Learning to teach

An activity-theoretical study of student teachers’ participation trajectories across boundaries

Cecilie Flo Jahreie

Thesis submitted for the degree of PhD

InterMedia, Faculty of Education
University of Oslo

April 2010
(colophon page; intentionally left blank)
Preface

This PhD period has been a long, but transparent, participation trajectory across practices in the activity of learning to research. I have participated in a number of practices in which I gradually have learned to talk and act as a researcher. It is through relationships within and across these practices that I have sustained and developed my work.

First of all, I want to thank my main supervisor, Sten Ludvigsen, and my cosupervisor, Trond Eiliv Hauge. Sten, you are a true sociocultural person who facilitates the best possible learning opportunities for your students. I have had the privilege of working with you for a decade, even before I started my PhD project. Our discussions, your support, and your belief in me have been invaluable. Once, many years ago, you gave a speech for me. You pointed out that I was stubborn, and you followed up by saying, “That is why you will make it as a researcher!” When I have felt like giving up, I recall that sentence. I am so grateful for everything you have done for me. Trond Eiliv, our discussions have been very fruitful. I am also grateful for your good comments on my work. Ola Erstad encouraged me and convinced me that academic work would be interesting and possible—you were right!

There have been some unforeseen breakdowns during my participation trajectory, but today I can look back and see that I have learned and developed during this period. My colleagues Anniken Furberg, Kathrine Løvaas Nygård, Ingeborg Krange, Ingvill Rasmussen, and Thomas de Lange, thank you for all our great discussions, all your good suggestions and comments, but most of all for being such good friends. Your friendship and support have been extremely important.

I also want to thank the research group at InterMedia and present and former PhD students: Palmyre Pierroux, Andreas Lund, Louise Mifsud, Lars Opdal, Hege René Hansen Åsand, Annett Hillestad, Line Lundvoll Nilsen, Sturle Nes, Svein Olav
Norenes, Anders Kluge, Synne Skjulstad, Bård Engen, Dagny Stuedahl, Kristi Agerup, and Eli Ottesen. Our reading groups, paper discussions, and sessions for data analysis have been of great value. Eli Ottesen coauthored an article and a book chapter included in this thesis. Our theoretical discussions and data analysis have been extremely valuable for building up the argument in this thesis.

I also have to thank all my colleagues at the Faculty of Education’s research school—Learning, Communication and ICT—for their constructive comments, discussions, seminars, and nice dinners. I would also like to thank the senior researchers, David Middleton, Svein Østerud, Leif Lahn, and Hans Christian Arnseth, for making my text better through their comments.

Thank you to former master student, Ingrid Furfjord Berglund, for your valuable help and discussions during data collection. Thanks also to Ole Smørdal for typesetting the thesis. Furthermore, I am grateful for administrative support from Lars Lomell, Kari-Anne Ulfnes, Siri Jønnum, and Suresh Johnpillai and for technical support from Jens Bertheussen, Knut Quale, and Per Christian Larsen.

During the spring of 2009, I had the opportunity to spend 6 weeks as a visiting scholar at the Oxford Centre for Socio-cultural and Activity Theory Research. I am grateful to Professor Anne Edwards for our discussions and her thorough reading and comments on my work. Stefanie Schmachtel and Anna Touloumakos, thank you for making my stay memorable.

I owe great thanks to my grandmother, Gerd, and grandfather, Gunnar, for teaching me the importance of never giving up. Endless hours of talk with you since my childhood made me interested in questioning and discussing social and political issues. Finally, I would like to thank my husband, Thomas. Your constant support and encouragement these years have been invaluable. Last, but not least, my wonderful two daughters, Eira and Elea. You mean everything to me.

Blindern, April 2010

Cecilie Flo Jahreie
Contents

1 Introduction .................................................................................................................1
  1.1 Theoretical framework .........................................................................................2
  1.2 The Empirical grounding ....................................................................................4
  1.3 Aims and Research Questions ..............................................................................6
  1.4 Outline of the Thesis ...........................................................................................7

2 Review of different approaches of learning to teach ...........................................11
  2.1 Introduction ........................................................................................................11
  2.2 Reflection-oriented research on learning to teach .............................................13
  2.3 Learning to teach as development of professional knowledge ......................16
  2.4 Policy-oriented research: Organizing for learning to teach .........................23
  2.5 Sociocultural and CHAT perspectives on learning to teach .......................28
  2.6 Review of research on the PLUTO project ......................................................36
  2.7 Identification of the need for further research .................................................38

3 A CHAT approach to learning to teach ..............................................................43
  3.1 The theory of activity: The legacy of Vygotsky and Leontiev ......................44
  3.2 The perspective of CHAT ...................................................................................47
  3.3 Approaching learning in CHAT .........................................................................50
  3.4 Language, communication, and meaning making ...........................................59
  3.5 An analytic approach to investigate the activity of learning to teach............62

4 Methodological approach: Studying participation trajectories across
  boundaries ..................................................................................................................67
  4.1 The methodological consequences of a sociocultural perspective ..........68
  4.2 Data collection ....................................................................................................69
  4.3 Data analysis .......................................................................................................75
  4.4 Credibility of the research project ....................................................................80
5 Summary of the studies ................................................................. 85
    Study 1 ...................................................................................... 85
    Study 2 ...................................................................................... 87
    Study 3 ...................................................................................... 88
    Study 4 ...................................................................................... 90

6 Discussion and concluding remarks ............................................. 93
    6.1 Empirical contributions .......................................................... 93
    6.2 Methodological contributions .................................................. 98
    6.3 Theoretical contributions ........................................................ 99
    6.4 Implications for teacher education .......................................... 101

References ..................................................................................... 103
Extended abstract
1 Introduction

This thesis studies student teachers’ activity of learning to teach. During this process, student teachers engage in social practices at the Department of Teacher Education (DTE) and at schools. Bridging the gap between higher education institutions and schools is a recurring problem in professional education. This points to a classical problem in educational and learning research for the last 30–40 years.¹ Such issues promote policy reforms intended to develop a more unified learning process for students, possibly bridging the perceived theory and practice gap.

A recent white paper on teacher education in Norway, “The teachers, their role, and the education”, presented a number of efforts aimed at increasing the quality of teachers and teacher education. The authors stated a more structured framework for the collaboration between DTEs and schools is needed, and the intention is to introduce partnerships as a government requirement (KD, 2009). Initial teacher education providers have worked with different kinds of partnership agreements with schools over the last decade, and even though partnership was not mentioned, the framework for teacher education required the two institutions to collaboratively plan internship periods (UFD, 2003).

A recent summary of research on teacher education showed that over the last decade the problem of teacher education has been constructed and studied as a policy problem where the focus of research has been on institutional and programmatic policies and practices. In the

¹ This problem has been discussed as a classical transfer problem (Eraut, 1994, 2004) and as the relation between theoretical and practical knowledge (Polyani, 1967; Schön, 1983, 1987). For a overview of the research on theoretical and practical knowledge related to the education of professionals, see Grimen (2008). More recent are conceptualizations of transfer based on context (Beach, 1999; Greeno, More, & Smith, 1993; Lave & Wenger, 1991). In my thesis, I discuss universities and schools as two practices or activity systems.
1980s and ’90s, however, the problem of teacher education was constructed as a learning problem shaped by the agenda to produce knowledgeable, professional teachers. In the research literature, the concern was on student teachers’ knowledge and beliefs, mainly studied from a cognitive perspective (Cochran-Smith & Fries, 2005).

As a field of research, teacher education is fragmented, and has been researched from a variety of different perspectives and covers a number of issues (Cochran-Smith & Zeichner, 2005; Darling-Hammond & Snyder, 2000). The disadvantage is the scarcity of large-scale studies, randomized field trials, or longitudinal studies (Ottesen, 2006b). Ottesen saw the abundance of small-scale studies, often carried out by teacher educators themselves, as a possible advantage because, when synthesized, these studies provide significant contributions to the constitution of the knowledge base in teacher education.

In Norway, research efforts have been sparse and diverse (Teige, Dahl, Bauland, & Haugsbakken, 2008). A review of teaching and teacher education in Scandinavia found that a great number of studies were exploratory, and few were theoretically grounded (Bergem, Björkqvist, Hansén, Carlgren, & Hauge, 1997). In the absence of robust research to build on, reform efforts and development work have focused on organizational structures, such as formal agreements between partner schools and DTEs, the extension of teacher education to 5 years instead of 4 years, available resources, the competence of the teachers, and the quality of the internships (Teige, et al., 2008). The recent national reform effort, Program for Teacher Education, Technology and Change (PLUTO), has, however, generated research along several lines. A short review of these studies is presented in section 2.6. This thesis is a theory-informed study that looks at particular aspects of learning to teach. The cultural-historical activity theory (CHAT) perspective is used as a theoretical framework since this perspective offers a rich framework for understanding learning to teach on mutually, interrelated levels of description.

1.1 Theoretical framework

The theoretical framework for studying learning to teach is the sociocultural perspective where human development is seen as embedded within social, cultural, and historical contexts. More specifically, I use CHAT, which is one of the approaches within the sociocultural strand of research. The different approaches to the sociocultural perspective
share the same ontological and epistemological foundation, but CHAT contains a number of ideas that distinguish this theory from other sociocultural views on human development.

One of the most distinctive ideas is human mental functioning and development as object-related and activity as the minimal unit of analysis (Leontiev, 1978). This thesis understands learning to teach as an activity that is depicted as activity systems, including the activity system of the DTE and the activity system of schools. This makes the activity of learning to teach the unit of analysis in this thesis. The two activity systems have different historical objects. While the object of the activity system of the DTE is students’ learning and production of research, the object of the activity system of schools is the learning by pupils. However, as teacher educators, DTEs and schools collaborate to educate teachers. Thus, there is a potential space at the borders between the two activity systems where the participants share student teachers’ learning as a joint object. Furthermore, in this space, tools, rules, and the division of labor may be shared and move between activity systems. The focus of this study is the activity of learning to teach that takes place at and across the boundaries between the activity systems of DTEs and schools.

To study the process of learning to teach, I examined how student teachers, together with their school mentors and university teachers, construct situational objects. The object construction is seen as a process of making meaning of the problem the student teachers are working on at the time, and is always regulated by the historical object. This thesis emphasizes the formal, conventionalized sites of learning, or learning spheres, where the student teachers are produced as teachers. The notion of learning spheres is examined as a recurrent pattern of activities that consists of strings of actions (Engeström, 2008). I studied the activity of learning to teach by the means of student teachers’ participation trajectories in and between learning spheres. Foregrounding trajectories enable studies of how student teachers’ everyday lives emerge across interwoven but overlapping boundaries. These boundaries are established distinctions and differences within and between activity systems. These distinctions and differences can be categorizations of objects, people, and learning spheres.

By focusing on the student teachers’ process of learning to teach, my concerns are the trajectories of the object and the actors. This means that I explored (a) the relationship between the historical object and how situational objects are made sense of in participants’ actions in various learning spheres over time and (b) how student teachers produce and are
produced by the activity systems. In order to answer these concerns, it is necessary to increase the analytic attention to three levels of descriptions. It is necessary to provide analyses of (a) moment-to-moment interactions, (b) how these interactions change over time and across sites, and (c) ethnographic descriptions of the activity. While all levels are part of the analysis, I foreground level 2 of the trajectories (see section 4.3.1).

1.2 The empirical grounding

The empirical background for this thesis is the national reform program PLUTO. The program started in 2000 and lasted for 4 years. The aim was an organizational, technological, and pedagogical transformation of teacher education using information and communication technology (ICT). The Ministry of Church, Education, and Research (KUF) initiated the program as a part of the action plan ICT in Norwegian Education: Plan for 2000-2003, where “use of ICT in Norwegian teacher education” was one of six areas of priority. The PLUTO program was administered by the Network for IT-research and Competence in Education (ITU), which at that time was part of the Faculty of Education at the University of Oslo. Three Norwegian universities and four teacher education colleges took part in 10 projects.

Before I go more deeply into the reform program, a short explanation of the Norwegian system of teacher education is necessary. There are two ways of becoming a qualified teacher in Norway. One is to complete a general teacher education program at a university college, which qualifies the graduate to teach all subjects at the primary and lower secondary levels (ages 6–16). The other way is to complete a comprehensive program at a university. The students who attend this program must have either a bachelor’s or a master’s degree. This program qualifies the graduate to teach specific subjects at the lower and upper secondary level (ages 13–18). The program board visited all the institutions involved in the reform once a year and organized yearly gatherings in which representatives from all the institutions took part.

The reform program focused on four areas: electronic portfolio assessment, student-centered work methods (e.g., theme and problem-oriented methods), the use of ICT, and an enhanced relationship between the campus activities and the teaching activities at the schools. All the institutions worked actively to construct partnership agreements with schools, but this was solved in very different ways. The institutions that took part in the reform developed
local goals specifically targeting local priorities in addition to, or specifying, the four focus areas. One example is how the institutions decided to develop their work with ICT. Some of the institutions wanted to use ICT as a central catalyst for system change, while others wanted to try out ICT in teaching and learning practices or to develop learning resources (Ludvigsen & Rasmussen, 2006).

The empirical site for the studies in this thesis is the Department of Teacher Education and School Development (ILS) at the University of Oslo. This institution was one of the institutions that developed their use of ICT as a catalyst for system change. The department developed an in-depth relationship with a few schools and regular partnerships with others. The sociocultural perspective was used as an inspiration for the design principles for the project, and student collaboration and a closer relationship between students and university teachers were central initiatives. The University of Oslo, and four of the university colleges, organized the students’ portfolios by dividing them into a work folder and a presentation folder. The work folder was the site where the students stored their work, while the presentation folder was used as the basis for the students’ final oral examination. The students were supervised during their work with the cases and tasks in the work folder.

Case-based methods were used as a central resource and should be seen as a local initiative to develop student-centered work methods and to improve the connection between campus and teaching activities. The student teachers were organized in core groups (around 4 students in each) that collaborated on internships and campus activities. These groups had to collaborate on writing case assignments based on data (observations and interviews) and experiences from the internships.

The partner schools were committed to facilitating and supervising the students in this work. Another central aim, also related to improving the connection between the two activities, was a new model for internship based on institutional agreements with partner schools for a period of 3 years. Within this agreement, groups of students were assigned to schools, and the institutions (rather than individual mentors)\(^2\) were responsible for the

\(^2\) There are different terms for schoolteachers. The university colleges in Norway use the term “practice teacher” (øvingslærer in Norwegian), and the teacher education institutions at the university use the term “supervisor” (veileder in Norwegian). With the development of partnerships in England, the term changed from “supervisor”
organization of the internship periods, based on a set of guidelines developed by the department. The department intended to establish support structures to assist schools in their development. These efforts included courses in ICT, counseling, and subject didactics (Hauge, 2004).

1.3 Aims and research questions

The boundaries between DTEs and schools have been studied only to a small extent in the research on teacher education. However, how these boundaries are enacted is of great significance for the student teachers’ process of learning to teach. This thesis has three aims. First, it aims to contribute to our understanding of how student teachers learn to teach. I propose that learning to teach should be seen as a collective societal activity that is understood by investigating how student teachers make sense of available cultural tools in the students’ talk and actions toward a situational object or problem.

Second, this thesis aims to make a methodological contribution by analyzing learning to teach as a multileveled phenomenon. I analyze how the situational objects are made sense of over time and across sites and how this is related to the historical object. In order to conduct a multilevel analysis, there is a need for some analytic concepts to scrutinize how the participants engage in the interaction, how the interaction changes over time and across contexts, and how the interaction is embedded within activity systems. A focus on student teachers’ accounts enables me to scrutinize what turns out to be the participants’ concerns and how the participants deal with this situational object in their talk. Furthermore, this focus enables an exploration of how structural aspects and boundaries manifest themselves in talk. Turning analytic attention toward students’ participation trajectories makes it possible to scrutinize how students’ orientation toward the situational objects change over time and in various contexts. Finally, the analytic notion of positioning directs attention toward the student teachers’ opportunities and constraints for participation.

to “mentor,” because of the changed role in the partnership. As supervisors, teachers had been responsible merely for overseeing students. As mentors, teachers were responsible for developing students’ practical teaching competence (Furlong, Barton, Miles, Whiting, & Whitty, 2000). In this thesis, the term mentor is used.
A third aim, related to this, is to conceptualize and analyze the relationship between action and activity in order to understand the activity of learning to teach. The relationship between the subject and systemic perspective is a central theoretical foundation in CHAT (Engeström, 1987; Leontiev, 1978). However, much of the research conducted within this framework has focused on structural relations. This theoretically oriented research question reflects the attempt in recent years to conceptualize participants’ actions within activity systems. The focus on meaning making in a dialogically oriented approach (see eg. Wertsch, 1991; Wertsch, 1998) provides an opportunity to study the relationship between the situational objects participants orient and the historical object of activity. Together, this focus on the analysis of interaction provides the means to capture contradictions in and between activity systems.

Against this background, I ask the following overall empirical research questions: (a) What characterizes the student teachers’ participation trajectories within and between the two activity systems? (b) What are the resources used by student teachers, university teachers, and mentors as they make sense of the situational objects? (c) How are the situational objects made sense of in different learning spheres at the DTE and schools?

1.4 Outline of the thesis

The thesis is organized in two parts. The purpose of the first part is to clarify the unity of the thesis, and the second part is composed of the four articles that are the empirical analyses of the thesis. In the first part following the Introduction, different approaches of learning to teach are discussed. This chapter reviews previous research with a focus on studies on learning to teach from a reflection perspective, policy perspective, and sociocultural perspective. Based on this background, I argue for the need for studies that broach how meaning is made in the activity of learning to teach. In chapter 3, I present the theoretical framework for the thesis. The theoretical perspective of CHAT is chosen since it offers a rich framework for understanding multiple-level analyses. The main part of this chapter discuss the central theoretical concepts for studying how the activity of learning to teach is played out in student teachers’ trajectories. The chapter is concluded with a discussion of the analytic concepts used in the analyses of student teachers’ interaction. Chapter 4, A Methodological approach to study learning to teach, is composed of three parts.
First, I discuss the methodological consequences of a sociocultural/CHAT perspective. Then I describe the data collection and the analytic process. The chapter concludes with reflections on research credibility and research ethical considerations. Chapter 5 provides a brief summary of the four studies. Finally, in chapter 6, Discussion and concluding remarks, I discuss the aims I have for this thesis, seen as empirical, theoretical, and methodological contributions. The first part ends with some implications for teacher education.

In the second part of the thesis, the four articles are presented in the order in which they were written. These four articles contribute to the activity of learning to teach in different ways. Article I focuses on how the PLUTO project group constituted and constructed tools to organize for a more transparent participation trajectory for student teachers. Ludvigsen and I were interested in exploring the project groups’ negotiation of the portfolio assessment structure, case-based methods and the use of ICT. The central theoretical concepts in this article were boundary object, boundary zone, and boundary-crossing place.


While the first article is mainly based on interviews, the next articles approach the phenomenon with analyses of interaction. In Article II, Ottesen and I are concerned with how boundaries in teacher education are constructed in interaction, how they are made relevant by the student teachers, and how this affects their learning trajectories. Empirically, we focus on how a situational object, goals in education, is made sense of in interaction, and how the object construction differs as the students move across sites for learning. To scrutinize how the participants make sense of the situational object, we use accounts and positioning as analytic concepts. In this article, the concept of learning trajectory is used instead of participation trajectory. This does not imply any difference in meaning.

The analysis in Article II suggests some interesting findings concerning the student teachers’ process of learning to teach when collaborating in small groups. I found it important to further investigate the students’ collaborative process of problem solving. In Article III, I am concerned with how student teachers make sense of conceptual tools when working with case assignments and how the meaning-making process is embedded in, and interdependent with, complex social and cultural contexts. This article focuses on student teachers’ interaction over time in one learning sphere. The notion of trajectory is used to capture how the students’ orientation toward the object changes over time, and the analytic concepts of accounts and orientation are used in the analysis of interaction.


The purpose of Article IV is to demonstrate the value of a detailed analysis of interaction in order to get a deeper understanding of the complexity of learning to teach. This is a chapter for a book on teacher education from a cultural-historical perspective and was written with Eli Ottesen. The chapter aims to describe and illustrate how we pursue an empirical analysis that illuminates how meaning of knowledge is constituted in interaction and how the institutional context is made relevant in the participants’ talk. In this chapter, the notions of learning spheres and participation trajectories are further developed, and the empirical focus is the ways in which participants make sense of tools across learning spheres.

2 Review of different approaches of learning to teach

2.1 Introduction

“The university courses were an introduction to the case assignments, not to the internship” (Marion, student teacher). This statement by a student teacher shows a tension between the university and school settings. Student teachers often see their internship as the place where they learn the craft of teaching, while the courses at university are useless theory. This chapter will review studies that in different ways have approached how student teachers learn to teach.

In review articles on research on teacher education (eg. Cochran-Smith & Fries, 2005; Wideen, Mayer-Smith, & Moon, 1998), learning to teach was seen as a research epoch in the 1990s when this topic was studied as a microphenomenon. From my point of view, much of the policy-oriented research that has dominated the research over the last decade is concerned with the same phenomenon but is now studied as a macrophenomenon. Instead of seeing teaching as a solitary profession, the attention shifted, and the gap between learning and teaching was seen as organizational challenges that had to be overcome, for example, with the implementation of partnerships. Both approaches touch upon important issues in understanding how student teachers learn to teach, but when the phenomenon is analyzed either as an individual issue or as an organizational issue, the complexity in understanding learning to teach is missed. I argue that these approaches must be exceeded empirically, methodologically, and theoretically. The sociocultural/CHAT perspective is promising because it offers conceptual tools to investigate and combine several levels in analyzing learning to teach. In this chapter, I will examine what types of knowledge various research
positions have achieved about student teachers’ school-based experiences. Based on the review findings, I will identify what types of research are still needed.

2.1.1 Research traditions in learning to teach

Addressing teacher education as learning to teach was seen as an epoch in research on teacher education from the 1980s to the beginning of the 2000s as a result of the cognitive turn in psychology, and the influence of anthropology and other interpretive traditions\(^3\) (Cochran-Smith & Fries, 2005). Frequently, the focus was on student teachers’ beliefs and knowledge, their prior experiences, their development as professional teachers, and mentor roles (Cameron-Jones & O'Hara, 1995; Cochran-Smith & Fries, 2005). Furlong and Maynard (1995) identified two major schools of thought within the research literature on learning to teach: the competency movement, which has been studied from behaviorist and cognitive perspectives, and the reflective practitioner movement. In a review of research on learning to teach, Wideen, Mayer-Smith, and Moon (1998) identified three traditions: the positivist tradition, the progressive tradition, and the social critique tradition.

The focus of research on teacher education has shifted since Furlong and Maynard and Wideen et al. published their work. Since the mid-1990s, Cochran-Smith and Fries (2005) have identified a shift to conceive teacher education as a policy problem. The explanation for this shift is probably the need for knowledge that would inform the reform efforts that increased in the 1990s and 2000s. The recurring focus of attention is the challenge regarding how to tackle discontinuities between teaching and learning, and the solution is often different forms for school-university partnerships (Darling-Hammond, 2006). A central concern of this research is to provide evidence of “what works” in order to construct successful and cost-effective programs (Kennedy, 1999). I argue that a new approach to studying learning to teach emerged from the end of the 1990s and during the 2000s, known as the sociocultural perspective. The basic idea in this perspective is that human mental

---

\(^3\) Constructing teacher education as a learning problem is seen as the second epoch in research on teacher education. The first (from the late 1950s to early 1980s) constructed teacher education as a training problem. The object of research was to identify training procedures that may have an impact on the behavior of student teachers (Cochran-Smith & Fries, 2005).
processes have to be understood in relation to the cultural, historical, and institutional settings the individual is participating in at the moment (Wertsch, 1991).

To sum up, I find it useful to differentiate among four traditions of research on learning to teach: competency-oriented, reflection-oriented,\(^4\) policy-oriented, and sociocultural-oriented research. The sociocultural perspective is, as I will come back to, a reaction to reflection-oriented studies and policy-oriented studies.

This chapter consists of four main sections. The first part of this chapter focuses on reflection-oriented research on how student teachers learn to teach. I will give a brief overview of what is conceived as the two main perspectives within this field, before I review a couple of studies in detail. In the second part, I review studies of structural issues on how to organize student teachers’ learning and teaching, from the perspective of partnerships. In the third section, I look into sociocultural studies of learning to teach, and emphasize three strands in order to illustrate how this approach opens up for studying different levels of descriptions. Finally, I end with an identification of the need for further research.

### 2.2 Reflection-oriented research on learning to teach

Despite the apparent ubiquity in research conducted and reported, the term “reflection” is vague and encompasses a range of theoretical and practical approaches (Calderhead, 1989). Across the diversity of perspectives, a common generic base is that increased reflection will translate into actions and result in improvements in teaching and learning. Another common focus is on the student teacher as a learner who should not only engage in the what and how of teaching but also ask questions about why one works as one does (Cornford, 2002). The ideal types of teachers incorporating reflective qualities are as manifold as the term itself: the development of self-monitoring teachers, reflective teachers, teachers as experimenters, teachers as researchers, teachers as inquirers, teachers as problem-solvers, teachers as moral craftsmen, to mention but a few (Cornford, 2002).

\(^4\) The competency-oriented and the reflection-oriented perspectives belong to the research epoch usually identified as “learning to teach” (see, e.g., Cochran-Smith & Fries, 2005). For a thorough and detailed critical analysis of this field of research, see Wideen, Mayer-Smith, and Moon (1998).
Different suggestions for the categorization of the literature on reflection have been put forward (Calderhead & Shorrock, 1997; Cochran-Smith & Lytle, 1999; Grimmett, 1988). I prefer to distinguish between two main approaches of reflection: a cognitive and constructivist approach and a critical and pragmatic approach. I will give a brief outline of the two, before I review several empirical studies.

2.2.1 Cognitive and constructivist interpretation of reflection

This broad approach put forth varieties of conceptions of reflection as reconstructing experience. These writers draw on Donald Schön (1983, 1987) as a main source of inspiration, but of course there are variations. An important idea within this approach is Schön’s notion of reflection-in-action, a cognitive process in which thinking goes on in conjunction with action. Professionals should learn to frame and reframe the problems they are facing, test out various interpretations, and then modify their actions as a result. While reflection-in-action can be acquired only in practice, reflection-on-practice is an after-the-event evaluation in which one thinks back on what one has done (Calderhead & Shorrock, 1997). Many of these writers belong to the teachers’ thinking tradition. The focus is on what teachers need to know, what practical knowledge teachers need to develop in order to be effective practitioners, and their decision making (Calderhead, 1987a; Elbaz, 1983; Furlong & Maynard, 1995).

Another area of focus within this perspective involves studies of how student teachers learn to be professional by learning how to reflect (Korthagen & Kessels, 1999; Loughran, 2002; Munby & Russell, 1994). The ideal reflection process is described as a cyclical model (ALACT)\(^6\) (Korthagen & Kessels, 1999) in which the focus in the learning process should be on the specific concerns, questions, and problems the student teacher might have. The highest level in reflection is the attention to the core qualities in people (Korthagen & Vasalos, 2005).

---

5 For comprehensive and critical reviews of the tradition of teachers’ thinking, see Clark and Peterson (1986), Calderhead (1987a), and McNamara (1990).

6 The reflection process is described in the ALACT model in terms of five phases: (a) action, (b) looking back on action, (c) awareness of essential aspects, (d) creating alternative methods of action, and (e) trial, which is the start of a new cycle (Korthagen, 2001b).
These researchers strongly believe in practitioners’ articulation of professional knowledge. The role of the teacher is to help the students to reflect on “what do you yourself think” by posing concrete questions about various aspects of the teaching situation to stimulate the student teacher’s ability to analyze and make meaning from his or her experience (Korthagen & Vasalos, 2005).

2.2.2 Critical and pragmatic interpretation of reflection

The other main perspective within reflection-oriented research are writers who are mainly influenced by John Dewey (1910, 1933). This approach is interested in how people interpret and define their environment and how they use these interpretations to guide their actions. One of the most influential partnership programs and leading research groups in England, the Oxford Internship Scheme (OIS), draws on this perspective. OIS researchers called for a new understanding of the “theory-practice gap” where theory and practice were understood as different forms for practices with tensions between them (McIntyre, 1997). These forms for practice are more or less reflective, as can be seen in Dewey’s distinction between routine and reflective action. These researchers see knowledge as the social construction of knowledge. Reflection was defined as a systematic inquiry into one’s own practice (McIntyre, 1993). In contrast to the cognitive interpretation, these researchers mean that it is impossible to define “good teaching.” Each individual teacher has to deliberate and examine between different forms for knowledge to find out what is considered good teaching for him or her and his or her pupils on that particular occasion (Hagger, 1997).

Another strand within this approach are researchers who advocate a philosophical and critical form for teacher education programs that prepare teachers to act as agents in the realization of social justice in school and society (cf. Carr & Kemmis, 1986; Zeichner, 2006). One of the aims is to illuminate the way social structures and institutional conditions create obstacles and opportunities for actors (Liston & Zeichner, 1991). Many of these writers also

---

7 Routine action is guided primarily by impulse, and the teacher is unreflective about his or her own teaching and uncritically accepts the taken-for-granted definitions of reality in the school. Reflective action, on the other hand, involves active and careful consideration of beliefs and knowledge in light of the reasons that support the action (Dewey, 1933).
draw upon the work of Habermas and Van Manen. Van Manen (1977) makes a distinction between three levels of reflectivity, each of which implies a certain content or focus of reflection. The first level is everyday practical thinking that is technical and routine, the second is based upon conceptions of practical action where teachers ask questions about the educational aspects of their work, while at the third level, teachers are able to incorporate moral and ethical issues into the discourse about practical action. At this level, both the teaching and the surrounding context are viewed as problematic (Zeichner & Liston, 1987). The social justice approach to teacher education has gained new popularity in the last couple of years with an emphasis on the development of sociocultural consciousness and intercultural teaching competence to prepare teachers for an increasingly diverse group of students (Zeichner, 2006).

2.3 Learning to teach as development of professional knowledge

In this section, I review studies that take two different perspectives on student teachers’ development of professional knowledge. I end the section with a summary in which I compare the studies.

2.3.1 Development of professional knowledge as changing beliefs

During the 1980s and until the middle of the 1990s, a substantial amount of research focused on teachers’ thinking, beliefs, and professional knowledge, in particular, research comparing student and experienced teachers, research tracing the origins of experienced teachers’ practice, and research on student teachers’ learning over the course of their training (Calderhead, 1991). It is however limited research on the processes of which novices becomes experts (Borko & Livingston, 1989). Most investigations have compared novices and experts at a single point in time or over a period of weeks and months. The few longitudinal studies have examined only the initial stages of the process, from student teaching until the 1st year of teaching (Borko & Livingston, 1989).

Some of the few researchers who has been concerned with the process of professional development are Calderhead (Calderhead, 1987b; Calderhead & Shorrock, 1997) and Furlong and Maynard (Furlong & Maynard, 1995; Maynard, 1996b; Maynard & Furlong, 1993),
whose work I will review in the following. In addition to focusing on the process, these studies were also chosen because they are central contributions in the field. Moreover, they conceptualize the nature of student teachers’ professional development and how practicing teachers can contribute to that development.

To review the work by Furlong and Maynard, I go into one of the three Swansea studies that investigated student teachers as they developed professionally during the course of their training (Furlong & Maynard, 1995; Maynard, 1996b; Maynard & Furlong, 1993). The studies took the form of action research. The fieldwork in this study took place over a period of one academic year during which the researchers observed planning meetings and debriefing sessions between the student and the supervising teacher, observed the lessons, and conducted separate semistructured interviews with the student teachers and the supervising teacher.

Calderhead (1987b) followed a group of 10 student primary teachers through their 1-year postgraduate professional training course. To collect data on the student teachers’ perceptions of teaching and the process of professional learning, he used semistructured interviews in addition to observations of postlesson discussions between the student teacher and the college tutor and the student teacher and the supervising teacher.

As seems to be generally accepted in this body of literature, Calderhead and Furlong identified stages or phases of development that student teachers appear to progress through during the process of learning to teach. Their development goes through discernible patterns that are reflected in the student teachers’ changing concerns and behavior (Calderhead, 1987b; Furlong & Maynard, 1995; Maynard & Furlong, 1993). In research on expert and novice teachers, studies have generally found that the thinking of novice teachers is qualitatively different from that of experts (Borko & Livingston, 1989; Carter, Sabers, Cushing, Pinnegar, & Berliner, 1987; Westerman, 1991). The differences identified in the thinking of teachers are often explained by postulating that experts’ cognitive schemata are more elaborate, more complex, more interconnected, and more easily accessible than those of novices (Borko & Livingston, 1989).

As consistent with these studies, the studies reviewed here found that students do not think about different things at different stages but think about the same things in different ways. For example, the students view pupils and the content of learning change differently at the beginning and the end of the students’ training (Furlong & Maynard, 1995). Calderhead
recognized three phases (fitting in, passing the test, exploring), while Furlong and Maynard discerned five stages (early idealism, personal survival, dealing with difficulties, hitting a plateau, and moving on). In my reading of the studies, I argue that these researchers recognize the same developmental process. Both studies found that in the beginning of training the students have idealistic images about teaching and learning. Then the students try to “fit in” by adopting the teachers’ behavior even though it conflicts with the students’ own preferences. Then the students have a period of “performance.” After the students have gained basic competence and confidence, both studies report that the student teachers’ learning reaches a plateau where the teaching is manageable. Calderhead (1987b) found that in this phase of the students’ learning the nature and quality of their reflection on practice were superficial and pragmatically oriented. The study shows that in this period the student teachers often get minimal challenges and support from the supervising teacher. Both studies suggested that assistance and supervision are especially important during this period to help the students reflect on their teaching in a way that promotes professional learning.

While the study by Calderhead made this a concluding remark, Furlong and Maynard (1995) intervened in their work with student teachers when they reached the “the plateau.” The researchers actively challenged the students, trying to make them understand the need for change in their teaching practice in order to become professional educators. Based on the findings that professional development goes through stages, researchers have suggested that teacher education programs should design experiences for novices at various stages during the process of learning to teach (Borko & Livingston, 1989; Furlong & Maynard, 1995). Furlong and Maynard argued that during the process of learning to teach students must be exposed to four different dimensions of professional knowledge. First, the mentors should help the students reflect on their actions. However, it is not enough for students to base their professional knowledge on their own reflection. Their experience needs to be achieved by “indirect” practical training, such as books, visits, and talks. Furthermore, to be justified, the

---

8 Furlong and Maynard (1995) suggested a new role for the university tutor as well. In the early part of the school experience, tutors should support mentors in their work with students, while at the later stages tutors should challenge students to examine and evaluate “theoretical” understandings in relation to practical experiences (Maynard, 1996a).
students should be encouraged to question their teaching and understanding in light of professional principles and disciplinary theory (Furlong & Maynard, 1995).9

Furlong and Maynard (1995) claimed that the students’ ability to develop appropriate forms of practical knowledge and the speed of the process through different stages are influenced by personal factors. The researchers concluded that students’ development is also affected by contextual factors such as the class teachers’ actions and ability to articulate their own knowledge and the particular teacher education program. However, this approach acknowledges only that the person’s belief may change in various contexts; the approach does not pay attention to the participants’ actions. The studies that I outline below take another stance and pay attention to the situated nature of learning and teaching and are concerned with how students and mentors interpret the context they engage in.

2.3.2 Development of professional knowledge as interpretation of actions

The OIS was planned as a research agenda and scheme for initial teacher education (ITE) in the middle of the 1980s as a reaction to Schön’s perspective of reflective practice. McIntyre (1991) also criticized Furlong for prioritizing academic knowledge over practical, school-based learning. Instead, ITE should prepare for student teachers’ critical examination, developmental, and experimental use of ideas from many sources: the practice of experienced teachers (craft knowledge) and theoretical and research-based literature, as well as one’s own existing knowledge and beliefs. The critical evaluation of sources was called “practical theorizing,” and the ideas were seen as different forms of theories, or different forms for professional knowledge. None are inherently superior to another; they are simply different. It was therefore not possible for researchers to make any theoretical claims about how teachers ought to work (Burn, 2006; Hagger, 1997).

9 In the development of professional knowledge, Furlong and Maynard (1995) implicitly drew on both Schön’s and Dewey’s notions of reflection. Furlong and Maynard recognized Shön’s contribution in the importance of reflection-on-action, but they do not follow his beliefs that the sophistication of a teacher’s action is revealed first and foremost in his or her ability to work effectively in a particular situation. Instead, the student needs to articulate his or her own behavior. However, unlike the critical researchers (see chap. 2.2), Furlong and Maynard did not prioritize one type of questioning over others.
The focus in the OIS perspective was to uncover the characteristics of the craft knowledge that teachers use in their teaching and the development of new professional knowledge. Craft knowledge is one aspect of teachers’ professional knowledge and is derived from intuitive practical experience in the classrooms (Brown & McIntyre, 1993). Researchers should gain access to teachers’ professional craft knowledge by encouraging them to articulate what they valued in their own teaching, what they tried to accomplish, and how they achieved the things they did well (Brown & McIntyre, 1993). The purpose for the researchers was to discover and understand the implicit theories that teachers used to guide their teaching.

To illustrate the empirical work of the OIS researchers, I will examine more closely a study by Burn (2007), which is a typical example of how craft knowledge is studied within this perspective. The study is part of a larger research project of the OIS. The OIS is a one-year postgraduate program for secondary school teachers. The schools and DTEs have a shared responsibility for the student teachers’ program and were seen to have equally legitimate professional knowledge (McIntyre, 2009). In this particular study, Burn (2007) was interested in student teachers’ development of one particular form of craft knowledge, pedagogical content knowledge (PCK) within history, and how this forges a new form of professional identity for mentors. The research interest was to identity different kinds of knowledge, the opportunities for learning provided in school and university, and the extent to which the partners’ contributions complemented one another. The notion of PCK pays attention to the subject-specific dimensions of teachers’ knowledge and the connection between different categories of knowledge held and used by teachers. In line with the OIS’s conception of knowledge, PCK is a construction built from many different sorts of knowledge and can be created only in practice. Based on many studies of the development of professional craft knowledge, the OIS research literature found that the essential ways to gain access to such knowledge are first through observations of experienced teachers’ practices (Hagger, 1997; Hagger & McIntyre, 2006), then collaborative planning and teaching between mentors and student teachers (Burn, 1997), and later on, student teachers need practice to repeatedly try out activities for themselves, followed by focused support and feedback from their mentors (Hagger & McIntyre, 2006). This implies that the researchers emphasized mentors’ professional identity, which depends not only on existing knowledge but also on the capacity to generate new professional knowledge.
Burn’s study (2007) is an action research study. The research team, composed of researchers, mentors and tutors, developed and agreed upon some shared principles for student teachers’ learning, revised the structure of the university sessions, and worked out a program of activities that could be implemented in the schools. The focus of the data collection was on the provision that mentors and tutors offered and the ways in which it appeared to contribute to the student teachers’ PCK. The entrance to study this was observations of talk in mentor meetings and university sessions and two interviews by the student teachers that focused on specific observed lessons. Other kinds of data were written assignments and two questionnaires completed by the student teachers. In the analysis of the student teachers’ development of craft knowledge, the method developed by Brown and McIntyre (1993) was used to explore the teachers’ goals, the conditions that the teachers took into account in their planning, and the actions the teachers took to achieve their goals. In addition, Burn identified the different knowledge components embedded in the principles for student teachers’ learning by drawing on seven knowledge categories of PCK.

The study found challenges to the identities of the student teachers and the mentors. The student teachers faced challenges to their conceptions of the nature of the discipline and their sense of identity as subject specialists. The student teachers were influenced by previous experiences and distanced themselves from experienced teachers. The mentors faced challenges to their expertise as experienced subject teachers and their professional identity as teacher educators. The study revealed that the mentors lacked knowledge of specific teaching strategies and seemed reluctant and occasionally unable to provide the student teachers with relevant, contextualized suggestions for practice. To give the student teachers the opportunity to critically evaluate ideas, the study concluded, it is not enough to focus on improvement of the mentors’ practice as teacher educators; developing the mentors’ practice as teachers is just as critical.

2.3.3 Summarizing the studies of development of professional knowledge

The studies reviewed in this section have a similar focus. Calderhead, Furlong and Maynard, and Burn all focused on student teachers’ development of professional knowledge, but the researchers approached the phenomenon in different ways. In the summary of the two approaches, I will compare the epistemological underpinning of their work, the methodological arrangement, and the empirical findings.
The two approaches reviewed have different epistemological assumptions for their work. Furlong and Maynard and Calderhead analyzed student teachers’ changing beliefs and the knowledge student teachers need to develop to be professional. The review of these studies clarifies that learning to teach is seen as a development inside the student teachers, where they put the individual as the center of the construction of knowledge. Related to the conceptualization of learning and change, this implies that the development of learning to teach will change one’s beliefs, which again will result in changing teaching practice. In this view, change is reduced to an attribute of the individual. The gap between learning and teaching is integrated by linguistic and conceptual awareness. Even though the researchers do not explicitly take a theoretical stance, I will argue that these studies draw on a constructivist view of learning. Due to the epistemological assumption of mental constructions, the abundance of research on teacher-thinking and teacher beliefs is not able to capture the complexity in teaching activities. The OIS researchers have a different epistemological underpinning. For them, learning is the interpretations and critical experimentation of different forms for knowledge in a situated context. The integration between theory and practice is, in other words, dependent, on observations and interpretations of others’ actions. The focus is on the participants’ interpretations here and now. This implies that learning and change cannot be understood as attributes of the individual but have to be situated in the cultural context. Change is seen as a practical process where people shape and are shaped by the social world.

Concerning the methodological arrangement, Furlong and Maynard and Burn shared the emphasis on improving practice by action research, where they as researchers also work as teacher educators. This type of research characterizes the research on teacher education in general (Cochran-Smith & Zeichner, 2005). The studies reviewed collected the same type of data (observations and interviews); both are concerned with professional development, but their strategy for analysis varied. While Burn approached professional development by analyzing the teachers’ goals, conditions, and actions, Furlong and Maynard identified individual development of belief and competence and described how three broad areas emerged from the analysis. However, Furlong and Maynard did not explicitly state their strategy for analysis that made them find these areas.

The final point is related to the empirical findings. Since the theoretical framework and the strategies for analysis differ, the researchers have produced different findings. Burn’s
main findings showed that the mentors lacked knowledge of teaching strategies. This had implications for the student teachers’ development as professionals. Burn argued that, to facilitate student teachers’ interpretation and exploration of the different forms of knowledge in their learning environment, one has to develop the practice of mentors as teachers, not only as teacher educators.

Furlong and Maynard found that teachers’ knowledge base and their thinking were extremely complex and difficult to articulate and pass on to students. Furthermore, the researchers found that student teachers go through stages in learning to teach and argued that the role of the mentor is related to the developmental stage of the student. That student teachers move through stages of confidence and competence is not a controversial issue. Based on observations and talk with mentors, Edwards and Collison (1996) found that mentors could be placed on a continuum that was rather similar to Furlong and Maynard’s findings, but in this study, the continuum did not appear to relate to where the students were in their development as teachers. Rather, Edward and Collision found that the continuum was connected to how individual mentors wished to describe and act out their roles.

Despite the abundance of research on reflection in the literature on student teachers’ professional development, there is no empirical evidence that clearly establishes that reflective teaching approaches have resulted in superior teaching or learning about teaching (Cornford, 2002; Russell, 2005). Russell (2005) ask whether this may explain why this field of research more or less disappeared in the mid-’90s.

In the next section, I review policy-oriented research that deals with how to organize partnerships between DTEs and schools. In these studies, partnerships are seen as one way of organizing for learning to teach.

2.4 Policy-oriented research: Organizing for learning to teach

Even though there have been some local partnership agreements, no national directives or formalized agreements have been created in any of the Nordic countries. However, an evaluation of Danish teacher education in 2003 recommended formalization of the collaboration between school mentors and teacher educators, especially in the planning of internships (Rasmussen & Thune, 2003). A white paper published in Norway suggested that requirements for partnership agreements should be established (KD, 2009). Internationally,
the idea of partnership between a DTE and schools is not new, however. There is a long history of different models of partnership in the United Kingdom (UK) and the United States. The national and well-known partnership model in the United States is called professional development schools (DPS) and is an effort to reform schools alongside teacher education. The PDS model offers a form of partnership that is very different from the English models. While the PDS put considerable emphasis on strengthening student teachers’ academic preparation, the UK model is school-based with a focus on becoming a competent practitioner.

In UK, the issue of partnership has been the focus of a significant amount of research (Furlong, McNamara, Campbell, Howson, & Lewis, 2008). In the United States, there are extensive studies and evaluations of PDS, but an earlier review of PDS shows that the attention has been on changes in teaching and learning in kindergartens and schools, and little systematic research on teacher education has been conducted (Valli, Cooper, & Frankes, 1997). In the review of partnership in this chapter, I will briefly outline the PDS and focus more closely on the UK system and the research that grew out of the OIS. I will then identify some problems within these kinds of studies from the arguments of this thesis.

2.4.1 Professional development schools

In the 1980s, several reports addressed some serious concerns regarding the state of public schools, student achievement, and the teaching the students received. A second problem was an inadequate and unrealistic teacher education provided by universities (McIntyre, 2009). One central solution to these problems was radical reforms in teacher education. One of the most influential was the Holmes Group’s proposal for PDS. A central line of thought in this proposal was that reform in teacher education must be accompanied by efforts to restructure schools (Darling-Hammond, 1994a). The most important goal is to develop a culture of academic expertise in order to professionalize teachers. This is done through exemplary teacher preparation and professional development programs that are research-based. The emphasis on research also makes inquiry a primary goal for effective PDS, and has been implemented through several avenues.

An important focus is action research conducted by the teacher candidate, as it is seen to lead to improved learning. The idea of PDS became very popular in many American university schools of education, and today there are more than 1,000 PDS schemes in
partnership with schools (Darling-Hammond & Baratz-Snowden, 2007). Most approaches used in PDS settings are inquiry oriented and aim at promoting reflective ways of learning. PDS projects are seen as a promising way to integrate theory and practice (Korthagen, 2001a). A review of method courses and field experience reported that six studies found PDS-based teacher education was superior in all measures except stress compared to a traditional course at the same university (Clift & Brady, 2005). However, case studies also illustrate the many problems associated with this approach (Darling-Hammond, 1994a). One of the critiques of PDS projects is a too strong focus on academic achievement means that they have not lived up to their promise to promote equity in schools (Boyle-Baise & McIntyre, 2008).

2.4.2 Different forms for partnership in the UK context

In England and Wales, HEI has been investigating ways of working in partnerships with schools since the 1980s, but it was only since 1992 that there has been a legal obligation for training partnerships from the government (Furlong, et al., 2008). Government circulars in 1992 stated that teacher education should be based more in schools than in DTEs and were highly specific in the requirements (Furlong, et al., 1996). The circulars not only stated that DTEs were to have a closer relationship with schools but also defined the nature of this relationship: they should, for example, have joint responsibility for the planning and management of courses and for the training and assessment of student teachers (Mutton & Butcher, 2008). However, the circulars were silent on what constituted the spirit of partnership in teacher education.

Although the rhetoric of partnership has been important for many years, the concept has a variety of interpretations. While it historically had epistemological and pedagogical dimensions, in the policy change in the beginning of the 1990s, partnership was seen as a way to challenge the universities’ hold over ITE (Furlong, et al., 2008). Because of problems associated with recruitment and retention among teachers in early 1990s England, an increasing number of routes in teaching have been developed over the last few years. These include School Centred Teacher Education (SCITT) schemes, consortia of schools to be funded directly for their own teacher training program (Mutton & Butcher, 2008), which may or may not involve a contribution of HEIs. This is in contrast to the partnership thinking in the United States, where the perceived crisis in teacher education appeared to be
strengthening the academic preparation provided for teachers and the standards that teachers should be obliged to meet (McIntyre, 2009).

The findings from the national research project, Modes of Teacher Education (MOTE),\textsuperscript{10} suggest three ideal models of partnerships. In complementary partnerships, the DTEs and schools have separate responsibilities. The partnership is therefore a division of labor and not an attempt at integration. This model is used to describe the way in which the government envisioned that schools and universities should work together (Furlong, et al., 2000). However, the research findings revealed that most schools were unable to take the “joint responsibility” outlined in the government circulars, and the majority of the partnerships were DTE-led,\textsuperscript{11} where the DTE designed, administered, and guided the course and the schools offered opportunities to put this into practice (Furlong, et al., 2000). The MOTE study, however, found that a few universities had established more collaborative partnerships where both partners shared responsibility for the design, content, and implementation of the course (Furlong, et al., 2000). The best-known example in England, the study suggested, is the Oxford Internship Scheme (OIS). The study by Burns (2007) reviewed earlier in this chapter found that mentors within the OIS develop a strong identity as teacher educators because they feel that their expertise is valued and that they play a crucial role within the partnership. Other researchers have found that such an identity is comparatively rare in DTE-led schemes (Boag-Munroe, 2007).

While the government policy in England embraces a collaborative model and seems to assume that the role of DTE can be interchanged with schools, many research studies stress that the roles between DTEs and schools should be complementary and with a distinctive contribution for DTE. A study of models of partnerships in the UK argued that the collaborative partnership models have tended to destabilize or marginalize the role of DTEs and the development of school-centered approaches has introduced inconsistencies in the

\textsuperscript{10} The Modes of Teacher Education project was a national research project in England and Wales that aimed to monitor the policy changes being introduced in teacher education. The first MOTE project ran from 1991 to 1992, and the second project ran from 1993 to 1996.

\textsuperscript{11} Furlong et al. (2000) did not use the notion of department of teacher education; instead, they used higher education institutions.
quality assurance of the student experience (Smith, Brisard, & Menter, 2006). The authors recommend a DTE-led model that formalizes a distinct set of roles and responsibilities for school staff and that ensures a coherence of student teachers’ experience within ITE (Smith, et al., 2006).

A survey of perceptions of roles and responsibilities found that HEI tutors, school-based mentors, and student teachers all see students’ professional development as complementary roles for school and DTE (Williams & Soares, 2002). Further, this and other studies have found that neither of the partners in ITE wants to give major responsibility to the school for any aspect of training. The studies also found a strong preference for a partnership model where DTE maintains a significant responsibility (Barker, Brooks, March, & Swatton, 1994; Williams & Soares, 2002). The evaluation of the National Partnership Project (NPP) was critical toward the technical-rationalist approach to teaching that is encouraged by the partnership program. Since partnership arrangements do not have to include DTEs, the authors argued that “partnership arrangements are no longer predicated on the complex task of bringing together partners who provide access to different conceptions of professional knowledge” (Furlong, Campbell, Howson, Lewis, & McNamara, 2006, p. 41). A partnership is not about the complexity and contestability of professional knowledge but about contemporary practice in schools (Furlong, et al., 2006).

Studies of the OIS have found that there are challenges regarding shared understandings between DTEs and schools even in more collaborative partnerships. In one of the studies from the early days of the OIS (Davies, 1997), the student teachers were expected to critically explore different views of learning and teaching in the DTE and in the schools. The findings revealed that the student teachers had a strong engagement in exploring and negotiating learning and teaching in their university courses, but in the school context, neither the mentors nor the student teachers pursued a dialogue about various views of the subject (Davies, 1997). Similar findings were shown in a recent study of the OIS that illustrates the very different roles played by schools and universities in partnership (Burn, 2006). The tutors’ focus was on the students as learners; for the mentors, on the other hand, the pupils were the first priority. Another difference was that while the mentors tended to base suggestions on their own experience in the context of their current school, the tutors stated the reasons for their advice based on research-based knowledge. The tutors drew on research evidence in discussing the students’ practical experiences, while the mentors quite rarely
questioned or challenged the students’ suggestions (Burn, 2006). Another study that looked more broadly on the nature of partnerships in England found that the relationships between the schools and the DTEs were often limited to paperwork and procedures (Edwards & Mutton, 2007).

2.4.3 Summary of policy-oriented research

In the research on partnerships, the discussion has been on which role DTE and schools should have, and which model is the best. These organizational solutions give important insight into how to design new curricula and new teacher education programs. The problem with this approach, though, is that only the intended instruments for change are taken into account, implying a direct correspondence between intentions and ideas (Rasmussen & Ludvigsen, 2009).

Another problem with this policy-oriented research is that it has paid scant attention to how the transition between the DTEs and schools is managed. The studies that do focus on this transaction have provided important evidence of the different roles played by the DTEs and the schools and the challenges that even well-established partnership programs, such as the OIS, face (e.g., Burns, 2006; Davis, 1997). However, the research literature does not focus on student teachers’ experiences, as participants, in the transition between DTEs and schools. During the process of learning to teach, student teachers face different kinds of expectations, rules, and norms in often conflicting sociohistorical contexts. This thesis argues that it is necessary to conduct a multilevel analysis to study how participants use and make sense of tools in the various sites for learning the student teachers participate in and how this relates to historical and cultural aspects.

In the third and final part of this chapter, I will review three different approaches to study learning to teach within a sociocultural/CHAT framework, and I will situate the contribution of this thesis in relation to some of the key studies in this field.

2.5 Sociocultural and CHAT perspectives on learning to teach

Whether learning to teach is conceived as student teachers’ changing beliefs or as organizing for student teachers learning, knowledge is considered something a person has and can be transferred from one context to another. Knowledge may be internalized to guide subsequent actions, and individual actions and institutional activities may be constrained by
educational policies. If this transformation does not take place, the common view is that the person has the appropriate knowledge but is not able to access that knowledge in a new setting (Putnam & Borko, 2000).

In contrast, the sociocultural framework has as its starting point a dialectical relationship between the individual and the collective (Roth, Hwang, Goulart, & Lee, 2005). Cognitive activities such as thinking are, in other words, inseparable from the actions that people engage in. This implies that instead of studying what student teachers know and how learning and policy affect student teachers, the focus would be on what the student teachers do in a situated practice and how cultural resources are negotiated, used, and transformed in interactions. From a Vygotskian view, this thesis argues that the meaning of a task depends on the activity in which the problem is taking place and the individual’s assumptions about the relevant premises for his or her actions (Säljö & Wyndhamn, 1993; Vygotsky, 1987). Furthermore, this thesis argues that DTEs and schools are two different activity systems that are responsive to different constituents, have different motives for their production, and respond to different ideals, values, and norms (Engeström, 1987). Consequently, on campus, the student teacher operates as a student and has different motives for his or her actions than in school. What counts as knowledge varies from one activity system to another, and the student teachers orient themselves with their assumptions of what is conceived as valid definitions of situations and problems.

As mentioned earlier, the sociocultural framework has emerged in research on teacher education since the middle of the 1990s. The perspective is not yet well developed and described within teacher education, but a growing number of studies have been conducted over the last couple of years. The newly published book Cultural-Historical Perspectives on Teacher Education and Development: Learning Teaching is important in terms of rendering visible an alternative theoretical and methodological tool in analyzing student learning teaching and for designing new curricula and teacher education programs.

The sociocultural perspective is used in teacher education research in a variety of different lines. The situated perspective has inspired research on how student teachers participate in the community of practice of teachers and move from being peripheral to more legitimate participators. These studies sought to explain the student teachers’ participation in the school community (Maynard, 2001; Putnam & Borko, 2000; Sutherland, Scanlon, & Sperring, 2005). The studies found that the school community’s configurations of what it
means to be a teacher greatly influence new teachers’ actions (Maynard, 2001; Sutherland, et al., 2005). Others, inspired by the Vygotskian notion of the zone of proximal development, used the perspective of learning zones in a self-study research (Samaras & Gismondi, 1998; Samaras, et al., 2006). A CHAT perspective was used to generate, support, follow, and analyze the trajectory in and between activity systems. These researchers used an interventionist methodology to reconfigure the communication between university and school (Ellis, 2008; Konkola, Lambert, Tuomi-Gröhn, & Ludvigsen, 2007; Lambert, 2003; Roth & Tobin, 2004; Roth, Tobin, Zimmermann, Bryant, & Davis, 2002). The work of teacher mentors and mentor conversations have been the focus of several studies that draw on both CHAT and the Vygotskian line (Boag-Munroe, 2007; Edwards & Collison, 1996; Edwards & Protheroe, 2003, 2004; Ottesen, 2006b). Furthermore, these two lines have been used for studying how social and cultural factors mediate student teachers’ professional development (Grossman, Smagorinsky, & Valencia, 1999; Smagorinsky, 2010; Smagorinsky, Cook, Moore, Jackson, & Fry, 2004). I agree with Wardekker (2010), who argued that the diversity of strands makes the sociocultural perspective a powerful lens for understanding the problem of teacher education.

Reviewing the different strands in sociocultural studies in the research on teacher education is beyond the scope of this thesis. I have chosen to examine more closely the three perspectives that use CHAT in different ways. To begin with, I look more thoroughly into how CHAT has been used to design spheres for communication between university and schools to promote learning and change. Then I describe how Edwards and her colleagues performed their studies of mentor conversations. Finally, I look closer into how Roth and his colleagues used coteaching as a method for learning to teach. These choices are made because the contributions have served as inspirations for my own work, and in different ways, these studies help to illustrate my theoretical and methodological approach for studying the activity of learning to teach.

2.5.1 An Interventionist approach: Reconfiguration of partnership

CHAT researchers most often use an interventionist approach to promote learning and change in activity systems. Developmental work research (DWR) lies at the core of Engeström’s version of CHAT (Engeström, 1987). The question in DWR is “what can and will be done.” This question is answered by working with the practitioners to redesign the
Practice and by interfering in the implementation of a new activity (Engeström, 1995b). DWR is a structured intervention in which ethnographic evidence, called “mirror data,” is shared with participants in the study in order to reveal tensions and contradictions within the systems in which the participants are working. Through these contradictions, the research process itself enables the change and development of the systems. The data analysis in the studies that use DWR is most often interactions from the DWR sessions. The studies mentioned in this section do not give a complete description of a full-scale expansive process but show different ways to conduct this kind of research. In one study, DWR was used by creating a tool, a learning studio, for communication between student teachers, teachers, and practitioners (Lambert, 2003), while Ellis (2008) used DWR for opening up the problem of practice between teacher mentors, university teachers, and student teachers and, in this way, promote learning.

Lambert (2003) argued that teacher education needs to facilitate boundary-crossing places where student teachers are given the opportunity to act as mediators between universities and schools. A “learning studio” was designed to facilitate the collaborative construction of a new object or task between the activity systems. The data analyzed were illustrations of what was being said in the learning studio sessions. She found that the student teacher offered a tool that made a boundary object for questioning and analyzing the vocational institutions. During the process of negotiation, a new object was agreed on and finally implemented in the vocational institutions. The student teachers were, in the study, seen as important change agents in reforms of teacher education, and Lambert concluded that student teachers should be supervised to act as boundary-crossers and mediators between the university and the workplace.

Instead of seeing the differences between university and schools as “boundaries to be transferred,” Ellis (2008) focused on opportunities for learning.\(^\text{12}\) The study reported on

\(^{12}\) Ellis, in his work, was inspired by Beach’s concept of consequential transitions. This implies that Ellis employed a sociocultural perspective on transfer, instead of a CHAT perspective that understands transfer as developmental transfer (see, e.g., Lambert). Conceptualizing the boundary crossing of student teachers as consequential transitions means developing the student teachers’ metacognitive awareness of the relationships
participatory research that sought to work on the division of labor to expose and examine the contradictions in understandings of teacher identity and teacher agency held within the different activity systems (4 schools and 1 university). Another aim was to focus attention on a more systemic and relational view of what it means to learn teaching than has previously been done in the OIS. The reason for this intervention is the findings reported earlier in this chapter (section 2.3.2) that the interns in the OIS were required to cross boundaries between DTEs and schools, but the boundaries themselves were not open to examination and transformation. The study referred to episodes in DWR settings in which mentors and interns participated, and the collected data were interactions from the sessions.

The analysis showed how the mentors began to work with some of the tools in CHAT in order to understand and work on changes in the activity systems in which the mentors participated. The study found that the mentors gradually revealed an alternative conception of teacher agency as one that is distributed among various participants and that this understanding is seen as important for student teachers’ learning. Ellis found an indication of the potential of DWR methodology since this understanding was taken back to the mentors’ own settings in order to reconfigure the mentors’ work practices. DWR sessions are seen as boundary zones that enabled the participants to acknowledge contradictions in understandings as systematic and cultural and historically shaped rather than the outcome of individual performance.

2.5.2 Coteaching for learning to teach

The studies by Roth and Tobin (2001, 2004) also used an intervention approach as a framework to focus on the possibilities for acting in particular situations. Roth and Tobin developed a coteaching model between university researchers, supervisors, schoolteachers, and student teachers, where all engage in teaching. However, while the studies above focused on the structural aspects of human activity, other studies that used a CHAT approach focused on the possibilities for acting in a university and school collaboration (Roth & Tobin, 2004).
As a response to the well-documented finding that teachers’ knowledge is tacit and eludes verbalization (cf. Brown & McIntyre, 1993), Roth and his colleagues developed coteaching and cogenerative dialoguing, a situation in which two or more teachers take shared responsibility for the events of the classroom. Coteaching is a collaboration between teachers and a researcher or teacher (Roth & Tobin, 2004), between a teacher and a student teacher (Roth, Masciotra, & Boyd, 1999) or between students, a student teacher, a teacher mentor (called cooperating teacher), supervisor and researcher (Roth, et al., 2002).

I will briefly illustrate the method with the article “Becoming in the Classroom” (Roth, et al., 1999).13 Two of the authors, Roth and Boyd (the student teacher), cotaught a 4-month unit. The entire unit was videotaped. They also had meetings where they planned lessons, debriefed the classroom events, or watched and reflected on videotaped teaching episodes. These meetings were videotaped or audio-taped. The data analysis is grounded in hermeneutic phenomenology. The study described the student teacher’s growing competence in asking questions of the pupils. When the student teacher taught alone, she asked the pupils questions that encouraged short answers, filling the blanks in the teacher discourse, and often required only yes or no answers. Through the process of coteaching, the student teacher began to critically examine her questioning, and gradually she allowed the conversation to develop rather than closing it down.

The authors argued that coteaching affords many opportunities for learning to teach. While coteaching, one observes and experiences the other’s teaching and actions, which afford implicit learning on how to ask particular questions at particular times. Furthermore, coteaching leads to the development of a shared experience that can serve as a common ground for communication of the classroom events (collective reflection-on-action) and allows for stepping back and taking pauses for reflection (reflection-in-action).

---

13 Roth has published a huge amount of work in which he uses CHAT and phenomenology. Some of these studies are about learning in coteaching (cf. Roth & Tobin, 2004; Roth, Tobin, Carambo, & Dalland, 2004; Roth, et al., 2002). His theoretical and methodological framework is too complex to go into at this point and will be discussed in more detail in chapter 3.
2.5.3 Teaching as a process of learning to participate

Edwards and her colleagues’ studies of mentoring are an important contribution as they were inspired by the structural aspects of CHAT and the focus of agency and tools from the Vygotskian legacy. In this way, these studies are part of the attempts in recent years to include the notions of agency and discourse in CHAT. Edwards and Protheroe (2003) saw teaching as a process of learning to participate. Learning to teach is understood as a:

process of learning to be, see and respond in increasingly informed ways while working in classrooms. The role of the teacher educator therefore becomes one of raising the ante by gradually helping the student teacher to recognise and respond to the complexity of the situation while the student teacher as learner is engaging in practice. (Edwards & Protheroe, 2003, p. 231)

A series of studies over a period of 10 years focusing on mentor-student conversations expressed a wide range of concerns for how students are learning to teach under the guidance of mentors (Edwards, 1995, 1997; Edwards & Collison, 1996; Edwards & D'Arcy, 2004; Edwards & Ogden, 1998; Edwards & Protheroe, 2003). A study from the early days of training partnerships identified that mentors had difficulties in talking to student teachers about pupils’ learning (Edwards & Collison, 1995). A number of studies have shown that teachers’ knowledge is highly situated, and they have problems relating their practice to generalizable theories or accounts of how pupils learn (Brown & McIntyre, 1993; Maynard, 1996b; Ottesen, 2007b). In a later study, Edwards and Ogden (1998) examined how mentor conversations support the learning of student teachers. The study used content analysis to identify the content of mentor-student talk. The researchers found that much of the talk (79%) focused on positive descriptions of observed events. The mentors did not assist student teachers in acquiring a practical understanding of teaching and in interpreting classrooms. Thus, mentor conversations were not opportunities for student teachers to appropriate the practical knowledge of teachers that would later help the student teachers to interpret and respond to their actions. In other words, the student teachers did not get an opportunity to enhance their pedagogical professional knowledge.

A follow-up study focused on what student teachers are learning about teaching (Edwards & Protheroe, 2003) and how mentors are positioned in partnerships (Edwards & Protheroe, 2004). The data were gathered with an open-ended questionnaire, interviews with student teachers and mentors, and postobservation mentor conversations. The interviews and observations were content analyzed. The studies showed that the mentors’ concerns with the
progress of their pupils meant that the students’ teaching was restricted to curriculum delivery, and the work was guided by lesson plans, which made the students become increasingly less responsive to pupils over the years of the students’ training. Feedback from the mentor focused on the delivery of the lesson and the pace that pupils moved through the curriculum (Edwards & Protheroe, 2003, 2004). In contrast to much previous research on mentoring (Burn, 2007; Hagger & McIntyre, 2006), Edwards and Protheroe did not argue that the problem was the mentors and their knowledge base, but rather the problem lay at the level of organization. The researchers therefore analyzed the mentors’ actions within the activity system of the schools and suggested that the mentors were, in many ways, just doing what was required. The researchers found that the schools valued the teachers’ work in the classroom and the focus should be on the pupils and the curriculum task rather than focusing on the student teachers’ learning and their work as mentors in training partnerships. Studies of Norwegian teacher education likewise found that discussions between mentors and student teachers predominantly were directed toward the doings of the student teacher and that the discussions were rarely theoretically informed (Ottesen, 2006b; Sundli, 2001).

2.5.4 Summary of different CHAT interpretations of learning to teach

In this section, I have been looking at three CHAT interpretations of learning to teach. The three interpretations are similar in foundational aspects in regard to the overall interpretation of learning to teach. In line with the CHAT interpretation, these interpretations take the cultural historical activity into account and claim that the use of cultural tools plays a decisive role. The three strands have different focuses for their work though. While Ellis and Lambert sought to identify and work on problems of practice in order to achieve systemic development, Roth sought to develop coteaching as a possibility to act in university/school collaboration. Edwards studied mentor-student conversations. These differences in the focus of analysis are reflected in the theoretical emphasis. While all employ a CHAT framework, Ellis and Lambert were inspired by a more structural approach to CHAT\textsuperscript{14} while Roth and Edwards wanted to include the notion of agency in CHAT.\textsuperscript{15}

\textsuperscript{14} The structural approach to CHAT is mainly inspired by the work of Yrjo Engeström.

\textsuperscript{15} This will be thoroughly accounted for in chapter 3.
A similarity between the studies is that the data material was collected from the school setting. In the interventionist studies, the focus was on sessions with participants from all activities, but the meeting took place at the school. A main difference between the contributions in this section is connected to their methodological arrangement. Ellis, Lambert, and Roth arranged for thoroughly developed interventions in which the researcher played an active role either as a facilitator or teacher who introduced and organized new tools for improving the setting, while Edwards always studied natural settings. All the studies collected observations and interviews, but the studies’ strategies for analysis differed. Edwards conducted content analysis of interactions and interviews to show the characteristics of student-mentor conversations, while Ellis, Lambert, and Roth\textsuperscript{16} used observations and the participants’ utterances to show how the participants developed their work with the available tools.

The last point in the summary is the empirical findings of the studies. Edwards and her colleagues found that the focus in mentor talk was curriculum delivery and few instances of assisting students in how to interpret classrooms. In light of these findings, the intervention studies by Ellis and Roth become very interesting. Ellis showed how mentors, by working with CHAT tools in DWR sessions, gradually revealed alternative conceptions of teacher agency. Similarly, Roth’s studies of the coteaching method show how the student teachers in coteaching situations gradually began to critically examine their own questioning of pupils.

2.6 Review of research on the PLUTO project

Although the PLUTO program was a substantial national reform that was considered innovative within the national context and was highly regarded as an example of best practice within the European Union system, few systematic analyses of the program have been conducted. This section will provide a short review of the findings from the PLUTO program.

\textsuperscript{16} In other parts of his work, Roth has conducted interaction analysis to study learning in science classrooms (Roth, 2005b, 2006). Roth is also a central writer within CHAT, and I will come back to his theoretical and methodological contributions in chapter 3.
The alternative assessment forms, based on electronic portfolios, were a central focus for the program. A range of uses of the portfolio existed, but usually a portfolio contained a variety of students’ products collected over time. Based on analyses of the reports from the PLUTO projects, Rasmussen and Ludvigsen (2009) found that the organization of the electronic portfolio assessment involved changes in institutional norms and a division of labor between students and teachers. The division between a work folder and a presentation folder meant in practice that the students received more feedback on their work than they had previously. These findings were confirmed in studies by Hauge (2006) and Wittek (2003), who found that the new way of working played a significant role in the students’ learning processes. In interviews, the students say that the relationship between theory and practice is improved, the work with the portfolios has supported their reflection process, and the students reported closer collaboration among themselves and between themselves and their teachers (Hauge, 2006).

All the institutions that aimed for systemic change introduced tasks in which it was obligatory for the students to use experiences from internships as data in the students’ work with the tasks. The use of ICT in combination with different forms for project work was central, and the work with the assignments was organized in core groups (Ludvigsen & Rasmussen, 2006). A survey by the University College of Østfold found little support for students' development of self-regulatory learning skills. The discussion of learning and study strategies was not systematically integrated into any of the different forms of instruction. In addition, students' development of collaborative learning skills was not systematically supported in the program. The instruction in the seminars and lectures was characterized as teacher-regulated knowledge transmission. Thus, student responsibility for knowledge construction consistent with the concept of problem-based learning was mainly restricted to the activities in the core groups (Bråten, Strømsø, & Olaussen, 2003).

In analyses of the reports from the different institutions, Rasmussen and Ludvigsen (2009) identified several large-scale innovations to strengthen the relationship between the campus activities and the schools as a practice arena, but the researchers found few traces of trajectory or system changes. For example, the partnership agreements were not necessarily transformed into changes on other levels within the institution.

Ottesen (2006b), in her thesis, contributed to our understanding of students’ learning in internships in her analyses of interactions between student teachers and mentors in the
This study provided valuable insight into how student teachers become teachers from the perspective of internships. She found that what became of the internship was contingent on how tensions were resolved in the schools and not on the reform intervention. Mentoring conversations is highly context bound; the talk was on what the student teachers planned to do, or had done, when teaching. In other words, the focus was on teaching, not on learning. Second, she found very few instances of explicit use of theoretical resources (Ottesen, 2007a, 2007b). A study of how student teachers use ICT found that even though the students had learned methods of teaching with ICT and experienced learning with ICT, it did not spontaneously translate into new forms of practice; rather, practice emerged in the interplay of tools, institutional traditions, and students’ and mentors’ agency (Ottesen, 2006a).

In the examination of what was interactionally accomplished in the PLUTO projects, these studies provide an important contribution to the understanding of how education practices change in relation to organizational reforms. However, neither of these studies investigated how DTEs and schools conjointly contribute to the student teachers’ learning. Such research calls for analyses of how interaction is accomplished in different contexts and how this is related to the cultural, historical, and institutional setting where the interaction takes place. My work aims to contribute to the student teachers’ participation within and across DTEs and schools in the activity of learning to teach.

2.7 Identification of the need for further research

Looking into the differences into the focus of analysis in the three research areas on learning to teach, it becomes evident that these give attention to a broad range of issues. In this review, I have been looking at studies that have emphasized mental constructions in student teachers’ development of professional knowledge, while others have studied student teachers’ exploration of different forms of professional knowledge. Moreover, I have gone through studies that focus on structural issues such as the use of partnerships to tackle the discontinuities between learning and teaching. Finally, I have studied approaches that in different ways have highlighted issues concerning communication between participants from universities and schools and mentor-student conversations.

These foci of analysis have been approached through various theoretical frames. We have seen that the differences in emphasis are related to different epochs in research on
teacher education. The majority of studies on learning to teach focus on students’ reflective actions. However, the field of reflection is vague and encompasses different theoretical approaches. I have categorized two main approaches to reflection-oriented studies that dominated the research on learning to teach in the 1980s and ’90s: the constructive and cognitive perspective on reflection and the interactionist perspective. I have shown how the research focus changed in the mid-1990s to policy-oriented research because of the increase in reforms in this period. Finally, we have seen that there is an increase, however still limited, in research using different kinds of sociocultural interpretations since the end of the 1990s.

The methodology arrangements have also varied. Different forms for interventions characterize the research within the field of learning to teach; the main approach is action research where the researcher is the practitioner. We have seen how CHAT uses another intervention approach, known as developmental work research. Finally, descriptive studies have been conducted to study mentor conversations and national or local reform efforts. The theoretical and methodological interpretations give premises for the choice of strategy for analysis. We have seen that many studies used interviews and observations, but the strategies varied. Some conducted content analysis, others identified levels of mental development, and still others used a particular type of strategy for identifying the participants’ goals, actions, and conditions. Moreover, we have seen that CHAT-informed studies employ analysis of interactions from DWR sessions.

This review shows that there is a lack of research addressing student teachers’ experiences at DTEs. Instead, the focus has been on what goes on in internships and the role of the mentor. This emphasis has made robust findings across theoretical approaches showing that mentors are reluctant to challenge students and unable to articulate their practical knowledge. Furthermore, theoretical issues are rare in talk between mentors and students; the participants are concerned with curriculum issues. In other words, in internships, the students act as teachers. I have also shown that policy-oriented research has dominated research on teacher education over the last decade. These studies addressed important issues regarding constructive and challenging sides of different partnership models. However, the problems with these studies are that organizational aspects are seen as working in practice rather than as a context that affords and constrains practices.

Within the microoriented studies on learning to teach, an abundance of studies focused on student teachers’ development of professional knowledge. Studies from a constructivist
viewpoint described how student teachers gradually develop confidence and competence, often identified as mental levels or phases of development. These studies provide important knowledge of the concerns student teachers have in their process of learning to teach. From the point of view of this thesis, the problem with these studies is that the individual is the unit of analysis. Another strand of research within reflective-oriented studies is interactionism. From these studies, we have learned the importance of giving student teachers room to interpret and explore different forms of knowledge. The studies also demonstrate the importance of mentors’ facilitation in this process. The problem with the OIS perspective is that it values knowledge that is generated in interactions in knowledge communities by the participants in these practices over knowledge generated by the teacher education institution. In this perspective, commonsense theories are inadmissible and leave it to the student to make up his or her own mind about what are appropriate forms of practice. From the point of view of this thesis, the problem is that learning to teach is reduced to situated craft-based practices without taking into account how historical cultural resources, such as pedagogical theories, mediate participants’ actions.

Looking into the CHAT studies of student teachers learning teaching, these make a rich contribution in showing how learning to teach can be approached in the research in various ways. What characterized the CHAT studies on teacher education are intervention-based research and a study of the school setting. The studies share a strong focus on interaction for studying negotiations between teachers and students. These studies found that the opportunity for learning, and change of practice, increases when participants from different practices collaborate in different forms for research-led interventions. However, the studies emphasized the development of the historical activity and paid little attention to the individuals’ actions. The studies did, however, conduct analyses of interaction, but if we look at how the analysis was performed, it was content analysis to understand what characterized communication, or analysis of what was being said to inform contradiction and change in the collective activity.

Based on the review, it is possible to identify what kind of research is needed to understand how student teachers learn to teach. The empirical focus has been on student teachers’ experience in internships, without paying attention to what goes on in DTEs and students’ transition between the DTEs and schools. The research literature is dominated by studies that took either the individual or the social structure as the unit of analysis. The
relationship between collective and individual learning has not been addressed either empirically or theoretically. This is because learning has mainly been studied from one level of description. To capture the complexity of learning to teach, studies with a multilevel approach, focusing on how meaning is made and how different tools, rules, and divisions of labor mediate the activity of learning to teach, are needed. This implies studies that investigate student teachers’ interactions and how these are structured by the possibilities and limitations within the different settings.

The studies in this thesis have addressed this in different ways. Article I identifies how the portfolio assessment system creates systemic changes in the teacher education program, while Article II focuses on how boundaries in teacher education are constructed and made relevant by participants in their interactions. Article III explores student teachers’ learning trajectory while working with case-based methods in a university course. Finally, Article IV discusses methodological considerations and shows that an analysis of participants’ interactions and tool use reveals how construction of knowledge is affected by historically developed rules and the division of labor.

Based on the identification of the gap in this area, I develop a theoretical argument for scrutinizing the activity of learning to teach in chapter 3. In chapter 4, I bring this perspective further and give an account of my methodological viewpoint and at the same time make an empirical description of how this has been followed up in the studies that I have performed in this project.
3 A CHAT approach to learning to teach

The sociocultural perspective that frames this study builds on the Russian cultural-historical school of thought from the early 1920s and the 1930s. Central figures in this tradition are Vygotsky and his students Leontiev and Luria. The main concern in Vygotsky’s theory of semiotic mediation is that learning and cognition are social and cultural activities that cannot be separated from the tools and signs in use. Tools mediate our actions, and together with speech and actions, tools create meaning in concrete situations (Vygotsky, 1978). The mutual understanding within the culture of our concepts and actions makes it possible for us to talk and interact in meaningful ways (Wertsch, 1985). However, within this fundamental, mutual understanding, the perspective allows different kinds of interpretations. I argue that there are two main lines of interpretations that dominate the sociocultural perspective: one is cultural historical activity theory (Daniels, 2009; Edwards, 2009; Engeström, 1987; Kaptelinin & Nardi, 2006; Leontiev, 1978; Roth & Lee, 2007), and the other is the dialogical perspective (Bakhtin, 1986; Linell, 1998; Mercer, 1995; Säljö, 1999; Wertsch, 1991).

Although both lines of interpretation build on Vygotsky’s ideas, there are tensions between the interpretations related to whether mediated action or activity is the appropriate level of analysis. Wertsch (1985, 1991), influenced by Vygotsky and Bakhtin, developed an account of human mental processes that recognizes the essential relationship between these processes and their cultural, historical, and institutional settings. Engeström (1987) began from a different direction by asserting that the entire activity system is the unit of analysis. While including the individuals, tools, and mediated action for analyzing the activity system, he also included an analysis of the history of the systems of activities he investigated. Cole
Extended abstract

(1996) emphasized the fundamental similarities between the interpretations: “Mediated action and its activity context is two moments of a singular process, and whatever we want to specify as psychological processes is but a moment of their combined properties” (p. 334). As I will come back to, there have been several attempts in recent years to conduct a multilevel analysis where one pays attention to subjectivity and discourse and the object-oriented activity.

This thesis is framed within a CHAT interpretation of object-oriented activity. I find the analytic structure of the activity system to give a virtue in understanding how student teachers learn to teach by analyzing individual actions in relation to the collective activity they are part of. In this chapter, I will first outline the theoretical foundations of CHAT. To identify my own position, I will then account for the key theoretical and analytic concepts that are informed mainly by CHAT but also the meaning-making version of the sociocultural perspective.

3.1 The theory of activity: The legacy of Vygotsky and Leontiev

The concept of activity is probably the most important concept in Soviet psychology and has philosophical foundations in the dialectical logic of Hegel, Marx, and Engels. Marx stressed the importance of activity as a fundamental theoretical concept in which activity and the mind are truly social as this is what forms us as human beings (Leont'ev, 1981). Tolman (2001) wrote that in Marx’s account:

The category of practical activity achieved a highly concrete conceptualization, fully situated both in human needs, natural and cultural, and in the societal relations of historically conditioned social practices. Moreover, activity was conceived as constituted by societal relations, and thus constituting the individual, but also as individuals’ means of constituting societal relations, and thus constituting themselves (Tolman, 2001:91).

The theory of activity has different strands in Soviet psychology, in which the sociocultural perspective has its roots in the legacy of Vygotsky and Leontiev (Wertsch, 1979). They took as their basic premises individuals and their activity, and the material conditions individuals live in, those already existing and those produced by their activity. Even though Vygotsky himself never made a complete philosophical analysis of the concept
of activity, major features of the theory today have their origins in Vygotsky’s work (Wertsch, 1991). One of the defining features of the contemporary theory of activity is activity as shaped by mediational means. This is the basic claim for Vygotsky, who was particularly interested in extending the notion of mediation by tools to mediation by signs and speech. Language is seen as the most important means humans employ to organize social interaction, to regulate others and oneself. Human mental processes are inherently social by nature and are mediated by sociohistorical tools and can be acquired only through interactions with others. Mental processes are thus interpsychological processes that later can be carried out independently by the individual and are converted to intrapsychological processes (Vygotsky, 1978).

This is related to the notion of internalization. Vygotsky was concerned primarily with how the child internalizes certain features of activities that are social and cultural in nature. As we will see later, the contemporary theory of activity focuses not only on internalization but also on a developmental cycle that also contains externalization. This also shows a developmental or generic approach to activity. Vygotsky dealt mainly with the social origins of individual mental functioning, the ontogenetic transition, and paid special attention to semiotic mediation. In the last years of his life, however, there is an essential change in the way he approached development. This is obvious in chapter 6 of *Thinking and Speech*, in which he approached concept development not only as an ontogenetic transition but also on how this development emerges in institutionally situated activity. This implies that a sociocultural approach to mental functioning should identify historically, culturally, and institutionally situated forms of mediated actions and how their mastery leads to particular forms of meditated action on the intramental plane (Wertsch, 1991). Leontiev expanded Vygotsky’s work and developed the foundations for analyzing the structure and function of activity.

Leontiev widened the scope to view object-related practical activity as the proper unit of analysis. The concept of activity has a specific, distinct meaning in the theory of activity and is an evolving, complex structure of mediated and collective human agency that is object-oriented:

The basic characteristic of activity is its object orientation. The expression “nonobjective activity” is devoid of sense. Activity may seem to be without object orientation, but scientific investigation of it necessarily requires discovery of its object. (Leont’ev, 1981, p. 48)
Activity used in a CHAT analysis should therefore not be used in the everyday sense of the term, as relatively brief events with definite beginning and endpoints, as is characteristic of school-based tasks (Roth & Lee, 2007). Analyses of activities open up the possibility of properly understanding subjects and objects. No properties of the subject and the object can exist before or beyond activities; the properties exist only in activities, when being enacted (Leontiev, 1978). For researchers, the concept of the object of activity is an analytic tool that provides a means of understanding not only what people are doing but also why they are doing it. The subjects concretely realize the activity by adopting and realizing the general object or motive (Leont'ev, 1981).

Every activity consists of a structure of activity, actions, and operations, which is dialectically related. This implies that activity has to be analyzed at these three levels (Leontiev, 1978). Activities take shape and are transformed over lengthy periods of time and are realized by goal-directed actions framed by individuals. A number of actions serve the purpose of developing professional teachers: reading books in educational theory, discussing theory with other students, giving feedback on other students’ assignments, practicing teaching skills in classrooms, discussing learning, teaching or experiences with supervisors, mentors, or fellow students. An important aspect of the relationship between activity and actions is that such actions may be motivated by needs arising from several activities. The actions of the student teachers simultaneously realize the activities of teaching in schools and learning to teach. Actions are in turn concretely realized by unconscious operations that are oriented to the current conditions. The difference between action and operation becomes clear in these actions involving tools. A tool is a material object in which the methods or operation, rather than actions or goals, becomes visible (Leont'ev, 1981). To conduct an action, such as giving a student teacher feedback on his or her assignment, the student teacher has to carry

---

17 In the sociocultural perspective in general, “activity” is typically used in this broad sense of the concept.
18 Engeström (2000) addressed the same critique of the situated perspective, as the cognitive perspective. Neither of these perspectives has the activity as the unit of analysis. They therefore take into account only what people are doing and not why they are doing it. The possibility of constructing knowledge and reality is then, according to Engeström, reduced to ahistorical situations.
out certain operations, which means that he or she has to master the appropriate tools, i.e., reading and writing.

Leontiev’s ambition was to develop a theory of personality as a sociohistorical phenomenon. Personality and consciousness are not prior to activity; they are produced within societal relations, and are activity-based (Leontiev, 1978). Leontiev analyzed three aspects of culture that have a fundamental impact on the mind: tools, language, and the division of labor. The analysis of tools and language followed Vygotsky’s approach. The division of labor has a special significance for the development of personality, and tools ensure the development of sophisticated forms of collaborative work and other socially distributed activities (Kaptelinin & Nardi, 2006). Leontiev did not develop further the instrumental and collective aspects of activity. This was followed up by his son, A.A. Leontiev, who emphasized that activity cannot be characterized as individual; it is truly social.

Thus, when we are dealing with joint activity, we can, with full justification, speak of a collective subject or of a total subject of this activity, whose interrelation with the “individual” subjects can be comprehended only through psychological analysis of the structure of activity. However, the essential elements and inner relations of activity were not comprehensively analyzed and modeled by either one. This was Engeström’s project in his influential thesis, “Learning by Expanding” (Engeström, 1987).

3.2 The perspective of CHAT

To be able to use the concept of human activity in concrete research, Engeström (1987) created a model that explicates the components and inner relations. The activity triangle reveals the social and material resources that are salient in activity. Roth and Lee (2007) explained the difference between activity and activity systems as follows: “The subject of individual activity systems (individual, groups, organizations) concretely realize collective (generalized) activity by adopting and realizing the general object or motive” (Roth & Lee, 2007, p. 201). Thus, activities are seen as embedded in activity systems, and one activity can consist of two or more interacting activity systems. As understood in this thesis, the activity of learning to teach is depicted as two interacting activity systems: the DTEs and schools. The unit of analysis of this thesis is, in other words, the activity of learning to teach. The
activity system is an expansion of Vygotsky’s triangle (the subject and the object are mediated by tools) with the collective concepts of rules, community, and division of labor.

Figure 1. Conceptual model of an activity system (Engestöm, 1987).

This extension makes it transparent how CHAT analysis focuses on what people (subjects) actually do, the objects that motivate people’s activity, the tools people use, the community of which they are part, the rules (norms and values) that pattern people’s actions, and the division of labor, that is, how participants divide work among themselves. Tools, community, rules, and division of labor are social and material structures that enable and constrain human agency. Put in another way, these structures mediate the relationship between human agents and the object of their actions.

In his later work, Engeström elaborated on the interaction between two or more activity systems. Expansive learning is understood as an accomplishment in and between multiple loosely connected activity systems and organizations, which represent different traditions, domains of expertise, and social languages (Engeström, 2004). The activity systems, such as a children’s hospital and primary health care center, need to be analyzed against the history of the local organization, and against the global history of medical concepts, procedures, and tools, which are employed and accumulated in the local activity system (Engeström, 2001).
Each of the elements (tools, rules, division of labor, etc.) in the activity system, and consequently the activity system as a whole, undergoes continuous change and can be understood only through a combination of historical analysis and analyses of the situated actions (Engeström, 1987). Important in this respect are the inner contradictions, which are understood as the driving forces for action and change (Ilyenkov, 1977). The identification of contradictions within and between activity systems is a central component of an activity theoretic analysis (Engeström, 1987). According to Engeström, contradictions may exist (a) within each constituent element of an activity system (tools, object, etc.); (b) in the relationship between two elements (between the division of labor and tools); (c) in the relationship between the object of one activity system and the object of a culturally more advanced activity; and (d) between the elements of different connected activity systems (Engeström, 1987). The dialectical logic in CHAT makes the contradictions positive constituents; they are potentials for development and change (Ilyenkov, 1977).

Contradictions are historically accumulated structural tensions within and between activity systems (sociogenesis). Contradictions are then different from conflicts that emerge in personal development (ontogenesis), and disturbances that are gaps in interaction (microgenesis). In empirical research, it is important to pay attention to recurring disturbances in actions since these are potential actions for change and development in the activity system (Engeström, 2008b; Engeström, Engeström, & Kerosuo, 2003).

Since the notion of activity is a dialectical relation between activity, action, and operation, each corner of the triangle has these three qualitatively different levels inherent. To understand the activity system, the researcher should study how tools, objects, community, rules, and division of labor are enacted in each level of the activity and the relation between them.

In the research literature, the notions of activity and activity system are used in various ways according to the focus of the research. At the Centre for Activity Theory and Developmental Work Research, the structure of an activity system is used to analyze complex systems such as health care organizations (Engeström, Engeström, & Kärkkäinen, 1995; Engeström, Engeström, & Vähäaho, 1999; Kerosuo, 2003). In the work by Kerosuo (2003, 2006), the multiorganizational field of health care was seen as the activity that is depicted as the interaction between three activity systems: the activity system of primary and secondary care, the activity system of tertiary care, and the activity system of patients.
Instead of using CHAT to explain change and development in collaborative work, Wolff-Michael Roth is interested in specific individuals participating in an activity, and in his research studies, he uses CHAT to analyze education. His theoretical interest is dialectical perspectives on participation learning and identity (see Roth et al., 2005). One of the studies focused on how the identities of students and teachers are continuously made and remade by participating in the activity of schooling (Roth, Tobin, Elmesky, et al., 2004). This was analyzed by focusing on a science class that was seen as the activity system. A new teacher, Cristobal, was seen as the acting subject in the study, and the object was his identity as a teacher.

The notion of activity is used in a confusing array of interpretations. Activity is treated as the unit of analysis in the different interpretations, but what is conceived as an activity changes in scale from health care (Kerosuo, 2006), school class (Roth, Tobin, Elmesky, et al., 2004), astronomy course (Barab, Barnett, Yamagata-Lynch, Squire, & Keating, 2002), down to school tasks (Varelas, Pappas, & Riefe, 2005), and even as parts of tasks (Junefelt & Lindberg, 1995). A second aspect is that it is often blurry whether the activity system is treated as an a priori form or an empirical question.

3.3 Approaching learning in CHAT

3.3.1 Conceptualization of object and motive

Activity as interpreted in CHAT is a unit of subject-object interaction defined by the motive of the activity. This implies that an activity is oriented toward an object that motivates and directs the activity. The object has a dual, but inseparable, character; it is material as well as ideational. This definition of the object, the identity of the material object and an object of thought, which orients the subject’s (individual or group) practical and cognitive activity, embodies an inner contradiction that drives practical activity (Roth & Lee, 2004). The object’s dual nature becomes explicit when translating from Russian into English. In Russian, the concepts of objekt and predmet mutually constitute the theoretical construct that we here call object (Kaptelinin, 2005). Objekt is a realization of a material reality and constitutes the subject-object opposition. Predmet, the object of thought, gives direction and orientation to an activity (Roth, 2004). The former holds product features while the latter holds process features. Predmet is related to the motives, needs, emotions, and feelings that direct and
regulate human activity. Needs must become motives, and emerge in the appropriation, use, and development of objects and artefacts in collective human activities (Miettinen, 2005). “Need direct activity on the part of the subject, but they are capable of fulfilling this function only under conditions that they are objects” (Leontiev, 1978, p. 54). In his famous hunting example, Leontiev showed how the beater’s actions became meaningful only as a part of the activity of hunting. Hunting has a societal division of labor where someone has to chase and someone has to ambush the frightened game. The materialized object, killed animals, relieve the participants’ need, states of hunger and cold (Leont’ev, 1981). For Leontiev then, the object of the activity connects the actions of the various participants under the same motivating whole, which is transformed during the course of the activity. This aspect of the term illustrates the collective, dynamic, and nonfinite quality of the object.

Engeström developed Leontiev’s interpretation of need to study change and learning in work activities. In this approach, a work community analyzes disturbances, lack of coordination, and breakdowns in the activity to formulate a new hypothesis for a new object of activity. A need is thus not related to an individual but is understood as societal essential problems, which are expressions of historically formed internal contradictions of the activity (Engeström, 1987). The object refers to the historically developed object of the activity system, which is the institutional answer to societal needs (e.g., the need for professional teachers), and institutional structures.

Since the research focus for Engeström and his colleagues is learning and change in work activities, the interpretation of object is closely related to production. Organizations emerge and continue to exist in order to produce goods and services. Teacher educators at DTEs and schools potentially share the same object, for example, student teachers’ learning. The understanding of students’ learning is not static, and the participants often have different

---

19 Engeström uses the concept of double bind to explain this. This concept originally comes from Batson, who used it in the sense of an individual who receives two messages or demands that deny each other, and where the individual is not able to comment on the messages. As Engeström was concerned with the development of activity structures, a double bind situation was reformulated as “a social, socially essential dilemma which cannot be resolved through separate individual actions alone – but in which joint co-operative actions can push a historically new form of activity into emergence” (Engeström, 1987, p. 165).
conceptualizations of it. What students’ learning is and should be is constructed and interpreted by the participants during the flow of actions, resulting in differing object conceptualizations by the participants in the teacher education program (cf. Engeström, 1987). In order to understand the development and change in an activity system, one should investigate the object-unit of the activity at a particular moment. Object-units are partial manifestations of the object of activity and refer to the problem or tasks the subject(s) direct attention to in their actions. These situational objects are procedural and give direction to the (inter)action. Understanding the object of activity requires careful observation of the trajectories of situational objects across space and time, across various situations and boundaries. Such an analysis enables the researcher to study the mutual relationship between individual actions and the overall activity and the inner movement of the activity system (Engeström, 1987).

As we have shown, Leontiev saw “the object of activity” and “the motive” as the same thing. Recent research on object formation in collaborative settings illustrates a need to reformulate the original activity theoretical understanding of the object of activity where one distinguishes between motive and object (Hyysalo, 2005; Kaptelinin, 2005; Kaptelinin & Nardi, 2006; Miettinen, 2005; Stetsenko, 2005). In a study of a biotechnology research department, Nardi (2005) argued that the object, a cure for cancer, was shared among the researchers, but they related to the object via different motives. The study found that the motives of the scientists and postdocs played with and against the motives of the managers. A key finding was that the motives, scientific interest, profit, and humanitarian desire, were linked through relations of conflict, power, resistance, and acquiescence. Others have argued that power relations and passions imbue human activity but are neglected in CHAT research (Kaptelinin & Nardi, 2006; Nardi, 2005). In a study of internships in teacher education, Ottesen (2008) identified how pupils’ need for continuity and stable routines, mentors’ need to be accountable deliverers of curriculum, and student teachers’ need to experiment and try out their ideas may lead to a continuous construction and construction of objects.

The notion of object is explored in different ways in the researcher literature. I will illustrate this by briefly going through how the notion of object is used in research studies from the Centre for Activity Theory and Developmental Work Research and studies by Roth and his colleagues. Radical innovative change in the activity system has been a driving force for the research at the Centre for Activity Theory and Developmental Work Research. A
A CHAT approach to learning to teach

53

A recurrent theme for these researchers has been the discursive expansion of historical objects of activity. I use an article by Virkkunen, Mäkinen, and Lintula (2009) as an example of how these researchers approach the notion of object in their empirical analyses. The focus of their study was boundary crossing and codevelopment in professional education, more specifically, physiotherapy. As is common in the activity theory studies, this study was carried out as a change laboratory process with the aim of constructing a joint object between physiotherapy educators and workplace representatives. The researchers described the process of constructing a joint object. The participants had different objects for their activity. For the teachers, the object was to help students acquire the knowledge and skills they needed to get their degree, while for the workplace representatives it was to enhance the health of the therapy clients. The change laboratory process revealed that helping different types of clients should be seen as a shared object. The participants designed new learning tasks for the practice period where the idea was that both educators and practitioners learn when they collaborate on new ways of helping clients. The researchers found that, during this process, the function of these tasks changed so that instead of practicing specific methods the students were more involved in studying the clients’ general needs. The collaboration among the educators, practitioners, and students made patient care and treatment a joint object where they together questioned the client’s problem and selected methods to help.

Roth and his colleagues focused on the dialectical tension between subject and object at the three levels of activity. The study of interpreting graphs (Roth and Lee, 2004) serves as a good illustration. In the study, they saw doing research on graphs as the activity. In this study, the researchers were, on the level of activity, interested in the tension between the materially existing graph and the participants’ idea or interpretation of the completed product. Second, at the level of actions, the researchers were interested in the dialectical tension between the global meaning of graph and the analytic meaning as it unfolded in the interaction. Finally, at the level of operations, the researchers were interested in the dialectical tension that exists between the visual image and the language used in speech and gestures.

What neither of these studies, nor anyone else, to my knowledge, paid analytic attention to is the relation between the problems the subjects direct attention to in their actions (situational object) and the historical object of activity. My work goes into this space investigating how student teachers make meaning of the situational objects in the teachers’
talk and the objects’ trajectories across time and space. How the situational objects unfold enables me to investigate the characteristics of the activity system(s) here and now. For example, when student teachers use scientific concepts in a joint construction of the case assignment, the student teachers enact the tools, rules, and division of labor of the activity system of the PLUTO project. Thus, the problem the student teachers are oriented toward, case assignments, is a partial manifestation of the object becoming professional teachers.

3.3.2 Learning and participation

Engeström’s project in “Learning by Expanding” was to develop a theory of learning activity (Engeström, 1987). Expansive learning is a process of continuous construction and reconstruction of evolving contradictions in a complex system that includes the object, the mediating tools, and the perspectives of the participants (Engeström, 1999c). The expansive process is the logical consequence of the dialectic relation between the activity, actions, and operations. To work out his theory of expansive learning, Engeström (1987) elaborated Gregory Bateson’s three types of learning. Learning I (on the level of operations) is a stimulus-response type of learning, for example, the learning of correct answers in a classroom. Learning II (on the level of actions) means the acquisition of the context of some type of operation, for example, when students learn the “hidden curriculum” of what it means to be a student: how to please the teachers, how to pass exams, etc. Another part of action learning, important for this thesis, is productive learning. This refers to learners who create tools to experiment on a solution on given problems. An example of this type of learning is when student teachers use and discuss the meaning of a scientific concept in their work on case assignments. Learning III (level of activity) is a rare form of learning in which a person in a group begins to question and reconstruct the sense and meaning of the context. Engeström developed this idea into a systematic framework of learning situations where the problem has to be created. The object of expansive learning activity is the entire activity system in which the learners are engaged and which produces culturally new patterns of activity.

The theory of expansive learning is often used together with the DWR methodology where the aim is to redesign the practice by generating, supporting, following, and analyzing cycles of expansive learning in the activity systems (see Engeström, Lompscher, & Rückriem, 2005 for a collection of studies). Analytically, these studies pay attention to
structural learning where actions illuminating contradictions is the focus of study. However, my interest is the way student teachers learn to teach by participating in activity systems in which the student teachers actively construct knowledge and understanding. I therefore turn to Wolff-Michael Roth, who pays attention to the dialectical relationship between individual and collective learning.

Learning in a dialectic perspective means that people produce and reproduce the conditions in which they live, but they are also subject to those conditions. Participants interpret and act by using available cultural tools, and the participants’ actions will in turn impact the activity. Learning and participation are products of ongoing interactions that involve the different resources available to the participants (Roth, Tobin, Elmesky, et al., 2004). In this perspective, learning is seen as “changing participation in ongoing but changing collective practice” (Roth, et al., 2005, p. 17), a local and historical process of continuous movement, development, and change. Since participation can be understood only in the relation between action and activity, it is therefore necessary to analyze the way in which the structures of the activity (tools, community, rules, and division of labor) enable and constrain participation. In this perspective, learning to teach is constructed and reconstructed through experiences of participation across time and space. Thus, I need a conceptualization of trajectory.

### 3.3.3 Participation trajectories

To understand the process of learning to teach, it is necessary to explore how the object unfolds over time through the participants’ actions and across multiple contexts. I therefore am interested in trajectories of participation (Dreier, 1999; Strauss, 1993). The notion of a participation trajectory enables the researcher to analyze evolving experience over time and in various learning spheres.

One of the first scholars to introduce trajectory as a concept was Interactionist Anselm Strauss and his colleagues. In studies of hospitals in the 1960s, the course of a disease from the perspective of an ill person was studied as the illness trajectory. In other words, the concept of trajectory is used as how a phenomenon evolves over time and the actions and interactions that contribute to its evolution (Strauss, 1993). According to these researchers, the concept of trajectory enables the analyst to investigate the process of activity, how the activity is planned, and the expectation, cooperation, and confrontation among participants,
as well as the consequences of their action (Söffner, 1991). Strauss’s conceptualization of trajectory involved temporal aspects of how time unfolds, and he did not take into account spatial aspects of trajectory.

From a critical psychology perspective, Dreier (1999) paid attention to how personal participation across multiple contexts is at the core of individual development. An important premise in Dreier’s work is that social structures work in a unidirectional way but as open-situated practices where interaction connects the participants’ different trajectories. Participation requires knowledge about the organizational features of the context, such as social position, distribution of authority and tasks, normal procedures, and the concerns of other participants. However, neither Strauss nor Dreier paid attention to learning and the use of tools in interaction or the connection between historical processes and interactions here and now.

CHAT researchers use the notion of “problem trajectory” as a way to follow how an activity system handles and resolves a problem (Engeström, et al., 1995). These analyses focus on the connection between historical processes and interaction (Kerosuo, 2006; Saari, 2003; Toiviainen, 2007). In a study of how networks of firms collaborate, Toiviainen (2007) studied the life trajectories of two customer projects. In her analysis, a trajectory was made up of phases, understood as focus shifts in the project, and episodes, understood as discourse tensions. In other words, CHAT analysis pays attention to how time unfolds over longer periods of time within and between activity systems. Interactional data were used to analyze disturbances in individual actions, but this was interesting only to inform transformations in the sociocultural events that are the focus of concern.

In contrast, the sociocultural perspective foregrounds in-depth analysis of interaction to study time as experience, as a resource for action, while time unfolding over longer periods is in the background (Ludvigsen, Rasmussen, Krange, Moen, & Middleton, 2010). The notion of participation trajectories has, among other things, been used in studies to investigate students’ changing understanding of scientific concepts (Furberg & Arnseth, 2009; Krange, 2007). In an in-depth study of interactions Krange (2007) explored the way that cultural tools intersect in the interactions and how the participation changes over time. She found that the knowledge domain and tools intersected and that students’ knowledge was increasingly sophisticated during their trajectories.
The notion of participation trajectory in this thesis is used to be sensitive to the dialectical relation between individual and collective learning. On a theoretical level, the concept of participation trajectory is important because it provides for the possibility of understanding learning as changing participation (Roth, et al., 2005). This is made possible because the participation trajectory provides a means for exploring how student teachers construct a situational object over time, such as a scientific concept, and how an understanding of the same scientific concept differs between DTEs and schools, depending on the historical object of activity. In other words, the participation trajectory expands the analysis of activity systems by taking into account how continuity and change are constructed in interaction. Consequently, the notion of participation trajectory becomes important on a methodological level, related to the multileveled approach argued for in this thesis. I will return to the methodological implications in the Methods chapter (chap. 4.3.1).

During the student teachers’ trajectories, the student teachers face boundaries that have evolved over a long period of time, along with the development of the institutional practices. Thus, to study the notion of participation trajectory, I need a concept of boundary.

3.3.4 Boundaries

As learning today takes place not only as a vertical relation between novice and expert but also between experts in interacting activity systems, CHAT researchers have focused on a view of horizontal expertise that takes the form of negotiation and exchange between multiple contexts. To study the collaboration between activity systems, the notion of boundary crossing is often used (see Engeström, et al., 1995; Lambert, 2003; Ludvigsen, Havenes, & Lahn, 2003; Tuomi-Gröhn & Engeström, 2003a; Tuomi-Gröhn & Engeström, 2003b). Boundary crossing is not all crossings between activity systems, but is seen as interactions where the participants engage in a process of collective concept formation (Engeström, et al., 1995). The stepwise emergence of a joint tool can be illustrated by a study of children’s health care (Engeström, 2001). During 10 sessions of a boundary-crossing laboratory, the three activity systems responsible for the care of children created and negotiated the concept of care agreement. The concept was gradually transformed into a “germ cell” for a new kind of collaborative care where the activity systems have joint responsibility over the entire care trajectory.
The studies of boundary crossing direct attention to a process where participants from different activity systems meet in intervention sessions and collaborate on a new object. These studies have paid scant attention to how boundaries are constituted in actions.

Kerosuo’s (2006) dissertation is an important contribution as she studied how boundaries are expressed in interactions. She defined boundaries as “established distinctions and differences between and within activity systems that are created and agreed on by groups and individual actors during a long period of time while they are involved in those activities” (Kerosuo, 2006, p. 4). Boundaries are intrinsic to the activity and become transparent on and through participants’ talk and actions.

In her study of a Finnish health care organization, Kerosuo (2003) focused on how the boundaries appear in discussions according to CHAT and how the boundaries identified evolved during discussion. She used the DWR methodology in which the research data were gathered during the transformation process in interventions. The patients and professionals involved were interviewed, and the patients’ consultations with doctors were videotaped. The researchers analyzed the disruptions and the problems related to the care of patients, and provided a video demonstrating the interactions. The video was presented to the participants in the change laboratory and served as a tool for discussions for the patients and professionals from the different health care departments. The laboratory session was tape-recorded and videotaped. The analysis focused on how boundaries were “marked” in speech. The transcript was divided into utterances of each individual speaker, and boundary expressions were categorized as speech aiming to maintain, question, and transform the prevailing boundary. Every boundary expression was then related to the analytic tool depicting the activity level. The findings showed that the unresolved boundaries affected the practices of health care as disruptions, dilemmas, or problems that are not easy to resolve. Questioning of the boundaries led to defensive actions in discussions, and the study concluded that questioning and transforming boundaries are demanding learning challenges.

Kerosuo’s work provides a conceptualization for understanding and analyzing how boundaries are expressed in interaction. However, her analysis is restricted to how boundaries are discussed in an intervention setting where the intention is the transformation of collective activities. The focus of this thesis, however, is student teachers’ participation trajectories at and between boundaries.
Boundaries appear as both a terrain of limits and of possibilities for student teachers’ participation trajectories. This represents a challenge for the students since the systems demand and give complementary and conflicting tools, rules, and patterns of social interaction (Engeström, et al., 1995). To understand student teachers’ participation trajectory, it is thus essential to explore boundaries in different ways. First, one has to explore the evolving objects and how they are conceptualized and used in and across various practices and professions. As we recall from the discussion on object and motives above, it is argued that, in collaborative work, participants have different motives for the same object. If we take the example of the lesson plan again: this is an object that is used in different activity systems, and none of the participants contest whether this object is useful or not. However, the object is instantiated in different ways because of conflicting motives (cf. Kaptelinin & Nardi, 2006). Second, one has to explore how the student teachers cross institutional and professional boundaries. When student teachers cross institutional boundaries, for example, moving between the DTE and schools, it is reasonable to assume that the student teachers will meet contested objects, as the example with the lesson plan.

An analysis of participation trajectories through institutional boundaries will help me explore how student teachers experience their participation trajectories. Student teachers also face a professional boundary in each of the activity systems where the object is conceptualized across these power levels (Nardi, 2005). This is, for example, related to the possibilities for making sense of the object in teacher-led activities and how teachers position themselves and student teachers in their talk. Thus, in order to understand how the boundaries are enacted, one has to take into account the structural relations that enable and constrain participation. I will account for how I conduct such an analysis in chapter 3.5 below.

3.4 Language, communication, and meaning making

In this chapter, I have accounted for the theoretical concepts I need to study learners’ participation trajectories within and between activity systems. I have shown how CHAT research mainly has focused on initiating and following systemic change with an emphasis on how the object is jointly constructed within and between activity systems Consequently, subjectivity in the transformation of activity has not been largely discussed (Miettinen, 2005), either as language and dialogue (Engeström, 1996). In a review of CHAT studies, however,
Roth and Lee (2007) found that educational researchers concerned with language, language learning, and literacy often ground their work in CHAT and most frequently in reference to Vygotsky’s *Thought and Language*. How language is treated though is quite confusing; sometimes it is treated as tools for construction of knowledge, sometimes as action, and sometimes as practice (Roth & Lee, 2007).

In the last couple of years, interest has increased in how to conceptualize participants’ actions within activity systems (Daniels, 2007; Edwards, 2005; Kaptelinin & Nardi, 2006; Miettinen, 2005). Stetsenko’s work on the dialectical relationship between the object and the subject has been one of the inspirations (Stetsenko, 2005). She argued that as we work on the object by contesting its meaning and understanding it better the object itself works back on us. In this process, we transform ourselves and how we in turn approach the object. In an attempt to elucidate the relation between action and activity, Daniels (2009) and Edwards and Kini (2009) suggested that there is a need to develop cultural historical analysis of how institutional structures mediate participants’ actions and how these structures themselves are transformed through the actions. Edwards and Kini recognized the way people reveal their meanings as representations for this transaction. Daniel’s concern was how language is used to construct meanings in boundary spaces. She suggested using the principles of DWR not to provoke systemic change but to set up meetings that enable relational work between participants. Daniels (2009) suggested that one promising way could be to turn to Bernstein’s theory to develop an account of rules and division of labor in terms of power and control to understand how social position is regulated in terms of social, cultural, and historical relations. He emphasized how social structures shape discursive practices and are interested in identifying points at which interaction engage with the institutional transformation. Daniels’ argument brings to the fore the need to examine how subjects work discursively, and to relate their talk to the conditions in which meaning can be made. However, the work in this field is still in its infancy and needs to be developed further, both theoretically and as related to empirical analysis.

In the following, I will go more deeply into how language and voices are conceptualized by Leontiev and Engeström. If we turn to Leontiev (1978), language is subordinate to activity. Interaction and communication are treated as exchange relations between the subject, rules, and community in the activity system (Engeström, 1987). Exchange is one of the four subtriangles in the activity system, which are inherent parts of
human activity, and changes in one of them change the others. Each of these subtriangles is potentially an activity of its own, but within the total practice of the society, the subtriangles are actions. According to Roth and Lee (2007), language mirrors the three levels of analysis in CHAT. At the level of operation, language (the production of words, gestures, and perceptions) is used for action and does not require consciousness or reflection. Viewed as action and activity, language becomes an explicit tool, sign, or object. Language is here about action; the language is the object of attention. Consequently, the entrance to study meaning is through discourses that include analysis of the relation between the action and its constitutive operations together with an analysis of the relation between the action and the activity.

An activity system is by definition a multivoiced formation (Engeström, 1987). The expansive cycles, the central events in the activity system, are a “reorchestration of these voices, of the different viewpoints and approaches of the various participants” (Engeström, 1999b, p. 35). To provide a notion of voices, Engeström turned to Bakhtin’s work and his concept of multivoicedness: “all the conflicting and complementary voices of the various groups and strata in the activity system under scrutiny shall be involved and utilized” (Engeström, 1987, pp. 315-316). As the collaborative nature of actions is seen as events in the activity system, communication becomes an integral part of object-oriented activities. Elucidating the different voices in the expansive cycle, the studies used interviews and analyses of interaction (Engeström, et al., 2003; Saari, 2003; Toiviainen, 2007). Utterances are used to illustrate the breakdowns taking place during the series of actions in the activity system. In the analysis, one is interested in the content of the utterance and what the utterance says about the structure of activity. Discourse is then subsumed as an aspect of larger social and cultural transformations rather than investigated specifically as meaning making.20

To get a more precise understanding of meaning making, I turn to the sociocultural approach of mediated action (Wertsch, 1991; 1998). This approach is concerned with action as dialectically interacting moments between mental functioning and sociocultural settings

---

20 Ritva Engeström (Engeström, 1995a, 1999a) is one of the few who have focused on social construction of meaning in conversations and suggested integrating Bakhtin’s notions of utterance, speech genre, voices, and social languages within the framework of CHAT. However, this was never elaborated.
Thus, the historical and cultural settings are central in the analysis only in the way they inform the subjects’ actions. Wertsch extended Vygotsky’s theory of the relationship between language and thought by incorporating Bakhtin’s concept of the dialogic. Bakhtin emphasized that the speakers always presuppose the other when making utterances: “meaning can come into existence only when two or more voices come into contact: when the voice of the listener responds to the voice of a speaker” (Wertsch, 1998, p. 52). Thus, your response is always oriented to the utterance of the other. Furthermore, meaning-making processes are mediated through historical, cultural, and institutional settings. In producing an utterance, a speaker always invokes a social language. The social language shapes what the speaker can say, and the meaning of this voice is dependent on the social system in which the voice is included (Wertsch, 1998). The studies in this thesis are concerned with how participants make sense of the situational object. When participating in different sites for learning, such as supervision, mentoring, and group work, the student teachers orient their talk toward more or less explicit expectations, norms, and values in the particular activity system. This implies that how student teachers make sense of situational objects, such as a scientific concept, has to be seen in relation to how aspects of the activity system are invoked and oriented in their meaning making. This can be in terms of how a task should be solved, the teacher and mentor’s instruction, the tools in use, and assessment criteria.

### 3.5 An analytic approach to investigate the activity of learning to teach

Meanings are situated in action, but they are a function of the social relation, always related to activity. This thesis is concerned with the meaning-making processes of student teachers in and between activity systems. This implies sensitivity toward how student teachers orient their talk and actions during the process of doing learning and doing teaching and the relation between those. To be able to emphasize participants’ meaning-making process in a CHAT analysis, I need a level of description that grasps the mutually constitutive relationship between interaction with cultural resources and how this is mediated by the activity system. This implies taking into account not only how participants use tools and follow existing rules but also how the participants continuously renew and develop tools. In
the following, I argue for the use of analytic concepts that allow an analysis of the participants’ talk to reveal their participation trajectory in relation to the historical activity they engage in. I will first argue for the use of learning spheres to address how different sites for learning shape and are shaped by relatively stable activities. Then I will go through the analytic concepts used in the articles to be sensitive to the doings of students and teachers: accounts, orientation, positioning.

3.5.1 The relation between activity and action: Learning spheres

To elucidate the meaning-making process when working on object constructions, I investigate participation in and across different sites for learning that constitutes a teacher education course. These sites are too diverse and shifting to be considered activity systems; there have, therefore, been attempts to identify intermediate units between the levels of action and activity, conceptualized as practices (Kerosuo, 2006; Scribner & Cole, 1981), projects (Hyysalo, 2005), engagements (González, 2006; Kaptelinin & Nardi, 2006), and working spheres (Engeström, 2008a). Theoretical shortcuts should not be taken, but methodologically this intermediate level may aid empirical analyses (Engeström, 2008a).

To conceptualize this intermediate level, I use the notion of learning spheres. Learning spheres are patterned ways of interaction (cf. Scribner & Cole, 1981) and are regulated by the historical object, rules, and division of labor of the activity system (Engeström, 2008a). Engeström (2008a) divided learning spheres into four ideal types: formal and repetitive, such as standard procedures; informal and repetitive, such as cultural practices; formal and unique, such as projects or events; and informal and unique, such as problems. This thesis is concerned with the standard procedures in the activity systems, such as seminars, mentoring, supervision, teaching, group work, and exams. Each sphere offers possibilities of enriching the student teachers’ repertoire as teachers. In each of the learning spheres, there are different participants with multiple backgrounds, interests, and motives for their actions. It is in student teachers’ participation in the learning spheres that tools, rules, and divisions of labor are experienced as salient constraints or possibilities available to the student teachers’ actions. It is therefore important to study the ways in which participation is managed across the spheres and the connection between them.

This thesis is concerned with how situational objects are made sense of in various learning spheres within and between activity systems and how the legitimacy of student
teachers’ accounts varies between learning spheres. For example, what characterizes talk between students and a teacher about scientific concepts in seminars could be different from how scientific concepts are introduced by the teacher and talked about and in an oral examination. By emphasizing how situational objects are made sense of in various learning spheres, I am able to explore how participation is played out in an activity system and the inner contradictions within and between activity systems.

In order to illuminate the characteristics of central learning spheres in teacher education and the relationship between these, I investigate actions in moment-to-moment analysis. The analysis holds explanatory power to follow the trajectory of the construction of the situational object and to unpack how it is mediated by institutional rules, division of labor, and tools in situated contexts. A dialogical stance on participants’ accounts in and across the various learning spheres provides important insight into the internal dynamic of the activity systems.

3.5.2 Accounts

In the learning spheres of teacher education, students carry out goal-directed actions. Goals are open and pliable and constructed in interaction through the participants’ accounts. Accounts refer to forms of talk and actions where participants make their ideas, understandings, options, agreements, and disagreements available to each other (Mäkitalo & Säljö, 2002). The attention is on what the students treat as relevant, in other words, the situational object for their talk, as well as how they try to deal with these concerns in their talk. The students’ accounts are based on the contingency in the activity, the ambiguity in the tools in use, and what is considered reasonable interpretations of the rules and norms of the activity. The students’ accounts relate not only to their experiences but also to what is justified as legitimate within the context (Ottesen, 2007b; Shotter, 1984).

By being sensitive to how the participants’ produce accounts, one can explore how institutional aspects are part of their talk and actions and how boundaries manifest themselves in the interaction. In order to study how the boundaries of the university and schools were constructed, Ottesen and I analyzed (Article II) how the participants produced accounts for maintaining, challenging, or transforming the prevailing boundaries.
3.5.3 Positioning

The division of labor in an activity creates different positions for the participants, and the participants carry with them their own diverse experiences with them into the activity (Engeström, 1999c; Leontiev, 1978). Boundaries appear both as a terrain of possibilities and as constraints for student teachers’ participation trajectory. The limitations and possibilities depend on the structural relations of rules and the division of labor. Thus, positioning reflects the cultural and historical distributions of power, legitimacy, and authority in the activity system but is situated and created in interaction. In other words, the division of labor in an activity system creates different positions for the participants, but there are spaces of authoring, moments that participants use for positioning rather than being positioned (Holland, Lachicotte, Skinner, & Cain, 1998). In the flow of interaction, participants position themselves in accordance with, or as a reaction to, the rules and norms in the activity and the participants account for what they will orient and position themselves in relation to. What counts as knowledge in various learning spheres and which aspects of the practice the participants orient and position themselves in relation to are managed by interaction, but are regulated in social, cultural, and historical relations.

3.5.4 Orientation

As has been mentioned several times, learning is created in the relation between actions performed by the students and the collective activity (Roth, et al., 2005). Aspects of the activity constitute an indivisible part of meaning making. By focusing on participants’ accounts, it is possible to identify how participants invoke and orient to the aspects of the activity in the participants’ talk. In the studies, the notion of orientation is used to be able to capture what is considered to be relevant by those who are doing the talking and how their orientation changes over time. Being empirically sensitive to participants’ orientation is essential in order to address participants’ shifting perspectives on a problem.

A focus on participation trajectories in relation to orientation makes it possible to investigate participants’ changing orientation toward the problem over time and across learning spheres. Furthermore, it is a way to analytically capture the constant shifts between an object and tools. Whether the object is constructed as a situational object or the tool is decided by the constellation of the activity, and changes during the course of interaction. How the tool/object relationship changes over time is discussed in Article III. Articles II and
IV are concerned with how this relationship varies across learning spheres. Finally, orientation makes it possible to explore how participants make sense of the more or less explicit expectations, rules, and division of labor embedded in the activity system. An emphasis on orientation allows the researcher to investigate if, and how, accounts differ across learning spheres, and how the student teachers’ positioning within learning spheres may influence the student teachers’ accounts.

For research in teacher education, the why’s and how’s of student teachers’ accounts are an important concern. In the studies of this thesis, I have shown how structural relations as division of labor and rules may constrain or afford possibilities for individual action. Neither entitlement nor legitimacy is a “given”; they are negotiated in interaction as possibilities for actions.
4 Methodological approach: Studying participation trajectories across boundaries

In this chapter, I will account for the methodological approach that I have used to study participation trajectories within and between activity systems. In chapter 3, I accounted for the theoretical perspectives that frame my investigation. I anchored my perspective on participation trajectories within a CHAT tradition. I considered central theoretical concepts for the study, and I discussed how my work, by also emphasizing meaning making, goes into recent theoretical and methodological development of CHAT focusing on the relation between activity and action. Then I accounted for the analytic concepts that have been central for being sensitive to the relation between activity and action.

This chapter will concentrate on methodological issues. First, I will discuss the methodological consequences of a sociocultural/CHAT perspective. Then I will describe the data collection, including a description of the data and the empirical methods I used to answer the research questions in the articles. Third, I will outline the analytic process, including a description of how I carried out the multilevel analysis. Finally, I consider the credibility of the research project.
4.1 The methodological consequences of a sociocultural perspective

As shown in the review of learning to teach in chapter 2, studies of reforms have been concerned with “what works” and the studies are built on an input-output model that curtails the change process. These types of studies assume that there is a direct correspondence between reform intentions and actual change. Rasmussen and Ludvigsen (2009) argued that it seems like a general agreement that prior studies have often: “(a) overlooked the recipients’ process of negotiating and making sense of the reform, (b) not recognized the impact of the history of the institution, and (c) not accounted for the significance of artifact mediation in human activity” (Rasmussen & Ludvigsen, 2009, p. 85).

This calls for an interactional orientation in addition to historical analysis when investigating reforms. Furthermore, it calls for approaches that offer conceptual tools to investigate and combine several timescales so that incremental changes can be identified and discussed in light of established historical patterns of change.

The approaches in the sociocultural perspective share the key concepts of activity, action, mediation, and tools, which represent an alternative way of studying reforms. Instead of investigating the learning product, the sociocultural perspective scrutinizes the learning process that is dialectically related to social and cultural contexts, or activity systems. In terms of methodology, this means examining how participation is mediated by the use of different kinds of resources in a social practice and the mediating role of social, cultural, and institutional settings. Consequently, the task of the analyst is to study how participation unfolds along different timescales (Lemke, 2000). The different approaches in the sociocultural perspective therefore differ in which timescales the approaches emphasize. Depending on the unit of analysis, either an individual’s changing participation in dialogue or learning and change in activity systems is highlighted in the analysis (Ludvigsen, 2009).

The dialogic approach focuses on how the meanings and functions of discourse, tools, and knowledge are constituted in social practices (Säljö, 2000). Some studies within this approach tend to focus solely on the communicative action, not taking into account where the communication is taking place (Stahl, 2006; Wegerif, 2008). Others are also concerned with the historical genesis of the artifacts or practices in question, or the specific institutional
arrangements as technological infrastructures, division of labor, rules, and regulations (Ludvigsen, 2009; Mäkitalo & Säljö, 2002).

Studies with a CHAT approach differ from these studies with their emphasis on understanding the object itself, and not only how actors construct the objects. The studies’ concern is to follow the trajectory of the historical object, and the analytic focus is on structural change. In order to understand the mutual relationship between participants’ actions and the history of the activity system, the CHAT methodology calls for analyses of (a) the history of the object, (b) the secondary contradictions in the activity system, and (c) the construction of the object-unit or situational objet (Engeström, 1987). Before I account for the analytic process in this study, I will go through the data material and how it was collected.

4.2 Data collection

The PLUTO project was initiated at ILS in the autumn of 2000. I was at that time employed as a research assistant at InterMedia, and was involved in the PLUTO project, until I started my PhD. Together with my (at that time) leader and now supervisor Sten Ludvigsen, we conducted interviews with the project group and the student teachers, together with observations of seminars at campuses in education and natural science. In this section, I will mainly explain the main data collection for this study, which was the school year 2002–2003 and 3 weeks in autumn 2003. Then I will briefly account for the data used in Article I that are based on the set of data collected in the 1st year of the reform.

Since the theoretical framework is CHAT, it was important for me to get a thorough knowledge of the teacher education program at ILS. It has been important for my knowledge of the activity that I have been involved in the PLUTO project as a researcher from the beginning. Since I wanted to investigate the object construction, I decided to observe one core group of 4 student teachers during their one-year trajectory in various formal learning spheres at university and the internship school. At that time, there were four seminar groups in education theory. I had collaborated with 1 of these 4 teachers in previous fieldwork. Ethnographic research depends upon good relationships and trust (Roth, 2005); I therefore saw it as an advantage to continue my observations in her class. The seminar groups in educational theory were put together according to the subject courses the students followed.
The seminar group that I observed was mainly a group of students who took social science and/or history, some students in combination with other courses such as Norwegian, English, French, and religion. In conversation with the teacher, I found one group of 4 students to observe throughout the school year. The group consisted of 2 men and 2 women, and they were around the average age of student teachers at ILS (±25 years old). The school was part of the municipality’s effort for pedagogical use of ICT (InnsIKT).

4.2.1 Description of the data

The overall analytic focus of this thesis is an investigation of how the student teachers make sense of the object in the learning spheres where the student teachers are produced as teachers. Article I studied how potential mediating pedagogical and technological tools in the 1st year of the reform were picked up and stabilized during object construction. Articles II through IV are concerned with how a group of student teachers make meaning of situational objects as part of their participation trajectories and how this is a function of the social relation of the activity systems. While Article III delves deeply into how the students make meaning of case-based methods (a tool of the activity system) over time in one learning sphere, Articles II and IV are concerned with how an object unfolds in various learning spheres.

To carry out this kind of analysis, I observed interactions between the group of student teachers and their teachers and mentors in various learning spheres during the school year. At the university, I observed seminars in educational theory (these were organized both as whole class discussions and group work) and courses in social science and history. I also observed one of the oral examinations. In the internship, I observed mentor conversations, the students’ planning of the lessons, the teaching practices, the supervisions with both the university supervisor and the school coordinator. In addition, I was also part of the cross-institutional meeting in the first internship period.21 During the first internship (4 weeks), the 4 students had joint responsibility for the teaching in a second-grade class in social science and a third-grade class in history. In the second internship (8 weeks), the student teachers were divided into dyads. The 2 women continued teaching the class in social science but got a new third-

21 See Article II in the second part of this thesis for a more detailed description of the learning spheres.
grade class in history. The 2 men continued teaching the history class and got a new third-grade class in social science.

In addition to observations, the analysis is based on different forms of documents and interviews. Table 1 below gives a presentation and description of the different types of data. The data collected are divided according to how they are used in the empirical analyses as core data and ethnographic contextualizing data. The 47 hours of video and audio recordings of interaction constitute the core data from the analyses in Articles II through IV. These are all recordings of the interactions in various learning spheres during the school year 2002–2003. A further description of the various types of data is given in the next section.

<table>
<thead>
<tr>
<th>Type of data</th>
<th>Description</th>
<th>Status of data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video and audio recordings</td>
<td>47 hours in total.</td>
<td>Core data</td>
</tr>
<tr>
<td>Documents</td>
<td>Organization document</td>
<td>Core data</td>
</tr>
<tr>
<td></td>
<td>School organization</td>
<td>Ethnographic contextualizing data</td>
</tr>
<tr>
<td></td>
<td>Students’ lesson plans</td>
<td>Core data</td>
</tr>
<tr>
<td></td>
<td>Students’ case assignments</td>
<td>Core data</td>
</tr>
<tr>
<td></td>
<td>Handout to students</td>
<td>Ethnographic contextualizing data</td>
</tr>
<tr>
<td></td>
<td>Handout to pupils</td>
<td>Ethnographic contextualizing data</td>
</tr>
<tr>
<td>Field notes</td>
<td></td>
<td>Ethnographic contextualizing data</td>
</tr>
<tr>
<td>Audio-taped interviews</td>
<td>Students: individual semi-structured interviews at the beginning and end of the school year (core group students)</td>
<td>Ethnographic contextualizing data</td>
</tr>
<tr>
<td></td>
<td>Project group: Individual semi-structured interviews with 9 people)</td>
<td>Core data</td>
</tr>
</tbody>
</table>

Table 1: Type of Data

4.2.2 Types of Methods

Ethnographic research involves exploring the nature of particular social phenomena without working with a closed set of analytic categories at the point of data collection and investigating a small number of cases. Another important feature is that the data analysis
involves explicit interpretations of the meanings and functions of human actions (Hammersley & Atkinson, 1995). When conducting ethnographic research, one must decide how to record the data. This decision has to be done in accordance with what one wants to investigate (Silverman, 2006). It was central for me to be in the field throughout the whole school year, and I wanted to observe the central learning spheres where the student teachers were produced as teachers. It was therefore important to have a careful consideration of which situations to videotape and where I should rely only on field notes. To get knowledge of the nature of the social practice, I observed and wrote field notes the first time in each learning sphere. Then I decided which learning spheres to observe more systematically. Table 2 gives an overview of the learning spheres observed during the study, the type of data collected, and the participants in each sphere.

<table>
<thead>
<tr>
<th>Learning spheres</th>
<th>Type of data source</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seminar Educational theory</td>
<td>Field notes</td>
<td>29 students and 1 teacher</td>
</tr>
<tr>
<td>(including group work in case-based methods)</td>
<td>Video (17 hours)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Students products</td>
<td></td>
</tr>
<tr>
<td>Course history</td>
<td>Field notes</td>
<td>App. 25 students and 2 teachers</td>
</tr>
<tr>
<td>Course social science</td>
<td>Field notes</td>
<td>App. 25 students and 1 teacher</td>
</tr>
<tr>
<td>Oral exam</td>
<td>Field notes</td>
<td>1 student and 2 teachers</td>
</tr>
<tr>
<td></td>
<td>Audio (1 hour)</td>
<td></td>
</tr>
<tr>
<td>Lesson planning</td>
<td>9 hours</td>
<td>Student teachers</td>
</tr>
<tr>
<td>Teaching</td>
<td>Field notes</td>
<td>Student teachers, pupils and 1 mentor</td>
</tr>
<tr>
<td>Mentoring</td>
<td>Audio (11 hours)</td>
<td>Student teachers and 1 mentor</td>
</tr>
<tr>
<td>Supervision</td>
<td>Audio (8 hours)</td>
<td>1 student, 1 university / school supervisor</td>
</tr>
<tr>
<td>Cross-institutional meeting</td>
<td>Audio (1 hour)</td>
<td>8 students (two core groups), 1 university teacher, the school coordinator</td>
</tr>
</tbody>
</table>

*Table 2: Sources and Participants*

The data from the seminar in educational theory, oral examination, lesson planning, mentoring, supervision by university teacher, and the school-university meeting are the core
data. I was interested in exploring the patterns of interactions between student teachers and with student teachers and their teachers/mentors. I therefore did not record the student teachers' teaching practices. However, it was important for me to observe and write field notes. The data, therefore, have the status of contextualizing data.

I primarily used observation with field notes to get knowledge of the field in the beginning of the school year and the learning spheres and topics that were not of primary interest. To understand the object construction, it was essential for me to look for what the participants were doing and how they did this, including how they used tools, and the division of labor and rules or norms of behavior that the community has adopted (Roth, 2005a). It was also central to capture how students and teachers interacted (who talked and what they talked about). After returning from the field, I typed out a longer record in which I elaborated on what I saw, what the observations signified, and, if possible, the role of the observations in my emerging understanding and theoretical framework (Roth, 2005a). When notes were used as a supplement to recordings, the notes were not systematic field notes but rather recordings of reflections and thoughts to follow up when subsequently transcribing and analyzing the data. Moreover, these notes were also important for documenting things that happened just before or after video-recording situations.

The 47 hours of video and audio recordings of interaction constitute the core data for the analyses in Articles II, III, and IV. As Table 2 shows, audio recordings were used in the meetings (mentoring, supervision, oral examination). Moreover, the lesson planning sometimes happened more spontaneously, such as during lunch; these sessions were then audio-taped. I used video to record whole class situations and group work, both at campus and at the school. I always had a camera and an audio recorder with me out in the field. In the data collection of the case-based assignments for Article II, a master’s student with experience in ethnographic observations was with me out in the field. In these situations, I had two cameras and recorded two different groups working with the assignments. The master’s student, who wrote her master’s on the PLUTO project as well, operated one camera and kept observational notes about one of the groups, while I operated the other camera and made notes about the other group. The master’s student was an important discussion partner during this data collection. The camera used was placed on a tripod. In whole-class situations, the camera was placed in a corner in front of the classroom to capture most of the students. I moved the camera and zoomed in and out when what I felt it was necessary. When the
students worked at a table in small groups, they were seated around the table in a way that all students (usually around 4) faced the camera. In these situations, I connected a flat tabletop microphone, which had a hemispheric characteristic and picked up sound from the table on which the microphone was placed. When possible, I also asked the group to find a table in a quiet place. This way, the voices were picked up very well, without interference from other tables.

Another source of data was interviews with the 4 students in the core group at the beginning and the end of the school year. The purpose was to elicit the students’ accounts and interpretations of the object of activity and social practices under investigation (Hammersley & Atkinson, 1995). The interviews were semistructured in which I formed a series of themes to be covered during the conversation (Kvale, 1996). These themes focused on (a) the organization of the courses in educational theory and subject didactics, (b) case-based methods and portfolio assessment, (c) collaborative work in groups, (d) the relation between different components at campus (educational theory and subject didactics, educational theory and ICT, subject didactics and ICT, educational theory, subject didactics and ICT), (e) use of learning management system (LMS), (f) the internship, and (g) the relation between the internship and the campus. The interviews lasted about 60 minutes. They were audio-taped and transcribed. As mentioned previously, the interviews were supplementary data in Articles II through IV. However, the first interviews signaled some topics that would be interesting to investigate further in the observations. In Article I, the interviews were the core data, and the observations were supplementary. The data used in this article were collected during the 1st year of the reform (2001) when I was a research assistant. The focus in this study was on the project group’s conception of the reform effort and which of the central pedagogical and technological tools stood out as most powerful for designing the learning trajectories. We interviewed the project group (9 people) and used observations of the meetings in the project group, reports from the meeting, and observations of different whole-class activities in different subjects as contextualizing data. For a more detailed description of the data and analysis, see Jahreie and Ludvigsen (Jahreie & Ludvigsen, 2007).

Finally, the data material consisted of different types of documents. On the level of activity, there were three sources of documents. The overall plan for practical-pedagogical education and the administrative arrangements of the practical-pedagogical education in the PLUTO project gave an overview of the structure of the course. The agreement to collaborate
between ILS and the partner schools clarified the institutional agreement in the partnership. These documents were necessary to get a thorough knowledge of the reform effort on the level of activity. The summary of the portfolio work and the guidelines for the different cases in educational theory focused on the demands for the work, the aims of the assignments, and the different phases the work should cover. I also got electronic copies of the student teachers’ case assignments, which were used as core data in Article III. Finally, the student teachers’ lesson plans for the supervisions were used as core data in Article II. I also had access to the LMS that was used in the course (It’s Learning).

The interviews together with the first observations in the field (the 1st year of the reform and the initial observations in the main data collection) clarified some themes that it would be interesting to explore more deeply. For example, I discovered that the use of ICT, which was what I, to begin with, had planned to focus on, was not so interesting after all (because of the rather limited use); instead, the case-based methods and portfolio assessment turned out to be more interesting. The contradictions between the university and the internship also stood out as salient to focus on. This is also an important topic for research since hardly any studies have been conducted on participation between universities and schools. It also turned out that even though the notion of “case-based methods” was used by the teachers on different kinds of tasks and assignments in different subjects, the students viewed only some particular kinds of assignments in educational theory as “cases.” The students’ arguments, together with what is understood as case-based methods in the academic literature, decided which case assignments to focus on in Article III.

4.3 Data analysis

4.3.1 A multilevel approach to study learning to teach

As mentioned in the beginning of this chapter, there have been several efforts in the different versions of the sociocultural perspective to grasp the interrelated levels of learning. The analytic focus in this study is how the reform effort provided new opportunities for student teachers’ process of learning to teach. In an investigation of learning teaching, I followed the trajectory of the object construction by investigating how the objects were picked up, developed, and stabilized in student teachers’ interaction and student teachers’ participation trajectories within and across learning spheres. I am interested in how the
participants used and made sense of different resources and how the tools mediated participation in the different learning spheres. To study the dialectical relation between individual and collective learning, I conducted a multilevel analysis by following three levels of description. This was based on the theoretical description put forward in the previous chapter and informs the empirical analyses (Articles I–IV).

*Activity level.* This level is an abstraction and is related to the historical development of activity. The level of activity is cyclic and recurrent, based on “stepwise formation and resolution of internal contradictions in activity systems” (Engeström, 1999, p. 33). Investigating the historical unfolding of the activity of learning to teach is beyond the scope of this thesis. Rather, I am concerned with how the activity is realized in real time. In the empirical analyses, this level draws attention toward what is considered rational and appropriate actions within the two activity systems of DTEs and schools and the opportunities and constraints for object construction.

*Trajectory level.* The concept of trajectory is used to study different levels of analysis. Dreier (1999) paid analytical interest in the ontogenesis, related to how individuals develop over time, while others, such as Strauss (1993) and CHAT researchers (Saari, 2003; Toiviainen, 2007), are interested in the sociogenesis, how a phenomenon or an object and social interaction together create a process over time. Ludvigsen et al. (2010) argued from a sociocultural approach to include both aspects of trajectory in the analysis. As said before, the participation trajectory, as used in this thesis, is a way to make the mutual relation between activity and action transparent. In other words, the participation trajectory is related to the notion of learning spheres. Learning spheres are the institutional arrangements where student teachers are produced as teachers and are historically built into the object, the division of labor, and the rules of the work of activity. The analytic focus on the level of trajectory is on changes in the student teachers’ orientation over the course of the interaction. The notion of participation trajectory is thus important to capture the construction of objects across learning spheres and how this meaning making always is related to the object of activity. By following a path of talk and actions over stretches of time and in different learning spheres, repeating patterns of interaction emerge (see Lemke, 2000). I am therefore able to identify how situational objects are made sense of in various learning spheres. The conflicting object conceptions in learning spheres make it possible to investigate the ways in which participation is managed across the spheres. Furthermore, the participation trajectory
serves as a way to capture the inner contradictions within and between activity systems. Consequently, the trajectory level makes it possible to study the relationship between the object of activity and the situational object.

The interactional level. The focus of the analysis on this level is on what characterizes the moment-to-moment interaction. In other words, how an action is achieved in one moment. The analytic attention is oriented toward what the participants are doing. This implies that I am interested in exploring what becomes of talk and actions. New tools, such as technologies or pedagogies, are adjusted, changed, and transformed in these actions. The communicative act is understood as an answer or a response to something in the context. The utterances mutually shape one another in and through social interaction, and their meanings and functions are the result of negotiation and sense making (Linell, 1998). The actions are intentional; in our actions, we make meaning of the objects. Furthermore, the meaning people make is a function of the social relation (Roth, 2005). The three levels of analysis are therefore mutually dependent and reflect different, but complementary, aspects of the process of learning to teach.

4.3.2 Interaction analysis

To carry out the multilevel analysis, I used interaction analysis (Jordan & Henderson, 1995). In the study in Articles II–IV of how students learn to teach, the analytic focus was what the participants actually were doing and how they constructed the situational objects. The aim was to identify the ways in which the participants use and make sense of available tools in interactions in the object construction, the patterns of talk and actions in different learning spheres, and the historical opportunities and constraints embedded in the activity system (Roth, 2005a). To investigate how resources are used to perform actions at particular moments, how actions unfold, as well as the ways in which in situ actions are related to a sociohistorical activity, interaction analysis is used as an analytic framework.

Interaction analysis focuses on at least three principles in line with a sociocultural approach. First, the focus is not only talk-in-action but also on how tools and objects are used to conduct certain actions. Second, interaction analysis combines moment-to-moment analysis of interactions and the use of ethnographic data to investigate the temporal organization of practices. Ethnographic fieldwork provides “thick descriptions” of the observed activity that are necessary for an understanding of social interaction (Geertz, 1973;
Roth, 2005a). In interaction analysis, the combination of ethnographic fieldwork and the use of video analysis is understood as a reflexive process in which the ethnographic fieldwork provides a background for the analysis of interaction and the detailed understanding derived from the microanalysis informs the ethnographic understanding. Finally, interaction analysis sees cognition and action as socially and ecologically distributed; thus, the empirical grounding of research must be “naturally occurring, everyday interactions among members of communities of practice” (Jordan & Henderson, 1995, p. 41). An implication is that one should not be drawn into categories while collecting the data or analyzing the data. Rather, the analysis should be kept “free from predetermined analytic categories” (Jordan & Henderson, 1995, p. 43).

The empirical analyses in this thesis aim at making the interaction between participants the starting point for exploring what turns out to be their orientation during interaction and their way of constructing and making sense of the situational object. Instead of predefined categories, I use analytic concepts that are informed by the theoretical framework and through the analytic work with the ethnographic information and video recordings (see chapter 3.5 for a description of the analytic concepts).

4.3.3 Analytical process

Even though data analysis does not follow distinct stages, it is possible to look back and describe the analytical work in terms of four main steps. The first step was to attain knowledge and understanding of the activity system (Roth, 2005a). The intention was not to conduct any systemic historical analysis; rather, I went through the documents about the reform and the field notes to explore the characteristics of the activity. A review of previous research on the PLUTO program was also important (Hauge, 2004, 2006; Ludvigsen & Rasmussen, 2006; Rasmussen & Ludvigsen, 2009).

The second step was to create an overview of the video and audio recordings. To do this, I logged the content of the videotapes and audiotapes (Jordan & Henderson, 1995). These logs contain summaries of the actions on the tapes, as well as the chronology and timing of actions that could be important in later stages. The field notes were used to contextualize the unfolding actions.

The third step was to identify recurring patterns of interaction in different situations over time. By looking through the video recordings several times in combination with
reading the field notes and the logs, I gradually identified patterns of interaction that differed across learning spheres. As a consequence of following a trajectory over a year, I had to analyze a rather huge amount of data. I did not find it necessary to transcribe all 47 hours of recordings, but it was important to be able to systematically identify the patterns of interactions. However, I decided to transcribe all the audiotapes. This was mainly because I found it more difficult to get an overview of the material by just listening. To help me with identifying patterns in the video recordings, I used AVID, originally a professional video editing tool. AVID allows the user to edit recordings, to tag written notes to the recordings, and to search through these notes. After having logged the content on the tapes, I categorized the recordings according to learning spheres. I tagged the beginning and end of talk that seemed important and wrote notes while exploring the recordings in depth. Thus, the AVID software was used as an intermediate step before the analysis. During this work, I gradually identified the themes for the different studies.

The fourth step was to select data according to the more specific themes identified in step 3. During this stage of the work, I used AVID to make video clips, and I started transcribing. The level of detail included in transcripts depends on the researchers’ theoretical and analytic interest. For my analytic purpose, the talk was the primary focus, and gestures were not that important. It was therefore important for me to make the transcripts as plain as possible to make them accessible to the readers. I will discuss issues concerning transcription in the discussion of the project’s reliability (section 4.4.1). The transcriptions were worked with in two stages. First, I wrote down roughly what was said. As I found extracts that I wanted to work with, these were transcribed in detail.

4.3.4 Selection of data

To explore the patterned interactions in various learning spheres and how this related to the activity system, empirically sensitive concepts are needed (Engeström, 2008a; Hammersley & Atkinson, 1995). In section 3.5, I discussed the theoretical relevance of the analytic concepts in this study. However, these concepts also have a methodological relevance concerning how I selected extracts for the empirical analysis.

The process of learning to teach is explored by observing how the student teachers make meaning of the object in different situations over time. The evolving interaction was selected in terms of important episodes. An episode is an interactional event where the
participants orient toward a problem, task, or topic (Linell, 1998). According to the theoretical framework in this thesis, I looked at an episode as the particular object the participants were oriented to in a particular moment. By identifying the different episodes, one is able to investigate the object/tool relationship and how it changes over the course of interaction (Engeström, 1990). During the interaction, the object can function either as a problem or as a mediating tool. The role of the object is decided by the constellation of activity, and is changed during the course of the interaction.

The notion of participation trajectories captures the changes in the participants’ orientation toward the object. In other words, the participation trajectory gives an opportunity to explore how objects are picked up, interpreted, followed, challenged, and rejected in different learning spheres over time. To analyze object construction, the extracts were selected in terms of accounts, that is, the specific linguistic actions, such as explanations, justifications, or clarification the participants used to make meaning of the object.

On a microgenetic level, episodes and accounts are interesting because they enable the researcher to scrutinize what turns out to be the participants’ concern during the object construction. Episodes and accounts were also interesting on a sociogenetic level because they enable the researcher to scrutinize tensions between historically developed activity systems and participants’ reproduction and resistance of these activity systems (Engeström, 1987; Ludvigsen, 2009; Mäkitalo, 2003). The activity system is a context of relevance from the participants’ point of view. The focus of accounts made it possible to explore what is conceived of as valued, acceptable, and normal practices within the activity system the student teachers are engaged in. Furthermore, the extracts were selected because they demonstrate the opportunities and constraints the students have for participation in various learning spheres.

4.4 Credibility of the research project

4.4.1 Reliability

The question of reliability in qualitative research concerns the consistency of the research findings (Kvale, 1996; Silverman, 2009). This concerns both the data collection and the data analysis. The core data in Articles II through IV are based on video- and audio-recorded interactions. Transcripts of such recordings are reliable in a way that field notes and
different forms for recollection of past events are not, because the transcripts are based on interactions that took place. It is thus possible for another researcher to go back to the recordings. However, transcriptions are also interpretations that can be weakened by a failure to transcribe pauses and overlaps. The transcriptions were done according to standardized transcript conventions where I included clarifying information, context descriptions, simultaneous/overlapping talk, pauses, and soft voices (such as “yes” or, more usually, “mmm”). Furthermore, I have included the extracts in the studies; this makes it possible for the reader to follow the analyses step-by-step and make his or her own interpretations.

Another effort that strengthens the studies’ reliability is that the material is often analyzed together with colleagues. The analyses were performed as a stepwise replication (Lincoln & Guba, 1985; Roth, 2005a). In the cowritten articles, we developed an independent analysis of the data before we met to compare and negotiate our interpretations. Then we discussed each of the extracts, and we went through utterance for utterance. This work was done several times. The reliability was also strengthened by joint analytic efforts in internal research seminars and with external researchers and research groups. The interviews used as core data in Article I are characterized by predefined themes and questions that are put into the interview guides. However, I will argue that the open character of the themes strengthened the reliability. Furthermore, I emphasized in the interview situation that the participants should get an opportunity to tell their narratives (Middleton & Edwards, 1990). I asked follow-up questions where I found it necessary. Another effort to strengthen the reliability in this article was to perform the analytic work in several steps and as collaboration between the two authors (Kvale, 1996).

4.4.2 Validity

The validity of qualitative studies refers to whether the collected data can answer the research questions and if the claims being made are convincing (Kvale, 1996; Silverman, 2009). A problem regarding validity in writing articles for journals is that most journals have strict word count limits. This often implies that one reduces the reflection on the applied methods. I therefore saw it as important to write up a detailed examination of methodological

22 See Jahreie and Ludvigsen (2007) for a description of these steps.
issues in this first part of the thesis. However, the fact that the empirical studies in this thesis have been published in journal articles is also part of strengthening the validity. The peer review processes in the studies were often concerned with the typicality of the interaction patterns indicated by the analyses of a few selected extracts. This was especially the case with Article II in which one extract from each learning sphere should indicate the typicality of the situations. Based on comments from the reviewers, we rewrote the empirical analysis several times. This peer review process strengthened the reliability and the validity in this particular article.

Triangulating data and methods is often seen as a way to strengthen the validity (cf. Denzin, 1970). The assumption is that if the findings obtained with a combination of different methods (e.g., interviews and observations) correspond and draw the same conclusions, then the validity has been established. However, according to the sociocultural and CHAT perspective in this thesis, actions are situated in particular historical and cultural contexts. This implies that different methods cannot give us an “objective truth.” To establish validity, it is been central to choose methods and data that give meaning in relation to the theoretical perspective. According to CHAT, in order to understand learning and change, the researcher has to understand the complexity between social structures and participants’ actions (Engeström & Middleton, 1996). Furthermore, as Foot (2002) has reminded us, the study of the development of an activity’s object requires careful observation, over time, from multiple viewpoints within the activity system. These issues concern ecological validity and refer to whether the activity observed and recorded in a study reflects the activity that actually occurred in natural settings (Silverman, 2009). The ecological validity is strengthened in several ways. First, the fact that I have been a researcher on the PLUTO project during the entire project period means that I have a thorough knowledge of the activity system. It is also reasonable to think that this has been positive regarding the camera effect. The participants knew me quite well at the time when I recorded their interactions. Second, previous studies and descriptions of the PLUTO project were available. Third, field notes and interview were used as contextualizing data. However, according to CHAT, it is important, but not enough, to do observation over time. The researcher also has to study the object from multiple viewpoints:

Activity systems as a unit of analysis call for complementarity of the system view and the participant’s view. The analyst constructs the activity system as if looking at it from above. At the same
time, the analyst must select a participant, a member (or better yet, multiple different members) of the local activity, through whose eyes and interpretations the activity is constructed. This dialectic between the systemic and the subjective-partisan views bring the researcher into a dialogical relationship with the local activity under investigation. The study of an activity system becomes a collective, multivoiced construction of past, present, and future zones of proximal development. (Engeström & Miettinen, 1999, p. 10)

As accounted for in chapter 2, I analyzed how the participants made sense of the object. This is my way of studying how the object is constructed from different viewpoints. Furthermore, I wanted to explore the object construction from the student teachers’ point of view. However, their opportunities and constraints for object construction were mutually constituted in the social structures of the activity system. To get a valid impression of the activity system under investigation, it was therefore important to study how the student teachers interacted with their university teachers and school mentors and how this was directed by historical manifestations of the object, division of labor, and rules of the activity.

4.4.3 Generalization

In the qualitative method, it is problematic to speak of generalization as a transfer from the study to other settings. Many qualitative researchers assume that qualitative inquiries are not generalizable. Eisenhart (2009) argued that generalizations from qualitative research are enduring and useful and discussed different kinds of generalizations that are produced by interpretative and practical science studies. Theoretical or analytic generalization is seen as the most important to qualitative research and to education research. In analytic generalization, “the conclusions of [a qualitative study] are seen to be generalizable in the context of a particular theoretical debate rather than being primarily concerned to extend them to a larger collectivity” (Davies, 1999, p.91 in Eisenhart, 2009, p. 59). The generic claims raised in the conclusions in the four articles in the second part of this thesis are therefore best seen as analytic generalization. This implies that the generic claims are based on a combination of the theoretical approach, the analytic generated findings in the articles, and the findings of related studies.

The work in this thesis is concerned with how participants make meaning of the object of activity across different learning situations. Thus, the generalization of this study relates in many ways to the review of previous studies in chapter 2 and the theoretical accounts made in chapter 3. How this was conducted varied among the studies, mainly dependent upon
which journal the study was published in. In Article II, which was published in *Mind, Culture, and Activity*, we were mainly concerned with how interactions at the boundaries in teacher education are constructed and made relevant to the participants when they are working on object constructions. The aspects of object construction and boundaries are mainly theoretically derived. Thus, we reviewed studies that have been concerned with boundary crossing in teacher education from a CHAT perspective. The focus can be conceived as generalized aspects of student teachers’ object construction on the boundaries between school and work. However, how the students orient and make meaning of the object is something that is realized by the participants in the particular practice. In Article III, however, which was published in *Teaching and Teacher Education*, I had a different concern, and the findings in this study relate to the articulated knowledge in previous studies on the same topic. I reviewed previous studies on case-based methods in teacher education. In the quite robust findings across these studies, this method has the potential to improve student teachers’ reflection and problem solving; however, the studies were concerned with cognitive outcomes. I used these findings as a point of departure, selecting one group of student teachers that could be said to be productive, analyzing the student teachers’ problem-solving process while working with case-based methods.

4.4.4 Research ethics

The research in this thesis followed the research ethical guidelines for social science and the humanities (NESH, 2006). An important part of the ethical aspects in the guidelines is out of consideration for the individuals. As research was an integrated part of the PLUTO project, all student teachers had given written approval to be part of research activities. None of the student teachers in the seminars I observed declined. During the transcription of the video and audio recordings, all names were replaced with pseudonyms. According to the ethical guidelines, all information should be treated as confidential. All the videotapes and audiotapes from the project have been stored in a locked cabinet. Clips from video recordings have been shown only for analytic purposes in the internal research group I am a member of. Finally, the research work was conducted according to current norms and practice for academic honesty (NESH, 2006).
5 Summary of the studies

Study 1


This article reports on how members in a teacher education program picked up and stabilized tools that are important conditions for the collective change of the institution. Research on reforms is often directed to provide evidence of what works (Cochran-Smith & Fries, 2005). These studies often set up theory and practice as different concerns and provide suggestions on how to bridge, link, or integrate these two realms. This distinction is related to how one understands learning and change. In research on teacher education, learning and change have often been studied from the perspective of the reflective practitioner (Schön, 1983) and more lately from a situated perspective (Lave & Wenger, 1991; Wenger, 1998). While the first perspective explains change from experiences within the individual, the situated perspective sees change as participation within a community. The article argues that to understand the hybrid character of teacher education it is necessary to explore participation within and between communities. The article therefore takes a CHAT perspective where learning is seen as a way of acting on and talking about the object within and between communities. A CHAT perspective is seen as a promising theoretical framework to study reforms because it creates sensitivity to the structural features of the activity systems and how they are interconnected at the meaning-making level.

The empirical focus of the study is how the project group constituted and constructed central tools of the reform. The project group included participants from different subject communities. We have been interested in the contradictions between the components in the
activity system. These contradictions give insights to differentiate how we can understand change when new divisions of labor and new instruments, such as portfolio assessment, case-based methods, and ICT, are used in teacher education. In the study, we raised two research questions: (a) How were the new artifacts introduced in the reform effort interpreted by the participants, and which of the artifacts introduced have become the most significant ones? (b) How can a focus on interaction and negotiation between communities be a fruitful approach for understanding and explaining learning and change in teacher education?

The analysis was based on interviews, ethnographic observations, and reports. The empirical analysis shows that the construction and interpretation of the cultural tools accumulated a set of structural contradictions within and between the communities. The project had implications for the division of labor between the university teachers. Teachers from different subject communities collaborated and negotiated how the historically new infrastructure should be designed. The changes in the division of labor had crucial implications for practice, where the portfolio assessment structure became an institutional responsibility across the institutionalized boundaries. This collective endeavor around these tools also changed the institutional norms and rules of the activity systems and had implications for how the teachers carried out their work. In other words, the new object had an impact on the institutional and individual levels, creating a historical shift in the activity.

A central aim of the reform was to enhance the use of student-centered work methods and to improve the connection between theory and practice. The project group agreed that case-based methods should be a central tool, but the understanding of case methods varied between the communities. The role and the use of ICT created a set of contradictions concerning how to teach and organize knowledge in the specific knowledge subject domains. Even though the communities were not able to negotiate a common understanding of the work format and use of ICT, they functioned as conditions for creating systemic changes as part of the new assessment system. Related to the theoretically based question, the empirical analysis shows how theoretical concepts from CHAT contribute to an explanation of how new forms of practices are from the perspective of the participants’ actions.
Study 2


This article reports on student teachers’ participation in different practices over a period of one semester. We used CHAT as the theoretical framework. Studies within this approach have, to a large degree, focused on structural change. This article goes into the recent move toward research aiming to study the mutual relationship between subjectivity and structure in social activities (Daniels, 2007; Edwards, 2009; Roth, et al., 2005; Stetsenko, 2005). In this article, meaning making is seen as emerging in the dialectical relationship between activity and action, and is regulated by the enactment of rules and norms, and the division of labor. Research on teacher education from a CHAT perspective is mainly interventions where the researcher designs a learning task to promote communication and learning between activity systems (Konkola, et al., 2007; Lambert, 2003). These studies provide important evidence on how students, teachers, and practitioners develop a joint object to work on when the researcher creates a space for collaboration. However, research within this field has paid scant attention to how student teachers manage the transition between DTEs and schools. This study examines how boundaries are constructed in interactions, and how this created limitations and opportunities for the student teachers’ learning trajectories. The study analyzed interactions in detail to examine how participants made meaning of the object and how historical norms, values, and the division of labor were enacted in the interaction. In order to emphasize the subjectivity in human activities, two research questions were addressed: (a) How do participants construct the object across learning spheres? (b) How are the boundaries in teacher education constructed and made relevant in social interaction?

In this article, we focused on how a situational object, the conceptualization of goals in education, emerges and develops in interaction, and how the object’s trajectory differs as the students move between learning spheres. The findings indicate that the participants’ positions are of importance. In teacher-led situations, such as university-based supervision and mentoring, the teachers influenced the meaning making of the object. The analyses of the interaction in the different learning spheres show that the different meanings of the object in the learning spheres are based on conflicting expectations in the activity systems. In
university-based supervision, regulated by the DTE, the lesson plan is conceived as a task, and as students, the student teachers are accountable for demonstrating that they understand the didactical conceptualization of goals. In mentoring, the lesson plan is constituted as a practical device for teaching, and the students, as teachers, are accountable for making visible the connection between their teaching and the national curriculum, which is the mandate for their teaching. The tools, rules, and division of labor are inscribed with historical views in each of the activity systems on how to conceive the object and serve to work as authorized practices for the learning spheres.

An important finding, however, is that, in group collaboration, in both activity systems, different forms of knowing from the DTE and the school are recontextualized. Student teachers made meaning of the situational objects by asking questions, bringing up dilemmas and problems, and exploring action. Unlike the teacher-led situations, the students are in a position to experiment with different forms for doing, which may erase or combine current boundaries. The student teachers act as learners, coconstructing meanings and changing the object with the integrated use of different tools.

Study 3


Studies of case-based methods have often been approached in terms of how cases help develop the prospective teacher’s ability to reason pedagogically and reflect on practice. These studies are grounded in a cognitive and constructivist approach in students’ understanding, often focusing on the students’ ability to connect theory and practice (Lundeberg & Scheurman, 1997), students’ reasoning and problem-solving (Harrington, 1995; Levin, 2002) and students’ thinking during case discussions (Levin, 1995; Moje & Wade, 1997). In this study, I am concerned with the students’ problem-solving process. Adhering to the CHAT perspective, the focus is on the relationship between the educational task, the scientific concepts the students use to respond to the task, and the societal context.
With detailed analyses of the student-teachers interaction, I examined how they make sense of conceptual tools when working with case-based methods. The analytic focus is on a group of 3 students’ participation trajectories while collaborating on three student-generated cases. To emphasize the relationship between the activity, the task, and the tools in the interaction, three research questions were addressed: (a) How do the student teachers use the available resources to construct the task? (b) How is the student teachers’ interaction related to the societal activity? (c) How can CHAT be a fruitful approach for studying case-based methods?

Four findings of the study can be summarized. Previous studies have found that, through the process of analyzing or writing a case, students manage to make theory-based explanations. The present study demonstrates that transforming practical experiences into a theoretical reflection is not straightforward. The analysis of the students’ trajectories show that the tools used to expand and explore the case are expanded from a merely superficial use of a theoretical concept to a quite complex theoretical discussion related to the students’ practical experiences. Moreover, the analysis demonstrates that it is hard cognitive work to elicit, recognize, and negotiate the use of tools in order to analyze and write the cases. From a CHAT perspective, this is related to a tool/object transformation. During the process of interpreting the task (the object), the students have conflicting understandings of the scientific concepts (tools). The students solve the tension by using their reflections about the task content as a tool to make meaning of the scientific concept. When the students have a joint understanding of the concept, it can again be used as a tool for working on the task. These findings suggest that the tool/object shift is crucial for elaborating and refining one’s arguments.

Furthermore, the analyses demonstrate how the students’ interaction when working on the tasks is a response to the students’ interpretation of the activity system and its rules, expectations, and division of labor. The way the students interpreted and constructed the task was possible because of the institutional requirements embedded in the activity system. Overall, the study demonstrates the value of the CHAT perspective for enhancing our understanding of the activity, the actors, and the tools the students use to construct the task. Moreover, an interactional approach demonstrates that the critical issue in students’ analysis of cases is not that students apply theory to practical situations, but the way students make meaning of their knowledge.
Study 4


This book chapter demonstrates how CHAT can be a highly productive theoretical and methodological lens for studying how student teachers learn to become teachers. During their trajectories, the students face a variety of tasks and expectations across learning spheres. The aim of the chapter is to describe and illustrate how we pursue an analysis that makes it possible to study how meanings of knowledge are constituted in talk between participants and how the participants respond to and make relevant the institutional context through their interaction. To aid our analysis, we “chunked” the students’ experiences into learning spheres that are socially developed and patterned ways of interaction (Engeström, 2008a; Scribner & Cole, 1981). To address how students learn to become teachers, we analyzed their participation across learning spheres, each sphere offering possibilities of enriching the students’ repertoire as teachers. We used the notion of participation trajectory (Dreier, 1999; Rasmussen, 2005) because it enables the researcher to analyze how interaction evolves over time within and across learning spheres and the relation between them.

The empirical focus is the ways in which students make sense of available tools in interaction with other participants across learning spheres and how the students’ actions are historically regulated by the activity. The empirical analysis in this chapter serves as an illustration of the methodological arguments. Two empirical findings can be summarized. First, the study demonstrates contradictions in the institutional requirements of the partnership between the school and the DTE. The participants in the different activity systems follow the expected script, but the students provide conflicting accounts for the rules and division of labor. More importantly, the findings demonstrate how the students position themselves both as teachers and as students in order to try to be accountable to both activity systems. Second, the analysis demonstrates how the students and teachers together in the seminar group negotiate what counts as knowledge in the forthcoming oral exam. This finding is interesting because it shows an atypical interaction between the teacher and the
students. The interaction is a less rigidly scripted place than the typical interactional patterns between teacher and students. The students position themselves as experts, which is acknowledged by the teacher. However, in the oral exam, there is only one position available, that of a student. These findings demonstrate that, although the participants are working to construct the same object across learning spheres, the students’ motives differ in various learning spheres. Furthermore, this study shows that what counts as knowledge is inherent in the different learning spheres and interacts in the situation. Overall, the study demonstrates the value of a detailed analysis of interaction in order to get a deeper understanding of the process of learning to teach.
6 Discussion and concluding remarks

The focus in this thesis is the student teachers’ process of learning to teach, seen as an historical and cultural activity. My main concern has been to understand the activity from the student teachers’ perspective. In this chapter, I will first discuss the empirical contributions in the four articles in relation to the previous research reviewed in chapter 2. The discussion is related to the empirical research questions raised in the introduction: (a) What characterizes the student teachers’ participation trajectories within and between the two activity systems? (b) What are the resources used by student teachers, university teachers, and mentors as they make sense of the situational objects? (c) How are the situational objects made sense of in different learning spheres at the DTE and schools? Then I will discuss the methodological and theoretical contributions of the thesis, before I end with some challenges for teacher education.

6.1 Empirical contributions

The findings in these studies demonstrate promising as well as challenging sides of partnerships in teacher education when designing transparent and coherent learning processes for student teachers. The review of the research on the PLUTO program shows that the DTEs designed support structures for increasing the relation within DTEs and between the DTE and the schools. In line with Rasmussen and Ludvigsen (2009), I argue that the changes within the activity system of the DTE can be characterized as systemic change (Article I). Both studies found that the organization of the electronic portfolio assessment, together with student-centered working methods and the use of ICT, involved changes in institutional
norms and the division of labor between students and teachers. The new activity system within the DTE created conditions for more coherent trajectories for the students. However, I will emphasize that these structural conditions do not in themselves ensure that student teachers make meaning of the problems and tasks within and between the DTE and in schools in a way that is intended in the project. Important criteria for the outcome of educational reforms are students’ effort to participate in the learning processes and teachers’ intervention.

How the students experience the relations between the different learning spheres within the DTE varies. In a study of the early phase of the project, we found that the students had a sense of integration between educational theory and the subject didactics, but the relation was not transparent enough. However, interviews with the students suggested that they experienced a change in their thoughts, ideas, and practice during the one-year course (Jahreie & Ludvigsen, 2003). Studies of the portfolio assessment structure found that the new institutional trajectory plays a significant role in students’ learning and development (Hauge, 2006; Wittek, 2003). One reason for these findings is that the students had increased opportunities for participation. In a study of talk between students and teachers in the seminar groups, we found that the teachers and students could, to a certain degree, negotiate rules, the division of labor, and working methods (Jahreie & Ludvigsen, 2003). Furthermore, the analysis of the students’ interaction in Article IV shows that the students and the teacher in the seminar jointly make sense of what counts as knowledge in an exam situation. From these findings, it seems reasonable to argue that the new institutional trajectory formed an unscripted space (cf. Gutiérrez, Rymes, & Larson, 1995) that opened up opportunities for students’ participation.

The literature on internships demonstrates robust findings that the talk between mentors and student teachers is first and foremost about methods that work where the student teachers are presented with the way teachers think and act on an everyday basis (Edwards & Protheroe, 2003; Moje & Wade, 1997; Ottesen, 2006b; Sundli, 2001). In Article II, we found that the talk between student teachers and mentors in internships was highly situated. Mentors have problems articulating practical knowledge and relating their practice to theories of how pupils learn (see also Burn, 2007; Edwards & Protheroe, 2004; Furlong & Maynard, 1995; Maynard, 1996b; Ottesen, 2007b). Consistent with other findings from studies of internships, Articles II and III show that instances of interaction between theoretical concepts and practical issues are rare in mentor conversations.
Research on the talk between university teachers and student teachers is limited. However, a previous study from one of the PLUTO projects found that seminars and lectures on campus are teacher-regulated with a focus on learning theories and on how to use and understand a system of concepts (Bråten, et al., 2003). The findings in this thesis demonstrate only a few instances of opportunities for interpretations in talk with university teachers. The analyses of the talk between university teachers and students indicate that scientific concepts are often highlighted, but the relevance between theory and the task at hand is rarely made explicit for the students (see also Jahreie & Ludvigsen, 2003). The findings in Article IV show one of the few instances where the use of scientific concepts was a shared object for discussion in the talk between a teacher and the students. However, more research is needed to get more robust findings on student teachers’ experiences in the DTE. It is important to emphasize that the forms of talk at the DTE and schools are not seen as inadequate. Students need to learn what teachers do and how they do it, and student teachers need knowledge and experience of theoretical concepts. The problem is that these forms of talk dominate, and other forms of interaction are curtailed. To be able to respond to the complex demands of practice, students need to learn to interpret learners’ actions, and students need to discuss and explore different methods of teaching.

I have previously discussed how the DTE and the schools in their interaction with students demand and afford both complementary and conflicting tools, rules, and patterns of social interaction. The lesson plan and case assignments are tools that were supposed to increase the continuity of the students’ learning process. As shown in Article II, the lesson plan is an historically evolved tool at both the DTE and the schools, but the lesson plan is used and made sense of in various ways in the two systems. At the DTE, the lesson plan is an important task for learning about specific scientific concepts. In schools, however, the lesson plan is a central part of teachers’ everyday work; the lesson plan is a tool for planning the practical work in classrooms. In mentor conversations, the lesson plan mediates pupils’ learning, and in talk with university teachers, the lesson plan mediates student teachers’ learning.

In contrast to the lesson plan, the case-based method is a new tool developed for promoting interaction between activity systems. Intervention-based studies have shown that the tools designed for learning and collaboration between activity systems are promising for creating developmental transfer (Konkola, et al., 2007; Lambert, 2003). The experience from
the PLUTO program suggests that these changes are difficult to organize for the participants involved. It is one important issue that makes my study incompatible with Konkola et al. and Lambert’s studies. The researchers in those studies designed a learning studio that aimed to promote systemic change, while I studied a naturalistic activity. The DWR studies are important because they show that systemic change presupposes that participants are crossing boundaries that prevent learning and cooperation, as well as developing new tools and instruments for boundary-crossing (Lambert, 2003). These are crucial findings in order to organize opportunities to optimize the historical object of student teachers’ learning. However, the studies did not follow actors’ trajectories across boundaries and show only the potential for boundary crossing. This thesis argues that to understand how participants cross boundaries studies that explore how practice is played out over time within and across activity systems are needed. An overall finding in this thesis is that crossing the boundaries between the DTE and the schools is a complex challenge since the historically developed boundaries between the two activity systems appear rigid and isolated. The studies have shown that in teacher-led activities in the DTE and the schools the participants rarely negotiate conflicting perspectives of tools and concepts. The findings demonstrate that in the process of making sense of tools the students struggle to open up spaces for a conceptual elaboration of the situational object. However, in discussions, the teachers and mentors defend the boundaries of “their” activity and do not accept the students’ accounts as valid seen from the positions of students and teachers.

From the perspective of the student teacher, it seems reasonable to argue that the contradictions between the DTE and the schools serve as constraints for the student teachers’ participation trajectories. During the student teachers’ process of learning to teach, they meet divergent structures and discourses in the DTE and the schools. The mentors and university teachers make sense of the situational objects in the activity of learning to teach in different ways. These findings imply that the work toward the student teachers at the schools and the DTE is directed by conflicting historical objects. The historical object of the schools is pupils’ learning and curriculum delivery, while at the DTE the historical object is student teachers’ learning. In their process of learning to teach, students therefore have to cross the boundaries of two conflicting activity systems. This puts heavy demands on the students since they face a variety of expectations when moving between the DTE and the schools. When meeting conflicting expectations without any help from teachers and mentors to do the
translational work, the student teachers come in an “in-between” position where they struggle to be accountable to both systems. Despite the institutional intentions of a stronger integration between DTEs and the schools, the two activity systems remain unconnected.

The discussion above is from teacher- and mentor-led practices at DTEs and the schools. An important argument in this thesis is that to understand the complexity of student teachers’ processes of learning to teach one has to investigate all the central learning spheres the student teachers participate in. Articles II and III demonstrate that students’ collaboration in small groups has the potential for interpreting and negotiation perspectives on teaching and learning. In case assignments, the students must reflect on and integrate resources and perspectives from different activity systems. The studies from this thesis show that the students struggle to make sense of the resources used in the DTE and schools in the students’ interpretation of learning and teaching. However, an important finding in Articles II and III is that when the students are given time to work on the situational objects in small group activities, such as in lesson planning and when engaging with different types of school tasks, the students are able to reconstruct the situational object combining the conflicting accounts from the DTE and the schools. As demonstrated in Article III, the students elicit, recognize, and negotiate a shared meaning of scientific concepts during the students’ process of managing the case assignments. Furthermore, the students hold themselves accountable to the others by consulting each other and taking others’ contributions seriously. Small group collaboration seems to provide important opportunities for the student teachers to construct knowledge and understanding. However, construction of knowledge and meaning making develop over time (Engle & Conant, 2002; Furberg, 2010).

Portfolio assessment and case-based methods are tools orchestrated for students to work on problems over a relatively long period of time. The findings in this thesis demonstrate that these tools are promising for facilitating transparent participating trajectories for the students. However, the findings also indicate that the students struggled to transform practical experiences into theoretical reflection. This shows the importance of the teacher’s facilitation of these problem-solving processes. It seems reasonable to argue, however, that the student teachers, in their group work, have created an unscripted space where they played with and explored different ideas (Gutiérrez, et al., 1995). This could be seen as the first step to a closer integration between the two activity systems and is therefore an important finding for a transformation of the activity of learning to teach.
6.2 Methodological contributions

The main methodological contribution of this thesis relates to approaching learning to teach from a multilevel approach, with a particular emphasis on student teachers’ participation trajectories across learning spheres. This is a different orientation to studying learning to teach than the majority of studies of this phenomenon in the research on teacher education. As accounted for in chapter 2, most of the studies on learning to teach have been microoriented studies focusing on individual learning. In this thesis, I have reviewed studies that investigated learning to teach as professional development (Burn, 2007; Calderhead, 1987b; Furlong & Maynard, 1995). While Furlong and Calderhead explained learning and development from changing beliefs, Burns and the OIS researchers were concerned with how student teachers and others interpret their own and others’ actions. Another strand of studies is studies on how to organize for professional development. These are often policy-oriented studies of reforms, often of different kinds of partnerships (Darling-Hammond, 1994b; Furlong, et al., 2000; Furlong, et al., 2006). These studies explored change from strategic intentions. This implies that in research on learning to teach only one level of description is studied.

This thesis seeks to understand learning to teach from multiple, interrelated levels, by emphasizing different aspects and contexts of the phenomenon. First, learning to teach is conceived as a societal and historical activity depicted of two activity systems: DTEs and schools. In exploring the activity, the analytic emphasis is on the processes involved in teacher education from the perspective of students’ interactions. The main analytic emphasis is on how continuity and change are constructed in interaction and how this is dependent of historically developed conditions. The intermediate level of trajectory is used as an analytic strategy to study the interrelation between activity and actions.

The theoretical conceptualization of activity in CHAT implies that the theoretical concepts of objects, tools, rules, and the division of labor have to be understood on all three levels of activity. The theoretical foundations therefore provide a rich framework for a multilevel analysis. However, most of the CHAT research has studied learning and change on the level of sociogenesis.

To get a more nuanced understanding of the relation between individual and collective learning, the notions of participation trajectory and learning spheres are used as an
intermediate methodological level of description. Learning spheres are repetitive procedures in which the activity of learning to teach is chunked. Participation trajectory is used to study the construction of situational objects over time and across learning spheres. The analytical emphasis makes it possible to demonstrate that objects are made sense of and used in different ways across learning spheres. Furthermore, it is possible to demonstrate that different cultural tools mediate interactions across learning spheres or that the same tools are understood differently.

Previous sociocultural studies of internships have found that student teachers hardly reflect on theoretical concepts (Edwards & Protheroe, 2003; Ottesen, 2007a). Since I studied students’ participation trajectories across learning spheres, the findings in this thesis confirm as well as add new perspectives to Edwards and Protheroe’s and Ottesen’s studies. The findings confirm that in talk between mentors and student teachers scientific concepts are seldom explored. However, Articles II and III also suggest that collaboration in small groups is an unscripted space or possible border zone between the two activity systems. Furthermore, the analytic focus elucidated contradictions concerning how the situational objects were conceptualized across learning spheres. This suggests unresolved contradictions within the activity of learning to teach.

6.3 Theoretical contributions

The theoretical contribution is also related to the concept of trajectory. Theoretically, the notion of trajectory is related to how one understands the temporal aspects of learning. The two approaches within the sociocultural perspective offer two different interpretations of the notion of trajectory, related to whether they maximize the horizontal or vertical dimensions of learning (Ludvigsen, et al., 2010).

CHAT researchers pay particular attention to the horizontal aspects of learning focusing on transformation through activity systems. The notion of trajectory is used to understand the lifecycle of the historical object. In these studies, interactional data are used only to analyze the historical and collective development of learning.

Dialogically oriented researchers, on the other hand, use the notion of trajectory as a way to expand moment-to-moment analysis of learning by taking into account how continuity and change are constructed in interaction over time. These researchers maximize
the vertical timescale, focusing on time as experience, as a resource for learning. These studies provide important insights into students’ changing orientation while participating in technology-rich environments and how institutional aspects are displayed in interactions (Furberg, 2009; Krange, 2008; Ludvigsen, et al., 2010; Ludvigsen, 2009; Rasmussen, 2005).

Both of these approaches, by focusing on trajectories, provide a unit of analysis and levels of description that cut across different traditions and make learning more transparent. Which dimension the analyst puts in the foreground depends on the research interest. The aim of this thesis is to study how the activity of learning to teach is realized through the participants’ interactions across learning spheres. Learning is thus considered to be changing participation in ongoing, but changing, practices (Roth, et al., 2005).

The notion of trajectory, as it is used in this thesis, makes transparent the relation between the vertical and horizontal timescales of learning. In this way, I am able to illuminate how an orientation toward a problem, that is, the situational object, changes over time, the vertical dimension, and across sites or learning spheres, the horizontal dimension. Focusing on how the interaction develops illuminates the constant shifts between different situational objects. This is crucial for understanding the transformation between tool and situational objects in interactions. CHAT literature has stressed the importance of the tool/object shifts, but few empirical analyses on how these processes take place have been conducted. The analyses in the articles contribute to an understanding of how these processes take place, how they are played out in interactions, and the implications for object construction. Second, I am able to illuminate how the historical object of the activity system regulates how the participants orient to the situational objects in the participants’ interactions. Third, the possibility of studying the vertical and horizontal crossing of boundaries is provided. Finally, this focus makes transparent the contradictions within and between activity systems.

Object construction in learning spheres is closely related to how different forms of knowledge are privileged in activity systems. In line with Daniels, I have argued for a conception of positioning in CHAT. However, while Daniels is inspired by Bernstein’s work on positioning, I am inspired by dialogical researchers (cf. Linell, 1998). The studies in this thesis have shown how the students through their participation in learning spheres position themselves as teachers, students, and learners. The availability depends on how their account is legitimized by others in different learning spheres. The concern with positioning is a
contribution to the study of the relation between the societal division of labor and the shifting interpersonal division of labor.

6.4 Implications for teacher education

The recent white paper on teacher education in Norway suggested that requirements for partnership agreements between teacher education institutions and school owners should be established (KD, 2009). Even though partnerships are not a requirement in Norway, or in the other Nordic countries today, different organizations exist locally. As partnership is played out in the PLUTO program, the DTE and the schools live side by side as two parallel systems. Such a parallel model puts, as we have seen, great pressure on the student teachers who have to manage their own transitions between the two systems.

Based on the analysis, I want to point out three main implications for teacher education. These are dilemmas that, from the findings in the analysis, must be taken care of, but they are not solutions for the organization of teacher education.

First, DTEs and schools are two activity systems with historically different objects, divisions of labor, norms, and directions for their work. Based on the findings in this thesis, the quality of both activity systems should be increased. If learning to teach is to learn how to undertake responsible, deliberative actions, then partnerships have to organize spaces for reflective practices in both activity systems. Collaboration in small groups together with student-centered working methods, such as case-based methods and portfolio assessment, are promising for facilitating transparent participating trajectories for student teachers. Furthermore, DTEs have to support schools as places for internships where student teachers learn more than delivering the curriculum. This is not a new recommendation. It is an idea that underpins, for example, the professional development schools in the United States (Darling-Hammond, 1994b).

Second, to increase the continuity between the activity systems in partnerships, organized spaces for communication should be created. The understanding of central objects and tools cannot be embedded in local practices but has to be communicated and negotiated with participants from DTEs and schools and the student teachers.

The final aspect is the importance of teacher intervention. University teachers and schoolteachers should be trained to orchestrate and facilitate student teachers’ learning
processes. Important issues to be worked out include making mentors more aware of the theoretical underpinnings of their work and making university teachers more aware of the embodiment of theoretical concepts in the practices of teaching. Roth’s extensive studies of coteaching between students, experienced teachers, and researchers have shown possible results for all participants involved to learn how to interpret classroom activities (Roth, Lawless, & Tobin, 2000; Roth, Tobin, Carambo, et al., 2004).

In order to capture the complexity of student teachers’ process of learning to teach, research on teacher education would benefit from studying the transition between DTEs and schools. It is a challenge for research to capture the movements between activity systems. Studies that follow the trajectories of participation, as I have done in this thesis, enable a multilevel analysis that seeks to understand learning from the levels of activity, trajectory, and interaction. The limitation of these kinds of studies is that it is not possible to do systematic analyses of all three levels of description. The main contribution in this thesis is foregrounding the level of trajectory. A valuable contribution to further research on teacher education and research on CHAT is a longitudinal study that takes into account change in the historical activity of learning to teach and how this is played out in participants’ interaction in particular moments. However, this presupposes further theorizing and further concept formations on key aspects of CHAT.
References


Mutton, T., & Butcher, J. (2008). 'We will take them from anywhere': schools working within multiple initial teacher training partnerships. *Journal of Education for Teaching, 34*(1), 45-62.


The studies
Study 1

Portfolios as boundary object: Learning and change in teacher education
PORTFOLIOS AS BOUNDARY OBJECT: LEARNING AND CHANGE IN TEACHER EDUCATION

CECILIE FLO JAHREIE
InterMedia, University of Oslo, Norway
P.O. Box 1161, Blindern, N-0318 Oslo Norway
c.f.jahreie@intermedia.uio.no
http://www.intermedia.uio.no

STEN R. LUDVIGSEN
InterMedia, University of Oslo, Norway
P.O. Box 1161, Blindern, N-0318 Oslo Norway
sten.ludvigsen@intermedia.uio.no

Transformation in teacher education is seen as crucial for creating change within the educational system. In this article, we explore how members in a teacher education program interpret new ideas and tools such as portfolio assessment, case-based methods, and ICT. These ideas and tools are important conditions for the collective change of the institution, where portfolio assessment emerges as a new object between the subject-oriented communities. In activity theoretical terms, we suggest that learning is a matter of acting on and talking about the object within and between communities. These sideways movements lead to transformations on the object. This conception also gives us an alternative perspective on the classical theory/practice problem.

Keywords: Cultural-historical activity theory; teacher education; boundary zone; boundary-crossing place; boundary object; portfolio assessment.

1. Introduction

In discussions about teaching and learning in teacher education, the distinction between theory and practice often becomes the focus of attention. How one understands this distinction is closely related to how one understands learning and change. In the research literature, different conceptualizations of this problem can be identified, but they have in common that theory and practice are set up as different concerns (Smagorinsky, Cook, & Johnson, 2003). Theory is understood as the opposite of practice, something that can be put into practice (Kearsley, 1994–2001) or can have an effect on practice (Association for Computing and Machinery, 1997). Different suggestions to the problems are that these two realms may be linked (Grisham & Brink, 2000), bridged (Akmal & Miller, 2003) or integrated (Beyer, 1996; Korthagen, 2001). All of these postulations have in common a hierarchical conception of theory as more authoritative and practice as more protean and
pragmatic (Smagorinsky et al., 2003). We argue that the dualism analytically is problematic in itself and propose a different approach in which theory and practice are conceptualized as different types of cultural practices. We study how learning and change were developed at the Department for Teacher Education and School Development at the University of Oslo. The reform effort is based on four pillars: ICT as social and technological infrastructure, case-based methods, portfolio assessment, and partnership schools. The focus for our empirical analysis is how portfolios, case-based methods, and ICT are objects for negotiation among the teachers. Within cultural-historical activity theory (CHAT), we argue that individual learning and collective learning stand in a dialectical relationship. Learning is a matter of acting on and talking about the object within and between communities. These actions entail ongoing transformation of the activity (Edwards & D’Arcy, 2004). CHAT is an expanding perspective within educational and psychological research, but has not been used extensively in research on teacher education (Roth, 2004).

After a brief discussion of CHAT, we will review how learning and change are conceptualized in different approaches in teacher education and how CHAT could be an important additional approach. In our empirical analysis, we raise two research questions: (1) How were the new artifacts introduced in the reform effort interpreted by the participants and which of the artifacts introduced have become the most significant ones? (2) How can the focus on interaction and negotiation between communities be a fruitful approach for understanding and explaining learning and change in teacher education?

Empirical analysis provides us with conceptual tools for understanding how theory and practice can be seen as different cultural practices.

2. Cultural-Historical Activity Theory (CHAT)

In the middle of the 1980s, a reaction against the dominating cognitive approach to teaching and learning developed in many research communities. This paradigm shift has to be understood as part of a general shift toward language and social practice in different social scientific communities (Bourdieu, 1977; Giddens, 1984; Habermas, 1984; Ludvigsen & Hoel, 2002; Pickering, 1992). The reaction toward the cognitive approach is based on a totally different ontological and epistemological understanding (Packer & Goicoechea, 2000). One of the approaches that are part of the shift toward practice is CHAT.

One important historical source can be identified in Hegel’s work in his notion of activity. For Hegel, the self is constituted in the activity, in the social practice of labor. The subjective and the objective worlds are interdependent. One other line of thinking that is important is Marx’s elaboration of Hegel’s idea of activity. Marx stresses that activity and the mind are social as they contribute to our formation as human beings. Any activity has a specific historical function and is a representation of human actions (Wartofsky, 1979). Consequently, historicity has to be recognized as an essential part of a person’s way of being. Leont’ev (1981) shows how individual
actions are part of a larger community and that activity as a concept is needed to understand the formation of collective aspects in our lives.

Engeström (1987) takes the ideas on activity one step further and creates a graphical representation and model of an activity system. In this model, artifacts mediate the activity between the subject and the object. This means that the subjects, artifacts, and objects have to be part of the unit of analysis when we try to understand human learning. The activity system unveils how individual actions are part of the collective activities that are mediated by rules, the division of labor, and the community where the activities take place (Engeström, 1987). Rules could be understood as norms and values in the system, while the division of labor is concerned with how participants and activity systems divide work between them. The community is composed of all those individuals or groups that share the same object and that construct themselves as distinct from other communities.

An activity, such as learning, consists of several short-termed learning actions, i.e., writing an essay, going to classes, passing an exam. To understand the collective activity, it is important to analyze how the individuals use and produce artifacts. Every activity is object-oriented; it is shaped and directed by an object. Objects exist only by means of other objects. This means that they have two fundamentally different roles: as objects and as mediating artifacts or tools. The place and the meaning of the object are decided by the constellation of the activity (Engeström & Escalante, 1996). It is constructed in a dialogical process between the subject and his or her community. An individual’s construction of an object is therefore both facilitated and constrained by historically accumulated constructions of the object (Foot, 2002). Since transformation of objects is a very important aspect and premise for change in CHAT, it provides an adequate framework for describing and understanding change in complex social systems.

As most institutions today consist of networks of activity systems where multiple activities seem to be a key issue, it is important to investigate the negotiations and contradictions not only within but also between interacting activity systems. In teacher education, the subject-oriented communities are historically directed toward different objects for their activities, e.g., understanding of assessment or use of ICT. This means that even if teachers from subject-oriented communities in a teacher education department are part of the same institution, they could be defined as members of different activity systems within this institution. It is necessary to examine what happens in the interaction between the different activity systems. To be able to do this, we need some conceptual tools to understand learning across and between boundaries. The area between the activity systems has no established

1 By community of practice or activity system we do not refer to a specific organization. These concepts could be used to understand a single organization or subsystems in an organization, but as concepts they are not concerned with borders in the same way as in organizational theory (Scott, 1992). Communities of practice could be related, for example, to an academic community or a community of general practitioners in medicine. Organizational borders are thus no longer the most interesting feature of such communities.
practice but reflects the attitudes, norms, and roles of the present systems. The concept of a boundary zone is used to describe and explore the place where participants from different activities meet, interact, and form new meanings (Konkola, Lambert, Tuomi-Gröhn, & Ludvigsen, in press). This is considered a multivoiced place where it is possible to negotiate a shared understanding of the objects. In this way, the activity itself is reorganized, resulting in new opportunities for learning (Engeström, 2001).

3. Learning and Change in Teacher Education

Teacher education has been extensively researched from a variety of different approaches (Cochran-Smith & Fries, 2005; Coolahan, 2002; Houston, 1990; Sikula, Buttery, & Guyton, 1996). Cochran-Smith and Fries (2005) identify three shifts in how research on teacher education is conceptualized and studied as a training problem, learning problem, and policy problem. Since the mid-1990s, there has been an emphasis on policy with a cycle of critique and calls for reform in teacher education (Cochran-Smith & Fries, 2005; Edwards, Gilroy, & Hartley, 2002). Policy studies will not be the focus of our review. Instead, we will present two versions of the research on the training of teachers and teaching as a learning problem so that each enlightens different aspects of learning and change. We will argue that CHAT could be an additional approach with its focus on interaction within and between activity systems.

From the late 1950s to the early 1980s, teacher education was mainly seen as a training problem. The early versions of these studies typically looked at teacher behavior and pupils’ learning as a one-to-one relationship. Identification and verification of instructional methods used in teacher-training programs are major topics in this approach (Cochran-Smith & Fries, 2005). A more contemporary version of teaching as a training problem builds on Schön’s concept of reflective practitioner. The concept involves considering one’s own experiences in applying knowledge to practice while being coached by professionals in the discipline (Schön, 1988). Schön’s concept can be seen as a way of bridging the dichotomy between a positivist epistemology and an epistemology of a more subjective or tacit character (Edwards et al., 2002).

Edwards et al. (2002) argue that Schön’s work has been the prevailing orthodoxy in teacher education. The concept of reflection in teacher education is concerned with how educators make sense of the phenomena of experience and can be divided into three broad categories (Grimmett, 1988). The first category represents research that thinks educational theory can be applied to practice. The second category is training students as, e.g. good teachers. Contributions look at competing versions of teaching and examine their consequences for classroom practice (Korthagen, 2004). The third category draws, in many cases, on a constructivist approach and views reflection as the reorganization or reconstruction of experience that leads to new understandings of action situations or self-as-teacher (Grimmett,
In understanding teaching as training, change is related to how individual behavior is understood as dispositions inside individuals (Bereiter, 1995, 1997). This approach is based on the idea that a teacher’s knowledge can be transferred from one setting to another based on these dispositions. This approach must be connected to how knowledge is produced and rises out of activities. In this perspective, learning will evolve and change during the flow of activity.

Since the 1980s, there has been a change in teacher education research focusing more on teaching as a learning problem. The theoretical orientation within this approach varies, but most often, studies are positioned within a cognitive tradition focusing on how “knowledge is developed, used and organized by individuals” (Cochran-Smith & Fries, 2005). Learning to teach is mainly seen as a process of beginning teachers becoming acquainted with the best available knowledge about teaching. This universal body of knowledge is by many seen as the basis for reform in teacher education (Edwards et al., 2002; Wideen, 1995). Within this approach, learning and change depend on whether the learner is able to use his or her mental model to recognize a new problem and identify the knowledge and skills necessary for a solution (Bassok & Holyoak, 1993; Reed, 1993).

At the end of the 1990s, a different epistemological and ontological assumption in cognitive science attempted to work out whether and how distributed cognition and situated cognition are viable concepts in research on education (Roth, 2001). Within this approach, it is argued that knowledge is developed and understood within specific contexts. In contrast to the individual assumptions in cognitive studies, learning entails transformation of the person and of the social world. Within teacher education, the notion of communities of practice (Lave & Wenger, 1991; Wenger, 1998) has inspired research on how student teachers participate in the community of practice of teachers and move from being peripheral to more legitimate participators (Ottesen, 2006; Sutherland, Scanlon, & Sperring, 2005).

Situated learning offers a promising perspective since the focus of learning is no longer inside the individual but on members participating in a community. This means that cultural practices cannot be seen as separate identities but as a dialectical relationship. However, there are some conceptual issues that are underdeveloped in the approach. There are different understandings of how homogeneous a community has to be to be seen as a community of practice (Handley, Sturdy, Finchman, & Clark, 2006). Wenger (1998) characterizes a community as a “shared repertoire” but acknowledges the possibility of tensions and conflicts within individuals and within a community of practice. However, how different practices interact is not well explained by the situated perspective. No concepts are offered to explain tensions within and between practices, and one is unable to grasp how different communities, or sub-communities in teacher education, have different orientations for their activities. These sub-communities are based on subject domains such as mathematics, natural sciences, language, etc. We argue that the site for learning and change is not just within a community of practice but between multiple communities. Learning in professional domains should involve more than just participation; learning has
to take into account how the participants cross boundaries and expand the object in question (Engeström, 2001, 2004). In CHAT, learning is conceptualized on the collective level, where the unit of analysis is interaction and negotiation within and between activity systems. This implies that learning is seen as a dialogical process that creates new knowledge and new practices within and between activity systems. Learning is, in other words, embedded in and constitutive of the qualitative transformation of the activity systems, which is also called expansive learning (Engeström, 1987, 2004).

In the empirical analysis, we explore how teachers from different subject domains create a new structure for the teacher education program. The focus is on the learning activities that take place between these activity systems. This gives us some conceptual tools to explain the interaction between different cultural practices. The analytic concepts central to explaining our understanding of the theory/practice problem will develop from our empirical analysis presented in the next part of the article.

4. The Study

Engeström and Middleton (1996) argue that to understand learning and change we need to understand the complexity between social structures and participants’ actions and activities. In our study, the central question is how the reform in teacher education is constituted and constructed. In activity systems, there are potential tensions, breakdowns, and contradictions between all components of the system, which is the key source for change. Empirical analysis based on CHAT involves investigating these tensions and contradictions. This can give us insights to differentiate how we can understand change when new divisions of labor and new artifacts, such as portfolio assessment and learning management system (LMS), are used in teacher education.

Our empirical point of departure is a reform effort at the Department for Teacher Education and School Development at the University of Oslo. The students have either a bachelor’s or master’s degree, in specific subject domains, before they start this nine-month intensive program. During these two semesters, they study pedagogy and two subject matters, such as social science and history or physics and biology, and are educated to work in either secondary or upper secondary school. The reform phase started as a pilot project with some of the subject communities involved in the fall of 2000. Beginning in 2003, the innovation was expanded to include all the communities. The sociocultural perspective used as an inspiration for the design principle in which they combine a problem-oriented, or case-based, method, portfolio as a new form of assessment\(^2\) and interdisciplinary teams

\(^2\)The portfolio consists of a selection the student’s cases in the different subjects. The portfolio can be either paper-based, net-based or on a CD. The students have an interdisciplinary oral exam at the end of the year based on their portfolio.
of teachers. LMS was used to create an infrastructure for coordinating, planning, and structuring learning resources and as a communication platform for interaction among the students, teachers, and partnership schools. The students were also expected to use ICT in their learning activities on campus and to practice teaching with ICT during their internships.

This study is based on observations and interviews from the first year of the reform. Our focus is on the project group’s conception of the reform effort. To understand learning and change as a collective activity, we have to analyze how the participants take part in different activities and activity systems over a period of time (Miettinen, 2002). We followed all the meetings in the project group in the fall of 2000 and spring of 2001, approximately seventy-five hours of observations. The second author, who was an external member of the project group, conducted these observations. We had access to all the reports from the meetings. The first author conducted observations from the first semester of different classroom activities in pedagogy, the natural sciences (biology and physics), English, and German. The duration of these observations was twenty-four hours. Within these corpora of data, nine hours were videotaped, and there are thirty-six pages of field notes.

These ethnographic observations and the reports from the project group provide an opening to a description of the empirical context and created the background and the focus for developing an interview scheme. The first author interviewed the academic members of the project group, four teachers, the project leader, and the elected leader for the institute. The interviews lasted ninety minutes and were transcribed by a graduate student. The analysis of the interviews was presented to the informants. The observations and the interviews were analyzed together, but we prefer to present the interviews since they give voice to the participants.

In the analysis, the scientific software HyperResearch was used as a workbench to transcribe the audiotapes and code the raw data according to topics. The analytic work was performed in several steps (Kvale, 1996) as a collaboration between the authors. We analyzed the whole corpus of data to get a substantial understanding of the significant changes in the reform. Then the interviews were systematized according to the themes that were the most frequent and significant among the participants. Relevant themes were, for instance, integration of subject domains, division of labor, ICT, problem-based learning, curriculum, and assessment. These themes were then systematized to illustrate change processes in an institution as part of the formation of new artifacts (division of labor, portfolio assessment, case-based methods, and ICT). Finally, we linked the themes to our theoretical framework. This could be described firstly as an inductive approach in which the empirical data are systematized and analyzed. These analyses were then connected to the overall theoretical framework and review, which could be described as the deductive part. The analysis was presented and discussed in internal research meetings and international conferences.
With ethnographic observations, we can capture how concepts, procedures, and tools are employed and accumulated in the teacher education program (Engeström, 2001). The heterogeneity and the diversity of orientations in the activity system(s) are manifested in the participants’ talk, thoughts, and action. Based on the participants’ talk and observations, these multiple perspectives are revealed. This analytic approach gives variation and depth to our material. Based on the ethnographic data, thematic interviews, and our theoretical framework, we will argue that we achieved a substantial understanding of the processes of change that actually took place.

5. Empirical Analysis

We will describe and analyze the change processes that were created with emphasis on the following themes: change in the teachers’ division of labor, portfolio as an emerging object for change, and ICT as an infrastructure for change.

5.1. Change in the teachers’ division of labor

The teachers responsible for the teacher education program can be described as members of subject-oriented communities with a high degree of division of labor, and also a high degree of autonomy in their work. The relationships between these subject-oriented communities can be characterized as loosely connected. These communities have boundaries established by the organization and, equally important, by communities of subject specialists in other organizations. This means that their communities do not conform to the order of the organization. The different subject domains usually have tensions and contradictions built into them in relation to coordination and collaboration internally, and in their external relations and networks (Engeström, 2001; Jahreie & Ludvigsen, 2003). As a strategic intervention, the participants responsible for the reform organized an interdisciplinary project group in which the participants had to collaborate more across the boundaries of the different subject domains. As the project leader notes, “We bring together different groups who are used to working separately. And then you are a bit skeptical of the others. In my experience we have been skeptical, but I think that we finally are getting closer to something we can work together on.” The project leader emphasizes how the different communities are challenged by the project’s interdisciplinary approach. He also emphasizes that all the members of the project group are working for an institutional change:

We have institutionalized the project. It is not just something in a corner. It is a project with importance, and it has been a central part of the progress of the institution. If the project had not been deeply ingrained in the institution from the beginning, I am afraid it would have been an unimportant project with just a few enthusiastic people (Interview, project leader).
This reform project is not led by a few enthusiasts, but by many of the significant members of the organization who want some kind of innovation. Several of the important agents of change in the institution are involved. Even though the members share the idea of change, communication and interdisciplinary work are challenges for implementation.

We struggle to find the integration between pedagogy and the other subject domains. We started with a desire to find some common elements, but we found out that we were not able to do so because we have a different understanding of the concrete content regarding, for example, case-based methods and the tasks the students are supposed to do (Interview, project leader).

The project leader notes that there are tensions between the different communities regarding interpretation of the different activities. They have to negotiate to find new ways to integrate the relationship between theoretical ideas and practice. This applies equally to finding new classification standards for practical problems, as much as focusing on a mutual understanding of the categories that are chosen. Meetings in the project group, meetings in smaller working units, and informal conversations seem to provide important connections between the subject communities, which give opportunities to reconstruct knowledge and skills. In these activities, the members negotiate how the historically new infrastructure is to be designed. These meetings can be described as a boundary-crossing place where they discuss and expand objects strategic for the change (Lambert, 2003a, 2003b). In the teachers’ experience the status of their respective subjects become an object of negotiation (Kerosuo, 2001). The boundaries between the subjects have, of course, been discussed before, but this time the discussion lead to new relationships and implications for practice (see the next section for explanation). Most members in the project group want to negotiate the artifacts that are required to meet the goals for the project (i.e. portfolio assessment, case-based method, and ICT). In this process, they have to find ways to talk together to reach a reasonable level of shared understanding. In this process of negotiation, one learns how to use and talk about the new artifacts (Mercer, 2000).

In the following section, we will show how new understandings of assessment structure, case-based method, and use of ICT is negotiated. The evolution of the objects shapes the activity; structures, attitudes, beliefs, norms, and roles are put under pressure at the collective level and thereby create conditions for change (Konkola et al., in press). These processes demonstrate how the teachers, by means of their work, participates in a transformation of the object through acting on it and seeing it differently (Edwards & D’Arcy, 2004). One important result has been a higher degree of collective effort, which also implies a lower degree of autonomy. These collective efforts in the project group create opportunities for portfolio assessment to emerge as an object between the different communities.
5.2. Portfolio as an emerging object for change

The members of the project group agree on case-based methods, portfolio assessment, and use of ICT as the most important aspects in the new structure for the program. Each of these methods have been used elsewhere, but few have integrated these methods into one educational program. A member of the project group says that they now have the opportunity to make teaching more interesting, “This project has been the tool for changing teacher education, and it’s now more interesting for both the students and the teachers. Teaching has been more interesting because we use new technology and new pedagogical methods, especially assessment strategies” (Interview, member of the project group).

These opportunities create a high degree of motivation for change. A project group member emphasizes assessment strategies in particular as the most important aspect of the new educational practice. One of the other members thinks the use of portfolio assessment initiates a joint exploitation of other tasks as well:

We are going to keep the characteristics of the traditional curriculum subjects, but at the same time there are topic areas that have to be more integrated. We are getting there with the assessment strategies; the portfolio is used both in pedagogy and the curriculum subjects. With this assessment strategy we will have to collaborate to a higher extent. We have to be willing to do that (Interview, member of the project group).

The teacher stresses that the project’s innovation is a new organizational structure in which one maintains the characteristics of pedagogy and the subject domains, but simultaneously finds a way to integrate the domains of knowledge involved. He emphasizes that it has to be a collective effort between the communities. In this process, the teachers’ different points of view intersect, and the different voices create new conditions on how the teachers perceive each other and how they can work together (Gutiérrez, Rymes, & Larson, 1995). The head of the department points out in the interview that they have achieved a new and higher degree of coherence in the study because of the new assessment strategies. The discussions of how to design the portfolio system are tense, especially when the overall structure for the system is developed. The tensions are related to how the students should present their work, what kind of cases and tasks, and how much content from the different subjects should be part of the students’ portfolios. In addition to these aspects, the members are concerned with the need for students to update their work and how to select students’ work for the integrated oral exam, which is based on the portfolio. After several breakdowns, the project group is able to agree on some common elements concerning the structure. The students deliver their portfolio at the end of the year, which form the basis for the assessment. The portfolio consists of works from pedagogy and one of the two subject matters. Two of the works are interdisciplinary: a case based on their own teaching from their
internships and a document in which they reflect on their own learning trajectory. These works form the basis for an interdisciplinary oral exam with an examiner from each of the subjects.

This agreement creates conditions for more detailed work with the portfolio system. Teachers in the different subject matters cannot make decisions alone because the end product should be a representation of work from the different subject matters, as well as interdisciplinary cases. The project meeting creates opportunities for sharing ideas and thoughts about teaching practices, as well as for discussing how they can relate the subjects to each other in the portfolio. A member of the project group says:

In this project, we have worked through some fundamental pedagogical ideas which we have agreed upon. That is problem-based learning: it is to make situations related to practical experiences with the use of cases. (...) We have agreed that the portfolios are an assessment strategy, but we are not done with the discussions concerning what it is supposed to be, the concrete content of the portfolios (Interview, member of the project group).

The member of the project group says that they have been developing some pedagogical ideas central to teacher education. They all agree on portfolio assessment, but they have not come to an agreement on the content of the portfolios. They agree that a case-based method is the right direction to go, but how the method is understood and worked varies. In some communities, small theoretical tasks (such as commenting on another student’s ‘lab’ work) are seen as cases. In pedagogy, they work systematically with cases as a method for creating a better relationship between abstract concepts and practical action and for improving the continuity of the student’s learning trajectory. The students write a case study about a specific classroom, pupil, etc. The task presupposes that the students find relevant theory and use the theory to expand their view (Jahreie & Ludvigsen, 2003). Even though the different communities do not agree on the concrete content of the portfolio, all the members in the project group agree at a more general level that they want to try out new forms of assessment, and that portfolios represent the right direction to proceed.

From the teachers’ perspective the portfolio system can be interpreted as a boundary object in which the activity systems collaboratively construct a new understanding of the portfolio system. With the notion of boundary object (Star & Griesemer, 1989), the negotiations of new ways for collaborating become more

---

3The notion of boundary object is understood both as a historical-empirical construction, which is the original understanding from Star and Griesemer (Star & Griesemer, 1989), and as an artifact that can be designed as a boundary object, like Wenger’s understanding (1998). We argue that it is not possible to design a boundary object; rather we have to observe how it unfolds in a concrete activity.
transparent. Boundary objects are objects that serve to coordinate different perspectives, but do not necessarily create a bridge between divergent viewpoints. When a boundary object serves multiple communities, each has only partial control over the interpretation of the object. The content that the different subject communities in the teacher education program will have as their part of the portfolio is not clear, but they agree on some common elements, enough to work together toward a new joint object. The portfolios become an object to which they orient their actions and activities.

For the change effort to be a collective activity in the institution, individuals who can act as brokers between the different activity systems are needed. Brokers are able to make new connections across the activity systems, and therefore enable negotiations of meaning (Wenger, 1998). For Wenger, the broker is not accepted as a full member of the community or rejected as an intruder. According to our understanding, one must have the legitimacy to question the existing practices of the system to be able to act as a broker (Konkola et al., in press). As a consequence, the broker is interested in the whole activity system and its change, and is therefore a bona fide member of the community. In this view, the members in the project group all have roles as brokers. Both in the project group as such, and in relation to their subject-based community, they have the legitimacy to negotiate the meaning of the portfolio. In the project meetings, they all have to argue for and negotiate how their subject should be represented in the student portfolio. In addition, in their own community, they have to defend the results of the negotiations within the project group. Even if there are existing rules for how each subject should be represented in the portfolio system, the status of subjects, the traditions in the institution, and the teachers’ goals and strengths influence the results of the negotiations. Changing the relative balance among the different subject matters creates strong tensions among the teachers.

In the project group’s negotiations of the portfolio assessment, we have shown how they manage to develop a joint construction of the tool. The portfolio emerges as an object at the boundary zones between the activity systems where the participants meet and develop new understandings. However, how the concrete content should be understood is still under negotiation.

5.3. **ICT as an infrastructure and new tool in the reform**

All members of the project group have used ICT before the reform was initiated. In pedagogy, they used a groupware system to structure parts of the program and for teacher-student interaction. In natural science and language subjects, they used the web for handing out information and learning resources. They also had some experience with web-based, teacher-learner interaction. With the reform, the project group agreed to implement a learning management system (LMS). They found a solution that was supposed to support a minimum of standardization for dissemination of information and learning resources, for communication, and for the design
of their web pages, but there is no general agreement on how to use the system. One of the members in the project group describes what the disagreement is about:

> In a way we have kept the old organizational structure and added something new. And that is very demanding. The relationship to the students also becomes very demanding if we don’t use the virtual room to a greater extent than we have done until now. I am willing to have a discussion about that. I think we will have to. But we disagree on this. Some think they have the answer; I don’t think we have, and I actually think there is disagreement (Interview, member of the project group).

As the member points out, the use of LMS is only an add-on in the activity system, and they have not negotiated a common understanding of the role and use of the system. Because of this, he does not think they have reached any of their goals. The tension is first and foremost related to where different activities are to be performed, in a distributed or co-located learning environment. This is discussed in a natural science class with three of the teachers present, whereby one is a member of the project group. Here we draw directly on the observational data. In this discussion, it is easy to see the disagreement:

> Member of the project group: I think we have to ask when it is appropriate to use ICT and when it is not. It is absolutely clear that we can use the opportunities ICT gives to a greater extent than we do. Sometimes physical meetings are necessary, but we can, and we have to, make the most of the C in ICT. The C, the communication between the students, has to be present. Now we use ICT for information, and we lose the C.

> Teacher: We disagree on this point. I think that physical meetings are necessary in much of what we do in biology. How are we supposed to complete the curriculum if we cut more classes? We have too few as it is. And laboratory experiments cannot be done on the web! It is better to use ICT in the arena around us, but we cannot cut classes.

> Member of the project group: It has always been a fact that that we do not have time to complete the curriculum in classes. But I want to create good net-meetings for what we are not able to complete. That has to be better than saying to the students that they have to read all by themselves?

In these segments, two interrelated themes were discussed: which and what kind of activities should take place within different settings and how the concept of curriculum can be understood. Let us first focus on the function of ICT.

We think that this segment of a discussion shows that how ICT is to be included in the students’ learning progress is not a straightforward issue, and it will therefore
constitute a set of tensions between the participants in the activity systems. The ideas that are reflected upon are about what type of knowledge can be obtained in physical meetings and what kind of knowledge can be obtained in virtual meetings. Furthermore, it is stressed that some types of knowledge, such as science experiments, have to be accomplished in physical meetings, and the time they have for lecturing is already at a minimum. As the segment shows, the participants have different opinions about how the LMS should shape the different learning contexts. The discussion relates to how they understand and talk about aspects of ICT and learning, how they should understand specific knowledge domains, and how they should teach in specific domains.

The second theme in this segment is concerned with assumptions related to coverage of curriculum. One of the teachers argues “how are we supposed to complete the curriculum in classes when we already have so few physical meetings.” The member of the project group argue that the number of meetings is not the important issue, but how the participants view their field of knowledge and how they think the teaching should be structured. The fact that the curriculum is partly taken for granted by one of the teachers could be regarded as part of the problem. Curriculum is a social and cultural construct, which carries forms of knowledge, assumptions, values, and attitudes. The discussion is related to ideas that are based upon traditions, experiences, and normative assumptions. Without actually testing new teaching methods, the teachers will be caught in dogmatic positions. In a discussion of the differences between physical and virtual meetings, one loses, from an analytical point of view, the possibility of testing how different tools can complement one another. The disagreement about the use of distributed and co-located learning environments shows that the participants have to explore and form new meanings of the object.

ICT can be understood as a set of artifacts and has to be seen as an interrelated part of the activity system. Changes in one part of the system, such as the implementation of an LMS, have effects on the other aspects as well. The implication of this is that ICT is an integrated part of how the teacher education program could be structured and an integrated part of the content in the concrete activities. The idea of how LMS is used in specific activities creates tensions on different levels, such as the relation between co-located and distributed settings, between what types of knowledge could be taught and learned in such settings, and how the curriculum could be interpreted. In the tensions presented in the segment above, the use of the artifacts was connected on how to teach within a specific domain. The interdependency between the different aspects is what needs to be negotiated.

6. Discussion and Conclusion

In the introduction, we raised two questions related to theoretical and empirical issues. We will first offer some conclusions for the empirical question. It is in the relation to practical solutions that we can best identify sets of tensions in and
between activity systems. These tensions become visible in the reform effort analyzed in this article, when the artifacts were introduced, picked up, and interpreted by the participants. Both the historical experiences, which the participants are part of, and the actual implementation of artifacts, create the sources for the tensions described. It was not clear to the participants which aspect of the reform would meet with the strongest approval. Case-based methods, portfolio assessment, and parts of the curriculum had to be negotiated.

The learning challenge in this reform was to acquire a new way of working in which teachers from different subject domains have to collaboratively plan the assessment system and the construction of the curriculum. The tensions and contradictions have created efforts to restructure the division of labor toward a more interdisciplinary way of organizing the community of teachers involved. The teachers had to negotiate and create a new form of social order between the different subject-oriented communities. The consequences of the reform effort are steps toward a new activity system that is built on a higher degree of shared knowledge about each other’s practice, and which implies more collective work and a lesser degree of autonomy. The individuals have to be concrete in their collective efforts and accept their colleagues’ criticisms of their teaching practice. The fact that the participants in teacher education emphasize different aspects in the change process has to be understood based not only on their history in the institution but also from their position in their disciplinary communities.

We argue that the problem is not resistance to change, which usually is seen as the main problem when trying to create educational reforms, but the direction and the depths of the actual change. All the members of the project group can be seen as brokers in that they all want an institutional change and have the position to question the existing practices of the system (Konkola et al., in press). The participants negotiate how the historically new infrastructure among them is to be designed and the boundaries in the subject themselves become objects of negotiation. The project group creates a boundary-crossing place between the different activity systems where they co-construct their activities (Engeström, 2001; Lambert, 2003a, 2003b). This collective engagement was vitally important for the institutional development.

At the boundary-crossing place, the portfolio assessment becomes a boundary object (Lambert, 2003a, 2003b; Star & Griesemer, 1989). The portfolio is part of a collective effort that bridges the disciplinary communities. The assessment system is an institutional responsibility, and changes in this system have to cut across institutionalized boundaries. In this way, the portfolio assessment system becomes the most powerful object in the reform effort. The group members had to talk and discuss within and between the communities, and the different subject-oriented communities had to configure themselves in relation to each other and to the students. There were different orientations within the project group in how to understand and organize the concrete content of the portfolios, but they agreed on the general structure, enough to work together toward a new joint object.
From a descriptive point of view, ICT has created a new infrastructure. The participants can agree on the importance of ICT in the process of change, but at the visionary level and related to abstract goals. They are not able to develop a shared understanding of how to integrate ICT in teaching and learning. This contradiction points to a basic structural problem, that is, where different activities are to be performed. Whether ICT makes an impact or not is not related to ICT itself, but how it is assimilated as an integrated aspect of the activity system. We argue that the ideas and practices between teaching and learning in co-located and distributed settings have to be put under pressure and reorganized.

When the artifacts were collectively constructed and interpreted, a set of structural tensions within and between the activity systems accumulated. The objects were re-conceptualized and embraced wider possibilities than in the previous mode of the activity. The relevant elements for this conclusion are the change in division of labor, the new meaning attributed to the portfolio as a boundary object, and how the use of ICT creates a set of tensions concerning how to teach and organize the knowledge in the specific subject domains. These contradictions are central sources for learning and change in the entire activity system and produce new cultural patterns of activity. In activity theoretical terms, the reform effort could therefore be described as expansive learning (Engeström, 1987).

The theoretical problem raised in the introduction is related to how we understand theory and practice. The overall argument in this article involves a view of learning and change that goes beyond the leading approaches in teacher education. In the different positions of teacher education we have reviewed in this article, learning and change are understood as reasoning based on dispositions, mental models, and participation. From our point of view, the basic problem with the study of reflective practice in teacher education is that change is understood and explained with new experiences within each individual. The community the learner is a part of and the dynamic development of the environmental structures are not taken into account. Within the situated perspective, change is seen as participation in communities. To understand the hybrid character of teacher education, taking part in several distinct practices, it is not enough to study the individuals’ participation within a community. We need to explore and grasp how they participate in their own community as well as across boundaries. New objects could emerge as part of the negotiation in the boundary zones between the activity systems. We will argue that CHAT is an appropriate approach for understanding learning and change in teacher education because CHAT creates sensitivity to the structural features of the activity systems and how they are interconnected at the meaning-making level (Ludvigsen & Rasmussen, 2006).

In this view, theory and practice are understood as different types of cultural practices. Theory is a type of knowledge, which is talked about in specific ways in an activity in institutional settings. We argue that with CHAT we are able to understand how individuals construct new knowledge and new patterns of collective activity. The empirical analysis shows how central concepts from CHAT help to
explain how new forms of practices are created and how organizations are changing. The concepts explored in this article, i.e. boundary zone, boundary-crossing place, and boundary objects, provide us with some conceptual tools for understanding how a basic theoretical problem such as the dualism between theory and practice can be seen as different cultural practices. The perspective and the concepts that CHAT provides us offer possibilities for understanding how learning and change occur in an activity system and at the boundaries between activity systems. Theoretical knowledge is not a given authoritative status, but needs to be understood as embedded in the activities that form the social practice the teachers and the students are part of, whether the activities take place on campus where the intention is learning theory or in schools where the purpose of the activity is teaching students in a specific knowledge domain.

Acknowledgments

We would like to thank the Network for IT-Research and Competence in Education and the research program at the Norwegian Research Council: Competence, Education and Value Creation for supporting this research. Professors Trond Eiliv Hauge, Svein Østerud, Ingrid Calgren, post.doc Hans Christian Arnseth, and the participants in the Research school: Learning, Communication and ICT have given valuable comments on drafts of this paper. And, lastly, we want to thank InterMedia and ‘Competence and Media Convergence’ (CMC) for their support in writing this article. CMC is a strategic research effort at the University of Oslo. For more information about CMC, see http://cmc.uio.no/. We also thank the anonymous reviewers and the guest editor for valuable comments and Karin Lillehei for helping us with the language and creating a clearer presentation of our arguments.

References


Portfolios as Boundary Object


through a school — university partnership. Teaching and Teacher Education, 21(1), 79–92.


Jahreie, C. F., & Ottesen, E. (in press)
Construction of boundaries in teacher education:
Analyzing student teachers’ accounts
*Mind, Culture, and Activity*
Construction of boundaries in teacher education:

Analyzing student teachers’ accounts

Cecilie Flo Jahreie and Eli Ottesen

Abstract

This article analyzes student teachers’ interactions in different practices over a period of one semester. We use Cultural-Historical Activity theory as a theoretical framework to address how interactions at the boundaries in teacher education are constructed and made relevant to the participants when they are working on object constructions. In the analysis, we show how an object, conceptualization of goals in education, emerges and develop in interactions, and how the object’s trajectory differs as the students move between practices. In the analysis we call these practices learning spheres. Our findings indicate that the participants’ positions are of importance. In teacher-led situations, such as supervision and mentoring, the teachers influenced the construction of the object, whereas in group work, the student teachers pursued and explored a variety of object constructions. Meaning emerges in the dialectical relationship between activity and action, and is regulated by the enactment of rules and norms, and the division of labor. An important finding is that the student teachers’ learning trajectories vary across the different parts of the teacher education program.

Introduction

This article examines how boundaries in teacher education are constructed in interactions, how boundaries are made relevant by student teachers and how this affects their learning trajectories. Ethnographic observation is used to understand the structure of activity as well as how individual agency is part of institutional activity.
We use Cultural Historical Activity Theory (CHAT) as a theoretical framework. Studies within this approach have to a large degree focused on structural change. In the last few years there has been a move towards research aiming to study the mutual relationship between agency and structure in social activities. This study goes into this space by studying student teachers’ changing participation across activity systems. Student teachers’ learning trajectories is divided between two activity systems: The Department of Teacher Education (DTE) and the cooperating schools. The object of activity for DTEs is the student teachers’ learning trajectories, while the object for schools is the learning of pupils. However, as teacher educators, DTEs and schools collaborate to educate professional teachers. Thus, teacher education incorporates participants, tools, rules and division of labor from the DTE and the schools. The student teachers’ learning trajectories are potential shared objects between the two activity systems. Furthermore, tools, rules and division of labor may be shared and move between activity systems, instigating negotiations that may change their sense and meaning. Such negotiations may occur in learning spheres (see explanation later) at the DTE (e.g., lectures and seminars) or in schools (e.g., teaching, mentoring and supervision), affording different possible actions for the participants. Student teachers learn to be teachers by producing accounts that legitimize their actions in the different learning spheres. In this study we want to illuminate the ways in which student teachers interact with a variety of tasks. By analyzing interactions of student teachers’ talk as they pursue tasks and account for solutions, we aim to disclose how objects are constructed and developed, and how the student teachers’ positions in different practices are enacted through their accounts.

Bridging the learning between the DTEs and the schools is a recurring problem in studies of teacher education. Such issues promote policy reforms intended to develop more unified learning trajectories for student teachers, possibly bridging the perceived theory/practice gap. For instance, the traditional sequences of “training” in internship periods may be extended, or transformed, through various configurations of partnership models for improving the quality of learning, where schools and DTEs collaboratively plan internship periods. In Norway, collaboration with schools to develop internship practice was an essential part of a national initiative in teacher education, the PLUTO project (2000-2004). At the Department
of Teacher Education, University of Oslo, the partner schools (rather than individual mentors) are required to take responsibility for the organization of the internship, based on guidelines developed by the DTE. However, a survey conducted by the Norwegian Ministry shows that universities and colleges continue to develop plans for internship without cooperation with schools. University teachers visit schools infrequently and, during internship, the school mentors take responsibility for planning and organizing the internship (Rambøl, 2007). Despite new models of partnership, the survey indicates that the division of labor between departments of teacher education and schools has not changed significantly. We raise two empirical research questions that are related to the context we study:

How do the participants construct the object across learning spheres?

In Norway, goals in education are stated in the National Curriculum (NC). Such goals are often general, and must be translated by teachers into objectives and targets for their work. To answer our research question, we conduct an analysis of student teachers’ work with their understanding of “goals” as a core didactic concept in the DTE and during internship in schools. Didactics concerns theories of teaching, seeking to theorize and explain the what, how and why of teaching (Loughran, 2009). By focusing on the participants’ accounts in the object construction, we can explore how institutional aspects, as tools, rules and division of labor, are made part of their talk and action.

How are the boundaries in teacher education constructed and made relevant in social interaction?

The boundaries are part of the activities and have evolved over a long period of time, but they are also enacted and made relevant in interaction. We argue that it is not enough to study the collective level between activity systems to understand boundaries; boundaries need to be studied in the interaction between individual participants. In this study we are concerned with how boundaries in teacher education are accounted for and which limitations and opportunities this creates for student teachers’ learning trajectories.
Research on Teacher Education from a CHAT Perspective

There is much on research on teacher education; however only a few studies use CHAT. A group of Finnish researchers studied boundary crossing between school and work, using an interventionist approach, in vocational teacher education, occupational therapy education, and a training program for nurses. In these research projects the researchers design learning tasks to promote communication and learning between activity systems. In two of the studies, the researchers developed a model of a learning studio as a space for communication between student teachers, teachers and practitioners (Konkola, Lambert, Tuomi-Gröhn, & Ludvigsen, 2007; Lambert, 2003b). While the studies above focus on the structural aspects of human activity, other studies using a CHAT approach focus on the possibilities for acting in particular situations (Roth & Tobin, 2004). As a response to the problems teachers experience because of the gap between university courses and the lived experience of their work, these studies describe and explain developmental work focusing on university/school collaboration in teacher education. In the co-teaching model, university researchers, supervisors, teachers and student teachers all engage in teaching, resulting in profound learning experiences for all.

A series of studies of reform in teacher education in Norway used CHAT to study innovation and learning in the PLUTO project. Findings show how a portfolio assessment scheme was developed as a powerful object that cut across institutionalized boundaries, allowing for the production of new cultural patterns of activity (Jahreie & Ludvigsen, 2007). A study focusing on the use of how student teachers practice teaching with information and communication technology (ICT) indicates that the availability of new digital tools does not automatically translate into new practice; rather, practice emerges in the interplay of tools, institutional traditions, and students’ and mentors’ agency (Ottesen, 2006a). In a study of institutional change in the PLUTO project, it was found that principles of design, ideas and models of reform are enacted in local contexts, interpreted and transformed. It is argued that focus needs to be directed at the negotiations that occur between policy, models and practice (Rasmussen & Ludvigsen, 2009).

Studies on initial teacher education in England indicate that learning in internship is guided to a large degree by school policies and practices: lesson plans,
Construction of boundaries in teacher education

Curriculum delivery, and how to take the children through the curriculum (Edwards & Protheroe, 2004). Consistent with these studies, a study of mentoring in Norwegian teacher education shows how, in mentoring, the content of talk centers on delivery of the curriculum, and that the traditions and practices of the institution are intrinsic in the discourse (Ottesen, 2006b). However, institutional traditions are flexible and in constant transformation, leaving room for individual subjects to conform to, adapt, or question the existing practice.

The studies reviewed put emphasis on student teachers’ school-based practice, or on what happens at DTE. In general, research on teacher education has paid scant attention to how the transition between the DTEs and schools are managed. Studies of boundary crossing between DTEs and schools, provide important evidence on how student teachers, teachers and practitioners develop a joint object to work on when the researchers create a space for collaboration at the school site (Lambert, 2003b). In this article however, we study patterns of interactions in naturally occurring practices, or learning spheres, between activity systems. While the boundary crossing studies mainly focus on the structural aspects of boundaries, our aim is to explore how boundaries are constructed in interaction, and how this creates limitations and opportunities for the student teachers’ learning trajectories. In our study, boundaries are defined through the relations within and between activity systems; they are dynamic and evolving, constructed in the situated negotiation of the tools, rules and divisions of labor of each of the interacting activity systems.

In the next section, we discuss CHAT as a framework for studying boundaries between activity systems and how this is enacted and negotiated in dialogue among participants. We will then describe our study and methodology and present an analysis of video and audio data from teacher education for upper secondary schools (students age 16-18) in Norway. We analyze how participants construct their understandings of “goals” as a core didactic concept, both in DTE and during their internship in schools. To study how the boundaries in teacher education are constructed, we explore how meanings are shaped and objects accounted for in various learning spheres. In our understanding, “meaning” arises in the relationship between action and social activity. Meanings are situated in action but they are a function of the social relation, always related to activity.
Studying the Mutual Relationship between Activity and Action

In the last couple of years, some CHAT research has made attempts to identify intermediate units between the levels of action and activity. While it is warned against theoretical shortcuts (Engeström, 2008), methodologically intermediate concepts may aid empirical analyses. Student teachers’ learning trajectories are organized across a number of practices, e.g. seminars, mentoring, supervision, and different forms of group work. We understand these as recurring learning spheres. The spheres are subordinate to the activity of teacher education and regulated by its unfolding object, rules and division of labor, but are too diverse and shifting to be considered as activity systems. We use the concept as a way to operationalize in order to be sensitive to the empirical phenomena. In order to investigate how interactions at the boundaries in teacher education are constructed and made relevant to the participants when working on object constructions, it is necessary to investigate participation in and across learning spheres. It is in the student teachers’ engagements in the learning spheres that tools, rules, and division of labor are experienced as salient constraints or possibilities available to the student teachers’ actions.

In the analysis, we investigate actions in moment-to-moment analysis, in order to illuminate the characteristics of central learning spheres in teacher education and the relationship between these. The analysis holds explanatory power to follow the trajectory of the object and to unpack how it is mediated by institutional rules, division of labor, and tools in situated contexts. A dialogical stance on participants’ accounts in and across the various learning spheres provides important insight into how the activity systems interact.

Historical and Situational Objects

A key theoretical concept in this study is the notion of object-oriented activity. With the notion of object, CHAT not only seeks to understand what people are doing, but also why they are doing it. “Why” questions can be addressed by analyzing the motives of object-oriented activities. In CHAT, object refers to two different, but interrelated, aspects: the historical, generalized object of the activity system and the
situational, constructed object that gives direction to the (inter)action. The first is the institutional answer to societal needs (e.g. the need for professional teachers), and institutional structures, and are historically developed. The second aspect of the object is procedural and is discursively constructed. Participants have individual motives and interests for being involved in the activity and they conceptualize and enact the object in diverse ways, resulting in differing understandings of the object within the same activity system. Such constructions are partial manifestations of the generalized object as it gives direction to possible actions. In teacher education, the objects are constructed in the learning spheres. In the analysis, we investigate how participants account for goals in education in different learning spheres. The students’ understanding of goals, conceptually and as a tool for planning and teaching, constitutes their situational object construction, and needs to be understood in relation to achieving the outcome of the activity.

**Boundaries and Border Zones**

When object construction is investigated over time and across activities, boundary is a key concept. From the perspective of CHAT, boundaries are part of activities and have historical layers. The boundaries in teacher education have evolved over a long period of time, along with the development of institutional practices. Boundaries are defined as “established distinctions and differences between and within activity systems that are created and agreed on by groups and individual actors during a long period of time while they are involved in those activities” (Kerosuo, 2006, p. 4). Boundaries are intrinsic to the activity system, but become transparent in and through participants’ talk and actions. The learning trajectories of student teachers are trajectories at and across the boundaries between DTE and school. To pass their final exams and become certified teachers, student teachers need to attain theoretical knowledge (about their subjects, pedagogy and methods), and field experience as teachers. Boundaries appear as both a terrain of limits and of possibilities for student teachers’ learning trajectories. In crossing boundaries, student teachers encounter different and sometimes conflicting views; thus processes of collective concept formation are imperative. There have been several attempts to conceptualize this “sphere in between,” e.g. boundary zone (Konkola et al., 2007), boundary-crossing
place (Lambert, 2003a) or border zone (Kerosuo, 2006). Common among these studies is that they draw on Engeström’s work on developmental work research, and use the Change Laboratory method, in which the participants use the learning tools of the laboratory setting as resources while working on work-related problems. This space is often referred to as a “no-mans land” where participants from different activity systems meet. In our study, we use the notion of border zone, but we identify this space empirically. It is not possible to design or promote a border zone; rather, we have to observe how practice unfolds, historically and situationally. Whether it can be analyzed as a border zone or not depends on at least two interactional aspects: the participants become positioned and position themselves to question the norms and rules of activity systems and they co-construct shared objects. In this study we explore how the boundaries of activity systems manifest themselves in the (inter)actions of the participants engaged in object construction. We analyze interactions in the learning spheres to investigate how the boundaries are accounted for and how and when border zones emerge.

The Study

This study took place at the Department for Teacher Education and School Development at the University of Oslo, Norway. There were 190 student teachers in the program when we collected our data in 2002/2003. To qualify as teachers in secondary or upper-secondary schools, student teachers must take a one-year course after finishing their subject degrees. On campus, the student teachers attend seminars and lectures in their different subjects (subject didactics) and in pedagogy (educational theory). Seminar groups have been organized to help student teachers integrate theory and practical experience. There are around twenty students in one seminar group. Most of the work is collaborative, either with the whole group or in smaller working units (core groups) consisting of four to six student teachers who work together in all their campus and internship activities.

The program is based on the idea of partnership between the DTE and the schools. The student teachers have two periods of internship: four weeks in the first semester and eight weeks in the second. In the first period, the core group as a whole is responsible for the lessons; in the second period they work together in pairs, with
responsibility for one class in each of their subjects. Each school has a contact person who organizes the internship. A teacher mentor, who is also the class teacher, is assigned to the group in each of the two subjects. The mentor observes their lessons and mentors the group twice a week. When using project work as a teaching method, the mentors normally teach with the student teachers, but the student teachers are responsible for planning the work. At the end of the second internship period, the mentors write an assessment report, which is sent to the DTE.

A supervisor from the DTE visits the school during every internship period. The university supervisors are not subject teachers, but teachers of subject didactics. The supervisor in this case is a teacher in history didactics. In the first period, the visit is organized as a meeting with the supervisor, the group of student teachers, the mentors, and the contact person at the school. In the second period, traditional supervision takes place, where each of the student teachers is supervised once. The student teacher makes a lesson plan that is sent to the supervisor some days in advance. The supervisor, student teacher, and mentor have a brief pre-lesson conference where they go through the lesson plan. After the lesson, which is observed by the supervisor and mentor, all three meet and talk about the lesson. The lesson plan offers a structure for the supervision. University supervision is of particular interest because it is realized through the joint efforts of school and DTE, and includes participants from both sites. The principal or one of the other members of the school staff undertakes a similar supervision with the student teacher in her/his other subject. The assessment reports from the two supervisions and the mentor form the basis for the evaluation of the student teacher’s practice teaching.

**The Norwegian Context: The National Curriculum, Project Work and Lesson Plan**

In Norway, the National Curriculum (NC) is formulated in two parts. The Core Curriculum states and elaborates the general aims of schooling. According to the core curriculum, the aim of education is to “expand the individual’s capacity to perceive and to participate, to experience, to empathize and to excel” (Curriculum, 1996b, p. 15). The goals in this part focus on soft skills, such as team work, project work, argumentative skills and criticism of the sources. The second part is the NC for upper secondary education, and consists of curricula for each subject. Initially, common objectives for that particular subject are stated. Such objectives are general,
as in this example from social science: “Have a knowledge of concepts, models and working methods that are fundamental to social science subjects” (Curriculum, 1996a, p. 6). The next part expresses detailed objectives and learning targets for each course in the subject. In the empirical analysis in this study, the student teachers plan a project about the welfare state in the course “Norwegian and International Politics.” The theme for the project is closely related to one of seven objectives for the course. The figure below shows the objective “have knowledge of the structure of the welfare state” and the related learning targets.

**Objective 7**

Pupils shall have a knowledge of the structure of the welfare state and be able to discuss the future of the welfare state

*Learning targets*

Pupils shall

7a have a knowledge of the most important principles and laws on which the Norwegian welfare state is founded

7b be able to describe the Act relating to social services and the Act concerning national insurance

7c be familiar with the financing of the Norwegian welfare state, with its administrative structure and political administration

7d be able to compare different welfare state models, be familiar with problems associated with the welfare state and be able to discuss different solutions to these problems

As an educational practice and method, project work is often described in relation to pupil activity, group work and the making of a special product. Project work was a mandatory method for teaching in Norwegian schools at the time of the study and was linked to both single subjects and to a cross-curriculum approach. The
method is defined as a problem-solving activity, where the pupils have to carry out a piece of work from an original idea to a product, result or solution (Curriculum, 1996b). During the course of the school year all pupils were required to carry out at least one project in social science and history. The topic and assignments should be selected within the framework of the curricula for the subject.

A central part of teachers’ work is to plan lessons. In the teacher education course studied in this project, an outline of the lesson plan is developed at the DTE, and has a didactic profile. The student teachers are expected to (1) state goals for pupils’ learning, (2) account for the content of the lesson (themes, tasks, educational resources), (3) account for the methods (what pupils are expected to do, what the student teachers as teachers are expected to do and the amount of time allocated to each task) and (4) account for the evaluation (what the student teacher would focus on in evaluating the pupils’ work, and how he/she would give feedback to pupils). The student teachers are expected to create such documents to plan their lessons during internship, and four to six of them should be handed in to the DTE. The lesson plan should be used during mentoring and supervision. The national curriculum, project work and lesson plans are tools that traverse the boundaries in teacher education allowing us as researchers to track the notions of the tools within and across learning spheres.

**Analytic Approach**

The data analyzed for this article was produced as part of a larger study, which is built on extensive observations over a period of one school year. One group of four student teachers was observed on campus in their courses in pedagogy, history and social science, and two groups of student teachers were observed in their two periods of internship. Actions are influenced and structured by the activity system, but not determined by it; they are always collaboratively negotiated. Our interest is in how the boundaries in teacher education work as both limitations and possibilities for student teachers’ learning trajectories. We use interaction analysis to study how participants orient themselves towards the object, and how historical norms, values and the division of labor are enacted in the interaction. The analyses of the participants’ interaction were conducted in three steps. First, to be able to carry out
an extended analysis, we made an overview of the total corpus of data (one hundred hours) that made it possible to select a subset. We selected border encounters in key learning spheres, and focused on situations where student teachers were working with their notions of what the goals should be in planning project work in their university courses and in internship. The data used in this study is from the second and last semester of their course (three months) and consist of video and audio recordings from seminars in pedagogy (three hours), university supervision (four hours), planning project work in internship (four hours), and mentor meetings (five hours). Second, we conducted an initial analysis of all the interaction data to identify recurring patterns of interaction in the key learning spheres. Finally, in order to explore and understand these learning spheres in more depth, five selected extracts of participants’ interactions were selected and analyzed in detail. The extracts were transcribed from Norwegian to English. To capture the student teachers’ learning trajectory the extracts we selected from internship were from the same group that we observed on campus, and all extracts are chronological. The table below gives an overview of the learning spheres included in the analyses in this article, when each episode is taking place, and who the participating actors are.

<table>
<thead>
<tr>
<th>Working sphere</th>
<th>When</th>
<th>Who</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extract 1</td>
<td>Seminar in pedagogy</td>
<td>Before second internship</td>
</tr>
<tr>
<td>Extract 2</td>
<td>Group work in pedagogy</td>
<td>Before second internship</td>
</tr>
<tr>
<td>Extract 3 &amp; 4</td>
<td>Planning project work</td>
<td>During second internship</td>
</tr>
<tr>
<td>Extract 5</td>
<td>Supervision</td>
<td>Middle of second internship</td>
</tr>
<tr>
<td>Extract 6</td>
<td>Mentoring</td>
<td>Towards the end of second internship</td>
</tr>
</tbody>
</table>
The extracts have been selected for three reasons. First, they display recurrent patterns of participants’ interactions in the different learning spheres. Second, they make it possible to explore and understand how the boundaries are enacted and made relevant in the various spheres. Finally, it allows us to explore the dynamics of change in activities.

To help us in the empirical analysis, we use “accounts” and “positioning” as analytic concepts. This enables us to investigate how the boundaries are maintained, questioned or transformed. Accounts refer to forms of talk and actions where participants make their ideas, understandings, options, agreements and disagreements available to each other. Accounts relate to the participants’ experiences, but also to explicit and implicit norms and rules within the activity. By being sensitive to how the participants’ produce accounts, one can explore how institutional aspects is part of their talk and actions and how boundaries manifest themselves in the interaction. To study how the boundaries of the activities of DTEs and schools are constructed, we analyze how the participants produce accounts for maintaining, challenging, or transforming the prevailing boundaries. For the participants the accounts are usually implicit, and various linguistic means are used in social interaction.

In the extracts that follow, participants’ contributions are analyzed to make patterns of interaction transparent. This allows us to investigate if, and how, accounts differ across learning spheres, and how the student teachers’ positioning within learning spheres may influence their accounts. Positioning implies that the world is perceived from a certain perspective, and that certain aspects of the world are visible from that particular position. Positioning reflects cultural and historical distributions of power, legitimacy and authority but is enacted in situated actions. In other words, positioning is collectively accomplished in a discursive process where one positions oneself and the other participants. In an utterance one makes available a subject position, which other speakers may or may not take up.

**Empirical Analysis**

The observations in the learning spheres and the initial analysis of the interaction data showed some recurring patterns of interaction. In mentor meetings, the discussions between the mentors and the student teachers are characterized by talk
about lesson planning, individual pupil’s motivation and behavior, and classroom management. Typically, the mentors ask for students’ opinions, but rarely challenge the students or open the discussions to different perspectives on teaching and learning. In the mentor meetings, the mentors establish a supportive and caring mode of talk. Before the visit from the university supervisor, the content of the mentor meetings changes toward assessment preparation. The mentor helps the student teacher plan a lesson with a teaching method that he assumes will be acceptable to the supervisor. Building on prior experiences with the same supervisor, he may also advise the student teacher about the meeting afterwards. In supervision, classroom performance and delivery are usually the themes of the talk, and the meetings with the university supervisor have an assessment focus. The supervisor sets the agenda, and the interactional pattern between the supervisor and the student teachers is characterized by the supervisor asking questions and evaluating, and the student teacher answering the questions. The supervisor rarely explores the student’s views and interpretations. Both the mentors and the supervisor in our study focus on didactic issues in their talk with the student teachers, but different aspects of the notion are made relevant through their accounts. The mentors focus on the NC and practical issues concerning teaching, the what and how issues. The supervisor is also concerned about such issues, but he puts special emphasis on relating teaching and learning to theory, the why of teaching. When the student teachers collaborate on tasks, both at the university and in lesson planning at school, the interaction is characterized by discussions, negotiations and interpretations of issues related to learning and teaching. They experiment with different ways of doing and understanding. In these talks various accounts are brought into play and justified in the interaction. In the various learning spheres the participants orient their talk and actions towards more or less explicit rules, values, expectations and practices embedded in the particular context. Below we analyze five selected extracts of participants’ talk in detail, in order to explore and understand the recurring interaction patterns in the various learning spheres in more depth.

When planning teaching in coursework on campus or during internship, the student teachers in our study struggle to understand goals, both as theoretical concepts and as tools that might direct their actions. In extract 1 and 2 we explore how the object goals is talked about in the last seminar in pedagogy, before the
student teachers enter internship. In extract 3 a and b, two student teachers, Kris and Geir, plan projects in social science and in history. How to understand goals when planning a project is a central topic for their discussion. In Extract 4, the university supervisor challenges Geir’s conception of the object, and in extract 5 from a mentor meeting the student teachers is told how one should conceive goals in the practice of teaching.

**Constructing the Object**

In the seminars in pedagogy that we observed, lectures are usually followed by plenary discussion and group work, allowing for the student teachers’ negotiation of meaning. The following two extracts are from a seminar where the student teachers work with internship preparation. Extract 1 is from a plenary session where the university teacher presents the task for the student teachers: to construct a lesson plan. In extract 2 the student teachers struggle to make meaning of the task. In the extract below, the university teacher explains how to write a lesson plan and how to break down goals.

**Extract 1**

University teacher: A lesson plan is a more demanding document, because you have to, in addition to planning the lesson, also give reasons for goals and choices within the different elements. And what do we mean by that? Yes, you are going to show what you think about education, what you think about learning, and how you think that the pupils will learn something about this theme. In pedagogy we actually demand that you give the reasons in pedagogical theory as well. That means that you refer to pedagogical theory in your reasons. Why do you request this goal for the work? How can you defend that it is a good goal? And, first and foremost, where are the goals derived from?

After a brief talk, the university teacher asks the student teachers to work out a lesson plan in groups. She gives them a template of a plan to follow. In her talk, and supported by the tool (the plan template), the university teacher instructs the student teachers about what a lesson plan is and what they need to include in the plan: They have to formulate goals for their pupils’ work, and it is essential that they ground the goals in educational theory. In other words, she accounts for the *why* of didactics. To appear accountable in this context (i.e., the activity system of DTE), the student teachers need to accommodate to certain rules (ground their selection and
concretization of goals by using educational theory, reflect about goals and show their ideas of teaching and learning), fulfill certain tasks (be able to create a lesson plan) and use certain tools (the NC, which is from where the goals should be derived, educational theory, ideas about learning and teaching).

In the plenary session following the introduction (observational data, 05.02.03), the university teacher argues that the student teachers need to take individual responsibility for actions in the classroom. She draws on thoughts and ideas about how to be accountable as teachers in schools. While she argues for the importance of grounding the goals with pedagogical concepts, the task presented to the student teachers is to use the categories of the template to make a lesson plan, not to discuss the categories. The task is general and abstract, and does not offer any suggestions for how the student teachers should approach the task. Initially, the group assignment is quite bewildering to the student teachers, as is evidenced in the following extract. As we come into the discussion, Ingrid and Heidi struggle to define a hierarchy of goals.

Extract 2

[1] Ingrid: Are they going to work in pairs? Or in groups, maybe? I think this is a good plan.

[2] Heidi: Yeah, it is, but what do we write on goals, then? That is the issue here.

[3] Ingrid: That is a goal. [Points at the core curriculum that they have on the table in front of them]

[4] Heidi: Yes. But which goal is it under? That is a subordinate goal.

[5] Ingrid: Oh…Yes, under the big goal? [Reading from the core curriculum] "Stimulate curiosity and learning how to pose questions."

[6] Fredrik: But the goals we are listing, how general or specific are they supposed to be? I wonder about that.


[8] Ingrid: I guess we can put up a general goal and then…
Just before this segment, the student teachers tried to figure out how to proceed with the task. Heidi argued that it was easy to make a template for a lesson plan: what was difficult was to make theoretical arguments for the goals. They eventually agreed to work on the theoretical arguments before making the template. Still, their initial discussion centers on finding a teaching plan that could work, as we can see in Ingrid’s first turn, where she asks whether the pupils are going to work in pairs or groups. Heidi confirms Ingrid’s suggestion, but, at the same time, she directs their attention towards the task. Ingrid does not answer Heidi’s question: instead, she seems to find a suitable goal in the NC. By connecting their plans to a legitimate goal, they have fulfilled the task (turn 3). In turn 4, Heidi urges Ingrid to elaborate her claim. She argues that it is not enough to find a goal: they also have to understand how it connects to the hierarchy of goals in the NC. Again, her account is to the task, this time in more detail. Goals need to be qualified by elaborating why they are chosen, why they are suitable, and from where they are derived. Ingrid asks for confirmation on whether the previously mentioned goal (turns 3 and 4) is subordinate to this “big goal” (turn 5). Fredrik responds by asking how specific the goals should be (turn 6). This question puzzles Heidi as well (turn 7), and Ingrid starts to suggest a possible approach when Fredrik interrupts her. As a teacher in school, Fredrik explains, he would start with the content, then plan the lesson and
develop the goals (turn 9). Ingrid urges Fredrik to elaborate this view (turn 10), and she agrees that this seems to be a reasonable way to develop goals (turns 12 and 14). Ingrid’s statement “I would have done” also indicates the difference between what they have been told to do as students and what they actually will do as teachers (turn 14). Geir, who has not been part of the discussion, suddenly joins in by saying, “I don’t know about you, but I’m just going to be a teacher.” By this utterance, he indicates a distance from the discussion. By using the word “just,” Geir positions himself as accountable to the practical work of teaching, as opposed to the university’s requirements of theory-based grounds and reasons. Thus, turn 9 can be seen as a turning point in their conversation, where the students position themselves as future teachers rather than as students working on a task.

In the analysis of the interaction, we note a change in the way the student teachers talk about the lesson plan. At the outset, Ingrid’s understanding of the task is to make a plan for the lesson. Heidi first turns their conversation to the category goals in the template lesson plan (turn 2), and then to a question about different kinds of goals (turn 4). There is an emerging tension between the completion of the lesson plan as an instrumental task, and as a learning task for the students. The NC is a cultural tool that might supply them with the right solution, or it might serve as a tool to help them reflect on the nature of goals. In turn 6 Fredrik aligns with Heidi’s bewilderment about what a goal is; however, his account is oriented to the completion of the task (“how general or specific they are supposed to be”). However, in turn 9 Fredrik’s account turns their orientation from an issue about different kinds of goals to what they would do as teachers. Instead of referring to the task, and thus the tools and regulations of the activity of the DTE, Fredrik grounds his argument in the division of labor and the rules of schooling. In the activity of DTE, the object is to create a lesson plan, and to be accountable as students they have to ground their goals in educational theory. As Fredrik sees it, however, in schools the job is not to conceptualize goals, but to find some goals in the curriculum that cover the content of the lesson. The shift in turn 9 indicates that Fredrik suggests an alternative interpretation of the lesson plan. Through his accounts of how to make a lesson plan, he positions himself as a teacher.

The ambiguity in how the objects and tools are talked about indicates that boundaries between DTE and schools are unsettled and permeable. During their
meaning-making process, there is a tension between the student teachers’ positions as students in the DTE and as teachers in schools. The task, to create a lesson plan, can be understood as an instrumental task (filling in the template with the correct goals); as an opportunity for reflecting on goals, learning and teaching; or as a practical device for teaching. The category “goal” in the lesson plan may be developed as a didactic concept, but it may also be talked about as a functional construct related to actual teaching. The student teachers solve the ambiguity by applying different linguistic registers to the knowledge domain. Though the object does not change, the realm for meaning making is different, in that the student teachers construct different object-concepts as possible alternatives for actions.

Reconstructing the Object: Transforming the Boundaries

The next two extracts illustrate how the student teachers recognize two possible conceptualizations of the object. During their internship, Kris and Geir plan and carry out two projects with their pupils: one in social science and one in history. They spend much time planning the projects, trying to decide which topics to focus on and how to attain their proposed goals for the projects. In this section, we will follow Kris and Geir’s trajectory over a couple of weeks. In the first extract, they are planning a project in social science.

Extract 3 a

Geir’s first statement in turn 1 indicates that he sees the main goal for the project to be the pupils’ development of argumentation skills. While learning “the facts” is also a goal, this is not considered to be the problem. In his response, Kris constructs a dilemma (turn 4) between how to develop a project that ensures that the pupils learn the formal knowledge, and learn to argue.
In this small extract, they are concerned with how to use the general goals in the core curriculum and the specific learning targets in the curricula for the subject (see Figure 1) in a practical situation. The student teachers do not connect the two goals; learning the facts and learning to argue are talked about as separate processes for the pupils (“We will manage to pound the formal part into their heads”). Because they see the goals as disconnected, the student teachers struggle to ensure that both goals are attained. Their solution seems to be first to learn the facts and then to learn to argue for their view based on the facts. In other words, two accounts of pupils’ learning are in play: the pupils as learners of a specific content (transmission of knowledge) and the pupils’ development of argumentation skills (participation). These parallel accounts reflect different goals in the NC.

A couple of weeks later, Geir and Kris are planning a history project. They are now occupied with articulating the reason for the goals they have set for the project.

Extract 3 b

[5] Kris: It is possible that Trond [mentor in history] thinks it is very difficult, what Helene [mentor in social science] says about not making it…get down to their level. But I think it is better to give them the challenge and keep in mind that, OK, the first priority is that they should learn the facts, but we are also in the end of, this is probably the last project in history in high school, for many of them the last project in history in their life! Then it has to be possible to “push the envelope” [his expression] a bit and say that this is the goal for this type of teaching, since secondary school in history and social science separate the chaff from the wheat, and argue with the use of historical facts. And then we can bring in the use of revealing one’s sources, etc. Say that this is stuff we are going to take up later on. We say that it is important for them in their written work, if they borrow argumentation from a place, then it’s important to use sources.

[They discuss which topics to include in the project for about 15 minutes before Geir turns the conversation to the goals for the project again].
[6] Geir: Our goal is that they are getting through parts of the curriculum [the textbook] and that they try out the skills that we want them to…

[7] Kris: Yes, and that is partly related to making arguments for choices, to differentiate what is important and argue why it’s considered important, and partly to see that what one considers important changes after one’s perspective.

[They continue to discuss the topics for a couple of minutes, i.e., whether their topics are too broad and difficult and what is relevant within each of the topics].

[8] Kris: Our choice has to be a request to try to get the pupils to connect this, try to get it into a context. Why this is interesting. I myself think it is fairly uninteresting to look at the infant mortality rate from 1923-1929, isolated, but if that says something about a considerable movement in the living conditions for a major part of the Norwegian population, then it is interesting in a historical context. Try to make them see the connection. What we want with this kind of project is exactly to make them see trends in Norwegian history, not singular events.

[9] Geir: Yes, I agree, but do we get them to do that with this project?

In this extract, Kris develops arguments for the project goals (turn 5). Through his accounts, he dissociates himself from the mentors and offers his personal view (“It is possible that Trond [mentor in history] thinks it is very difficult (…) But I think…”). In the last semester of upper secondary it seems reasonable to demand more of the pupils than just reproducing disconnected facts. Geir argues that their main goal is to cover parts of the textbook, and to have the pupils try out skills that they, as teachers, consider to be important. As a response, Kris specifies the skills they regard as important in the project. Kris’ argument is based on the pupils’ assumed learning trajectory: the pupils have been working in a project-based manner since lower secondary school in order to learn to argue, display their sources, and be able to criticize the sources. In turn 8, Kris gives a more detailed description of their goals for the project “…get the pupils to connect this, try to get it into a context.” The word “this” probably refers to factual knowledge, and he wants the pupils to place disconnected facts in a context and thereby see trends in Norwegian history. In turn 9, Geir confirms that he agrees with Kris.
The object for their conversation is pupils’ learning, i.e., the expected outcome of the project, and implicitly they touch on learning as a concept. In Extract 3a, and in turn 6, Extract 3b, formal knowledge and development of argumentation skills are seen as two separate learning processes for the pupils, aligned with two apparently disconnected goals in the NC. In their discussions, they explore ways of overcoming this dilemma. Kris’ account is conceptually oriented: Knowledge is more than information; it implies being able to argue for one’s view. In Extract 3b, Kris argues for a view of learning that connects the perspectives: formal knowledge based on the curricula for the subject is not disconnected fragments of facts, but needs to be placed in a context so that the pupil will be able to understand the significance of the facts and why historical knowledge is important. In their meaning-making process concerning their goals, which relates to the goals in the core curriculum and the goals for the subject, the student teachers co-construct the object in different ways, and in the last part of the extract (turns 8 and 9), a reconstructed object combining the two alternative accounts of the object emerges. However, for the two student teachers, it is problematic to write up goals in the DTEs prescribed manner as pedagogical content goals, skills goals and formative goals, and the final utterance (turn 9) indicates they are still struggling with how to arrange this in a practical teaching situation.

**Group Work: Negotiating Positions**

The analysis of our data indicates that when student teachers collaborate they pursue and explore different object constructions. A variety of legitimate accounts are used in the object construction. In group work on campus the object, the lesson plan, is accounted for both as a school task and as a practical device for teaching. In lesson planning (cf. above), the analysis reveals that the student teachers initially constructed two alternative accounts, reflecting what they saw as conflicting goals. Through negotiations, the student teachers co-construct their own understanding of what goals are and how they are connected.

The analysis of group work reveals how boundaries are constructed. In the two learning spheres, the analysis shows that the student teachers work on the object by asking questions, bringing up dilemmas and problems, and making suggestions that are supported and elaborated by the others. In the group work on campus, the
student teachers are working on a task presented by the university teacher. In the seminar (Extract 1) the teacher explains, and justifies what they, as students, are supposed to do (“In pedagogy we actually demand…”). These accounts can be seen as a way to maintain the boundaries of DTE. In Extract 2 Heidi also accounts for maintaining the boundaries of DTE by stating what she regards as the issue in the task (turn 2) and how they are supposed to understand the goals (turn 4). Fredrik suggests an alternative way of creating a lesson plan. This is posed as a question (line 6), indicating an ambiguity in the definition of the object, and as a problem (line 9), illustrating a gap between the boundaries (“The way I’m doing it when I come out …”). By his account he challenges the boundaries of DTE, and his alternative idea about how to construct the object is acknowledged by Ingrid and Geir.

When the two student teachers are planning the projects (Extracts 3a and b), they bring up a dilemma related to different kinds of goals and learning processes in the NC. In turn 6, Geir suggests that the goals for the project are that the pupils acquire formal knowledge (“getting through parts of the curriculum”) and practice some important skills. In turn 7 and 8, Kris elaborates what this might entail, and accounts for an integration of goals. It is in the pupils’ actions, as they carry out the project work, that goals concerning skills and factual knowledge are connected. In DTE the students are expected display their understanding didactic concepts when they account for the function of goals in education. As teachers in school, the student teachers’ are not concerned with categories or hierarchies of goals. Rather, their main interest is in formulating goals they can use as tools to plan for pupils’ learning. In their talk, the students permeate the boundaries between activity systems. This kind of talk holds the promise of facilitating transformation and change, as suggested by the utterance in turn 9: “Do we get them to do that with this project?”

The analysis indicates that the group work, both on school tasks and lesson planning, might be important learning spheres in teacher education, because the student teachers are in a position to explore different accounts of teaching and learning across current boundaries. In group activities, there is no strong pattern of asymmetry, as in other institutional discourses such as mentoring and supervision. The student teachers negotiate positions in relation to each other. The tensions between the positions open a space for exploring the tools and objects, expressed in the construction of accounts that are fluid and provisional.
Managing Institutional Boundaries

Our data shows that the lesson plan is an important tool in supervision. The plan is sent to the supervisor a few days in advance. The supervision starts with a short pre-lesson conversation, followed by the supervisor and mentor’s observation of a lesson. Often the supervisor will compare the written plan with what was observed, and possible deviations are commented upon and discussed. In the following extract, the supervisor has invited the student teacher, Geir, to elaborate on the goals he has stated in the lesson plan. In his plan, Geir has used the categories of pedagogical content goals, skills goals and formative goals for the whole project period, and not just for the particular lesson. The student teacher and the supervisor discuss the skills goals that Geir had formulated in his lesson plan:

The goal is that the pupils with individual activity and group work can argue for what they think is most important in the historical period. They are going to get training in trusting and using their own skills. Their critical and analytical skills are considered central in this period (Geir’s lesson plan, 12.03.03:3).

Extract 4

[1] Supervisor: But skills, did the pupils get any training in that?
[2] Geir: No, in the first lesson, I don’t think there is any training of skills.
[4] Geir: Yes, it is an practice in skills, but I don’t feel that they have got so far that they actually have started working with something.
[5] Supervisor: But it is training.
[6] Geir: I can see that over time, but…
[7] Supervisor: [Interrupts] Do you see any training of skills that they [the pupils] have got, that you could have focused more closely on?
[8] Geir: [Hesitates] They may have, the group collaboration went very well, I think.
[9] Supervisor: Organization. You should have mentioned that in your plan. That is also a skill, a general, not a specific skill.

As an answer to the supervisor’s question (turn 1), Geir responds that the pupils did not train on any skills, and emphasizes “in the first lesson.” He interprets
the supervisor’s question as relating to the first lesson, and not to the project period. The supervisor disagrees (turn 3), and Geir confirms the supervisor’s claim, before adding that the pupils have not started working with the skills yet. When the supervisor disagrees, (turn 5) Geir elaborates by suggesting that skills develop over time. Geir seems to want to elaborate his claim further. His turn in 6 ends with “but,” however, he is restrained by the supervisor’s interruption. The supervisor’s question in turn 7 suggests that Geir might have paid more attention to skills training. Geir hesitates, and answers that he thinks the pupils collaborated very well (turn 8). In his lesson plan (Lesson plan, 12.03.03), group collaboration is seen as a formative goal. Thus, this is mentioned in the plan, but not focused on in the particular lesson. The supervisor’s response of “organization” can be seen as a confirmation, where he categorizes “group collaboration” as organization, or as a different skill (turn 9). However, he maintains that Geir should have mentioned this in his plan.

We will focus on two aspects in this sequence. The first aspect is how the concept of goals is approached. The supervisor and the student teacher both use notions of goals as cultural tools in their talk, but their respective ways of approaching the concept indicate different accounts of skills: as goals for a longer period, or as goals to be stated for a single lesson. Geir’s account indicates a hesitation about the supervisors’ accounts of “skills goals” and “skills training.” He tries to argue for his account several times (turns 2, 4 and 6), but is interrupted by the supervisor, who neither recognizes his account nor explores the concepts. The second aspect is related to how the object in the conversation shifts between the student teacher’s teaching and the pupils’ learning, and how the lesson plan and the notion of goals function as mediating tools. Geir tries to make meaning of the concept of goal by searching for an explanation of the concept; the object is the conceptual meaning of goal. The supervisor’s change of orientation indicates that Geir’s account is not considered valid. Even though the lesson plan is a tool that may mediate a conceptual discussion, Geir’s orientation towards concept development is not manifested as a shared orientation. The different orientations remain un-negotiated. This could be explained by the enactment of the positions of supervisor and student teacher. Asymmetry in positions between a supervisor and a student teacher is embedded in the history of teacher education; our analytic interest is in how the asymmetry is played out in the interaction. In Extract 4 above, the supervisor’s accounts, although
often in the form of questions, tend to be directives that the student teachers are expected to follow. The general function of such directives is to regulate the students’ mental processes (such as thinking or attention) so that they can be mastered and appropriated by the students themselves. A function of the supervision discourse is to convey meaning adequately so that the student teachers may appear accountable as students.

Even though the school mentor and another student teacher are present during supervision, they rarely take part in the conversation. Our data show that the few places where the mentor takes part are in discussions explicitly dealing with pupils and events at the school (observation data, 12.03.03, 26.03.03, 27.03.03, 10.04.03). Plausible explanations can be a lack of shared interests and experiences, the supervisor’s instructions, and the supervision’s double purpose: the student teachers’ learning and the DTEs evaluation of the student teacher during internship. The supervisor is positioned as an expert in this conversation, while the mentor is positioned as expert on issues dealing with these specific pupils in this school. In the next extract, we will analyze an extract from a mentor meeting.

Studies show that, in mentoring, the content of the talk centers on the way that student teachers deliver the curriculum (Edwards & Protheroe, 2004). The talk is context bound, focusing on what the student teachers plan to do or what they have done (Ottesen, 2007). Consistent with these studies, our analysis indicates that the mentor meetings seldom provide any opportunity to discuss constructions of the object. The extract below takes place near the end of the student teachers’ internship, and Geir and Kris have one of their daily meetings with their mentor in social science. The mentor and the two student teachers discuss how Kris should prepare his lesson plan for a lesson that will be supervised by the school’s principal. This follows the same template as Geir’s plan in the meeting with the university supervisor. Before this extract, Kris has gone through the important parts of his lesson plan and he is now elaborating his distinction between skills, pedagogical content and formative goals (cf. Extract 4).
Extract 5

[1] Mentor: It is a bit difficult to make a distinction between goals relating to skills, those relating to pedagogical content, and those relating to attitudes. Because everything is interrelated, in a way it gets...

[2] Kris: I divide them here to the extent that I find it useful. It can be OK for structuring my thoughts, but I don’t bother to press reality into a prescribed form.

[3] Mentor: But the goals of the subject, where do you intend to put them? You have goals for the work [the project work] and the competence goals, but you may also need to show that you see a connection between the goals for the subject and the goals for the lesson.

[4] Kris: Yes. I think that is part of the goals for the work. That’s where I will refer to the National Curriculum.


[6] Kris: You mean that it needs its own heading?

[7] Mentor: Yes, because Ann [the principal and the school supervisor] is not familiar with this subject, and that is what you are going to make clear here, that you see...the goals are what direct our working day at school. And to know how to break down goals is an essential part of being a teacher. But what you do is to look in the back here [of the textbook]. We have been looking at the goals on the welfare state and then you can just find the goals that fit so you show a connection. But make sure you reduce it; you are not going to put in every goal, but it has to be a connection between the goals that you put in and how you break it down in the lessons.

This extract reveals how the concept and function of goals are interactionally developed, based on positions from different activity systems. Kris accounts for goals, from the perspective of the DTE, and takes for granted that goals are divided into pedagogical content goals, skills goals and formative goals. The mentor problematizes Kris’ distinction of goals because “everything is interrelated” (turn 1).
This can be understood as an invitation to conceptual exploration. However, instead of following up on this, Kris defends what he has done, saying, “I divide them here to the extent that I find useful,” but he also accommodates to the mentor’s view by saying, “I don’t bother to press reality into a prescribed form” (turn 2). The mentor turns the conversation to the goals in the NC and asks Kris where he intends to put the “goals for the subject.” When she talks about “goals for the subject,” she is referring to the general NC goals for social science. By saying that Kris has included “goals for the work and the competence goals” in his lesson plan, she indicates that he has mentioned the factual knowledge the pupils are supposed to learn and the skills they should develop (e.g., learning to argue). In other words, he includes the subject-specific learning targets (see Figure 1) and goals from the core curriculum. This can be seen as an acknowledgment of how Kris and Geir re constructed the object goals in their planning of the project (see extract 3b). However, the mentor argues that the plan should include a connection between “goals for the subject” and “goals for the lesson” (turn 3). In other words, the student has to take into account how the general goals for social science relate to the learning targets for the subject. A way of doing this (and hence appearing accountable) could be to be explicit about the relationship between the general goals for the social science as specified in the NC and the goals Kris has stated for this particular lesson. It is reasonable to interpret this as a request, even though it is posed as a question. Kris’ answer “I think that is part of the goals for the work. That is where I will refer to the NC,” indicates that he does not recognize the distinction between the general goals for the curricula of social science and the goals in the core curriculum (turn 4). The mentor follows up by explaining that Kris needs to be explicit when referring to the goals. It is not enough to refer to the curriculum; it needs to be written into the plan (turn 5). Kris makes sure that he understands the mentor by asking, “You mean that it needs its own heading?” The mentor confirms this, and explains why Kris should write down the goals for the subject in his lesson plan. The reasons are three-fold (turn 7): One reason is local and has to do with the principal’s role as supervisor: She does not know the subject, and in order for her to understand the lesson plan, Kris needs to clarify the goals. The second is cultural: the activities of teaching in schools are regulated in society through the NC. Thus, it is vital to be explicit about the connection between the specific goals in the NC and the goals for the lesson. In his
work as a teacher, Kris is also accountable to the mandate of teachers as expressed in the NC concerning the legal responsibilities of teachers. In the last part of the mentor’s utterance, however, there is a shift in her orientation when she presents a solution strategy for the student teacher: to use the learning targets developed for the lessons on the welfare state (figure 1) and find some general goals in the subject specific part of the NC that might fit. This is also the answer to the question the mentor asks Kris in turn 2 about the connection between the goals for the subject and the goals for the lesson.

This extract reveals how the concept of goals is interactionally developed based on aspects characterizing different activity systems. In the first part of the extract, the unresolved questions from the supervision about the hierarchy of goals are brought up by the student teacher. The mentor’s assigned role positions her as a mediator between the didactic and practical interests. She accounts for how to use the NC in a lesson plan and how they, as teachers, are expected to deal with the goals. Breaking down the goals of the NC into targets for their teaching is a significant part of the work of a teacher. She positions herself as a teacher mentor, where she justifies the what and how questions of didactics, thus giving the expected accounts as a student teacher educator. In the last part of turn 7 there is an important turn in her orientation, where she offers a solution strategy (“But what you do…”). Now she is positioned as a teacher accounting for how teachers in their daily life resolve the challenge in a situated, practical manner. Kris reconstructs his position and chooses to be accountable to the school when engaging in this learning sphere. This can be understood as a tension in positioning. The mentor assesses the student teacher’s “capability” as a teacher at the end of the internship. This aspect frames the mentor conversation and makes it easy to understand why a student teacher would choose to adjust to what is warranted in this activity.

**Constructing Accounts between Student and Teacher Positions**

In our analysis of the extract from supervision (Extract 4), we showed how the object for the conversation changed between student teachers’ teaching and pupils learning. In the mentoring session (Extract 5), goals are the object of the discussion. Below we discuss three aspects. The first aspect is related to the different role curriculum goals have as tools in the construction of the lesson plan at the DTE and the school. At the
DTE, the lesson plan functions as a task for learning about goals. The student teachers, as students, have to give theoretical arguments for the goals. In school, on the other hand, the lesson plan is a tool for planning the performance of practical work in classrooms. The function of goals is to give direction to the work of teachers and pupils. According to transcripts from the mentoring session and observations from supervision (observation data 12.03.03, 26.03.03), the university supervisor has told the student teachers not to explicitly state the NC-goals in their plan. The school mentor uses cultural and legal resources in her accounts of why it is necessary to include the NC goals in the plan. When the lesson plan works as a task and its function is to display the students’ pedagogical and didactical knowledge to the supervisor, the goals from the NC could be implicit. The supervisor and the students’ all know that the NC guides work in schools. If the intention is practical, it makes sense to include the NC goals as information for the teacher who does not know them. If the purpose is to do what teachers are expected to do, it makes sense to make visible the connection to government’s steering through goals, thus underscoring that the teacher is accountable in his professional practice.

The second aspect is the student teachers’ struggle to open up spaces for a conceptual elaboration of the object. Instead of opening for an elaboration, the supervisor and the mentor do not accept the student teacher’s account as valid from a position as respectively a student and a teacher. An important part of teacher education is that student teachers should learn to talk and act as teachers. This means for instance that they need to learn a distinct form for discourse: the curriculum discourse. This implies making use of a system of concepts such as, for example, pedagogical content goal, skills goal, and formative goal. In internship, student teachers are not assessed on their capability to conceptually interpret, but on procedural actions. This is confirmed in studies of mentoring (Edwards & Protheroe, 2004). The mentor guides the student teachers into warranted ways of seeing, representing and talking about their experiences, focusing more on their concerns for their pupils’ learning than on the student teachers’ learning activities.

The last aspect is related to how the boundaries are constructed. The boundaries of the activities of DTE and the school are rendered visible as the supervisor and the mentor position themselves as “experts” and control the movement in the discourse guiding the student teachers towards “valid” accounts. In
the learning spheres, the university teacher and school mentor defend the boundaries of “their” activity. Our analysis shows that the supervisor defends the boundaries by giving the student teacher directives on how to conceive the object (Extract 4, turns 3, 5 and 9). The mentor poses her accounts as statements and definitions. In Extract 5, turn 1, she states that it is difficult to make a distinction between different “types” of goals, thus defending the boundaries between school and DTE. In turn 3, she states the need to connect to the NC, in order to be accountable as a teacher in the school. Lastly, in turn 7, she accounts for how to do this in practice, grounded in the situation. The institutional accounts regulate what can be talked about, who can talk about what, and when. The student teachers meet these defenses in different ways. In the supervision, Geir tries to challenge the boundaries by bringing up a dilemma in the supervisor's directive (e.g. extract 4, turn 4), but is met with another directive. In the mentoring session, Kris chooses to adjust to what is warranted in the activity. In these two learning spheres, the student teachers are accountable for producing talk of a certain kind. This puts them in a vulnerable situation where they have to vacillate between valid accounts of different learning spheres.

Discussion

In this study we have used learning spheres as an intermediate concept to study how meaning emerges in the dialectical relationship between activity and action. With the use of accounts and positioning as analytic concepts, we demonstrate how interaction at the boundaries provides limitations and possibilities for student teachers’ object constructions. The analysis shows that the accounts of tools and object constructions vary across learning spheres. This has to be understood in relation to the history of the activity. The object of the activity for DTE is student teachers’ learning trajectories. The object of activity for the schools, however, is pupils’ learning. Supervision is a learning sphere, with participants from both DTE and the school, and thus has the potential for boundary crossing between activity systems. However, the DTE sets the rules and division of labor: the student teachers are accountable to and are evaluated by the university supervisor. Mentoring is also part of the production of DTE; however, university teachers are not participants in the learning sphere, and the school mentors evaluate the student teachers. The accounts in
supervision and mentoring are in other words saturated with traditions of institutional argumentation and action. The tools (documents, educational goals), rules (administrative routines), and division of labor are inscribed with historical and institutional views in each of the activity systems on how to conceive the object, and serve to work as authorized practices for the learning spheres. This is made evident by the way the object is constructed differently based on conflicting expectations in the activity systems. This is a conflict of purpose. In supervision, the lesson plan is conceived as a task, and as students, the student teachers are accountable to demonstrate that they understand the didactical conceptualization of goals. In mentoring, however, the lesson plan is constituted as a practical device for teaching, and they, as teachers, are accountable for making visible the connection between their teaching and the mandate for their work, the NC.

The PLUTO project emphasizes collaboration as vital in order to strengthen the relationship between pedagogical issues, subject matter, and student teachers’ teaching. A central aspect of PLUTO is that the student teachers have to collectively undertake tasks and assignments set by the DTE and, in internship, they have to collectively plan their teaching. The student teachers’ collaborative planning in internship is complex; they are accountable to the DTE, in terms of handing in lesson plans and university supervision, and to the school, which is responsible for the evaluation of their suitability as teachers. Although the student teachers are accountable to and evaluated by the DTE on the outcome of their group work on campus, their collaborative actions take place in a sphere outside the gaze of university teachers. Thus, issues of accountability towards the DTE may be bracketed in their interactions. Positions are therefore to a large extent based on relations and negotiated interactions, and legitimate accounts may draw on and develop accounts from both activity systems. Our analysis indicates that, in group work, both on campus and in internship, the student teachers construct the objects using accounts from both DTE and the school. Through their accounts they also challenge the boundaries in both activity systems. Based on our empirical evidence, we will argue that in group work the student teachers’ interactions constitute a border zone where warranted ways of understanding teaching and learning are reflected on and discussed. The student teachers act in a space where they are in a position to experiment with different forms for doing, which may erase or combine current
boundaries. The student teachers act as *learners*, co-constructing meanings and changing the object in question with integrated use of different tools.

In this study, the notion of learning spheres is used in order to be sensitive to the empirical phenomena. Learning spheres are historically built into and institutionalized in the activity, and the analysis of learning spheres illuminates the relationships between the object, tools, rules and division of labor which differ within the activity. Using the term learning spheres thus captures the internal dynamics of activity systems. The main finding in this study is that different practices in the learning spheres, within one and the same activity, give rise to variations in the construction of the object. The participants’ meaning production in learning spheres takes different directions and may collide. In our study, we have elucidated unresolved contradictions within and between division of labor, rules, tools, and objects.

Issues of power and conflict are aspects of negotiation that are seldom focused on in the CHAT literature. If we use position as an analytic concept, the analysis is attentive to the fact that objects often seem to arise from negotiations saturated with opposition and clashes of interests. Positions are interactionally achieved, implying that we cannot categorize a student as a “generalized” student. How student teachers are positioned and position themselves in interaction needs to be investigated in the analysis. Our analysis shows how the university teachers and school mentors maintained the boundaries of “their” activity, and how the student teachers are positioned in relation to the teachers and mentors. In group work, however, the student teachers position themselves as learners where they challenge and transform the boundaries. These findings could be important at the level of both individual and systemic learning. For the student teachers, this is important for opportunities to construct knowledge and understanding, and for teacher education it provides suggestions for how to bring forth a border zone between DTEs and schools.

In educational policy, there is a strong urge to develop partnership models between DTEs and schools. In the studies reviewed, the Change Laboratory method is used to promote a space for communication between activity systems by designing a learning studio (Lambert, 2003b). This implies that the researchers introduce and organize new tools for improving teacher education. This is an important approach
because it gives an opportunity to optimize the agency of student teachers. However, their studies are on an intentional level, and to understand how participants cross boundaries in a naturalistic setting, we study how practice is played out over time. Our analysis has shown that crossing boundaries between DTEs and schools may be a complex challenge, since the historically developed boundaries between the two activity systems appear rigid and isolated. The closed systems are enacted in participation. Based on our findings, we suggest three implications for boundary crossing.

Firstly, if teacher education is to succeed with partnership, then tools, rules and objects cannot be embedded in local practices, but instead have to be communicated and negotiated with student teachers and between participants from DTEs and schools. The interaction analysis in this study shows that the student teachers’ learning trajectories vary across the different parts of the teacher education program. The focus for the schools is the pupils’ learning, and they rarely take student teachers’ learning into account. To facilitate learning at both the individual and the systemic levels, DTEs and schools need to develop the learning trajectory of the student teacher as a joint object. This could bring forth a border zone between DTEs and schools in which the learning trajectories of student teachers are explored.

Secondly, our study shows that student teachers are important participants for questioning and challenging the boundaries. In group work, we find that student teachers explore various knowledge accounts to construct the objects in new ways. Gatekeepers of the boundaries between DTEs and schools have to be open for student teachers’ positioning themselves, rather than only positioned by others.

Finally, for researchers to understand boundaries in teacher education, it is not enough to study the collective level between activity systems; boundaries need to be studied in the interaction between individual participants. As argued, research on teacher education has focused on different forms of partnerships between DTEs and schools. The focus is most often policy oriented, with the aim being to provide evidence of “what works,” in order to improve programs. This gives important input to understanding these types of settings. In this study, we have demonstrated the importance of understanding institutional arrangements, such as partnerships, by being sensitive to the negotiations that are played out in and between learning
spheres. We emphasize that this seems to be a key area for further investigation on the part of teacher education research.

ACKNOWLEDGMENTS

We thank professor Sten Ludvigsen at InterMedia, University of Oslo, and guest professor David Middleton, Loughborough University, for constructive critiques in our writing of this article. Andreas Lund, Anniken Furberg, Thomas de Lange and colleagues at InterMedia, University of Oslo, have given valuable comments on earlier drafts of this article. We also thank the anonymous reviewers and the editor for their valuable suggestions.

References


Study 3

Making sense of conceptual tools in student-generated cases:
Student teachers’ problem-solving processes
Teaching and Teacher Education
Making sense of conceptual tools in student-generated cases: Student teachers' problem-solving processes

Cecilie Flo Jahreie*

InterMedia, University of Oslo, Post Box 1161 Blindern, NO-0318 Oslo, Norway

ARTICLE INFO

Article history:
Received 23 April 2009
Received in revised form 3 December 2009
Accepted 4 December 2009

Keywords:
Teacher education
Case method
Problem-solving
Cultural–historical activity theory

ABSTRACT

This article examines the way student teachers make sense of conceptual tools when writing cases. In order to understand the problem-solving process, an analysis of the interactions is conducted. The findings show that transforming practical experiences into theoretical reflection is not a straightforward matter. To be able to elaborate on the task it is crucial to make meaning of the tools. It is demonstrated that the institutional practices, rules and expectations must be explicit for the students. The overall aim is to demonstrate that activity theory can enhance our understanding of the interdependence between activity, task and mediating tools.

© 2009 Elsevier Ltd. All rights reserved.

1. Introduction

This article examines how student teachers take up, interpret and transform tools while working with student-generated cases. By “tools” or “resources”, I mean language and concepts as well as peers. The focus is on the relationship between the educational task, the case, the scientific concepts students use to respond to the task, and the societal context. Recognising the importance of developing problem-solving skills, case methods have received growing recognition in teacher education. Case methods are argued to create opportunities for students to develop knowledge in complex and context-dependent situations and to encourage reflection, analysis and inquiry. The literature on learning to teach using case methods reveals a variety of approaches, depending on their purpose for teaching and learning (Sykes & Bird, 1992). One can make a distinction between two main forms of case-oriented approaches. The first is cases of educational dilemmas that students read and analyse (in the following called received cases), while the second involves students generating their own cases. The students in this study used both received and self-generated cases during their course, but this article explores student-generated cases and the way in which a group of student teachers engages with them.

Darling-Hammond and Snyder (2000) emphasise the impact that school organisation and available resources have on teaching and learning. In a chapter reviewing the use of cases in teacher education, Grossman (2005) calls for studies that include classroom practice and a detailed analysis of how cases are actually used. Cultural–historical activity theory (CHAT) offers one way to conceptualise the social construction of knowledge and is seen as a powerful perspective for analysing the students’ problem-solving process. CHAT emphasises how we act on and shape our world using available tools. In other words, we both shape and are shaped by the world in which we act. Studies within CHAT have to a large degree focused on change in collective activities. In the last few years, there has been a move towards research aiming to study the mutual relationship between agency and collective activity, emphasising the process of acting intentionally as part of the participation in a distinct activity (Roth & Lee, 2007). This study goes into this last year’s focus of research by studying the relationship between the activity, the task and the tools in collaborative interaction. From this backdrop, I raise the following research questions:

• How do the student teachers use the available resources to construct the task?
• How is the student teachers’ interaction related to the activity of learning to teach?
• How can CHAT be a fruitful approach for studying case-based methods?

I will first give a brief review of the research literature on case studies before I present my theoretical framework. Then I account for the methods used in the study. I address the research questions by first making a brief analysis of the activity of learning to teach at...
the teacher education department and then analysing student interaction. The analysis will be discussed in relation to the theoretical framework and research on case-based methods.

The study was conducted at the Institute for Teacher Education and School Development, University of Oslo, Norway. The student teachers were enrolled in a one-year course after finishing their subject degrees. The student teachers attended seminars and lectures in two subject didactics and educational theory. The Institute was at the time of the study part of a national reform project: the Program for Teacher Education, Technology and Change (PLUTO) (2000–2003).

2. Research on case studies in teacher education

Since the mid-1990s, there has been a growing effort in teacher education research to understand, through empirical research, what and how student teachers learn from case methods. Most studies of case-based methods have used cognitive and constructivist frameworks, focusing on how cases help develop the prospective teacher’s ability to reason pedagogically and reflect on practice (Grossman, 2005).

Research on received cases can broadly be divided into three main categories. The first studies the student teacher’s ability to connect theory and practice. These studies find changes in the pre-service teacher’s ability to connect theoretical principles to practical problems after case analysis (Lundeberg & Scheurman, 1997). The second category studies the student teacher’s reasoning. According to these studies, reflection is revealed in what students write and say and how they approach their work. Several studies find that pre-service students develop multiple aspects of critical reflection through case analysis; however, the findings also seem to indicate that students experience challenges with critical and complex considerations (Harrington, 1995; Levin, 2002). A third group of researchers examines teacher thinking during case discussions. Findings show that even though case discussions did not dramatically change the teachers’ assumptions about teaching and learning, the discussions served as an important tool in prompting the development of teachers’ thinking about cases (Levin, 1995; Moje & Wade, 1997).

To date, most of the literature involves received cases, and empirical research on student-generated cases is sparse. Most of the literature is methodological, focusing on descriptions of case usage together with actual cases and case commentaries (e.g. Colbert, Trimble, & Desberg, 1996; Schulman, 1992). There is a strong need for studies that investigate the student teacher’s learning process while he/she is involved in student-generated cases. The descriptive literature reveals a variety of methodological approaches to student case-writing. Some take the form of a “case report”, where students write self-reports about the dilemmas faced in their work (Richert, 1992); others ask students to write stories of personal experiences during student teaching (Kleinfeld, 1991). Furthermore, others are development cases where the students write narratives inspired by observations of the other teachers (LaBoskey, 2002). Commonly, these approaches involve the students describing a dilemma or problem, reflecting on the experience through analysis and writing, and then engaging in collaboration with peers. However, these case assignments rarely include a requirement to use theory during the analysis. In this study, a course requirement was that the students should use theory to analyse their observations of a child, a classroom, and the school context.

One of the few studies to focus on how students include theory in student-generated cases is described in an article by Hammerness, Darling-Hammond, and Shulman (2002). The aim of the case assignments was to reflect on their own teaching practice with the use of theory. The students wrote an outline and two drafts of the case before producing a final draft. They received feedback from an instructor and a peer on each draft. The students participated in “case conferences,” in which they presented their cases to a small group of students. The group was encouraged to discuss theories and concepts and to consider alternative interpretations of the case. The researchers conduct a content analysis in which they identify six elements that appeared to be characteristic of expert thinking. The analysis suggests that the students’ final cases possess a substantial number of these characteristics. The students generate multiple hypotheses, elaborate and expand on theory — often in relation to practice, qualified certain statements and observations, and share concrete evidence of student learning.

To investigate the development of students’ expert thinking, two cases were examined from initial outline to final draft, supplemented with an examination of the instructor’s feedback and a review of the students’ reflective essays. The findings reveal that the students began with a simplistic explanation in which they offered a solution that did not involve theory. In their final drafts, the students moved beyond practical or personal explanations to theory-based explanations. The reflective essays showed that peer discussion was useful in generating explanations and in hearing alternative interpretations of their cases. The opportunity to evaluate the cases of others was also seen as useful.

The researchers suggest that the combination of time, multiple drafts and purposeful and specific feedback may have been particularly effective in supporting student thinking about practice. The researchers emphasise the role of instructor feedback during the various stages of case-writing, and claim that a critical aspect of this feedback was the constant reference to theoretical concepts from the course. While evidence exists that reading and analysing other cases may be fruitful for developing student thinking about teaching and learning (e.g. Lundeberg, Levin, & Harrington, 1999), the researchers conclude that case-writing can provide an opportunity for pre-service teachers to “examine assumptions, frame problems, and develop their pedagogical muscle in their own particular context” (Hammerness et al., 2002, p. 240).

The studies reviewed provide important evidence that a case-based pedagogy has the potential to improve problem-solving and reflection on their work with the cases. It is also important to note that the core idea behind the case method is context: cases add context to theory (Colbert et al., 1996). In the interpretation of their findings, Lundeberg and Scheurman (1997) conclude that anchoring concepts in specific situations helps to make theory relevant and useful.

However, most of the research in this area focuses on cognitive outcomes. There has been little empirical work that explores how students solve problems with the use of available tools. The centre of attention in Vygotsky’s work is to study cognitive processes, not just results (Vygotsky, 1978). Vygotsky’s followers developed his work by incorporating societal, cultural and historical dimensions into an explanation of mental functioning (Roth & Lee, 2007). To understand what the students do and how they do it, one has to see the pedagogical act, the task, in relation to the societal context—the activity of learning to teach. Analytically, this implies that I analyse students’ interactions and how these are mediated by the use of tools.

3. CHAT: taking the activity and the learning process into account

Cultural tools, with language being the most important, shape the way we learn (Vygotsky, 1978). Vygotsky’s interest was the study of children’s cognitive development by making available the tools for solving a given task and then observing the process of
problem-solving. The relationship between the task and the tools is a dynamic process where the subject is offered “a second series of stimuli that have a special function. In this way, we are able to study the process of accomplishing a task by the aid of auxiliary means” (Vygotsky, 1978, p. 74, emphasis in the original). The analytic focus is directed towards how learners use tools when responding to a task, and how they construct knowledge and understanding by using these tools. Case-based methods can be seen as tasks in which tools are used, revealed and refined. The relation between the task and the tool is dialectical (Vygotsky, 1978). The dialectical notion implies a process whereby subjects use cultural tools to interpret problems or tasks and also act on the problems by asking questions and creating tools that may be used to transcend constraints or instructions.

Leont’ev developed Vygotsky’s legacy by relating psychological consequences to social institutional phenomena. Instead of focusing on psychological entities such as skills, concepts or mental functions, Leont’ev argues that the unit of analysis must be activity:

“The real function of this unit is to orient the subject in the world of objects. In other words, activity is not a reaction or aggregate of reactions, but a system with its own structure, its own internal transformations, and its own development.” (Leont’ev, 1981, p.46).

Engeström (1987) creates a graphical representation and model of an activity system for revealing the social and material resources that are salient in activity (Fig. 1).

The upper part of the triangle is Vygotsky’s original model of cultural tools as a mediator between the subject and the object. The bottom part of the triangle reveals how individual actions are part of the collective activity that is mediated by rules, the division of labour, and the community in which the activity takes place. The rules and the division of labour within the community are important for understanding the specific structure of the activity in which the subjects act and the possibilities and limitations it presents for their actions. In my study, learning is understood as the ability to interpret the world in increasingly complex ways and respond to those interpretations (Daniels et al., 2007, p. 527). Learning involves not just the interpretation of the object, but also the transformation of the object by acting on it and seeing it in various ways. This implies that the activity and its available resources have to be seen as inseparable parts of the task itself.

The object is a crucial concept in CHAT that needs clarification. All activity is directed towards an object. With the notion of object, CHAT not only seeks to understand what people are doing, but also why they are doing it. “Why” questions can be addressed by analysing the motives of object-oriented activities (Roth & Tobin, 2004). Object refers to two different, but interrelated, aspects: the historical, generalised object of the activity and the situational, constructed object that gives direction to the (inter)action. The first is the institutional answer to societal needs and the object is historically developed (Miettinen & Virkkunen, 2005). The activity of learning to teach is oriented towards the student’s professional learning (object), which exists because of the societal need for professional teachers. The second aspect of the object is procedural and is discursively constructed. The interaction between students is only understandable in relation to the object, or the task, they construct together. The situational object is a partial manifestation of the generalised object, as it appears in the interaction (Engeström, Puonti, & Seppänen, 2003). To make a concrete example: The students’ professional learning is constructed in different ways, case assignments being one of them. In the empirical analysis, I explore how the case assignment is constructed in the interaction here and now, how it unfolds over time and how it is related to the student’s learning trajectory. In CHAT, tools mediate the subject—object relation. In transforming the object, the tools are also transformed, while the rules and division of labour remain relatively constant, systemic features of the activity. However, there is no clear distinction between objects and tools. The object can become a tool during a subsequent activity, and a tool can become an object (Engeström, 1990).

4. Analytic approach

My study is part of a larger research project with ethnographic fieldwork and video- and audio-recordings of the participants’ interactions and activities. The aim of CHAT research is not to disclose “objective” knowledge about the phenomena under study, knowledge that can later be transferred to new practices. Rather, the aim is to understand learning processes in a specific situation that may or may not have implications for other situations (Wardekker, 2000). Three sources of data were used in this particular study in order to get a detailed picture of (1) the student problem-solving process, (2) the correspondence between the interaction during the problem-solving process and the final product, and (3) the relation between the task (the case assignments) and the object of activity (professional learning).

The main source of data is a set of videotapes of two groups of student teachers engaged in three seminar sessions, each lasting for three hours over a period of three weeks. The second source is the students’ end products and instructions and institutional guidelines of the teacher education course. The third source consists of ethnographic fieldwork in the form of observations and interviews. The methodological approach chosen in this study is interaction analysis, because it provides an opportunity to study a particular moment and how the actions unfold and how resources are used to conduct certain actions. The ethnographic information provided a background for the analysis of the interactions, which in turn informed the ethnographic understanding (Jordan & Henderson, 1995). The analyses of the participants’ interaction were conducted in three steps. First, to be able to carry out an extended analysis, I made an overview of the total corpus of data pertaining to the students’ work with student-generated cases. Second, I conducted an initial analysis of all the interaction data in relation to the literature on the field. The review literature shows that students develop the ability to connect theory and practice with case analysis, but the focus is on the outcome. These findings made me interested in exploring how the student teachers pursue theory and theoretical concepts in exploring their practical experiences. To do this, I had to make the process of collaboration and joint problem-solving transparent. I therefore picked one group that explored Vygotsky’s theory and determined how it could be used in relation to the task. The group could be characterised as productive since they generated multiple hypotheses, offered connections between theory and practice, elaborated and expanded on theory — often in

![Fig. 1. Graphical representation of an activity system.](image-url)
relation to practice, and described and reflected on pupils' learning (Hammerness et al., 2002). Finally, in order to capture their learning trajectory and explore their work with the cases in more depth, I selected four chronological extracts that illustrate how the group's interaction changed during their work. The extracts were transcribed from Norwegian to English.

My analytical aim has been to investigate the students' interdependence when facing a collaborative task and conceptual tools, by focusing on what was achieved during the interaction and how their actions are connected to the activity. To study the relationship between agentive actions and the socio-historical activity requires intermediate concepts. For this purpose, I find accounts and orientation useful to guide my research:

From a socio-cultural/dialogical perspective, the meaning of participants' accounts is understood as intrinsic to the social practices they are engaged in as they speak (Linell, 1998; Shotter, 1993). Accounts are, from this perspective, historically generated linguistic devices in the interaction between people (Mäkitalo, 2003). The attention is on what the students treat as relevant, as well as how they try to deal with these concerns in their talk. The students' actions are based on the contingency in the activity. The sources for this contingency are related to the subjects involved in the activity, the ambiguity of the tools in use and what is considered a reasonable interpretation of the rules and norms of the activity. This implies that in order to carry out the case assignment, the students need to engage and orient themselves in the knowledge domain, towards each other, as well as in the expectations embedded in the activity system.

To understand how the task/tool relationship changes over time, it is essential to investigate how the participants orient towards the problem or the task. During interaction, the task can function as a problem the participants direct (orient) their conversation towards, or it can have the role of a mediating tool. Whether the object is constructed as a problem or a tool is decided by the constellation of the activity and the tool/object relation is changing during the course of interaction. It is essential to identify these shifts and how the object, during interaction, is picked up, negotiated, left behind, and reintroduced in another situation. This gives a scope that is broad enough to create ecological validity and narrow enough to understand the moment-to-moment interaction (Furberg & Ludvigsen, 2007).

5. Analysis of the activity

The PLUTO project is intended to improve the continuity of the student teacher's learning trajectory by developing a more problem-oriented teacher education for secondary schooling. Portfolio assessment and case-based methods are central tools for the object of activity, the student's professional development. The emphasis on these tools has to be seen in relation to the aim of enhancing the use of student-centered work methods and improving the connection between learning at campus and teaching at schools. The emphasis on case-based methods involves bringing the student's own experiences into the teacher education program. The socio-cultural perspective is used as the pedagogical design for the program. The students should:

“belong to and interact in a community of practice, engage with linguistic and cultural resources that mediate knowledge central to their development as professional teachers, and work in environments that allow for independent and critical knowledge construction” (Hauge, 2004, p. 5).

The portfolio assessment consists of seven cases in educational theory, each representing a key topic in the curriculum. Three of the seven are received cases, while the other four are student-generated cases. The student-generated cases are produced according to a set of predefined criteria with content relevant to school settings: 1) an individual pupil, 2) a classroom context, 3) the school culture and 4) the students' own teaching experience. The students are supposed to use learning theory, observations in internship, and discourse with students and teachers as tools for their work. The aims of the cases are to increase the ability to adjust teaching for individual pupils, to observe actions and to reveal and use ideas and knowledge in practical problem-solving. The student teachers are not tested on how they explain the learning theory, but on how they make theoretical reflections on practical situations. Student collaboration is a core principle (Hauge, 2004). They are supposed to analyse their observations individually and in groups. The tasks are discussed in seminars and in small groups and are seen as means for development, critique and further development of the students' work.

Jahreie and Ludvigsen (2007) studied how the portfolio assessment, case methods and ICT were picked up and understood by the project group in the first year of the project. We found that portfolio assessment became a powerful object, in which the participants managed to negotiate a common understanding. The university teachers also worked systematically with cases as a means to improve the continuity of the students' learning trajectory. Much work has been done to enhance the use of student-centered work formats and the theory-practice connection. These changes impacted significantly on the students' learning trajectory (Rasmussen & Ludvigsen, 2009). The pedagogical design introduced the students to a process where they had to work continuously and collaborate. Student interviews and surveys indicated that portfolio assessment and case methods played a significant role in the students' learning and development during the course. The portfolio assessment and case methods were, from the student perspective, perceived as meaningful and relevant to their practical experiences as teachers and supportive of a reflection process about subject matter and content (Jahreie & Ludvigsen, 2003; Hauge, 2006). However, there is never a transparent and immediate connection between students' school experiences and theory. The instructions given by the university teacher about the student-generated cases illustrate the historical contradictions these new tasks reveal:

Teacher: You have seen this and then you need this question, your mind wanders and you put it on paper (...) There is a tendency for everything to become descriptive instead of identifying problems or possibly — or discussions. So, these tasks — again — that are only a few pages long — we'll use the template I have presented many times: You have a practical situation that you have observed. You describe it, you present it so that the reader says that ok they have been there, they have seen this (...), then you put forward a statement of the problem: this is what we will look at. How did this occur (...) or what exactly took place, or why is it like that. Use such questions — or words. Eh. Then there are possible discussions attached to the theory. But of course, there is no room for a full discussion. You have to mainly show strategies for how it can be done.

The university teacher tries to clarify how to create a connection between their internship experiences and the learning theory through a grounded approach and a template formulated as this: “first we observe, and then we identify a problem and formulate questions that we use theory to solve”. The teacher's explanation of how to do the task shows that transforming an observation from a practical situation into a theoretical reflection is not straightforward. In the next section, I explore how the students manage to solve the task through interaction. This provides a more detailed and richer understanding of their learning trajectories.
6. Analysis of the student teachers’ learning trajectory: expansion of the situational objects

The group I follow consists of four students, one of whom was absent when the data were collected. I call them Elin, Sara and Britt. The data included in this study are from their collaboration on the pupil and classroom cases. The pupil case is an individual assignment. Based on observations, the students should collaborate on the pupil and classroom cases. The pupil case is a group assignment, and the focus is on the classroom environment, social behaviour and collaboration among pupils. By following the students’ communicative actions while working with the tasks, the study explores how the students use learning theories to reflect on their practical experiences.

Extracts 1 and 2 are episodes from the student discussion about a draft of Sara’s pupil case. Before attending the seminar, the students delivered a draft of their text on the Learning Management System (LMS), which the other students in the group have commented on electronically. When the group meets at the seminar, they discuss each other’s tasks. In Extract 1, they discuss how they conceive the institutional requirements for the task, and Britt and Elin suggest a theory Sara should include in her task. This is the first time Vygotsky’s theory is mentioned by the students. Extract 2 takes place 15 min later when the students negotiate the meanings of two scientific concepts they are using in their case work. Extract 3 is from the seminar a week later, where Elin and Sara have just started to work on the classroom case. In this episode, Vygotsky’s theory is further explored. How the interactions relate to the end products of Sara’s pupil case and the classroom case is shown after Extract 2 and in the last part of the empirical analysis.

6.1. Use of resources to construct the object

In this extract\(^1\) (Fig. 2), the students exchange ideas about the purpose and focus of doing case work. They pursue different orientations to the task. Britt is oriented towards institutional requirements so that the task will be approved. This is made explicit when she says that it would be “smart” to write a conclusion about how a teacher should make individual adjustments for the pupil [7]. Elin is content-oriented [8] and Britt responds ironically: “He probably doesn’t take advantage of the zone of proximal development” [9]. Sara tries to reflect on how she could use ZPD to discuss the pupil’s educational needs. However, Britt interrupts her and turns the conversation back to what she considers to be the historical rules and the teacher’s instructions, by constructing a smart concept she has made an assumption that he has a strategy for learning so he’ll avoid failing. That’s why he’s not so engaged in discussions and so on. Elin says that although she used theory in her text, she should relate it to the pupil case. Britt interrupts Sara that although she used theory in her text, she should relate it to her observations. Elin proposes that Sara include the triangle and with them. Britt and Elin have a pragmatic orientation to the task. They account for how to solve the task practically, by suggesting several scientific concepts to include. Sara orient towards the historical rules and the teacher’s instructions, by constructing theoretical accounts of the pupil’s behaviour and what the teacher should do. Sara’s accounts can be seen as bids in the negotiation of how to perceive the task. The critical point is if and how such bids are incorporated into the interaction (Middleton, 1998). Sara’s bids are not picked up and incorporated into the production of justified accounts and are therefore not legitimised by the other students. The reason for this is not necessarily laziness; another plausible explanation is uncertainty about the meanings of the theoretical tools that make it difficult for the students to be genuinely orientated towards the task. Their different orientations indicate that the task is not thoroughly defined and understood. In the next extract, we will see how they manage to negotiate a shared orientation towards the theoretical tools.

6.2. Negotiating the meaning of mediational tools

In this extract (Fig. 3), the three students negotiate the meanings of scientific concepts that they could use in the task. What is striking is that the tools (scientific concepts) the students used to construct the object (the task) in Extract 1 are now the object they orient their actions towards. Britt seems to have a more different orientation towards the task than in the previous extract. She tells Sara that although she used theory in her text, she should relate it to her observations. Elin proposes that Sara include the triangle and

---

\(^1\) Transcript notation:
- [ ] Text in square brackets represents clarifying information.
- [……….] Simultaneous/overlapping talk.
- (...) Short pause in the speech.

---

Please cite this article in press as: Jahreie, C. F., Making sense of conceptual tools in student-generated cases: Student teachers’ problem-solving processes, Teaching and Teacher Education (2010), doi:10.1016/j.tate.2009.12.002
6.3. Sara's pupil case

In the first part of Sara’s case, she explains the pupil’s behaviour using practical experiences: “Academically, Martin is an average pupil. He performs his tasks and homework in a satisfactory way...” and different theories of learning (reference to course material): “According to Maslow, he will also have a need to fulfill himself in one way or the other” (Sara's pupil case, Dec-03, p.1). However, the text is characterised by merely attaching terminology to the observations. In the last part of her task, she follows Britt’s proposal to include some practical suggestions for what they, as teachers, can do for that particular pupil (see extract 1, line 1 and extract 2, line 1). She relies on, among others, Vygotsky’s notion of ZPD, where she suggests that the teacher should “find out what Martin can do on his own and what he can do with help and try to set a task on a level in between, so that he has something to work towards that is not too far ahead” (Sara’s pupil case, Dec-03:3). She is able to account for what the teacher should do using everyday concepts to describe the notion of ZPD. However, even though she uses theories of learning to explain her observations of the pupil’s behaviour, she does not manage to use these ideas to explore practical problems.

6.4. Further construction of the object

One week later, two of the three students, Sara and Elin, work with the classroom case where they focus on how peer collaboration can promote learning, especially for pupils with special needs. When we come into the conversation 20 min after they started, they are in the process of finding a focus for their work.

This extract (Fig. 4) shows how Sara and Elin are able to construct an understanding about pupils with special needs by using Vygotsky. In her first utterance, Sara talks about how peer collaboration might be favourable for low-achieving pupils, and in [3] she recalls that this is related to Vygotsky. Elin responds by accounting for her observations of two pupils [4].

The scientific concept of ZPD is now used as a resource for the task again. Sara opens up a problem space using different kinds of resources to support their claims. She makes theoretical abstractions (“Vygotsky talks about language all the time. Language is the foundation of thought[7], personal assumptions (“She doesn’t learn much from the others because she’s the best”[11]) and theoretical ideas for explaining practical experiences (“And when they have process-oriented learning, then you learn by using language to express yourself and you get comments”[9]). Sara controls the

---

*Fig. 3. Data extract 2.*

---

*Fig. 4. Data extract 3.*

---

2 The practical triangle refers to a well-known Norwegian pedagogical concept. It is a three-level triangle, where the first level refers to teachers’ teaching, the second one to teachers’ reflections on their own teaching and the third on researchers’ reflections about teaching.
movement of the discussion, but this does not imply that the discussion is not interactionally managed. Elin does not explicitly contribute to the interaction, but by recognising Sara’s reflections, she acknowledges her bids as justified accounts. During the interaction, there is a development in the way Sara reasons. In [1], she argues with reference to pupils’ activities; in [3] she relates this argument to learning; then in [7], she makes a theoretically informed reflection on learning and in [9], this is narrowed down to the activity in the classroom: process-oriented learning. Finally, in [11], she uses this knowledge to suggest practical implications for the pupils. Sara’s understanding is developed through a reflective process in which different kinds of knowledge are brought to bear on the problem.

6.5. The group’s classroom case

In the first part of the case, the students describe the pupils in the class and the class environment. The pupils worked in small groups, and the research question is “How can core groups promote the learning environment in the class?” (classroom case, Dec-03:1). To answer this, they use Vygotsky’s theory: how development and thinking is related to culture and communication, the process of internalisation, and learning as ZPD. After accounting for the theory, they discuss learning activities in peer groups in light of the theory:

The pupils in peer groups get experience collaborating with others, and they learn from each other. They also get the chance to speak out a lot, so they get experience making themselves clear and developing their use of language. In collaboration with more knowledgeable peers, pupils can internalise the concepts and understanding so they develop their thinking. (…) The pupils will have greater opportunities for this than when they work individually” (Classroom case, Dec-03:2).

They conclude with this:

A danger is that the peer group model produces better results for low-achieving pupils than for the academically strong ones. It is the stronger pupils that help the others to reach a higher standard. (…) On the other hand, strong students can take advantage of passing on their knowledge to their peers because it demands greater reflection about the content” (Classroom case, Dec-03: 4).

Elin and Sara use the template formulated by the university teacher. They describe the environment in the classroom and account for their work in peer groups. They formulate a question based on their observations and use Vygotsky to discuss how learning takes place through the use of language (extract 3: 7, 9), and how low- and high-achieving pupils have different opportunities and constraints for learning when collaborating in peer groups (extract 3: 11). The analysis shows that the product corresponds to Sara’s exploration in Extract 3, but also shows a reflexive development in the students’ theoretical understanding as they reflect on how the teaching could be represented differently in light of Vygotsky’s theory.

7. Discussion and concluding remarks

My main concern has been to analyse how the student teachers make sense of theory in their collaborative construction of the cases. The point of departure is a group with productive interactions, where selected extracts are used to scrutinise its joint problem-solving process. In the following discussion, four analytic points are discussed. The first two answer how the students use available resources to construct the task (question 1), while the last two points are mainly connected to the relation between the students’ interaction and the learning activity (question 2). Research question 3 – how CHAT can be a fruitful approach for studying case-based methods – permeates the entire discussion, but is summarised in the conclusion.

The first point concerns how the students use tools, the scientific concepts, to solve the task. Many case designs, such as the one in this study, expect students to use theory to reflect on their experiences. The study by Hammerness et al. (2002) finds that through the process of analysing or writing a case, students manage to make theory-based explanations. The present study shows, however, that transforming the observation of a practical experience into a theoretical reflection is not straightforward. The tools used to understand and explore the case are expanded from a merely superficial use of a theoretical concept to a quite complex theoretical discussion related to the students’ practical observations. The available tools are never readymade: they need to be interpreted in the situation (Säljö, 1999). The crucial question is how the learners negotiate the tools in order to respond to the task. If we go into the analysis of the students’ interactions, there is no transparent connection between the scientific concepts and the students’ experiences in the field. The frequent interactional turning points, or perspective changes, at the beginning of their trajectory make it difficult for the students to gain a shared orientation of how to interpret the case assignment. The turning points give insight into how activity influences their learning trajectory. At the beginning of the trajectory, the students had a practical orientation, and theoretical reflections were not considered justified accounts. Thus, the resources brought into play during the interaction were pragmatic, serving the purpose of passing a school task. The accounts that are seen as legitimate by the participants are interactional constructs and have to be warranted in the situation (Mäkitalo & Säljö, 2002). In the next moment of interaction, the students’ responses may be resources opening up the negotiation of meanings. The analysis shows how theoretical reflection on the tools makes possible a genuine orientation towards constructing and reconstructing the tools for the task, with a subsequent expansion of the object.

The second point is how important it is for the students’ learning to construct and reconstruct the tools in use. According to Vygotsky (1987), scientific concepts are tools for communication and thinking: tools that student teachers may use to develop knowledge and expand their understanding about the task. This study suggests that the student teachers individually and collectively explore and use scientific concepts (tools) to explain the observed phenomena. Important in this respect is that the way the scientific concepts are accounted for reflects a tool/object transformation. When discussion about the task prompts the group to question their conflicting understandings of the tools, they use scientific concepts as tools to make claims about their experiences; however, they also use their reflections about the child as tools to critically reflect on the meaning of the scientific concepts. In other words, the tool temporarily becomes the object (Engeström, 1990). These findings suggest that this shift is crucial for elaborating and refining one’s arguments. New interpretations of the scientific concepts give the students the resources to expand their understanding of the task.

The third point concerns how student collaboration is made possible by the institutional requirements. Previous studies show that student case discussions are crucial for learning. Levin (1995) concludes that discussion allows the students to elaborate their thinking about particular issues in a case, and Hammerness et al. (2002) emphasise feedback as crucial in supporting student thinking. However, these studies are not able to reveal how
students collaborate. The analysis of the student interactions in this article shows that during the collaborative process of interpreting, constructing and reconstructing the task, the students become engaged with each other's individual tasks and their own group task. This is possible because of the institutional requirements embedded in the tasks. Since the cases are based on observations of a field familiar to all group members, they have a common point of reference. This allows a collective orientation towards their personal, practical and theoretical experiences. This way of working, by using theory to explore their experiences, was new to the students. The way they relate to this experience through their talk and their products suggests that their zone of proximal development is extended through interdependency (cf. Lund & Rasmussen, 2008). Negotiating the meaning of the tools enables them to collaboratively construct knowledge beyond the capacity of the individual. The collective orientation is seen in how the students construct the task by recognising that another person may be a resource. The students hold themselves accountable to the other students by consulting and taking each other’s contributions seriously. Another aspect is that the students recognise that it is hard cognitive work to elicit, recognise and negotiate the use of tools in order to analyse and write the cases. Other studies underpin the importance of engaging with other learners to gain new insights into the phenomena they are tackling (Edwards & D’Arcy, 2004; Engle & Conant, 2002).

The final point concerns the importance of scrutinising the analysis of the interactions in relation to the activity of learning to teach. The aim of the PLUTO project is to create a new activity, where the students, through the cases, use educational and didactical theory to explore and explain practical experiences. An important criterion for this development is the students’ effort in participating in this new activity. In Norway, cultural-historical conventions of task design emphasise individual work. The rules and division of labour of the activity are described in the guidelines and the conventions of task design emphasise individual work. The rules and division of labour of the activity are described in the guidelines (cf. Lund & Rasmussen, 2008). Negotiating the meaning of the tools enables them to collaboratively construct knowledge beyond the capacity of the individual. The collective orientation is seen in how the students construct the task by recognising that another person may be a resource. The students hold themselves accountable to the other students by consulting and taking each other’s contributions seriously. Another aspect is that the students recognise that it is hard cognitive work to elicit, recognise and negotiate the use of tools in order to analyse and write the cases. Other studies underpin the importance of engaging with other learners to gain new insights into the phenomena they are tackling (Edwards & D’Arcy, 2004; Engle & Conant, 2002).

The introduction of new tools, portfolio system, case methods and ICT creates an important facilitation of the student teacher’s learning trajectory. In the review, I have shown that most research on case methods considers mainly the outcome and products of case work and does not take into account the interdependence between task and tools in student learning. The empirical findings suggest that it is important to design for a unified trajectory where students have the opportunity to jointly construct the task over time and use each other as resources. They also demonstrate the importance of making the rules and division of labour explicit for the students. Theoretically and methodologically, the current study demonstrates that a CHAT perspective can enhance our understanding of the interdependence between the activity, the actors and the tools used to construct the task. An interactional approach makes it clear that the critical issue in the process of case construction is not that students apply theory to practical situations, but the way they negotiate and reconstruct their knowledge.

**Acknowledgements**

I thank Professor Sten Ludvigsen and Professor Trond Eiliv Hauge for constructive critiques in the writing of this article. Professor Anne Edwards, Professor Vrij Engeström, Thomas de Lange and colleagues at InterMedia, University of Oslo have given valuable comments on previous drafts. I thank the two anonymous reviewers and the editor for their valuable suggestions. I also want to thank the students and teachers at ILS for participating in the research project.

**References**


Ils (2002). *Uflyllende refleksjoner og orientering om praktisk-pedagogisk utdanning. PLUTO-prosjektet [Supplementary guidelines and orientation about the practical-pedagogical education. The PLUTO project]. The Faculty of Education, University of Oslo.


Ils (2002). *Uflyllende refleksjoner og orientering om praktisk-pedagogisk utdanning. PLUTO-prosjektet [Supplementary guidelines and orientation about the practical-pedagogical education. The PLUTO project]. The Faculty of Education, University of Oslo.


Study 4

Learning to become a teacher: Participation across spheres for learning
In V. Ellis, A. Edwards, & P. Smagorinski, (Eds.)
Cultural-historical perspectives on teacher education and development Learning teaching (pp. 131–146)
London: Routledge
LEARNING TO BECOME A TEACHER:  
PARTICIPATION ACROSS SPHERES FOR LEARNING

Cecilie Flo Jahreie  
InterMedia, University of Oslo,  
Eli Ottesen  
Department of Teacher Education and School Development, University of Oslo

Introduction
In this chapter we demonstrate how Cultural-Historical Activity Theory (CHAT) can be a highly productive theoretical and methodological lens for studying how student teachers learn to become teachers. Through the course of their initial teacher education, student teachers carry out actions that are organized in different ways and situations, located both at higher education institutions (HEIs) and schools. In order to grasp how student teachers learn to become teachers, we need a conception of how the relationships between interaction, learning and available cultural tools on the one hand, and the activity in which they are used on the other, can be conceived theoretically and pursued analytically (Arnseth and Ludvigsen, 2006). In each of the places, or spheres, that constitute a teacher education course there are different participants with multiple backgrounds, interests and motives for their actions. This means that the student teachers face a variety of tasks and expectations across spheres. What counts as knowledge is, in other words, inherent in the different spheres and this are interacted in the situation (Ludvigsen, 2009). What is considered methodologically important is to pursue an analysis that makes it possible to study how meanings of knowledge are constituted in talk between participants, and how the participants, through their actions, are responding to the institutional context they act
in and thereby make it relevant (Roth et al., 2005, Arnseth and Ludvigsen, 2006). In this chapter we will first explain how learning is conceived. In order to illuminate how student teachers become teachers, we will then direct attention to what characterizes participation over the course of a teacher education course. We will then describe how to pursue this analytically, and illustrate the description by an empirical analysis of participants’ talk. Finally we discuss our methodological concerns and conclude with why this theoretical and methodological approach is conceived as relevant for teacher educators and researchers within the field.

The basic premise in CHAT is that humans’ operations and actions are dialectically related to the collective activity (Leontiev, 1978). They presuppose each other. Thus, student teachers’ actions and interactions are intrinsic to the activity system in which they are embedded. Research must encompass the functions of the educational institutions that constitute teacher education, as well as the educational tasks (the objects) that are worked on by subjects. We follow Engeström by describing activities as ‘systemic formations that gain durability by becoming institutionalised…(and)…. take shape and manifest themselves only through actions performed by individuals and groups’ (Engeström, 2008).

The dialectic means that actors in teacher education produce and reproduce the conditions in which they live, but are also subject to those conditions. Student teachers interpret and act by using available cultural tools, and their actions will in turn impact on the activity. In this perspective, learning is seen as ‘changing participation in ongoing but changing collective praxis’ (Roth et al., 2005), a local and historical process of continuous movement, development and change. The purpose of this chapter is to suggest an approach for studying student teachers’ changing participation across the spheres in which they learn to teach. As an illustration for our methodological concerns, we use data from a research project at the Department for Teacher Education and School Development at the University of Oslo, Norway. The student teachers in this program are enrolled in a one-year course after finishing their subject degrees. On campus, the student teachers attend seminars and lectures in their subjects and in educational theory. A portfolio with a collection of the students’ tasks (case assignments) in pedagogy and subject matters forms the basis for an oral examination at the end of the course. In the oral examination the intention is to integrate subjects and pedagogy, but each is given a separate mark (ILS, 2002). The marks are decided on after a joint assessment of the portfolio and the
oral presentation. During the program, the student teachers have two periods of internship: four weeks in the first semester and eight weeks in the second. In each school a contact person organizes the internship tasks for the students.

**Participation trajectories in and across learning spheres**

Our methodological concern is to understand student teachers’ changing participation during the course of teacher education. This is considered important in order to design for coherent trajectories for student teachers. During the one-year course the students participate in a number of different settings and situations, constituting their learning trajectories. To aid our analysis, we have “chunked” the student teachers’ experiences into learning spheres. The spheres are subordinate to the activity of teacher education and regulated by its unfolding object, rules and division of labour, but are too diverse and shifting to be considered as activity systems (Hyysalo, 2005). Learning spheres are socially developed and patterned ways of interaction (cf. Scribner and Cole, 1981, Engestrom, 2008). They are both formal and informal and they intersect, overlap and co-exist. In this chapter, we are focusing on the formal parts of the student teachers’ trajectories, e.g. mentoring sessions, lectures, seminar groups, assignments to be completed and exams. The borders between learning spheres are not impermeable; for instance tools like the lesson plan template may travel between spheres (Jahreie & Ottesen, submitted). It is in and through actions in these spheres that cultural tools and actions may be constituted as important to the participants.

Historically evolved scripts codify and regulate standard procedures in the learning spheres. Although the script may be coded in written rules, they are often tacitly assumed in traditions and normative patterns (Engeström, 2008). Due to its rule-like character, the script is a peculiar cultural tool used by the participants in interaction. As they move between learning spheres, student teachers need to negotiate how to make use of, transform or resist using, scripts and other cultural and social tools. In the interaction, the participants can follow their scripted roles, or they can go beyond the confines of the given script, negotiating a joint understanding of how to conceptualize and solve it (Engeström, 2008). To address how student teachers learn to become teachers, we analyze student teachers’ participation across learning spheres, each of the spheres offering possibilities of enriching their repertoire as teachers. Thus, it is important to study the ways in which participation is managed.
Study four

The relation between talk and the socio-historical activity

Lately, there has been a growing awareness of agentic action in CHAT research (eg. Engeström, 2008, Edwards, 2005). Daniels (2007), starting from the collective, argues that a theoretically powerful move in CHAT would be to understand how talk is regulated in terms of social, cultural and historical relations. His argument brings to the fore the need to examine how individuals work discursively, and to relate their talk to the conditions in which meaning can be made. These issues are central to our methodological approach (Jahreie and Ottesen, submitted). Inspired by Roth and colleagues (Roth et al., 1999) we have studied how individual and collective agency emerges as participants deal with the opportunities, resources and constraints of different learning spheres. Our concern is with the ways in which student teachers make sense of available tools in interaction with other participants across learning spheres, and how their actions are historically regulated by the activity.

In the examples below, we use interaction analysis in order to investigate how actions unfold and resources are used to perform actions and operations at particular moments (Jordan and Henderson, 1995), as well as the ways in which in situ actions are related to a socio-historical activity. Ethnographic fieldwork, such as observations, videotaping, interviews and document analysis provided a background for the analysis.
of interaction and the detailed understanding derived from the interaction analysis, informed the ethnographic understanding (Jordan and Henderson, 1995).

To study the relationship between subjective actions and socio-historical activities requires intermediate concepts (Engeström, 2009). We use concepts that are empirically grounded, but informed by key activity theoretical concepts (Hyysalo, 2005). Our concern is to suggest intermediate concepts that will allow an analysis of the participants’ talk to reveal their participation trajectory in relation to the historical activity they engage in. In the learning spheres of teacher education, students carry out goal-directed actions. However, goals are open and pliable and constructed in interaction (cf. Middelton, 1998; Holland & Reeves, 1996) through the participants’ accounts. Accounts are specific forms of language use – i.e., actions such as explanations, clarifications or justifications (Mäkitalo and Säljö, 2002). By focusing on students’ accounts, the attention is on what the students treat as relevant, as well as how they try to deal with these concerns in their talk. Their accounts relate not only to their experiences, but also to what is justified as legitimate within the context (Ottesen, 2007; Shotter, 1984).

What is considered legitimate in the learning sphere are understood as scripts and are resources that participants use to interpret the talk and actions of others and to guide their own participation. It can be seen as an orientation the participants come to expect after repeated interactions in learning spheres (Gutiérrez et al., 1995). In the interaction, participants choose to give accounts for the historical script, or for alternative scripts. For research in teacher education the why’s and how’s of student teachers’ accounts are an important concern. In our studies we have shown how division of labour may constrain or afford possibilities for agency and action (Jahreie and Ludvigsen, 2007, Jahreie, submitted). However, neither entitlement nor legitimacy is a “given”; rather they are negotiated in interaction as possibilities for actions. Positioning (cf. Daniels, 2007; Holland et al., 1998) is a helpful analytical concept to unpack accounting practices. Student teachers’ options for participation in learning spheres are regulated by their scripted roles. The script has the function of distributing roles and defining more or less clearly what is expected from each role (Engeström, 2008). However, position is situated and created in interaction. Holland et al. (1998) argue that in situated action, there are spaces of authoring, moments that participants use for positioning rather than being positioned. In the flow of interaction, participants position themselves in accordance with, or as a reaction to,
the script. Student teachers make accounts for what they will orient and position themselves in relation to. Positioning may imply that the student teachers adhere to the requirement to use specific concepts or theories in certain ways, or to what are considered to be appropriate topics for talk in a seminar group, oral exam etc. By using interaction analysis we are able to demonstrate how actors participate in learning spheres, how they make use of tools and resources in their argumentation, and how socio-historical aspects are understood, dealt with and picked up. In the empirical analysis below we show that what counts as knowledge and which aspects of the practice the participants orient and position themselves in relation to, is managed by interaction, but is regulated in social, cultural and historical relations.

**Empirical analysis**

The empirical analysis in this chapter serves as an illustration of our methodological arguments. The data was produced as part of a larger study, which is built on extensive observations over a period of one year. One group of four student teachers was observed during their courses in educational theory, history and social science, and in their two periods of internship. In addition, one of the oral exams was observed. We have included extracts from three learning spheres: (1) an internship meeting between university teacher, contact person at the internship school and the student teachers at that school, (2) a sequence from the seminar in pedagogy and (3) an oral examination. This selection of extracts allows us to follow the students’ trajectories over time, and, important to our arguments, to follow the trajectories in different learning spheres.

**Extract 1 Internship meeting**

The first extract is from a meeting held at the school in the first internship period with a university teacher in social science, eight student teachers, and the school’s contact person. In the meeting a number of issues of relevance to the teacher education program are discussed. By asking questions directed at the students, the university teacher (UT) sets the agenda. However, the students are active participants sharing their accounts of different aspects of the program. The contact person (CP) does not play an active role in the discussion; the sequence below is the only time she was asked a direct question in this meeting. In the excerpt below, the UT orients the talk to the students’ case assignments. He is interested in the school’s engagement in the
assignments. According to the school-DTE partnership agreement, the school consents to be informed about the cases, to contribute to the students’ work, and to help in the process (PPU Directions, 2002/2003).

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>[1] UT: Does the school take any action regarding the case assignments?</td>
<td>I haven’t had anything to do with that. I’ve just read that it requires that we can help and contribute to the assignments, but I’m not familiar with the aims of the cases and their content [addressing the students]. But I’m sure that is something you have informed your mentors about.</td>
</tr>
<tr>
<td>[2] CP</td>
<td>We’ve got two hours with mentoring sessions each week with each mentor. During this time you are supposed to talk about what you are going to do in the following lesson, how it went, you have to talk a bit about the pupils, and the fact that you are going to observe one, maybe talk a bit about that. You don’t have time to go more into it. And our mentors have heavy workloads, so to use them more is a bit difficult I think.</td>
</tr>
<tr>
<td>[3] Gina</td>
<td>Just to follow up on that. Most of the meetings we’ve had, have been about lesson planning, the accomplished lesson, we have discussed structures in the class a lot, and things we should notice. And there the mentors have been quite pedagogical, they haven’t been strict about what to do or not to do, but listened to what we’ve observed. I think it is our fault that we’ve focused a lot on these formal requirements, but I have to admit that I have stopped doing that. I have taken notes and then I’m going to see how they fit. (…). The requirements of the cases makes one feel a bit cramped.</td>
</tr>
<tr>
<td>[4] Kri</td>
<td>The main impression of what you’re saying is that the mentors have let you loose. That is very professional.</td>
</tr>
</tbody>
</table>

The visit from the university teacher is a recurring meeting, taking place each year. The UT uses the script that is expected in this kind of visit: He asks questions and evaluates, and the CP and the students answer the questions. The UT sets the scene by asking a direct question to the CP. Since the schools are expected to be
involved in the students’ cases, this may be an effort to exercise control. The CP’s response indicates that she knows what is expected, but that she regards this as a responsibility for the students and the mentors (‘I’m sure that is something you have informed your mentors about’). In this way, through her account, she opts for a position as a responsible partner; although she does not herself get involved in the case assignments. Gina’s account has the form of an explanation that legitimizes why they have not had opportunities to discuss the cases with the mentors. She refers to issues they are expected to cover in the sessions related to planning and teaching experiences [3]. Kris supports Gina, before adding that the students focus too much on the formal requirements. His final sentence might indicate that the case assignments take too much time and resources in the internship. He emphasizes that he has done what is required of him; thus, he legitimizing his conduct both within the school (he is not focusing on the formalities anymore), and the DTE (he has made notes that he will use when writing out the cases). In [5] the UT appears positive towards Kris’s description of the mentors’ role, seeing them as professional.

The participants in the meeting all follow the expected script and what is expected of them, but they give different accounts for it. Through his questions, the UT monitors the school’s conduct, and the rules of the activity. The way he gives account for the script, positions him as the university’s representative. The CP, on the other hand, produces an alternative account of the rules and division of labour. She is aware of what is required of the school, but the student and mentors should deal with this. While the UT refers to the rules and divisions of labour of the partnership, the CP is positioned within the school; the students are expected to inform the mentors, and the mentors are supposed to help and contribute. The students’ accounts indicate their “in between” position, trying to be accountable to both systems. Through their accounts, they position themselves both as teachers (recognizing the mentors’ workload [3], not focusing on formal directives anymore [4]) and as students (they have made observations and taken notes). This indicates the conflicts between expectations from the DTE (the students are supposed to just do observations in the first internship period), the choices of the school (giving the students lesson responsibilities) and the practical possibilities for accommodating to the intentions embedded in the regulations. Another conflict that appears is the institutional regulations of the mentors’ role and how the UT positions them as ‘professional’.
Extract 2 Seminar in pedagogy: scientific language

This extract is taken from the last seminar in pedagogy where the focus is on preparation for the upcoming oral exam. A recurring theme during their talk is the use of scientific language. One student, Fiona, argues that one may be a good teacher, even if one does not ‘know all the concepts’. Just before the conversation below takes place, the university teacher asked the students what they see as an alternative to scientific language. While Fiona agrees that everyday talk is not necessarily an alternative, she argues that the concepts used in teacher education often are given different meaning. Alex proposes an alternative.

[1] Alex: Instead of asking ‘what do you mean by Vygotsky’s zone of proximal development’, I would explain what is meant by the concept and ask what do you mean by that difference, the development etc. That is the alternative. Instead of talking about his view, talk about what that view is, how you look at it. Maybe.

[2] Geir: Isn’t the point that you do not know Vygotsky like that, but that you can use, or compare with what you are doing when teaching? Or what it has to say about learning and teaching? I can reel off everything about Vygotsky, but (…)

[3] Teacher: [That is pretty irrelevant. Just to reel off and do namedropping that is ridiculous. One is supposed to use it to reflect about practice, and get a conscious relation to it, that is the point. Otherwise it makes no sense, so I totally agree with you.

Alex takes the teacher’s invitation and proposes an alternative [1]. It is reasonable to assume that the impending exam situation is Alex’s point of reference. He takes the position of a censor, suggesting how censors should pose their questions during the examination. Geir supports Alex’s suggestion by saying that concepts should be used to reflect on learning and teaching. The teacher picks up on Geir’s account, and characterizes namedropping as ‘ridiculous’.

The interaction in this extract is a less rigidly scripted place (Gutiérrez et al., 1995) than the previous extract. Rather than following a script, they focus on a shared problem, negotiating what counts as knowledge in an exam situation. Through their
accounts, the students challenge the teacher by positioning themselves as experts, teachers or censors. Alex’s alternative account is based on his personal view: ‘I would…’. Geir on the other hand, orients his accounts to institutional regulations and to the teachers’ accounts in the seminars. The teacher takes up their arguments, and in this way he acknowledges the students’ positions as legitimate. What counts as knowledge in the forthcoming oral exam is to use theoretical concepts to reflect on practical experiences.

**Extract 3 Oral exam**

In this extract we analyze Kris’ oral examination in pedagogy and history. The students were asked to make a presentation for the exam. According to the information at the seminar referred to above, the presentation should be an example from the student’s internship. The teacher emphasised that this gives the students an opportunity to be active and have a voice in the exam (field notes 05/07-03). Kris chose to show a few minutes from a movie (‘Saving Private Ryan’). His presentation was about a lesson he had planned for his internship, but decided not to carry out. Building on a dialogical perspective based on Bakhtin and Vygotsky, he focused on how experiences (as through a movie) may be a basis for verbalization and concept development. After the student’s presentation, a more traditional examination takes place, where two teachers (in pedagogy and history) examine according to their specialisms. The teacher in pedagogy (TP) picks up on the student’s decision not to use the movie in his history class. He talks about a teacher’s role as a subject expert and as a person with some responsibility for the care and wellbeing of pupils, and asks Kris to elaborate on this. Kris talks about teacher professionalism, and the teacher follows up:

[1] TP: Teacher professionalism, I want to bring that a bit further because it consists of some components, do you know which components I have in mind?

[2] Kris: Hmm, no, I’m thinking of, professionalism is about…

[3] TP: [Let me give you a clue so we don’t spend time on this. Bergem classifies this, (…) and he puts up three categories for competence.

To give an appropriate analysis of this extract, it is necessary to see it in relation to the examination as a whole. In his presentation Kris explains how to use experiences (through watching and talking about a movie) to develop concepts and oral skills. The student seems to have been consciously attempting to integrate the subject matter and pedagogy in his presentation. In the extract, the student answers questions from the TP. Kris has just talked about teacher professionalism and the TP wants him to mention three specific elements in relation to this [1]. Teacher professionalism is covered in different parts of the curriculum, and it is difficult for Kris to know what the teacher has in mind. However, he tries to give an account, but is interrupted by the teacher who explains that he wants him to use Bergem’s classification of competence [3]. This notion of competence is part of the curriculum. Kris is not able to reproduce Bergem’s categories, but tries to make an account without remembering the exact terms the teacher has in mind [8]. Again the teacher interrupts, this time giving him the right answer. The “naming” of the categories supplies Kris with information that enables him to continue. In [10] Kris gives an account for how he sees this classification in relation to another concept in the curriculum (development of practice theory).

After the examination, the two teachers have a short meeting to discuss the student’s oral presentation and decide on a set of marks for each of the two subjects. Based on the student’s written portfolio, they have decided the limits for adjusting the
students’ marks up or down. In the following sequence they discuss the mark for pedagogy.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>[11] TSD:</td>
<td>But in between the limits that we have, I feel that he pushes the borders quite a bit up.</td>
</tr>
<tr>
<td>[12] TP:</td>
<td>yes? (...)</td>
</tr>
<tr>
<td>[13] TSD:</td>
<td>Well, but I have (...)</td>
</tr>
<tr>
<td>[15] TSD:</td>
<td>But you had this with the concept of competence that he was not sure of and (...)</td>
</tr>
<tr>
<td>[16] TP:</td>
<td>[But he is quite good on learning theories, and that is an important basis (...)</td>
</tr>
<tr>
<td>[17] TP:</td>
<td>He could have done it better, I gave him the possibility to go close to 2.4 or 2.3 but he does not live up to that, when he didn’t manage the concept of competence, he doesn’t live up to that.</td>
</tr>
</tbody>
</table>

The Teacher in Subject Didactics (TSD) seemed to think that the student gave a better impression than in the portfolio [11]. The TP on the other hand answers “yes” in a questioning voice, and the TSD tries to explain his view, but is interrupted by the TP who seems to disagree. The TSD explains TP’s uncertainty with the concepts that the student did not remember. However, the TP emphasizes that the student displayed a good understanding of learning theories, which he sees as important. The TP seems quite uncertain about deciding on a mark; however in [17] he reaches a conclusion. He explains that he could have given him 2.4 or 2.3 but since he did not know the required concepts about competence he does not “live up to that”. The focus is therefore on what the student does not know when assessing the student.

In the two sequences of interactions from the oral exam, the teachers and the student follow a traditional exam script. Historically, examinations are built on asymmetric relationships: students are expected to come up with “right” answers in accordance to the curriculum, and the university teachers assess the quality of their response. In his opening presentation the student accounts for the shared object, negotiated in the seminar: he uses a dialogical perspective to account for development of pupils’ verbalization. The presentation is seen as good, but in the following
examination the participants retreat from this unscripted space: accounts and student positions that are considered legitimate in the seminar no longer count. One possible explanation can be that the community does not have enough interactional experience in this unscripted space to mediate participation and, thus, to mediate a different understanding of teaching and learning (Gutiérrez et al., 1995). Appropriate accounts in this script are characterized by the “right” answers. Both the student and the teachers produce appropriate accounts of what is expected in an exam script, the teachers position themselves as authorities and the student teacher as a student.

**Discussion**

A key characteristic of teacher education is its distribution across disciplines, sites and actors. For researchers aiming to study student teachers’ learning, this poses a number of methodological challenges. CHAT provides a useful framework to meet some of these challenges: it facilitates investigation of the interrelationship between actors’ situated actions, the cultural resources that are at play, and the socio-historical regulations that work on, and are worked on by, the actors. In this chapter, our aim has been to present a methodological approach to research that would enable us to disclose the agency of actors and the cultural-historic and systemic constraints that students confront as they learn to become teachers. Our approach has been to explore how knowledge is negotiated and accounted for in teacher education. Our investigation of interactions in institutional learning spheres allows us to pay close attention to different aspects of the students’ learning trajectories (e.g. cultural resources at play and the students’ agency and negotiations). Our findings indicate that although the student teachers’ learning trajectories provide a common motive for teacher education in schools and in DTE, these trajectories are often interpreted and constructed differently in different learning spheres. For example, in the analysis we have indicated how what counts as knowing differs in the seminar group and in the oral examination. Thus, a central concern in the analytic work is to illuminate the process of knowledge construction as a dynamic between individual agency and collective actions in different learning spheres, but also its relationship to the cultural-historical activity.

Complex activity systems, such as teacher education, may require intermediate concepts as heuristics for empirical analyses (Engeström, 2007). In this chapter we
have demonstrated how actors adhere to cultural *scripts* in their construction of accounts. Scripts connect micro processes in the different learning spheres to the cultural historical activity of teacher education. The rules, tools and division of labour in the activity system are actualised in scripted roles in the learning spheres, legitimising certain accounts or positions and proscribing others. The analytic concepts *account*, *position*, and *script* aid the analysis in demonstrating how the participants’ learning trajectories develop as individuals and collective movements, and their relationship to the cultural and historical development of the activity it is part of. The concepts make the agency of individuals transparent as they participate in collective actions. While participants are positioned as e.g. students, mentors or university teachers, based on the salient rules and division of labour of the activity system, actors also have the option to challenge or expand their positions. However, the legitimacy of their accounts varies between learning spheres, leading to disturbances and making evident contradictions inherent to the activity system. In the talk, student teachers and teacher educators make their ideas and understandings public, e.g. as Alex’s account about the use of scientific language in the oral examination in excerpt 2. Through his account he opens a space for negotiation. He can position himself as a “virtual” censor, and make his account from that perspective. However, in the oral exam (excerpt 3), there is only one position available, that of a student. Kris’ account is produced from that position; his agency is restricted. Using these analytical concepts, we draw attention to issues of power and influence in teacher education. We have demonstrated that objects often seem to arise from negotiations saturated with opposition and clashes of interests. Although the participants are working to construct the ‘same’ object across learning spheres, their motives may be different. For example the participants’ talk about scientific language that varied between the seminar group (extract 2) and the oral examination (extract 3). In the internship meeting (extract 1) student teachers produced different accounts that live side by side. The participants’ accounts reflect the rules of two activity systems.

**Conclusion**

The quality of teacher education is a central concern for policy makers around the world. Suggestions from the OECD point to the need for teacher education to be better adapted to teachers’ changed roles, to rethink the role of field experiences, and
Learning to become a teacher

to be better tuned to the interconnections between initial teacher education, induction and continued professional development in a perspective of lifelong learning (McKenzie and Santiago, 2005). In Norway a recent White Paper (KD, 2009) presents a number of efforts aiming to increase the quality in teacher education by strengthening the interplay of thorough reforms in teacher education and by strengthening partnerships between schools and HEIs for continued professional development of teachers. The methodological framework presented in this chapter is an important contribution to the field of research that might give further insight about learning in teacher education as well as workplace learning for teachers.

As part of our theoretical understanding, we accounted for how activity systems are reproduced or resisted in and through action. Our methodological argument has been that to understand how students learn to become teachers we need to study how the meanings of objects, tools and knowledge are negotiated in interaction between participants. Through their actions, the student teachers are responding to various features of the activity in which they act and thereby make them relevant. Seeing learning as a trajectory of participation in and across learning spheres makes it possible for teacher educators to reveal local disturbances in relation to contradictions in the institutional activity. This is important knowledge in order to prepare for a transparent and coherent participation trajectory for student teachers.

Bibliography


1 Transcript notation:
[ ] Text in square brackets represents clarifying information
[………..Simultaneous/overlapping talk
(…) Short pause in the speech