the teachers’ narratives, the classification between teacher education as a main-field and sub-fields such as teacher teams and project groups is perceived as strong (I, III, IV). Even the ICT department itself is described as strongly classified in relation to the context of teacher education (I, IV).
Teachers and leaders who share pedagogical ideas that challenge tradition have found a creative space within these strongly classified sub-fields (I, III, IV). In cases where members of a sub-field have agreed on using ICT for learning, the social construction of a pedagogical ICT discourse may proceed in a way that is less restrained by the main-field’s embedded pedagogical campus discourse. The idea of holding on to traditions will not hold the same symbolic capital within these sub-fields and will therefore not work as strong informal framing. Within these sub-fields teachers can agree on what concepts are valued and regarded as desirable. Methods such as e-portfolios, blogs and digital IUP may hold symbolic capital within a sub-field, even though these methods have low capital in the main-field (I, III, IV).

A strongly classified sub-field will constitute a social practice that, in interaction with its discursive practice, allows the members to engage in the social construction of a pedagogical ICT discourse (Figure 5). The four part-studies report on a variety of pedagogical ICT discourses and designs that are socially constructed in sub-fields such as project-groups, teacher teams or the ICT-department (I, II, III, IV).

![Diagram of Teacher Education and ICT](image)

**Main-field, sub-fields and the order of discourses**

The teachers’ narratives describe the difficulties teacher teams and project members have reaching out to colleagues outside the sub-fields in order to spread their ideas and experiences (I, III, IV). These circumstances will be discussed in relation to classification, framing and order of discourses.

**Classification, framing and order of discourses**

The strong classification between main-field and sub-fields that has enabled teachers within project groups and teacher teams to construct alternative
pedagogical discourses will, at the same time, hamper their efforts to share their ideas outside the sub-field. Teachers have reported that there are few formal meetings for pedagogical discussions and that the pedagogical dialogues that take place are generally informal and are held during coffee breaks, lunch hours and so forth (I, III, IV). Teachers who have developed and used alternative pedagogical methods describe difficulties they have making themselves understood and advocating ICT-supported methods during these informal meetings (I, IV). Even during course planning within teacher teams, which include colleagues who tend to hold on to traditions, teachers find it difficult to suggest methods such as e-portfolios, and IUP (I, IV). These ICT-supported methods are described as being in opposition to what is traditionally regarded as valuable and desirable. These discussions, during coffee breaks and course planning, will reveal the order of discourses. The pedagogical ICT discourses constructed within the sub-fields will constitute oppositional discourses that can have only a limited effect on the embedded dominant discourse (IV). These circumstances will be enhanced by the weak formal framing, that is, the lack of regulations on how to use ICT for learning (I, IV).

In summary, the social construction of a pedagogical ICT discourse, a common understanding of ICT-supported methods, will occur mainly within rather isolated sub-fields. The recontextualisation processes (the pedagogical device) will thereby proceed in a variety of teacher teams, project groups, the ICT department and so forth.

**Pedagogical device, the recontextualisation**

The following will present the pedagogical device and its process of recontextualisation in three parts. The *origin context*, from which the ICT-supported methods are transformed, the *pedagogical ICT discourses* that are constructed during the process and, finally, the *pedagogical ICT design* and teaching practice based on the pedagogical discourse (Figure 1, p. 32).

*Origin context* – The process of recontextualisation starts in the context outside teacher education campus courses. The three ICT-supported methods – digital IUP, blogs and e-portfolios – have different backgrounds and the recontextualisation processes through which these methods have entered the context of teacher education will therefore vary.

Digital IUP is used in elementary schools as a tool for setting study goals and describing individual development for each pupil. Since the concept of IUP has a strict educational purpose, the process of recontextualisation was mainly focused on transferring the elementary school concept into a method suitable for higher education. However, some of the teachers indicated that
they found it difficult to transform their understanding of IUP as something used at the elementary school level into something appropriate for higher education (IV).

Blogs have emerged and developed outside the school context with no pedagogical implications. The recontextualisation process could therefore be described as rather complex, since groups of students and teachers have found it difficult to transform their understanding of blogs as something used mainly for personal and recreational purposes into an acceptance that they can also be suited for use in an academic context (II, IV).

E-portfolios originate from different contexts depending on the teachers’ previous experiences of portfolios – they may have encountered them in elementary schools, in the arts, or in distance courses in higher education (III, IV). Like the IUP, e-portfolios entered the context of teacher education with a pedagogical approach and the informants had less difficulty recontextualising e-portfolios as something appropriate for use in the teacher education environment.

Pedagogical discourses – To recall earlier arguments, a context, a social practice with strong classification, weak formal framing and strong informal framing will affect the discursive practice. That, in turn, will act on the social construction of pedagogical discourses. The studies have shown that the processes of recontextualisation in which pedagogical ICT discourses are constructed have been rather isolated within project groups (I, IV), teacher teams (III, IV) and departments (III, IV). Communication between the strongly classified categories is limited. Furthermore, the strong informal framing will preserve the embedded dominant discourse and oppose attempts to construct any alternative pedagogical discourse. Moreover, a weak formal framing will leave the process without guidelines and a clear description of objectives, and will allow teachers to choose not to take part in the construction of pedagogical ICT discourses. As a consequence of these contextual circumstances there are no common agreements on any of these pedagogical discourses – digital IUP, blogs, and e-portfolios (I, II, III, IV). However, pedagogical discourses of these ICT-supported methods have been found within smaller sub-fields (I, III, IV). Since these groups are strongly classified in relation to the main-field, and may also be insulated in relation to other sub-fields, the process will most likely end up in a variety of discourses.

The pedagogical discourses of digital IUP and blogs were not scrutinised in the part-studies; however, the studies show that IUP and blogs have been used in various ways (I, II), and it is reasonable to assume that the understanding of these methods differed between the teacher groups. These ICT-supported methods are comparatively new in the context of teacher education, and these pedagogical discourses may be seen as being in an early stage of construction. The recontextualisation process of e-portfolios –
compared to that of digital IUP and blogs – has been going on for a rather long time. The third study examined an eight-year process during which at least three different pedagogical discourses were constructed. One discourse describes the e-portfolio as an archive, one considers it a tool for assessment, and the third discourse understands the e-portfolio as a method for learning and assessment (III).

As a result of disjointed discursive practices, the pedagogical ICT discourses are diverse, disputed, non-legitimised and mainly located within sub-fields. However, even if these pedagogical ICT discourses are diverse, the studies have shown that they all include concepts that challenge the embedded pedagogical campus discourse. All of these methods include the idea of focusing on the learning process rather than final products, and they all situate communication, reflection and learning activities in virtual environments in addition to classrooms (I, II, III, IV). Moreover, in order to adjust these methods to an academic environment, the objective of ‘grading the students’ has been added to the pedagogical discourse and design (I, II, III).

The pedagogical design – The socially constructed pedagogical ICT discourses have constituted the foundation for the design of digital IUP, blogs and e-portfolios. Digital IUP, blogs and e-portfolios have all been discussed and understood in different ways within each sub-field, which has influenced how these methods have been put into use. The design of digital IUP and educational blogs varied widely (I, II, IV) and there are at least three different e-portfolio genres represented in this context (III). However, the similarities within the ICT discourses, the understanding of these methods as focusing on the learning process combined with assessment on final products was established in all designs of IUP, blogs and e-portfolios for learning (the third genre of e-portfolios).

Struggle between discourses

Finally, returning to the overall picture of teacher education as the main-field including its sub-fields, teacher education may be regarded as an order of pedagogical discourses. The pedagogical campus discourse, representing the traditions and holding symbolic capital, is the embedded discourse, and any pedagogical ICT discourse will become a marginal or even an oppositional discourse. Therefore, struggles between discourses will emerge whenever members from different fields, supporting different discourses, and holding different social positions meet to collaborate or to engage in informal pedagogical discussions. Teachers who do not share the same discourse will have difficulty understanding each other. Furthermore, and depending on their individual habitus, they will defend what they consider to
be valuable and desirable. Statements like “We do not speak the same language,” “We did not understand each other,” “They did not want to listen,” “We do not have the same values,” and “We ended up not collaborating at all,” may capture this struggle. This struggle is likely to reconstruct the traditional pedagogical discourse as dominant and the pedagogical ICT discourse as oppositional.

**Discussion**

The following section will start with some reflections on the official recontextualising field. Thereafter, the pedagogical recontextualising field that is, the teacher education at Umeå University, will be discussed. The discussion will address the research questions guiding the overall process of introducing ICT into teacher education, the role of the context outside and within teacher education, as well as its actors – teachers, students and management. These local circumstances will be described in relation to reports from the international context of teacher education.

**The official recontextualising field**

As described earlier, the international as well as the national official recontextualising fields have generated discourses that generally relate ICT and education to national economic growth. Rhetorical concepts such as lifelong learning and digital competence may illustrate this discourse. However, even if national steering documents encourage teacher education to use ICT, there are usually no well-defined ICT-supported methods identified for implementation. Therefore, the intentions of national regulations as well as changes in the wider society have to be interpreted and recontextualised within the teacher education institutions, that is, the pedagogical recontextualising field. In other words, the social construction of pedagogical ICT discourse and design will take place within the local context of teacher education. Since there are no well-defined regulations setting out how to use ICT, and since research reports on a ‘slow uptake’ of ICT within teacher education, there is reason to assume that the official field has had a minor, or at least a slow, impact on the pedagogical field.

The circumstances reported from the international field concur with the results in this study. The weak national and local framing allows teachers within the pedagogical recontextualising fields in Umeå teacher education to construct pedagogical ICT discourses and designs to suit local circumstances.
The pedagogical recontextualising field

This thesis has shown that the pedagogical recontextualising field – the teacher education institution as a main-field – does not constitute a social practice that will enhance the social construction of a pedagogical ICT discourse. The embedded and dominant pedagogical campus discourse, representing the ‘thinkable’ and holding symbolic capital within the main-field, will be reconstructed rather than challenged by the introduction of ICT-supported methods. Therefore, the recontextualisation and construction of pedagogical ICT discourses and design will take place in sub-fields such as teacher teams, project groups and the ICT department. These sub-fields will thereby function as pedagogical recontextualising fields.

Depending on social positions within these fields and individual habitus, the teachers and students will have the role of constructors or reconstructors. They will participate in either the social construction of an oppositional pedagogical ICT discourse or the reconstruction of the dominant pedagogical campus discourse. Should the faculty boards or the department board act within the main-field as reconstructors, these circumstances may be reported as a lack of organisational support (Adamy & Heinecke, 2005; Finley & Hartman, 2004). However, even if management holds on to the traditional discourse within the main-field, leaders may support project groups or teacher teams that are willing to construct and try out ICT-supported methods. These actions will not challenge the dominant discourse within the main-field as long as they are kept within the smaller groups. But when they do grow beyond the smaller groups and challenge the dominant discourse, they will be opposed. There will be a struggle between discourses in which ICT-supported methods will come up against traditions and stability (Granberg, 2011; Sasseville, 2004). The pedagogical ICT discourse and designs that have been constructed and used within the sub-fields will represent the ‘unthinkable’ and may be dismissed as, for example, fad and fashion or commercialised new technology (Maddux & Cummings, 2004; Robertsson, 2003). As described earlier, the recontextualisation processes will not end up in a common understanding of and design for the use of ICT for teaching and learning. A range of discourses and designs will be constructed within the sub-fields. These ICT-supported methods developed and used within the sub-fields could be considered as ‘good examples’. However, since these ‘examples’ do not generally reach the main-fields, there are likely to be reports of a lack of vision and a dearth of good examples of how to use ICT (Finley & Hartman, 2004; Zisow, 2000).
Conclusion

In conclusion, the reported ‘slow uptake’ and the lengthy time needed to introduce ICT into teacher education (Toledo, 2005; Wozney, et al., 2006) cannot simply be attributed to shortcomings in the implementation process. The process is complex and involves interactions between humans and technology as well as interactions among individuals creating a shared understanding of and a common way of talking about the use of ICT for learning. Blogs outside the teaching context will be recontextualised into educational blogs, and the idea of learning through ICT, for example, may be transformed into pedagogical discourses including concepts such as documenting and reflecting on the learning process, reflective asynchronous dialogue, and online collaboration. These pedagogical discourses could then be realised through pedagogical designs of digital IUP, blogs, e-portfolios, process diaries, video papers etc. These circumstances point at the reasonableness of understanding the integration of ICT into educational contexts as a complex and time-consuming process of social construction of discourse and design, and therefore need not be viewed negatively as a ‘slow uptake’.

Finally, the pace of change outside and inside teacher education differs immensely. The growing use of ICT in the public context, driven by, for example, private, financial, cultural and governmental interests have a far more rapid and less opposed development than the process of social construction within a traditional field like teacher education. When ICT entered the social arena, a cultural change was initiated. Our way of communicating, collaborating, amusing ourselves, and doing business changed and is still changing. However, our way of understanding education and how teaching and learning should be designed (i.e. situated and mediated) is generally rather traditional. In the end, this will be a question about cultural change within the educational context that has to relate to a more rapidly changing context outside the universities. Therefore – and referring to Fischer, Higgins & Loveless (2006) – this is not a question about retooling, an instrumental uptake of ICT, it is a process of construction including actions of communicating, learning and reflecting, in relation to cultural changes outside as well as inside the context of teacher education. We are, together with colleagues and students, and in interaction with technology, invited to become constructors of pedagogical ICT discourses that will be manifested in our design of ICT-supported methods – an ongoing process still ‘under social construction’.
References


SOU 1994:118, *Informationsteknologin - Vingar åt människans förmåga [Information technology - Wings to human abilities]*.


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