

Power, positionings and mathematics – discursive
practices in mathematics teacher education
Climbing Lion's Head

Doctoral Thesis from the Department of Mathematics and
Science Education 8



Power, positionings and mathematics – discursive practices in mathematics teacher education

Climbing Lion's Head

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To my family and my friends
I love you

Abstract

This is an ethnographic study from within mathematics teacher education in Sweden. A methodological insider approach enabled to view teacher education from the students' perspectives, by focusing how discursive power-relations affected what becoming mathematics teachers brought forward as concerning during two years of education. I took a socio-political theoretical perspective and understood discourse, power and positioning as dynamically interrelated concepts, which allowed the analysis to foreground several aspects simultaneously and to illustrate elusive phenomena as they occurred and disappeared.

The results show that the mathematics education and mathematics discourses are open and multifaceted and reveal empowered positionings, whereas the language/culture and institutional discourses both are narrower and more constraining. These constraints, in turn, affect students' possibilities to enact empowered positionings within the more open discourses. The core of education, that is mathematics and mathematics education, may therefore be obscured by discourses of "truths".

The study shows a need for further research on how to strengthen students' possibilities to influence their education, and to ask questions like *why* education is organised this way, and *who* benefits from that.

Keywords: Mathematics teacher education, socio-political, power, positioning, ethnography, discourse

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Preface

The other day I read a text about writing. It was about doubts, performance anxiety and about writer's block – feelings that the author claimed to be good for

1. the process of writing, since what comes out after a struggle often is better in a revised version than in the first draft, and
2. for the one you become through processes of suffering and anxiety.

I agree, and recognise these processes. However, in writing this thesis about becoming there is more than coming out on the other side as another person. Becoming means that we are constantly on the move, affected by people we have met, by places we have been and by experiences we have made. Although I am responsible for all that is written in this thesis, it had not been what it is without disturbance from other people at different places, such as friends, colleagues and family. Five years is a long time and it is impossible to reconstruct every turn this work has taken. However, there are some people who, for different reasons and at different stages, have been very important for this work. Before focus turns to single individuals I first and foremost want to thank the becoming mathematics teachers who wanted to participate and contribute to this work, and the university teachers who opened their doors for me. I am thankful and honoured that I got the opportunity to conduct this study, and that you all wanted to contribute with your time and engagement.

My supervisors. Thanks to you, this project was allowed to grow and mature in its own pace. First of all, I want to thank Annica Andersson. My dear colleague, friend, roommate etc., who challenged me and gladly discussed my struggles; who put high demands and tight time limits and now and then sent a caring mail, just to check if I was ok. Big hug, Annica! And Astrid Pettersson, who together with Lotta Lager Nyqvist believed in me and the choices I made during the first years. Astrid, who scrutinised drafts thoroughly and asked the hardest questions; who helped me to prioritize during tough periods and stayed calm during the last weeks of intense work.

Another person, who came to be very important for the first tentative steps in this study, is Simon Goodchild, who taught PhD courses I attended in Agder, Kristiansand. Simon: this thesis is based on the question we

formulated together during a meeting in February 2009. Later the student – teacher relation grew to being friends. I am happy for that.

Malin Ideland and Maria Andrée read and responded to the study so far, at the 50% seminar. You pointed at strengths and weaknesses, which helped me to prioritize and develop what I wanted to communicate. Do you remember the long list of concepts? And that you asked me to cross out those that were redundant? There are three concepts left ☺.

Several times during these years, I have met Candia Morgan. Candia introduced me to positioning theory and politely challenged me whether it was about theoretical and methodological choices, course tasks, or about presenting my research at IOE in London. Candia, together with Marianne Dovemark read and responded to my 90% draft. You both inspired me a lot to deepen and develop my thoughts, to continue writing, and to finish.

During two summer schools in the Nordic countries I met Jeppe Skott and was several times invited to participate in meetings with senior researchers and doctoral students in Växjö. Jeppe: you inspired me to do what I believed in. Not because someone was asking me to do it, but because I wanted to explore these questions. Precisely that interest was the reason for doing it.

The PhD community and all colleagues, the administration and management at Stockholm University and MND have been very important and valuable over the years. In particular I want to mention our seminar group of doctoral students and senior researchers in mathematics education. You are all included and I want to stress, that thinking deeper and further becomes, if not easier, then at least more inspiring after meetings with this group. However, I need to, for different reasons mention some of you: Anna Pansell, my classmate. You don't know how much your warm and supporting attitude means to me. Soon it's my turn. I will pour you a cup of coffee, listen to your struggles and go and buy you a lunch whenever you need. Cissi Sträng and Anna-Karin Nordin: to sit down together with you in a couch, in the most intense of periods, chatting about work, about dancing and about future dreams, while tasting the coffee... Lisa Björklund Boistrup, I have felt strong support from you during the doctoral studies, and sometimes thought that you knew what I would talk about before I opened my mouth. You have helped me to see the process. And last: Eva Norén. I try to write, but I don't have the words. You have always been there, at all stages, positive, and friendly, helpful and inspiring. I enjoy your company ☺

The private sphere, family and friends, became inevitably involved in either ways during the years, on daily basis, more or less often and on longer or shorter distance. I want to thank you all for your patience and support. I don't expect anyone to understand what such a process of becoming means, because I can't imagine myself. To my kids, Olle and Märta: I hope thinking about this not only relates to suffer and anxiety. I hope this also may inspire you both to do what you wish and to live your dreams.

Points of departure

“What is your area of research?”

“Mathematics teacher education”

“Ah, that is very good! There is really need for this research... What is your focus?”

As being in the final phase of a PhD, I can look back and state that this short communication has occurred more times over the years than I can remember. People have asked me for different reasons, which I cannot guess. However I have recognised two strands in observing the interactions in these situations. First, the communication that evolves from the preconceived assumption that I do this research and then we will see changes in attitude and performance in mathematics. And second, the engaged discussion regarding mathematics, power-relations, discourses, and what thinking about those issues may lead to — for those engaged in the research, and for future discussions about the role of mathematics in our society.

These days, the debate about school mathematics, lack of mathematics teachers, requirements for becoming mathematics teachers, etc., puts these issues in primary position, as everyone has experiences from school and school mathematics. It is obvious that there are several discourses working and what is possible to say about mathematics in one context might be inconceivable in another.

*

In more than ten years I have been involved in mathematics education courses for becoming mathematics teachers. I will use *becoming* as a concept for understanding that the students are involved in processes of learning. Becoming is on-going through life and takes different shapes for different individuals. It does not end as they graduate. I have met many students, who expressed concerns regarding the mathematics content, their own mathematical competence, or their supervising teachers in initial teacher education and tests, to mention a few issues. I have also met students who wanted to contribute to course development and discuss how the educational quality could raise and how changes could be done to develop the teacher education programme further. All these small talks with the students – when they asked for my attention as they wanted to discuss something deeply or just drop a comment to let me know – made me think about what we as teacher educators can learn from our students. Questions

like: how do becoming mathematics teachers make sense of their education; how do they express their own part of this education; what affects the way they talk and why do they choose to talk about some factors and not others; arose my curiosity. As I had the opportunity to get involved in a longitudinal study where I could focus on students' concerns regarding their mathematics teacher education, I chose to conduct this study to illuminate some of my questions.

Becoming mathematics teachers in focus

This study is inspired by ethnographies from different social settings and cultures, as for instance Andersson (2011), Holland, Lachiotte, Skinner and Cain (1998), Clough (2010) and Norén (2010). However, as my study involved students from many countries, studies foregrounding multilingual and multicultural contexts have influenced most with regard to how I chose to write up the study (e.g., Haglund, 2005 and León Rosales, 2010).

Before I brought in any theoretical concepts I framed the scope of the study as focusing the students' concerns. That is: how they expressed their worries, what they found important for themselves and others as well as challenging and demanding; and what they talked about as their strengths and benefits. The departure point of this study hence developed from a wish to understand what becoming mathematics teachers chose to talk about with regard to their education, how they chose to express themselves and why they chose to articulate themselves the way they did.

Through the whole study one goal was to curiously listen to the stories I was told and to give the stories enough space when writing up the results, since the students judged them as important to tell. A second goal followed from this first one and it was to give the students a voice following Andersson (2011), who strived for giving "noisy" students a voice; students who had disturbed her as mathematics teacher. For me, becoming teachers from all over the world are important persons in the Swedish educational system. By giving them a voice through my research I believe that even if I am not the one who can tell their stories, I can offer theoretical lenses through which I can describe how I made sense of them.

Approaching a theoretical perspective

Researching educational settings involves taking into account the contexts within which the students are. That means that I, in line with Andersson (2011), by "locating the experiences in the socio-cultural context [saw possibilities of deepening my understandings] of the complex situations and

processes” (Andersson, 2011, p. 11). Therefore, the socio-cultural theoretical perspectives were central during the whole theoretical journey.

Despite the challenging task to find theoretical tools and concepts this process helped me to understand which possibilities and constraints different theoretical frameworks could offer. In addition it helped me to refine research questions and concepts; in order to make clear wherein the field of mathematics education research this study could be framed.

By taking a starting point within socio-cultural theories of learning I wanted to discuss whether combining two theoretical frameworks (see Prediger et al., 2008) — learning in communities of practices (CoP) (Wenger, 1998) and cultural historical activity theory (CHAT) (Engeström, 1998) — could help me to explore contradictions between different actors in the activity system. The activity systems would in this case illustrate contexts related to the educational programme at the university. From that starting point my goal was to illuminate identity development with regard to cultural, historical and societal aspects; framed as learning in communities of practice.

I presented a poster at CERME 7 (2011), focusing on the theoretical combination and got the opportunity to discuss possibilities and constraints with senior researchers as well as fellow PhD students. From these discussions I was strengthened in my believe that the connection of theories could work, and that it would be possible to go deeper into identity development as becoming mathematics teacher. However, I got many new questions to take into consideration, such as: is it possible to understand the phenomena of student’s concerns by exploring contradictions within activity systems; which aspects in the activity system were necessary to include and which could be abandoned; and how do the initial purpose of the study comply with the theoretical framing of the CoP/CHAT approach. Considering these questions made me aware that the most crucial issue — to understand students concerns — would be put in relation to organisation and society as a whole, which could lead to that phenomena, expressed by individuals might become secondary. Hence I chose to develop my understanding of CoP but to leave CHAT in order to focus stronger on interactions and communication.

At that time I framed identity development in line with Wenger’s theory of identities as a nexus of multimembership in communities of practices (Wenger, 1998). The range of interpretations regarding how identity can be understood varies ontologically; for Wenger (1998), identities are formed through participation in communities of practice, whereas Gee (2000) suggests that peoples’ multiple identities imply ”being recognized as a “kind of person”, in a given context” (p. 99) connected to their performances in society. Parallel with my interest in how one can understand becoming mathematics teacher identities, Solomon (2008) inspired me to use the concept of positioning to understand “identity in terms of how we are

positioned and how we position ourselves as mathematics learners with reference to the available cultural models” (p. 20). She drew on identity from Wenger’s theory of participation in communities of practices and on positioning theories (cf. Holland et al., 1998; Harré & van Langenhove, 1999), in order to understand how students expressed identities of inclusion and exclusion in mathematics education. The concept of positioning hence became a theoretical tool, which brought the analysis closer to the students and contributed to relate the students’ actions and stories to different contexts (Skog, 2012).

In a research paper presented at NORMA 11 (Skog, 2012) I attempted to make sense of the students’ concerns by drawing on Wenger’s (1998) situated perspective on learning within communities of practice, and analysed student teachers’ positioning as degree of participation through modes of belonging – imagination, alignment and engagement. The paper elaborated on a model for analysing becoming mathematics teachers’ identity positioning of participation and/or marginalisation. I showed that in the complexities of being a becoming a mathematics teacher there are several identity positionings working simultaneously. The analysis revealed underlying factors of language concerns, institutional constraints and cultural differences regarding mathematics teaching. Factors, that became difficult to explain through a participatory perspective.

I had learned that both CoP and CHAT could facilitate my understanding of learning in socio-cultural contexts. A CoP perspective would help me illuminate trajectories from peripheral participant as student teacher to becoming more central in the community of mathematics teachers, whereas cultural and historical factors, as well as power-relations, that impact the students during their teacher education could have been identified. However, none of these theoretical frameworks helped me scrutinise how these power-relations emerged and their connections with the student teachers’ concerns. Inspired by Valero (2004b; 2009) and Gutiérrez (2013), who discussed power and socio-political issues in mathematics education research, I found a theoretical umbrella that foregrounded power on different levels, from a societal macro perspective to an interactional micro perspective (Morgan, 2012). Theoretical concepts, such as power and discourses made it possible to move further and behind what was possible within previous socio-cultural approaches. This approach also offered analytical tools that would keep focus on issues that I considered necessary with regard to the overall aim of the study.

In order to explore how power-relations affected the way student teachers expressed themselves in discursive practices I kept hold on the concept of positioning, but instead focused on positioning theory from a discursive perspective by drawing on the work of e.g. Davies and Harré (1990) and van Langenhove and Harré (1999). This choice made it possible to frame

positioning as relational, dynamic and ephemeral, and to foreground how power-relations affected available discourses in educational contexts.

As I chose to take a socio-political departure point for my work, focusing on discursive practices, I still struggled with how to approach identity, and if the identity concept at all was important in the study. Data indicated that I hardly could explain the students' expressions as identity formation in Wenger's (1998) terms; and even though Gee's (2000) work is explicitly socio-political, his concept of identity did not facilitate my understanding of why the students talked the way they did, since they could change within a conversation and act different identities in the end of a conversation compared to what was expressed in the beginning. The dynamic character of students' actions needed to be explored and explained, and theories of positioning facilitated this understanding. During the whole study the students' actions were central, meaning that verbs, rather than nouns, were taken into account during the fieldwork and in the analysis. This view resonates well with a socio-political stance, within which identity is something you do and not something you are (Gutiérrez, 2013). She states that we are inevitably drawn into power relations in different contexts, which in turn suggest, that identity might be "consented to through constant social negotiation" (Walshaw, 2004, p. 65). Stentoft and Valero (2010) argue that a poststructural perspective allows them to "think of identity in terms of fragile identification processes embedded in discourse and, therefore, tightly related to peoples' actions and participation in on-going discursive practices" (p. 62). This on-going changing relationship requires a more nuanced understanding of the relationship between the individual and that to which one identifies, and therefore identity often is replaced by subjectivity (Walshaw, 2004).

To sum up so far, positioning, power, discourses and identity became helpful concepts within the socio-political theoretical perspective, whereas I in my study could see that power-relations affected the students' identities, hence the stories they told about themselves (cf. Andersson, 2011).

The theoretical journey made me aware of how data could be understood through different possible screens. It also made visible how the research questions and concepts, that were important for understanding the phenomena I aimed for, could be more explicitly articulated. In two conference papers we elaborated on positioning as analytical tool: one for understanding becoming mathematics teachers' identities (Skog & Andersson, 2013a), and one for analysing immigrant students' language concerns (Skog & Andersson, 2013b). Both studies took a socio political theoretical departure point, which allowed an analysis of power relations within available discourses in mathematics teacher education. This theoretical basis was also central as we later developed the analysis of positioning and identity as becoming mathematics teachers further (Skog & Andersson, 2014).

However, even though identity more clearly labelled the students as becoming teachers, as university students, as immigrants, as parents, etc., identity and positioning became very closely related, since both concepts were theoretical constructions for how students talked about themselves and acted in discursive practices. The concept of identity hence tended to take the focus away from the core of the study. In addition, the dynamic of positioning made it possible to explore how power flowed and discourses emerged. Therefore, I chose to leave the concept of identity behind and instead focus on positioning as the main theoretical tool for analysing and interpreting power-relations in discursive practices, in mathematics teacher education contexts. The discursive approach allows a dynamic analysis of how different phenomena are constructed in different ways under different circumstances. Barwell (2013) claims that, analysing mathematics classrooms from a discursive approach

seeks to understand how teachers and students construct each other as knowledgeable, rather than trying to find out what they actually know [and in addition] it offers an approach to analysis that is highly sensitive to fine detail of classroom life. (p. 605)

The focus is on how a discourse is constructed through interaction, meaning that students could construct a discourse of concern in one way under some circumstances, and in another ways under other circumstances. Therefore, students' positionings were understood as their concerns. This does not mean that the students concerns were left behind. Rather, the concept of concern became an important vehicle for me to grasp the scope of the study and to carefully listen to my data during the analytic process. The expression "students' concerns" will be used in this first part of my thesis when I introduce the background and overall aim of the study. Thereafter, I describe their concerns through *positionings* in order to explore how discourses emerge and what we can learn from mathematics teacher education by taking a socio-political theoretical approach with the becoming teachers in focus.

Overall aim of the study

The overall aim of this study is to explore and understand what characterizes becoming mathematics teachers' concerns regarding mathematics and mathematics education during the two first years at the university; and hence how this understanding can give insights in possibilities and constraints that are discursively produced in educational contexts. Understanding concerns here means, as shortly mentioned in the previous section, trying to understand what lies behind the students' worries, what they care about, fears they have, what touches them and matters in contexts related to the

educational program. The aim of understanding involves interpretations of what is said and done, that is, what is expressed, how it is expressed, and why; through talk and actions in social settings.

Mathematics teacher education is not seen as a single trajectory through which all students end up as fully skilled teachers, having the same experiences, competences and goals. Rather, it has been important for me to assume that each student experience his/her education individually, and to talk about their education from their perspective. Thus, all their stories became important for understanding student teachers' concerns, and from a rich ethnographic data construct I strived for creating an account of thick descriptions (cf. Bryman, 2008; Emerson, Fretz & Shaw, 1995). I have chosen larger pieces of transcripts when presenting the results and I have also chosen to use transcripts and fieldnotes in other parts of the thesis where student's voices were considered to bring further clarifications to the context or to specific phenomena (see for instance the reflective chapter).

Through the whole study it was important to keep the positive spirit of searching for opportunities. I believe that every student has the power to challenge and to overcome difficulties. I also believe that power expressed by them who are involved is necessary to take into account and to learn from. Therefore, from the basis of what the students chose to talk about and how they chose to act in different contexts, I aim at foregrounding possibilities for development and opportunities to learn even though difficulties and challenges sometimes will be used as stepping-stones to articulate this.

Researching well-known contexts

Researching well-known contexts entailed a need to thoroughly think about what consequences my profession as a mathematics teacher and teacher educator could have for the study. As a researcher one always impacts the study regardless of how data is gathered (e.g. Bryman, 2008). Therefore it was important to consider possible implications of the impact I had by being present to such high degree as almost every seminar. I was conscious that my participation in mathematics education courses to a large extent could impact the information I received. However, since the time span for the study was as long as two years, I assumed that students and teachers would see me as being one of them, as I was versed in their work — as researcher — and not limit their sayings due to my presence. Interestingly, I experienced that my presence may have affected the students to talk more than they usually did. One of the students, Tina, told me that my presence made it more important for her to talk, to ask questions and discuss during seminars. Other students showed me beforehand what they wanted to bring forward during the seminar, which I understood as a will to invite me in their

work. Hence some students seemed to adjust their participation to be more active when I attended the seminars compared with if I was not there.

The challenge of changing profession from being a teacher to becoming a researcher involved a changed perspective, which required that I looked even more critically into practices I knew quite well due to all my years as teacher educator. Hence, for me, there was a further aspect to consider: since I focused on mathematics teacher education and participated in several courses I thus became a previous colleague who now was engaged in doing research. This involved both the issue of perspective change, but what was more important was that I needed to think about how to handle my preunderstandings with regard to the educational context. By taking an ethnographic approach in researching a familiar setting I, as researcher, was “required to treat [the culture] as ‘anthropologically strange’” (Hammersley & Atkinson, 2007, p. 9) and be sensitive to the phenomena of investigation. The authors claim, that it is through detailed accounts of concrete experiences, that the researcher can make explicit the presuppositions that is taken for granted as a member of the culture. For me, this implicated an increased awareness of my presuppositions regarding how course content and common arrangements of seminars and groupwork could be arranged. However, I did not need to understand the structure and content as a newcomer and could instead focus on the students’ actions and reactions regarding courses, tests and initial teacher education, for instance. In addition, because of my previous experiences as mathematics teacher educator, I perhaps more easily than an uninformed researcher could ask questions to make the students develop their thoughts and concerns further. To conclude, I believe that the preunderstandings and presuppositions I had beforehand might have helped me to both get access to the field and to put most of my focus on giving the students a voice (cf. Gutiérrez, 2013).

Outline of the thesis

After this *Point of departure* where I gave a background to the present research the thesis is structured as follows:

Setting the scene aims at introducing research on and within mathematics teacher education, approaching towards research focusing on social and political issues in mathematics teacher education.

Theoretical directions and concepts introduces and elaborates on the socio-political research approach; and on discourse, power and positioning as central theoretical concepts

Thereafter I present the *Aim and research questions*.

The *Methodology* contextualises the research, describes the ethnographic approach and fieldwork, presents participants and an overview of the fieldwork.

In the *Analysis* I describe the process of describing, analysing and interpreting data, together with examples of the analysis. This chapter includes a section foregrounding ethical issues and reflexivity as researcher.

The three results chapters deal with characteristics of available discourses within a mathematics teacher education programme; of how students' enacted positionings reveal discursive power-relations; and how and why available discourses open up or narrow spaces for empowered positionings in mathematics teacher education contexts.

In the two last chapters, *Discussion* and *Conclusions* I discuss the results, the research approach and how this research may contribute to the field of mathematics teacher education research.

Setting the scene

My guiding principle for writing this chapter has been to offer a brief overview of research on and within mathematics teacher education, both from an international and a national perspective. As I place my research within the social, cultural and political field of mathematics teacher education research, I foreground researches that have been my cornerstones in the social, cultural and political context. Initially I draw from three research overviews: four international (Adler, Ball, Krainer, Lin, & Novotna, 2005; Tirosh, 2009 and Sánchez, 2011) and one Swedish (Grevholm, 2010) to present a broad overview of what has been brought forward as trends, to use Sánchez's (2011) wordings, in mathematics teacher education research over the last decade.

Research focus on and within mathematics teacher education research

Researchers take on different theoretical and methodological approaches in studies on and within mathematics teacher education to facilitate our understanding of possibilities and constraints for becoming mathematics teachers. Adler et al. (2005) conducted a large international overview of publications focusing on mathematics teacher education through which they scrutinised international mathematics education journals, international handbooks of mathematics education and international mathematics education conference proceedings. However the *Journal of Mathematics Teacher Education* (JMTE) became essential, due to the special focus of mathematics teacher education. Adler and her colleagues scrutinised research from all domains — pre-service, in-service, primary and secondary — in mathematics teacher education 1999–2003, and identified three main areas of research. These areas concern teachers' learning and change over time, teachers' beliefs, knowledge and practices, and meta-analysis made of the research field.

The overview focuses on research questions and methodologies for conducting research on and within mathematics teacher education. From the overview they point at differences between countries regarding group sizes and diversity in socio-economic conditions within which student teachers

become prepared for their future profession. This implies that becoming mathematics teachers all over the world are offered essentially different resources as teacher-learners. Another troublesome issue in teacher education internationally is the diversity in the students' mathematical history. In many countries, student teachers are expected to teach mathematics they have not learnt, or have weak knowledge about (Adler et al., 2005). The efforts of comparing mathematics teacher education on the basis of worldwide research can be discussed as social, cultural and political factors that constitutes the education may differ significantly even in comparison between neighbouring countries. However, there are also similarities in culture and educational systems, and mathematics is taught and learnt all over the world, so there might be examples from which we can learn in order to develop our national programmes.

Adler et al. (2005) observed that, methodologically, the field is dominated by studies conducted in English speaking countries. They also showed that mathematics teacher education research often build on small-scale studies presented from a teacher educator's perspective, whose informants are his/her own students reporting from short term development activities. However, they argue that these approaches are not contradictory, since qualities are to be found in both small-, and large-scale studies.

Teacher education needs both – the particular, and the general. [Because] there is also some general in the particular, and there is always the particular hidden in the general. (p. 369)

They conclude that developmental projects often are conducted by researchers having double roles; both of being the researcher and as the teacher in the group. This means that they have a lot of insight with regard to the context, but also that the relation student – teacher – researcher is not to be seen as unproblematic (Adler et al., 2005). The issue of researchers having double roles is recognised as being the situation also in Sweden, since it is easy to get access to research data while researching one's own students (Grevholm, 2010).

In the editorial notes of *Journal of Mathematics Teacher Education* (JMTE) issue 3, 2009, Tirosh discussed main issues and main challenges within mathematics teacher education research (Tirosh, 2009) and claims that “much more attention should be given to studying organizational issues such as the nature of assessment, whether or not the curriculum is mandatory, the role of the cultural context and the schools” (p. 84). She argues that these elements impact on various aspects of classroom practice and hence deserves more attention. She brought forward mathematical knowledge in different forms, the roles of affect and teacher growth — all including different approaches — as central in mathematics teacher education research.

From an international perspective Sánchez (2011) listed trends in mathematics teacher education in order to get an update of the field from the basis of recent research reports from the last decade, conference proceedings, two scholarly Journals, JMTE and Educational Studies of Mathematics (ESM), and papers from fellow researchers. He found, like Adler and colleagues, strong research concerns regarding teachers' beliefs, views and conceptions, teachers' practices, teachers' knowledge and skills, the relationship between theory and practice, and the reflective practice. In addition, Sánchez listed theoretical concepts as trends, such as pedagogical content knowledge and other forms of knowledge, reflection-in-action and reflection-on-action, and communities of practice.

An interesting contribution to this overview is that Sánchez (2011) points at some new trends in mathematics teacher education: online teacher education, the design and role of tasks in mathematics teacher education, the education and development of mathematics teacher educators, and social justice in mathematics teacher education research. Issues of social justice and equity are not foregrounded in the other overviews; however Tirosh (2009) stresses a need for more clear focus on social issues and socio-mathematical norms, which indicate that these interests have been part of published mathematics teacher education research for only few years. According to Gutiérrez (2013), attention to social and political issues in mathematics education research requires the researcher to have one foot in mathematics education and the other in psychology, philosophy or sociology. This interdisciplinary holding might be one reason for the late entrance to the field.

The Swedish context

In an extensive research overview on mathematics teacher education in Sweden, Grevholm (2010) scrutinised a large part of conducted research over three decades. Most research has been conducted after year 2001, thus the field is still young. Consequently the amount of publications is relatively small and it might be irrelevant to draw conclusions of which trends are to be seen in the Swedish context.

However, Grevholm (2010) lists areas of research in Swedish mathematics teacher education and concludes that problem solving, mathematical modelling and ICT are areas of interest; and also that there is some research focusing on conceptual development and communication in mathematics discourses. In the overview Grevholm stresses that many studies strive for answering what teacher education should develop, in order to meet the students' different needs. She argues that future research on Swedish mathematics teacher education should focus on research-based design of content and form of the mathematics teacher education. That is: on "research-based competence development programs for teachers"; on

“research-based textbooks for pupils and handbooks for teachers”; and on “factors that influence teachers’ working conditions and professional opportunities”. Further on, she concludes that longitudinal studies, on “teachers development of a professional identity and its long-term influence on their practice” (p. 360) are necessary, since teacher development takes time.

The latest reference in the overview by Grevholm (2010) was published 2009, and some intense years of research have past since. Therefore I scrutinised research on and within mathematics teacher education from year 2004 through 2013 in order to complement previous overviews and to identify possible trends or strands in the Swedish context. From my reading research focusing on becoming mathematics teachers at Swedish universities is mainly conducted within two major strands, and largest effort is put into studies on student teachers’ knowledge about specific mathematical topics (Grevholm, 2004; Bergsten & Grevholm, 2004; Hansson, 2006) including mathematical knowledge for teaching (e.g., Nilsson, 2005; Ryve, Nilsson & Mason, 2012, van Bommel, 2012). The other strand is focusing on the transition from student teacher to first year(s) of teaching (Bjerneby-Häll, 2006; Persson, 2009; Palmér, 2013).

Bjerneby-Häll (2006), Persson (2009) and Palmér (2013) conducted longitudinal studies focusing on becoming mathematics teachers’ in the borderline between student teacher and teacher. Bjerneby-Häll, (2006) showed that becoming mathematics teachers’ individual arguments for teaching mathematics changed during their first years as teachers and came to be identical with the goals of the national syllabus. The teachers in Persson’s (2009) study were concerned about having enough mathematical and didactical competence as novice teachers, even though they felt well prepared for mathematics teaching in pre-school and primary school. However, after only one year they expressed confidence and safety in their roles as mathematics teachers. Palmér (2013) took a participatory perspective drawn from Wenger (1998) and conducted a longitudinal study, through which she showed that both the social and the individual has to be considered, in order to understand the students’ professional identity development. She found that without a school employment after graduation, the identity development as mathematics teacher becomes vulnerable. Palmér (2013) argues that, if the becoming teachers should have possibilities to develop a sense of themselves as primary school mathematics teachers, then mathematics teaching has to become part of their teacher identities. Mathematics thus needs to become part of the becoming teachers’ image of a primary school teacher.

These studies bring forward issues about attitudes and experiences with regard to mathematics teaching and teacher education. They also shed light on institutional constraints in schools that push back what the student teachers learnt from teacher education, as well as issues arising during

novice teachers' first working year(s), when becoming members in the mathematics teacher community. In addition, they are important and informative for understanding teachers' entrance into the workplaces and support our understanding about coping in the transition between university and the school world.

Turning back to the overview of research on and within mathematics teacher education in Sweden, there is also a minor strand focusing on factors that impact mathematics student teachers, such as gender issues and what it means to become mathematical (Palmer, 2010); on discourses about teacher education and becoming teachers' learning (Ryve, Hemmi & Börjesson, 2013); and book-based and examination-steered approaches in teacher education (Player-Koro, 2011; Beach & Player-Koro, 2012).

Even though there are few studies that tightly relate to the present study I place my research within this strand with regard to research focus, methodological approach and the focus on power within mathematics teacher education. Player-Koro (2011) conducted a four-year ethnographic study at a Swedish university. She challenged the purported relationship that more mathematically trained teachers are necessary to turn the trend of low achievements in school mathematics. Through a critical examination of how the mathematics discourse is produced during teacher education she showed that it

[...] like the traditional school mathematics education, [is] built around a ritualised practice based on the ability to solve exercises based on mathematical concept that is conveyed through an examined-textbook-based content. (p. 338)

In Beach and Player-Koro (2012) the authors focus – from the fact that teacher education is set under constant development and change – on how subject textbooks in mathematics were used in the teacher education, and what meanings and understandings that were generated by this use. By describing and analysing how authoritative subject knowledge works in context, it became visible that the mathematics content rarely was challenged, there were no critical discussion about the textbook-based learning, and students enjoyed mathematics for “wrong” reasons. That is, the students enjoyed mathematics when they were successful and got things right and not because they understood mathematical relations or concepts. Hence, Beach & Player-Koro argues that the mathematics textbooks and tests became “key technologies of power in a performativity culture” (p. 121) in mathematics teacher education. They observed ritualism and reproduction “of a particular social order of hierarchy and control” (p. 121) as these discourses that were unchallenged.

The different approaches taken in these studies provide different characteristics of results. While, for instance Persson (2009) and Palmér

(2013) explored the “shift” from student teacher to teacher, Palmer (2010), Player-Koro (2011) and Beach and Player-Koro (2012) scrutinized discourse and power on different levels during teacher education. As mathematics education is a social and political activity (Gutiérrez, 2013), these approaches are both necessary and important contributions to the field of mathematics teacher education research.

Social, cultural and political approaches on mathematics education research

Mathematics education research has undergone what Lerman (2000) calls the social turn, which is defined as “the emergence into the mathematics education research community of theories that see meaning, thinking and reasoning as products of social activity” (p. 23). However Jablonka and Bergsten (2010) argued for calling the increased research in the socio-cultural field for a social branch instead. Not only social perspectives within socio-cultural research increased during the actual period. The whole field grew stronger on a broad basis and several strands grew stronger than the social branch (Jablonka & Bergsten, 2010). Despite their argument I have chosen to use Lerman’s term for the phenomenon of increasing focus on social theories in mathematics education. The social turn has made us rethink learning as a social activity and the situated theories of Lave and Wenger have become powerful for understanding learning as becoming in practice (Lave & Wenger, 1991; Wenger, 1998) for instance as becoming mathematics teachers become practicing teachers (e.g., Jaworski, 2006; García, Sánchez, & Escudero, 2006). From the socio-cultural theoretical perspective it is possible to understand how social practices set the rules for how we act and what we do in a practice. Accordingly this research is situated within a socio-cultural theoretical perspective and I follow Andersson’s (2011) understanding that “(mathematics) classrooms are spaces of socially organised practices that, in different ways, shape how individuals are expected to, allowed to and/or required to act” (p. 215).

Previous research within mathematics teacher education on issues of power and inequities

Socio-political studies in mathematics teacher education research foreground power-relations on different levels. The span is wide and researchers take on different approaches to reveal inequities and power struggles. However, research related to mathematics teacher education mostly draw from courses where becoming teachers can increase their awareness of teaching for social

justice (see e.g., Garii & Appova, 2013; Garii & Rule, 2009). Other studies focus on power relations on a structural level. For instance Adler and Davies (2006), scrutinised mathematics and mathematics education courses in teacher education programmes, since there was contestation over what should count as mathematics for becoming teachers, and where decisions about the courses should be taken. These tensions, described as power-relations between mathematics and mathematics education are well known and the authors argue that there is need for negotiation across the domains of mathematics and mathematics education.

Without this negotiation the power position of mathematics and mathematicians /.../ teachers will continue to miss a large component of what is entailed in knowing, and knowing how to use, mathematics for teaching. (p. 292)

Gates and Jorgensen (2009) raise the question of the place of social justice in the field of mathematics education research and to what extent researchers bring together socio-political issues and mathematics teacher education. The special issues on social justice (2009a; 2009b) and equity (2012) in *Journal of Mathematics Teacher Education (JMTE)* indicate an increasing interest in socio-political research within mathematics teacher education. Even though the single studies differ, the focus is strong on teaching for social justice and equity and the future, that is what may happen after the education, are a majority in studies within the education. The equity issue takes an inclusive perspective of cultural backgrounds and communities and how to teach diverse classrooms (Turner, Drake, McDuffie, Aguirre, Bartell, & Foote, 2012) and in teaching second language learners (Vomvoridi-Ivanović, 2012), for instance. Yow (2012) had a stronger focus on student teachers' beliefs and involved becoming teachers to engage in depicting situations of oppressive and liberative mathematics teaching. None of the articles discussed equity within teacher education by explicitly drawing from the student teachers' perspectives. In the beginning of the decade, Vithal (2003b) took a somewhat different approach. Together with her student teachers they conducted and wrote about a project in South Africa where the students taught street children mathematics. During a period of one year, each of the students was responsible for the mathematical growth and development for a young learner. The project aimed at preparing them for future challenges in diverse mathematics classrooms.

By drawing on Bourdieu's social field theory, Nolan (2012) took a discursive approach in her study. From interview data the students' stories represented five dispositions. Firstly, time constraints were expressed as demanding with regard to workload in the courses. Covering the content became privileged over learning, as there was not enough time to do both. Secondly, the students expressed discomfort with creativity and innovation. Mathematics was seen as a subject difficult to teach through creativity and

innovation with reference to its close-ended nature, In addition they used preparation for higher education as “excuses” for not conducting creative mathematics teaching, since traditional lecturing was what they expected to meet later. Thirdly, traditional classroom structures and expectations on how a mathematics lesson was supposed to proceed, was an accepted and unquestioned discourse, which Nolan claims, ”reproduces a network of relations governing becoming teachers’ pedagogic actions in the field” (p. 208). The fourth disposition shows the students’ reliance on tests. It illuminates how mathematics is seen a competitive subject through which one shows his or her knowing by solving tasks on a pre-given time without collaborating with others. The fifth disposition on mathematics strength supports the view on mathematics as a competitive subject, where there is no reward for helping each other, especially not for the strong students.

Summing up

In this chapter I have presented research on and within the field of mathematics teacher education that is relevant with regard to where the present study is conducted, in Sweden, and from its theoretical and methodological underpinnings. As the overviews showed, the focus on social and political concerns within mathematics teacher education research is limited. Internationally, issues concerning equity and social justice are argued to be essential in teacher education in order to prepare student teachers for their future profession. This is shown through several developmental projects, which aims at supporting becoming teachers for future challenges in teaching diverse classrooms. Mostly the studies are written from the teacher educators’/researchers’ perspectives as evaluations of how successful a course or project proved to be. In this respect the project conducted by Vital (2003b) differed from the others as it included the student teachers in the whole process, and ended up in collaborative reporting on the research.

There are few studies conducted with an approach to understanding possibilities and constraints for becoming mathematics teachers. The ethnographic studies by Player-Koro (2011), and Beach and Player-Koro (2012) contributed with critical studies on how mathematics courses within Swedish mathematics teacher education are organised and to which extent textbook-based content contributes (or not) to educating autonomous teachers. Also Nolan’s (2012) research foregrounded available mathematics discourses as it “carries the voices of becoming teachers into the field of teacher education and curriculum classes” (p. 213). Hence power-relations foregrounded what was possible to talk about with respect to mathematics education as becoming teacher.

Mathematics education researchers take on different theories and methodologies to describe challenges and contribute to developing the education for becoming mathematics teachers. Often the researchers are the teacher educators, who are responsible for the course or project. However, there is a lack of research foregrounding power-relations in mathematics teacher education practices. And there is a lack of research where becoming mathematics teachers' participations as co-constructors of the discourses are in focus.

In the present research I study mathematics teacher education from a socio-political theoretical perspective by focusing on how discursive power-relations affect becoming mathematics teachers' positionings in different educational contexts.

Theoretical directions and concepts

Discourses, power and positioning — a socio-political theoretical perspective

In the following chapter I ground the theoretical framing of the study by first taking a stance in and discuss implications of taking a socio-political theoretical perspective on research in mathematics education. I also show how this perspective will serve as basis for how the central concepts discourse, power and positioning are understood and used in the study.

Why take a socio-political departure point in mathematics education research?

The socio-cultural theoretical perspective makes it possible to understand how social practices set the rules for how we act and what we do in a practice. This can help us understand how social settings work and also to get a deeper understanding of how cultural and historical activities have formed peoples' lives and activities (Holland et al., 1998). Identities and agency develop “specific to practices and activities situated in historically contingent, socially enacted, culturally constructed ‘worlds’” (p. 7), such as romance, mental illness, or culturally constructed worlds, for instance as student or becoming mathematics teacher in the present study. Through positional identities, which develop heuristically over time, Holland et al. (1998) foreground power as present within “social-interactional [and] social-relational structures of the lived world” (p. 127). In their culturalist interpretation with regard to the well-known story about Gyanumaya, who climbed the house instead of walking through the kitchen in a higher-caste household power, identity and agency are fruitful theoretical concepts for interpreting the situation. Power is in this view strongly connected within the Hindi culture, which prevented Gyanumaya from walking through the kitchen. From a constructivist perspective the situation instead could be interpreted “as a sign of positioning by powerful discourses” (p. 16); an improvisation to solve the problematic situation by being pushed into subject positions of being both a welcome guest *and* a bearer of pollution. Whereupon she accepted the position afforded by a higher-caste woman and

climbed the house. Power is, from this perspective, assumed to relate to social positions and not to cultural constraints.

However there is sometimes a need to focus more on what is said and done, who is saying and doing what; and what the consequences of what is said and done are. Gee (2011) describes his understanding of the role of language within a socio-political framing:

[Politics] is about how to distribute social goods in a society: who gets what in terms of money, status, power and acceptance on a variety of different terms, all social goods. Since, when we use language, social goods and their distribution are always at stake, language is always “political” in a deep sense (p. 7).

The social and cultural theoretical approaches do not necessarily address political issues in mathematics education (Gutiérrez, 2013; Valero, 2004b) and therefore, researchers having this interest have moved beyond a socio-cultural theoretical perspective towards socio-political theoretical perspectives, highlighting identity and power at play. The research focus has thus shifted “from examining school structures and institutions to examining discourses and social interactions” (Gutiérrez, 2013, p. 39). By a socio-political theoretical approach the researcher adopts “theories and forms of enquiry that place power in the center of mathematics education practices” (Valero, 2009, p. 251).

The need for socio-political approaches in mathematics education research is also acknowledged by Sriraman & English, (2010). The field of mathematics education research has grown rapidly the last three decades and has been “heavily influenced by the social, cultural and political dimensions of education, thinking and learning” (p. 25). Sriraman and English discuss the relevance for this impact. They point at some issues, closely connected to mathematics education, which would be impossible to research without taking into consideration the social, cultural and political aspects. They exemplify by posing questions like:

- Why do school mathematics and the curricula repeatedly fail minorities and first people in numerous parts of the world?
- Why is mathematics viewed as an irrelevant and insignificant school subject by some disadvantaged inner city youths?
- Why do reform efforts in mathematics curricula repeatedly fail in schools? Why are minorities and women under-represented in mathematics and science related fields?
- Why is mathematics education the target of so much political/policy attention? (p. 26)

Valero (2009) argues for broadening the scope of mathematics education research to not only focus on the dominant definition of what mathematics education research is and what questions hence are possible to ask. By

including both mathematics and other aspects like language, culture, students' back- and foregrounds etc. we can move beyond the "dominant traditions of these fields in order to grasp their socio-political complexity" (p. 2). The tension between different approaches within mathematics education research can be grounded in different views on mathematics, which is further elaborated by Valero (2009). She states:

The dilemma of the mathematical specificity illustrates the tension between a traditional focus on the mathematical content in educational interactions and the opening of scope that makes that content one of the many other aspects at stake such as language, students' backgrounds and foregrounds for learning, cultural conflicts between the school culture and out-of-school culture, etc. The dilemma of the scope addresses the issue of navigating in an open field of investigation instead of researching highly specialized, well-delimited problems (p. 11f)

Gates & Jorgensen (2009) claim that there is need for change towards awareness of socio-political issues within mathematics education research: "Mathematics education has been for a long time a conservative field and a push for social justice is a call to change the field" (p. 168). What makes a study political differs with regard to the situation in each country and therefore we need to go behind the scenes of well-known contexts and look critically on the educational practices we are involved in. According to Gutiérrez (2013) the socio-political turn

... signals the shift in theoretical perspectives that see knowledge, power, and identity as interwoven and arising from (and constituted within) social discourses. Adopting such a stance means uncovering the taken-for-granted rules and ways of operating that privilege some individuals and excludes others. Those who have taken the sociopolitical turn seek not just to better *understand* mathematics education in all of its social forms but to *transform* mathematics education in ways that privilege more socially just practices [italics in original] (p. 40).

Gutiérrez (2013) argues that we can learn how to rethink mathematics education by learning from subordinated individuals and communities by asking *why* we teach a specific content, *who* benefits from learning the content, and what is *missing* from the mathematics classroom because we are required to cover this content. If we instead of seeing mathematics education as restricted to the sphere of our classrooms, include practices of and interconnections between social actors and institutions across levels "the social, political, cultural and economic dimensions that are a constitutive element of mathematics education practices" (Valero, 2009, p. 240), we can deepen our understanding of the types of questions Sriraman and English (2010) brought to the fore. According to this discussion above it is not uncontroversial to adopt a socio-political perspective in mathematics

education research, and with regard to the trends in mathematics teacher education research (cf. Sánchez, 2011) and published articles in the largest mathematics education journals (Lerman, 2010) this approach is not very common, however growing (Sriraman & English, 2010). By taking a socio-political theoretical perspective, based on the assumption that all language is political (Gee, 2011), and that mathematics education is a political activity (Gutiérrez, 2013), we as researchers are allowed to “engage in a more uncertain process of knowledge construction and sense making about the practices of mathematics education” (Valero, 2009, p. 4).

If we want to address issues of justice and equity in mathematics education it is important to both pose critical questions regarding mathematics education, like *why* and *for whom* education is organised; and also to let the research itself undergo critical scrutiny to ask why we construct research the way we do (Pais, Stentoft, & Valero, 2010). The socio-political turn in mathematics education research (Gutiérrez, 2013) — earlier brought to the fore as a trend by Valero (2009) — offers an additional layer that highlights issues of power at play in these interactions, thereby helping us better reflect on and contribute to the complexity in our society by “making the familiar seem strange, deconstructing the operating paradigms, and making the taken-for-granted rules of the game more explicit” (Gutiérrez, 2013, p. 50).

Andersson (2011) defines the socio-political approach with “capital P” and “little p” as two different approaches. A “capital P” researcher “politically consistent through the whole research process, meaning that power and relationships are emphasised through theoretical approach, methodology, analysis and conclusions. Adhering a “little p” approach “emphasises an awareness of political issues, is sensitive to power and relationships, and cares for research participants through a researcher ‘attitude’” (p. 30).

To summarize: A socio-political approach supports us to rethink learning as a political and social activity (Valero, 2004b; Gutiérrez, 2013), which provides an additional dimension to socio-cultural theories, as for instance Wenger’s (1998) situated perspective of learning through participation in communities of practice. The socio-political approach stresses the importance of transparency to make the familiar seem strange and to make taken-for-granted roles more explicit; of subjectivity to see the individual as constantly in the making, defying categories; and agency/voice to understand individuals negotiating and sometimes showing resistance to the discourse (Gutiérrez, 2013). Thus, if we want to understand becoming teachers’ concerns during teacher education, we need to move behind the scenes in the well-known contexts and focus on factors that affect both actions and reactions in social settings.

Discourse

In this study discourse will serve as both background and basis for understanding student teacher's positionings. If discourse is used in its broadest sense "to cover all forms of spoken interaction, formal and informal, and written texts of all kinds" (Potter & Wetherell, 1987, p. 7), there are possibilities to interpret positioning in several forms of communication through, what Potter and Wetherell name *performance of actions* (p. 57). However, there are some theoretical aspects on discourse that have to be taken into consideration before presenting and framing the methodology for the analysis. In this chapter I present a theoretical background, which aims at framing how discourse is understood on different levels, and I also bring in central concepts, which need to be introduced for the further reading.

Defining the concept of discourse

Discourse is defined and used in a variety of ways in the scientific literature. But, which is necessary to point at: what appears is that different definitions build on previous ones and new details are added in order to understand discursive phenomena from different levels of detail. The dissemination from the Foucauldian large, societal discourses of truth of knowledge, politics and medicine (Foucault, 1971/1993) and hegemonic discourses "which contribute to constituting, reproducing and transforming social relations of power and domination" (Fairclough, 2010, p. 28) to Halliday's (2002) social semiotic framework for analysing texts, reveal parts of the complexity of taking a discursive approach.

Foucault (1969/2002) takes a historical perspective on discourse and frames discourse on a societal and institutional level, but sensitizes us to see how these large societal discourses trickle down and colour our scientific as well as our mundane discourses. The discourse of truth, for instance, has for many centuries been strong at all levels in the society. Discourses change over time and in Foucault's work the historical perspective is salient. However, the prevailing discourse at each time frames what is okay to say and do, who has the power to act and hence what is included in and excluded from the discourse. An analysis within the discursive field brings forward questions about what is said, but also what is not said. Instead of searching for rules that explain why utterances are built the way they are, we ask why this utterance was performed and not another (p. 30). Fairclough (2010) defines discourse as "particular way[s] of representing certain parts or aspects of the (physical, social, psychological) world" (p. 358), which includes ways of acting and ways of being.

Discourse and context

Discourse is inherently connected to actual contexts (Foucault, 1969/2002), as language “is made up from particular utterances performed in particular contexts” (Potter & Wetherell, 1987 p. 14). Therefore, Potter and Wetherell argue, that the contexts need to be ‘read’ by the analyst in order to make sense of the discourses. Consequently we need to understand the context(s) in which statements occurs, in order to identify the limitations of the discourse and to understand how statements are related to other statements. We must also try to understand how discourses of inclusion and exclusion are working in the contexts, as emphasized by Foucault (1969/2002):

We must grasp the statement in the exact specificity of its occurrence; determine its conditions of existence, fix at least its limits, establish its correlations with other statements that may be connected with it, and show what other forms of statement it excludes. (p. 30f)

Potter, Wetherell, Gill and Edwards (1990) also brought forward the intimate relation between discourse and context.

The actual working of discourse [should be seen] as a constitutive part of social practices situated in *specific* contexts. Discourses or interpretative repertoires are always versions organised in particular contexts, their study should be based around the performance of procedures or actions. (p. 209, italics in original)

Further on, they argue that it is problematic if discourses are seen as independently existing entities and criticize discourse analytical works with too strong focus on discourse as “sets of statements” (Potter et al., 1990, p. 209) without taking the surrounding context into consideration. The dynamic of interactions, reactions and responses is not possible to idealise as “*a*” discourse, and frame the family discourse, or the scientific discourse, for instance. Potter and colleagues argue that “objects are constructed in talk and text in such a way as to perform actions, and actions can be studied precisely in terms of their context” (p. 210). This interpretation fits well with the adopted socio-political theoretical framework taken in this study. When “people use their language to do things” (Potter & Wetherell, 1987, p. 32), they “are using their language to construct versions of the social world” (p. 33). This makes possible for people to use their language in different ways and construct different versions of the world, regardless if the context is different or not. Understanding discourse in this dynamic way implicates that the actual educational context in focus is seen as unique, and hence, that the emerging discourses will be studied from this unique viewpoint. Focus is on the discourse itself, meaning “how it is organized and what it is doing” (p. 49). What follows from this understanding is the importance of examining related contexts, awareness of variability within the discourses, and a focus

on “specific formulations [and] detailed examinations of how evaluative expressions are produced in the discourse” (p. 55).

Power

Discourse and power are dialectically related and “flow into each other” (Fairclough, 2010, p. 4), which will become apparent in this overview. It is within the discourses that power is working (Foucault, 1971/1993) and hence it is within the discourses that power can be analysed (Wreder, 2007). There are different layers where power-relations can occur in a discourse and according to Foucault (1971/1993) it is stated that communication occurs within restricted systems, or rituals, and that these rituals determine who should take each position and what each individual can say and do. The discourse hence presupposes how to interpret different sayings and limits what can be said. If we want to understand discourse from a Foucauldian perspective we need to explore its occurrence in sequence, its regularities and limitations. In my work I base my understanding of discourse and power as outlined by Foucault (Foucault, 1971/1993). However, there is a need to clarify how discourse and power are connected and I will draw from the work of Fairclough (2001; 2010) to visualise this interrelation.

As a researcher, positioning oneself within a critical paradigm means having an ideology that looks critically into phenomena rather than only describing them. It also implies associating power with hegemony rather than with violence and force (Fairclough, 2010). To “talk about discourse and power in terms of hegemony” (p. 95), means talking about processes of “constituting and reconstituting social relations through discourse” (p. 64). Hegemonic systems are orders of discourse where relations of domination are sustained as part of the legitimising common sense. If we, for instance, talk about power asymmetries in university settings, the relationships of academia and students constitute hegemonic relations. The discourse conventions embody ideologies, knowledge, and particular ways of participating and relating to others. What is brought within such systems become “naturalised and commonsensical” (p. 129) conventions. The order of discourse, which is the way “diverse genres and discourses and styles are networked together” (Fairclough, 2010, p. 265), is not a static system. Rather it is open to resistance and can be challenged by subjects “whose positioning within other institutions and orders of discourse provides them with resources to resist” (p. 27).

Valero (2004b) outlines three ways of interpreting power and its consequences for research in mathematics education. First, she strongly rejects the assumption that power is within the mathematics subject, that mathematics is a powerful knowledge and that mathematics education empowers people. “Saying that mathematics is powerful means that

mathematics itself can exert power [and hence that] mathematics is given a life of its own that it does not have” (p. 13). Second, power can be seen as a capacity of people, or groups of people, to maintain social structures of inclusion and exclusion. This conception of power, rooted in the Marxist and Critical traditions, have been challenged in ethnomathematics and equity research and highlights the “necessity of questioning both mathematics and mathematics education practices” and “of incorporating *critique* as an essential element of a socio-political approach” (p. 15).

The third way of defining power — and the one for which Valero (2004b) argues — is related to postmodern and poststructuralist understandings and seen as “situational, relational and in constant transformation” (p. 15) and draws from the Foucauldian understanding of power. This means that we cannot see power as stable or intrinsic to i.e. social class or gender. Neither that power is built into the mathematics itself nor that receiving power relates to being mathematics educated.

Gutiérrez (2013) brings forward how social and political issues, thus power relations, impact the discourses, and hence constitutes for example what it means to be “successful” as a student or what “proficiency” in mathematics involves.

The meanings that people make of themselves and of their world are the result of the political struggles they undergo as they negotiate discourses. Here, discourses mean much more than talking and words. Discourses include institutions, actions, words, and taken-for-granted ways of interacting and operating. So, in some ways, discourses can be thought of more like paradigms in which we operate. Discourses reflect a particular point in history, including specific relationships between people, knowledge, and agency; they come to define what we think of as “normal.” (p. 43)

Discourses produce “truths” and structure the world and what we think of as “normal”. If learners and practitioners don’t have the means to challenge or re-inscribe the discourses with other meanings, they can, based on discourses operating in schools come to believe that they are successful or unsuccessful, and hence act in line with the “truth” about habits of successful or unsuccessful learners or practitioners in mathematics. Discourses understood in this way means producing “truths” which Gutiérrez argues must be open to debate.

Discourses of “truths” imply exercise of power and as “inextricable embedded in practice” discourses are about “negotiating and maintaining relationships among its participants” and hence establishing relations of inequity (Morgan, 2012, p. 181). Morgan argues that issues of power are brought forward on both micro and macro level as central aspects when analysing discourse in mathematics education research. Awareness of these levels can deepen our understanding of “how hegemonic discourses and the

interests of dominant groups shape the pedagogic discourse” (p. 192). Hence, in order to understand how power-relations are working we need to

...look outside the immediate practice of individual classrooms to consider the dominant discourses and social structures that shape the resources that students and teachers bring with them into the classroom. (Morgan, 2012, p. 182-183).

By taking a micro perspective, this study hence contributes to understanding how power-relations may affect discourses within mathematics teacher education from a broader perspective.

However, it is important to consider why we choose to analyse power-relations in mathematics education discourses. As Gutiérrez (2013) argues the socio-political turn should not be an intellectual exercise, but through deconstructing what is taken-for-granted and open up for new ways of thinking and operating, we can open up for new arrangements and meanings of school mathematics and to learn more about “how mathematical practices connect with the identities, futures, and lived consequences for individuals in society” (Gutiérrez, 2013, p. 56).

Positioning

Positioning is a conversational phenomenon through which individuals position themselves or others (cf. Davies & Harré, 1990; Holland et al., 1998; Tan & Moghaddam, 1999) through performance of actions (Potter & Wetherell, 1987). In contemporary socio-political research positioning is central (e.g. Evans, Morgan & Tsatsaroni, 2006; Herbel-Eisenmann, Wagner & Cortes, 2010, Walshaw, 2010), and used as an indicator of how power relations determine discourses and how individuals take up different positionings as a consequence of these discourses (Davies & Harré, 1990). Positioning is dynamic, which implies that one single person will enact different storylines in parallel, depending on whether the situation is well known or rare, and if the person is experienced or a newcomer. Posed in other words: what a person tells or does to position him- or herself, will differ and change; depending on the situation (Davies & Harré, 1990) or context (Andersson, 2011). This could happen almost simultaneously. Positioning could also be strategic, meaning that people will tell different stories about themselves depending on how they want to be presented:

The catalogue of kinds of positions that exist here and now will not necessarily be found at other places and times. In so far as the content of a position is defined in terms of rights, duties and obligations of speaking with respect to the social forces of what can be said, and these ‘moral’ properties

are locally and momentarily specified, positions will be unstable in content as well. (van Langenhove & Harré , 1999, p. 29)

Positioning not only involves individuals. It may also involve groupings of people through the discursive production of “‘selves’ as members, representatives and mediators of groups” (Tan & Moghaddam, 1999, p. 178), hence enacted *intergroup positioning*. The concepts of personal and intergroup positioning are reflexive in character: “a process by which one intentionally or unintentionally positions oneself [and others] in unfolding personal stories” (Moghaddam, 1999, p.75). Drawing on Foucault (1971/1993) communication occurs within restricted systems, or rituals, and these rituals determine who should take each position and what each individual can say. The social forces and ‘moral’ properties that permit different positionings are, as I can see, related to political issues and power relations. Hence, discursive power relations (the social forces) could be said to impact individuals’ positionings. And the discourse presupposes how to interpret different sayings and limits what can be said (the moral properties).

Holland et al. (1998) distinguish between figurative identities and positional identities, and write that “figurative identities are about signs that evoke storylines or plots among generic characters [whereas] positional identities are about acts that constitute relations of hierarchy, distance, or perhaps affiliation” (p. 128). This indicates that figurative identities have not so much to do with political concerns and power relations, and that the socio-political connection is much stronger when we are acting out our positional identities. This can be compared with the strong political writing of Davies and Harré (1990) about how our experiences and lived histories impact our positioning:

“Positioning” and “subject position” /.../ permit us to think of ourselves as choosing subjects, locating ourselves in conversations according to those narrative forms with which we are familiar and bringing to those narratives our own subjective lived histories through which we have learnt metaphors, characters and plot. (p. 52)

By foregrounding subjectivity we are “highlighting the idea that individuals are not fixed [but instead] constantly in the making, internally multivocal, and contradictory” (Gutiérrez, 2013, p. 50). This implies that individuals choose subjects among those available in the discourse. Evans et al. (2006) draw on Davies and Harré (1990) by arguing that analysing positionings “provides a way to fully specify the context for thinking and emotion” (p. 224) in relation to mathematics education. They show how individuals, through emotional expressions, take up positions that are available in the discourse. It could be a position as leader or evaluator, for instance that someone takes in collaborative work in mathematics.

However, the focus in this study is not positioning of self and others *as being* something or someone. Positioning is understood in terms of how actions and reactions reveal discursive power-relations, hence, how individuals enact empowerment and disempowerment in discourses, by *doing* something.

Empowerment

Researching mathematics teacher education from a socio-political theoretical perspective requires awareness of how power flows on several levels. That is: to analyse how power is exercised within hegemonic structures as well as through interpersonal relations. *Empowering* research is, as claimed by Tyrone (1994), commonly used within educational studies as having a common purpose “to change social and political relations in a society characterised by the unequal distribution of power” (p. 15). Tyrone criticizes the use of empowerment in educational research, arguing that it is unclear how researchers can argue that pupils have been empowered by the research. The construction and application of the concept of empowerment “is implied rather than made explicit” (p. 19) and often there is no explanation what researchers mean by empowering research: “It does not need unpacking because we are all agreed on what it looks like, where it comes from and how its achievements are measured” (p. 6). Hence, “empowering” research does not seem to have a uniquely discernible theoretical or epistemological home” (15), nor a specific place within contemporary lexicon of human geography (Kesby, 2005).

Educational research focusing on “giving”, “enabling” or “equipping” others with empowerment (e.g., Edwards, 2006) makes us aware of how power and possibilities to exercise power differ among contexts. This is a benevolent approach as it assumes that power is not dependent on a top-down relation. However, even though it assumes that the power may be distributed within the discursive practice, “like enforcing tolerance or granting freedom” (Edwards, 2006, p. 23), this approach often foregrounds power to be in the hands of the most powerful.

In his critique, Tyrone (1994) also points at, that within the discourse of educational research it is assumed that researchers are able to identify why subjects are disempowered; and that research can empower them who were previously disempowered. This implies that people are labelled as either empowered or disempowered with regard to social and political status:

What is immediately striking about the literature in this area is that we appear to be dealing with absolutes: the targets of these research interventions begin as 'disempowered' (or powerless) and at the 'end' they either remain so or

have achieved a state of empowerment. There is no room for manoeuvre, no shades of grey. (p. 10)

Instead of labelling individuals as empowered or disempowered, or bestowing power — which might be the teacher; who can decide to empower his/her pupils — *empowerment* and *disempowerment* may be understood through individuals' sayings and doings. A poststructuralist understanding of how empowerment understood is discussed by Kesby (2005), who argues that empowerment not only should be understood as resistance, but first and foremost in terms of creativity and positive power.

Empowerment could acknowledge the entanglements of power more explicitly than the terms *resistance* or *resisting power/.../*. It might also emphasize the positive, creative capacities of power more effectively than the negative notion of *resistance to*. (p. 2050)

Resistance however, following Medina (2012) must be understood as a complicated and heterogeneous phenomenon that defies unification; and as irreducibly forms of power flow in every direction “our cognitive, affective, and political lives are caught up in various tensions among multidirectional relations of power/resistance” (Medina, 2012, p. 10). Hence, empowerment and disempowerment is continuously enacted in negotiating/resisting discursive power-relations through different performances of action.

Our ways of thinking, feeling, and acting become empowered and disempowered in specific respects, as they are formed and remained inscribed within the different networks of power relations and the different forms of resistance that shape our lives in various (and not always fully coherent) ways. (p. 10)

Thus, empowerment in the meaning being “given” or “enabled” in educational research has to be compared with individuals' expressions of empowerment through actions; implying that each individual may “take” or “achieve” empowerment through their actions. Kesby (2005) writes about empowerment as a journey of self-discovery and the process prior to action for change. However, as individuals take empowerment to challenge hegemonic structures, there is need for collective forms of struggle to challenge hegemonic structures.

Empowerment is said to involve a journey of self-discovery. This takes place through some sort of awareness training, politicization process, and/or life event that stimulates a recursive movement between experience, reflection, and action for change. /.../ Accordingly, empowerment can never be delivered: outsiders can only facilitate insiders' struggle to “take” or “achieve” it for themselves. However, individual transformation is only the vital first stage: empowerment must develop into collective forms of struggle

if people are to challenge hegemonic formations by changing the laws and institutions of society. (p. 2051)

As power can be used as an analytic tool in different contexts, without limitations regarding race, gender, degree of education, the dynamic understanding of empowerment and disempowerment can contribute to new ways of thinking about education and how it is arranged (Valero, 2004a). By taking an approach where enacted empowerment is at stake, the discussion about what empowerment is (and what it is not) may be of interest. Another issue to focus on is: who may benefit from the research where analysing empowerment implies analysing performance of actions.

In the present study power is understood as "situational, relational and in constant transformation" (Valero, 2004b, p. 15), meaning that power flows continuously within and among discourses and that transformation happens when actors participate in the construction of discourses. My approach to empowerment and disempowerment as enacted through discursive positionings differs from the educational approach (cf. Tyrone, 1994). As theoretical concept and analytical tool empowerment and disempowerment here draws on Kesby (2005) and Medina (2012) to foreground students' enacted positionings. Following Andersson (2011), however slightly rephrased: "empowerment in this research is understood as students' *experienced* possibilities to achieve agency and take personal decisions regarding their *education*" (p. 66, my insertions in italics). Hence, the focus taken reveals discursive power-relations in the educational contexts through students' enacted positionings.

Aim and research questions

In the outset of this thesis I outlined the overall aim of the research to explore and understand becoming mathematics teachers' concerns regarding mathematics and mathematics education, in order to get insights in possibilities and constraints that are discursively produced in educational contexts.

The socio-political theoretical approach offers theories and methodological concepts where sensitivity to available discourses, power at play and positioning is explicitly articulated. Framing the aim within these theories implies understanding the dynamic interrelation of the concepts in the following way: available discourses emerge through the students' enacted empowered and disempowered positionings, which, in turn, illuminates the flow of power within and between discourses.

The socio-political approach offers access to theoretical concepts, which refines the wordings, without changing the purpose; however more precisely identifies the aim of the present study: *to explore how becoming mathematics teachers' discursive positionings reveal power-relations in mathematics teacher education contexts.*

The following sub questions guided the production of data, the descriptions, analysis and interpretations:

RQ 1: What characterizes available discourses, driven out of students talk about concerns, within a mathematics teacher education programme?

RQ 2: How do students' enacted positionings reveal discursive power-relations in mathematics teacher education contexts?

RQ 3: How and why do available discourses open up or narrow spaces for empowered positionings in mathematics teacher education contexts?

Methodology

In the methodology chapter I contextualise and frame the study by presenting the educational context and the participants, present the ethnographic approach and give an overview of the fieldwork. Related to each of these sections I describe different educational contexts, discuss consequences of the ethnographic approach and describe how data was produced. In the last section of the chapter I discuss how the theoretical concepts of discourse, power and positioning became useful methodological tools for conducting this study.

Contextualising the study

I conducted this study in a Swedish town where teacher education has been organized for half a century. In the following, I present the specific educational context wherein the becoming mathematics teachers for grade 1-3 and 4-6 participate, and thus the context to which all data relate.

On a national level in Sweden, teacher education has been reorganized several times the last decades: 1988, 2001 and 2010 (Grevholm, 2010), and the actual study is conducted during the latest reform. According to Grevholm (2010) there is a need for longitudinal studies focusing on students learning during and after mathematics teacher education. In terms of instability of the educational programme I argue that in addition to researching students learning and educational outcomes it is necessary to study how such reforms affect the students who attend the old program while a new programme is implemented. The specific mathematics educational programme, where I did my fieldwork, has been radically changed since this study began and the students involved were among the last becoming mathematics teachers who underwent this programme. These circumstances did not influence my choice to realize the study per se, since my focus was on educational contexts and not on educational structures. Nevertheless, the structural changes were always present and I could not ignore them during the research process. The students were sometimes treated in special ways, with reference to the reorganisation and there are traces of “being the last” in the data which will be foregrounded in the results. By doing critical research in these circumstances made me think even more about what was necessary for the students to talk about, what they chose to not talk about and how I

could ask critical questions to the data in order to “investigate what could be” (Skovsmose & Borba, 2004, p. 221). I therefore strived for writing up an account where also structural challenges are transparent and part of my contribution to the field of mathematics teacher education research.

Educational context

The general structure of courses presents an overview of the whole four-year mathematics teacher education programme, which the students in this study attend. The first semester all becoming mathematics teachers took the same introduction course. This course aimed at both introducing the students to teacher education and to the specific subject, in this case mathematics education. After the first compulsory courses, the students choose whether they wanted to specialize on becoming teachers in grade 1-3 or grade 4-6. Each specialisation included a package of courses, whereof four were mathematics education courses; specifically designed for mathematics education in the actual school years. Since these courses were oriented towards different teacher groups, they differed in content, but also partly in character. In addition to the mathematics education courses, each of the two specializations took one course in pure mathematics. In these courses, the learning outcomes were strongly directed towards the students’ mathematical skills, and their future professions as mathematics teachers were put aside for a while. The overview of the educational programme in table 1 shows the order of courses. The actual mathematics and mathematics education courses are in *italics* to show where they were situated in relation to the programme as a whole.

	Courses
1st semester	<i>Mathematics and Learning for Children from the Age of 6 to 13, (15 ECTS credits) including teacher training placement (4.5 ECTS credits)</i> Curriculum studies 1 - The School’s Knowledge Assignment (7.5 ECTS credits) Pedagogy and Education I, (7.5 ECTS credits)
2nd semester	Specialisation courses, (30 ECTS credits)
3rd semester	<i>Grade F-3</i> <i>Basic Perceptions of Number Sense and Space, (15 ECTS) credits</i> <i>Deepening the Knowledge of Mathematical Concepts, (15 ECTS credits)</i> <i>Grade 4-6</i> <i>Towards a Mathematical Symbol Language, (15 ECTS credits)</i> <i>Language Development for Young Learners, (15 ECTS credits)</i>
4th semester	<i>Grade F-3:</i> <i>Number Sense, Basic Statistics and Elementary Algebra, school</i>

	<p><i>year F-3, (15 ECTS credits)</i> <i>Geometry and Problem Solving, school year F-3, (15 ECTS credits)</i></p> <p><i>Grade 4-6:</i> <i>Discussing Mathematics, (7.5 ECTS credits)</i> <i>Deepening the Knowledge of Mathematics Education for Children from 9 to 13 years, (7.5 ECTS credits)</i> <i>The Importance of Language when Learning Mathematics, for Children from 9 to 13 years, (15 ECTS credits), including teacher training placement (6 ECTS credits)</i></p>
5th semester	<p>Child and Youth Studies, (7.5 ECTS credits) Challenges for Special Education in a School for All, (7.5 ECTS credits) Degree Project in General Education Studies, (15 ECTS credits)</p>
6th semester	Specialisation courses, (30 ECTS credits)
7th semester	<p>Analyses, Assessing and Grading Students Knowledge in Mathematics, Primary — Upper Secondary School, (7.5 ECTS credits) Mathematics Education; Theory and Method, Advanced Course, (7.5 ECTS credits) Curriculum Studies II — To record and assess knowledge formation, (7.5 ECTS credits) Pedagogy and education II, (7.5 ECTS credits)</p>
8th semester	<p>To organize for teaching and learning – Mathematics and Swedish in cooperation for children 6 to 13 years old, (15 ECTS credits) Degree Project II in Mathematics Education, (15 ECTS credits)</p>

Table 1 Overview of the students' study plan

Courses

All university-based courses in mathematics and mathematics education were scheduled between two and four days a week, two to four hours at a time. The courses differed in character, meaning that there sometimes was a clear focus on the students' own mathematical knowledge, and sometimes, on mathematics teaching and learning as becoming teacher. Reading and preparation for the next seminar were often conducted individually or in spontaneous groups. In most courses, the student teachers were divided into smaller working groups. Groups, that were expected to collaborate in much of the work between the seminars, such as taking responsibility for specific themes related to mathematics education, which then will be discussed at a coming seminar; or teaching activities, such as planning an introduction about fractions or how to calculate as the Maya Indians to give two concrete examples. Groupwork on specific tasks were also scheduled, but not teacher-led.

Theoretical discussions and activities that focused on learning and teaching mathematics had a strong position in all mathematics education

courses. However, the steering documents explicitly strived for increased scientificity in order to prepare students for master- or doctoral studies¹. Both professional and scientific aspects on mathematics education were mirrored in the course literature, and these aspects served as a basis for seminars and lectures during the whole programme. Steering documents and the national syllabus were compulsory literature in most courses, as well as research literature dealing with different approaches on central mathematical content. The balance between professional development as mathematics teachers on the one hand, and scientific reading and writing on the other, was sometimes challenging for the students, as will be shown later.

Initial teacher education

The school-based courses are in the syllabus named *teacher training placement*. I will refer to them as *initial teacher education*, which will make sense in an international perspective as well. The initial teacher education should offer possibilities for the student teachers to develop their professionalism as mathematics teachers, and from the very first period the students were expected to lead mathematical activities and plan lessons in collaboration with the supervising teachers at school. They were also expected to formulate individual goals for themselves, on the basis of learning outcomes and relevant goals for the pupils. This self-reflection was meant to serve as a red thread throughout the programme. As the program proceeded, the students were expected to take larger responsibility for planning, teaching and evaluating mathematics teaching, but also for the pupils' whole school situation and of taking active part in the teacher team.

The participants

The first contact with the participating group of students was taken during their first seminar at the university. The university teachers' invited me to participate in the course introduction in order to introduce myself and present the research project. Thereafter I participated in all scheduled seminars for two weeks. During these first weeks, all students were invited to participate in the study. All students got both oral and written information about my interest in their concerns during the first two years as becoming mathematics teachers. Those students who were interested signed an informed consent, including their agreement on participating in the study and contact information (Appendix 1). The informed consent entailed guaranties that data and personal information should be handled confidentially, and I got their permission to share parts of their time at the university. They also

¹ This is in line with the educational system in Europe, which enables students to move between European universities or participate in Erasmus exchange or the like.

got information about their rights to leave the study whenever they wished to. Students who choose to not participate got an invitation to contact me later if they wanted to share their experiences with me. I adopted an including and pragmatic approach in the selection of participants, meaning that all students who wanted to participate were invited. All participating students contributed a lot by letting me share their time at the university and by letting me listen to their stories concerning mathematics education (including all aspects of learning, teaching and learning to teach mathematics).

As the student group divided in two specialisations, after the first semester, there was a need to follow seminars in parallel courses. I therefore had to be pragmatic and choose the seminars that might contribute most to the study with regard to both course content and structure. Seminars in courses with stronger mathematical focus were prioritised before courses where language, music and crafts were integrated. For sure, it would have been interesting to share all scheduled time at the university, but that was not physically possible.

Due to changes in the order of courses for the actual students, their group became integrated with other students from the beginning of the second semester. Almost in every course new students arrived. Therefore, every new group constellation got information about me and about the research. Consequently, I always invited them, who wanted to know more, to contact me for further information. This introduction also served as a reminder for both educating teachers and the participating students.

Table 2 shows the numbers of students who participated over the three first periods of data collection. Five students discontinued the teacher education program and two students changed university, but not program. Three students had a one-semester study break, since they wanted more experience from working in schools. They all returned to the study group after the break. So in all, 19 mathematics student teachers' participated in this study, for a longer or shorter period. No one chose to withdraw from the study; however, three students joined the study in the meantime of data collection periods.

Period	Number of students	Students
1st period	16 students participated initially	Anna, Angelica, Aniza, Camilla, Charlotte, Evelyn, Frida, Leila, Lisa, Monica, Naazim, Nadia, Rita, Samina, Sofia, Theresa
2nd period	Two more students joined in. [Six students had discontinued or changed education after the first period of fieldwork.]	Karin, Tina [Aniza, Angelica, Lisa, Monica, Naazim, Samina]

3rd period	One more student joined in. [Two students discontinued or changed education after the second period of fieldwork.]	Jessica [Charlotte, Karin]
4th period	11 students participated. [No changes from previous period]	
Total number of students	19 students participated	Anna, Angelica, Aniza, Camilla, Charlotte, Evelyn, Frida, Jessica, Karin, Leila, Lisa, Monica, Naazim, Nadia, Rita, Samina, Sofia, Theresa, Tina

Table 2 Overview of students who participated in the study [students who discontinued the education within square brackets]

The student group, as such, was very heterogeneous with regard to age, family situation, school experiences, cultural background and mother tongue. However, like most teacher educational programs in Sweden there were a majority of female students.

Ethnographic approach

Ethnographic studies traditionally focus on culture and how people involved make sense of living in that culture (Hammersley & Atkinson, 2007). With regard to the deeply rooted anthropological traditions of exploring unknown social cultures, “fieldwork usually means living with and living like those who were studied” (van Maanen, 1988, p. 2), the approaches to how ethnographic research can be conducted have changed. Hammersley and Atkinson (2007) describe how a range of theoretical ideas has influenced ethnographic research over time, and therefore play a complex role in social science. Central parts of the fieldwork are to participate in everyday contexts, to interact with people involved, to collect documents and other artefacts relevant for the focus of study. Despite various theoretical influences, most ethnographers make central methodological decisions regarding fieldwork, such as participating over time, whether to adopt an overt or covert role in social settings and to use several sources for gathering information about the culture (Hammersley & Atkinson, 2007). Willis and Trondman (2002) write about the interplay between data and theory in ethnographic research. They argue that we cannot present data from “the nitty-gritty of everyday life” as raw and unmediated, assuming that “data speaking for themselves” – an empiricist view. Nor can we present ethnographic data “through abstract theoretical categories” (p. 399). The theories used to enable analysis of the data must be relevant in relation to ethnographic evidence and give scientific energy. Theories must also be

relevant in relation to the characteristic of data in order to help us foreground and analyse the data in a powerful way.

In the present study, positioning theory (Harré & van Langenhove, 1999) has been very useful and given scientific energy to the analysis; meaning that the students' positionings helped me to identify actual discourses and reveal present power-relations from interview data and field notes. The ethnographic approach hence made possible for the theory and the data to become tightly connected and from this starting point, the theory became a way of putting my study into words. On the other hand all sources of data that indicated positionings made me think about how the data could help me to understand theory, and hence how to integrate positioning in a socio-political theoretical framework as a way to understand how power flows in the discourses. Willis and Trondman (2002) write that we, in relation to the data and ethnographic evidence, as an outcome of ethnographic research, can develop new conceptual tools or make theoretical innovations. This might be helpful in the development of social theories to be more open for surprise

[Social theories] must be open to and allow the formulation of questions without automatically generating given answers. They must be capable of unfolding and developing themselves in dialectical relation to ethnographic data. (p. 400)

The theories I have used in the process of understanding, analysing and interpreting ethnographic data made possible to formulate open questions and to develop and refine the theories during this process. I strive for and will argue that this study exemplifies this dialectic relation between theories, which enables social and political theories to develop in the process of analysis.

Pros and cons

Ethnographic studies within mathematics educational settings are nowadays relatively common in comparison to the situation a few decades ago (Eisenhart, 1988). However, research focus, the extent to, and the degree of time the researchers participate vary a lot. Ethnographic work thus means studying the world by participating in it and that one takes the members' interactions, as well as their perspectives, seriously (Pring, 2004).

There is also a need to distinguish between what doing ethnography means in relation to using ethnographic methods (Wolcott, 2008). Asking becoming mathematics teachers to talk about what they find important or worrying and then say something about their concerns as becoming teachers would be possible to meet through interviews, focus groups, diary notes, etc. In this study, I would say that the extended time in the field, the close and trustful relation among researcher and participants and the openness with

regard to what I was looking at, enabled me to engage deeply in understanding what was going on. However, even though participation facilitated my understanding of the students' worries and reflections I assumed that observations would not be enough for me to identify power-relations in the discursive practices. I therefore needed to invite them to tell their stories, and in that way uncover how they constructed their reality of teaching and learning mathematics, and hence expressed unequal distributions of power (Shipman, 1997). He writes:

If reality is constructed, then the unequal distribution of power can be used not just to oppress /.../ Uncovering that means getting close to those involved and letting them tell their own stories. (p. 38)

I hence let several forms of ethnographic methods interact both during the actual fieldwork and in the different stages of analysis.

Producing ethnographic data

Participant observation

I conducted a large part of the fieldwork as participant observer (Bryman, 2008) in the educational context and initially wrote a lot in my notebook about what these new student teachers met in forms of information, tasks, course literature, demands, etc. Clifford (1990) wrote about note-taking during fieldwork and distinguished between three approaches to writing fieldnotes. Inscription means jotting down single words or phrases as memory support, to write "a mnemonic word or phrase to fix an observation or to recall what someone has just said" (p. 51). Transcription is used in order to write down verbatim responses or taking dictations to produce texts aiming at writing up later. The third approach is called description, which means that the researcher writes "a more or less coherent representation of an observed cultural reality" (p. 51).

Over time, I used all three techniques of writing. As Clifford (1990) states, the three approaches of writing: "blend, or alternate rapidly, in the shifting series of encounters, perceptions, and interpretations called fieldwork" (p. 52). When I entered a new social setting I wrote almost continuously to grasp the context. As I on the other hand curiously listened to students' questions to the teacher or responses to peer-students I used transcription. The written accounts of inscriptions are few; however I often wrote longer accounts later, after, what I experienced as important meetings with the students. A broad approach to what information that should be collected was necessary in the initial stage. Therefore, I wrote notes both in relation to what was happening according to the planned content and in

relation to overheard dialogues, spontaneous comments or movements. The field notes opened up for understanding the students' actions and interactions within the educational context. Over time, I focused more on emerging themes from the continuous analysis on what seemed important or concerning for the student teachers. As an example I very early noted that they expressed concerns regarding institutional constraints and issues regarding language requirements. Hence, the following two years I was attentive to how the students referred to language concerns and institutional constraints with regard to mathematics teacher education.

As I began to narrow my focus I wrote short reflections beside the notes in order to see how the produced data made sense in relation to the aim of the study, and hence tried to get an immediate sense of the relevance of data. Over time, as I managed to formulate my research in terms of positioning by taking a socio-political approach, the fieldnotes were coloured by comments regarding positioning and in terms of who has space and power to participate in available discourses. In the excerpt below, I show two examples of how I wrote the field notes. Both examples later proved to be relevant for understanding the students' discursive positionings in the educational context.

Fieldnotes	
Notes	Reflection
<p>Example 1 X and Y talk before the lesson starts. X says that it is good that Y is there because Y poses many questions regarding stuff no one understands. They sit in the cafeteria and look at the tasks they were supposed to have done till today. X says that T (the teacher) is progressing too fast, and can make sudden changes and erase everything before no one got time to write.</p> <p>X och Y pratar innan lektionen. X tycker att det är bra att Y är där för att han ställer många frågor på sådant som ingen fattar. De sitter i cafeterian och tittar på uppgifter som de ska ha gjort till idag. X säger att L (läraren) går snabbt fram och helt plötsligt kan ändra sig och sudda ut allt innan någon hunnit skriva</p>	<p>This situation is interesting with regard to positioning.</p> <p>Denna situation är intressant ur positioneringssynpunkt.</p>
<p>Example 2 T Do you remember Euclid's algorithm? GCD [Greatest Common Divisor] T exemplifies GCD (112, 64). What do</p>	<p>What space do the students take in mathematics discussions?</p>

we do now? One student says that we shall divide. $T 82 \cdot 47 + 69 \cdot 29 = 5855 = 836 \cdot 7 + 3$ L Kommer ni ihåg Euklides algoritm? SGD [Största Gemensamma Delare] L tar ett exempel SGD (112,64). Vad gör vi? En student säger att vi ska dela. $L 82 \cdot 47 + 69 \cdot 29 = 5855 = 836 \cdot 7 + 3$	Vilken plats tar studenterna i matematikdiskussionerna?
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Figure 1 Example of fieldnotes

After a seminar or school visit, I wrote short comments to grasp what was central in the actual occasion. Thereafter, not necessarily the same day, the notes were structured in relation to the emerging themes. As the fieldwork progressed the on-going analysis required reconstruction of the themes and limitation of research focus in order to better represent the culture through the socio-political theoretical perspective.

Interviews

A central part of the ethnographic work was to interview the participants more or less regularly over the two-year period. I conducted the first semi-structured interviews (Kvale, 1997) in the beginning of the university-based courses. The purposes of the first interviews were twofold. First, I wanted to meet every single student and create a trustful contact between him/her and me as researcher. Hence, they got the opportunity to ask more about the study and I could ask each one if they wanted to invite me to visit their initial teacher education. I asked them how they felt after a few weeks in teacher education, how they imagined themselves as mathematics teachers in the future, and asked them to elaborate more on issues they, themselves, raised. The following interviews were conducted after their first period of practice: after approximately one and a half, respectively two years. These interviews were longer (30-60 minutes) and I structured the interviews around some actual questions or themes; mathematics teaching in initial teacher education or earlier mathematical experiences, for example. The read thread through all interviews was mathematics, mathematics teaching and learning and the actual courses they took within mathematics teacher education. There were always spaces for follow-up-questions, for clarifications and, most importantly a freedom both for me as interviewer and for the students as interviewees to elaborate more on emerging themes. This approach developed over time and in the end of the two-year period the interviews were more or less unstructured, concerning fewer topics and had a clear focus on what the specific student and I had talked about earlier. Each

interview was unique and sometimes had a character to be more like a conversation (e.g., Bryman, 2008).

Interviewing is a conversational act, which hence always involves some sort of positioning (van Langenhove & Harré, 1999). Harré & van Langenhove (1999) stress the importance to grasp the dynamic character of positioning within conversations and that people involved in a discursive practice can negotiate and act new positions. This implicates that a speaker can change positioning during the communication, which also happened in several interviews. This will be exemplified, however not given a central role in the analysis.

Overview of fieldwork

Table 3 shows an overview of the amount and spread of seminars I attended; the spread of courses over time; of the amount, lengths and spread of interviews; and it shows when and how many school visits I made during initial teacher education. The length of seminars and student teaching is not specified, since the quality of information not automatically relates to the length of participation, but to the research focus. Which student who participated in each occasion is not relevant to present here, since the focus is on discursive positioning and not on tracing single students. Some students participated in few interviews whereas some students participated in several interviews, and also initiated meetings with me.

Information in terms of written accounts and spontaneous talks like on-going informal talk, phone calls, etc., which had relevance for the study, but was impossible to structure in table 3, is presented separately. The paragraph called “student initiatives” describes unplanned occasions where I participated in student activities or individual meetings, initiated by the students; and in “written material” I describe different kinds of texts which was included as part of the collected information.

	Courses (participant observation)	Interviews	Student teaching at school (participant observation), including interviews
1st period	Mathematics and Learning for Children from the	16 short interviews: approx. 3 min	Three lessons, including three interviews. Each interview, approx. 15 min

	Age of 6 to 13 15 seminars	each; 8 interviews after the first practice period, approx. 15 min each	
2nd period	Grade F-3: Basic Perceptions of Number Sense and Space 2 seminars Deepening the Knowledge of Mathematical Concepts 11 seminars Grade 4-6: Towards a Mathematical Symbol Language 11 seminars	Six interviews: approx. 40 min each	Two lessons, including two interviews Each interview approx. 45 min
3rd period	Grade F-3: Number Sense, Basic Statistics and Elementary Algebra, school year F-3 4 seminars Geometry and Problem Solving, school year F-3 (VFU) 2 seminars Grade 4-6: Discussing Mathematics 10 seminars Deepening the Knowledge of Mathematics Education for Children from 9 to 13 years 5 seminars The Importance of Language when	Three interviews: approx. 40 min each	Six lessons (one student invited me to participate during two lessons one day), including five interviews: Each interview approx. 25 min

	Learning Mathematics, for Children from 9 to 13 years (VFU) 2 seminars		
4th period	-	Six interviews: approx. 1h 20 min each	-
Total occasions /total time	62 seminars	39 interviews: 22 hours 10 minutes	Eleven lessons/ Ten interviews: 4 hours 25 minutes

Table 3 Overview of the four periods of fieldwork

Description of fieldwork

The ethnographic fieldwork stretched over a two-year period, wherein I participated as observer in nine mathematics education courses. In this section, I outline four main periods of data collection and describe how the fieldwork developed over time.

The first period of fieldwork was conducted in spring 2010 in the first course in the primary mathematics teacher education programme; a mathematics education course. During the second and third period of fieldwork I narrowed the focus to embrace situations and courses where as many of the participating students as possible were supposed to be present, and courses which focus was mathematics or mathematics education. The fourth period comprised seven interviews. The initial fieldwork and analysis had made me more sensitive to how the students enacted positionings in interviews as well as in seminars and other interactions. Therefore, the fieldnotes became more refined over time and I did not need to write as much as in the beginning to remember, and from them re-write the observations later. Still, during my observations in schools, I tried to write more fully, since my notes also served as a reminder when I let the student elaborate more on the lesson afterwards.

Student initiatives

Several times since the first meeting with the student teachers, some of them contacted me by e-mail, text messages or phone calls. There were different reasons for the students taking contact, but a common argument was that I knew them, I knew their history, and they often asked me to listen to dilemmas regarding their studies. If feasible, and if the students agreed, I audio-recorded or wrote some memos during those meetings. Some dilemmas did not refer immediately to the aim of the study and therefore

they are not relevant to bring forward here. Other dilemmas connected to earlier or new concerns, coming up because of examinations, practice periods or study breaks. I judged notes and recordings from these meetings as having equal importance as agreed interviews. Informal talks, before and after seminars, student teaching, at coffee breaks, etc., were handled in the same way as student initiatives.

Written material

I collected lesson plans, study plans, course documents etcetera during the whole period of fieldwork. I also got access to mathematical tasks, designed by the students, and in some cases I had conversations via e-mail with the students. All this written material served as enriching the research context, however will not be visible to any larger extent in the analysis.

Methodological basis for the forthcoming analysis

It is commonly assumed in contemporary mathematics education research, that theoretical constructs like discourses, positioning and power are dynamic and more or less inter-related (cf. Gutiérrez, 2013; Valero, 2009; Herbel-Eisenmann & Wagner, 2010). However, how the constructs are foregrounded and how their inter-relation may affect or benefit the analysis differ, on a theoretical as well as analytical level. In the following a discussion about the methodological approach in this particular study is taken in order to foreground how previous understandings of the concepts inspired me as researcher to analyse the dynamic from a somewhat different view. It would not be fair to claim that this approach is completely novel in the mathematics education research field. For instance Evans et al. (2006) elaborated on discursive positioning and emotion in school mathematics practices. They analysed transcripts from a small group of pupils, solving mathematical problems and focused their study on one single student. Drawing on the Bernsteinian approach to pedagogic discourse they identified available subject positionings and described the positionings that were taken up by the student. They argue that analysing positionings “provides a way to fully specify the context for thinking and emotion” (p. 224) in relation to mathematics education.

My readings of e.g. Foucault (1971/1993; 1969/2002), Valero (2004b; 2009) and Gutiérrez (2013) heavily influenced me to think about how power can be understood and used as a theoretical and analytical concept in mathematics education research, interwoven and arising from social discourses. Harré and van Langenhove (1999), together with Tan and Moghaddam (1999), Davies and Harré (1990), Wagner and Herbel Eisenmann (2009), to mention some, have all facilitated my understanding of positioning and challenged me as I wanted to go further than they did in

understanding positioning through the verbs used in empowered and disempowered positionings. The discursive approach hence focus on how people use language and performance of actions to do things; how the discourses are organized and what they are doing (Potter and Wetherell, 1987), Fairclough (2001) made visible the flow of power within discourses, and how power — hidden or face-to-face — is exercised and enacted in discourses.

Due to their interrelated and dynamic character, I argue that the concepts of discourse, positioning and power are powerful methodological and analytical tools to reveal power-relations in discursive practices. In the following I describe the analytic framework and how the produced data was handled through the process of production, coding, analysis and description.

Analysis

In this chapter, I describe how the produced data was categorised and coded. The analytic process is framed to show how the interconnections between discourse, positionings and power gave scientific energy to the analysis of the ethnographic data, as emphasized by Willis and Trondman (2002). They concluded that as data cannot speak for themselves theories must be relevant in relation to ethnographic evidence and the characteristics of data. I discuss consequences of taking an ethnographic approach; how ethical issues were considered, and how doing critical research influenced how I chose to write up the study. Thereafter, I describe and exemplify the analytic framework by drawing on relevant strands of data in order to make the whole research process transparent and hence open to critique (cf. Vithal, 2003a). The dynamic understanding of the central concepts implies that discourses, positionings and power-relations are mutually dependent and hence affect each other. However, as discourses are inherently connected to actual contexts (Foucault, 1969/2002), the context need to be 'read' by the analyst in order to make sense of the discourse (Potter & Wetherell, 1987). Consequently, there is also a need to describe and understand the context in which the statements occur. In so doing, it may be possible to identify the limitations of the discourse and to understand how statements relate to other statements.

A broad discursive approach was taken, that was highly attentive to how the students used their language to do things and how they constructed versions of their social life (Potter & Wetherell, 1987). The produced data therefore contains different forms of data from several kinds of sources, formal and informal, where "people use their language to do things" (p, 32). It is through analysing how persons vary their language according to their "purpose of talk" (p, 33) that I could illustrate how they positioned themselves within available discourses; and how the dynamic of discourses emerged and revealed power relations. This dialectic relation where discourse, positioning and power "'flow into' each other" (Fairclough, 2010, p. 4) is the core of the analytic framework. As I analysed these interrelated phenomena, as they occurred in the data, it was possible to understand how discourse and power were interrelated and affected the students' positionings. On the other hand, the mutual influence among available discourses, power-flow and positionings enabled an analysis of how

discursive positionings revealed power-relations and hence possibilities to challenge available and dominant discourses.

I take as starting point, that it is through discursive positionings — personal or intergroup positionings — we can interpret power at play. In order to clarify characteristics that make positionings through oral talk and/or performance of actions open for scrutiny within a socio-political theoretical framework I distinguish between positionings expressing empowerment and positionings expressing disempowerment. This dichotomy is not perfect in any sense, and there are blurred lines that distinguish a single utterance as expressing empowerment or disempowerment. Thus, power at play includes and excludes what is possible to say and not in discourses, and from having done this distinction we can ask, “why an utterance was performed and not another” (Foucault, 1969/2002, p. 30). However, the contexts within which the discourses are performed are central to this study and therefore emphasis is put in understanding how discourses of inclusion and exclusion are working in the educational contexts, as stressed by Foucault (1969/2002):

We must grasp the statement in the exact specificity of its occurrence; determine its conditions of existence, fix at least its limits, establish its correlations with other statements that may be connected with it, and show what other forms of statement it excludes. (p. 30f)

Following Potter and Wetherell (1987) I strived through the whole analysis for understanding my data in relation to its context, since “contextual information gives the researcher a much fuller understanding of the detailed and delicate organization of accounts” (p. 54). The contexts related to mathematics teacher education are specific to some extent and common for higher education to others. However, the produced data was deemed as relevant for mathematics education research even though there were more aspects than mathematics and mathematics education that were brought forward by the students.

In the next section I present the characteristics of data, how the coding and the following analysis was done. Thereafter I exemplify the taken analytical steps to open for scrutiny, as there might be several ways to analyse and interpret the results of this study.

Identifying discourses, positionings and power-relations — a tool box for analysis

The different ways of understanding positioning as theoretical concept, as outlined in the theoretical chapter, and according to Wagner and Herbel-

Eisenmann (2009), there is a need to be careful in the use of words and ideas, and not blur the complexity of positioning.

Clear explication is of utmost importance if positioning is central to the analysis /.../the significance and complexity of positioning may be lost if one is not careful about how the words and ideas are used (p. 12)

This is not only important for the concept of positioning. As I strive for presenting an analysis, which is transparent the whole way through, I need to describe — as clear as possible — the process. Therefore, before turning to describe the coding process, I here present how discourses, positionings and power-relations were identified in the data; hence, my underpinnings for coding the ethnographic data.

Discursive strands

At an early stage, categorising data as smaller discourses – discursive strands – such as being good at mathematics, high demands on mathematics teachers, of having language problems, of being immigrant, etc. was helpful in how to make sense of students’ concerns. These discursive strands, identified through the students’ enacted positionings in data from interviews, group-work and other social settings, facilitated my understanding of which discourses that were available for the students to position within. The identification of discursive strands became at a later stage catalysts for the further analysis as I strived for eliciting how and why power-relations enabled or constrained discourses that were produced in the educational contexts.

Positioning

So, how did positionings occur and how did I make sense of them in the data? As stated earlier I framed becoming mathematics teachers’ discursive positionings to include intergroup and personal positioning enacted through oral talk and performance of actions. Most emphasis will be put on oral expressions and in line with Herbel-Eisenmann et al. (2010) personal pronouns like “I” and “you” in connections with verbs were seen as strong markers for personal positioning. I understand and use positioning as verbs, in line with Wagner and Herbel-Eisenmann (2009). They draw attention to how they distinguish positioning as verb or noun by exemplifying how researchers presented their analysis

When the words ‘positioning’ and ‘positions’ are used as verbs, it is easier to see that positions change because the act of positioning implies a move to change the positioning. (p. 11)

Positioning is hence something a person does to choose how he or she — not necessarily consciously — positions him/herself in available discourses.

The possibility for a person to choose how he or she wants to be understood is inherently connected with the act of positioning. In contrast to for example Davies and Harré (1990) I do not interpret positionings as “multiplicities of ‘self’” (p. 47) as “choosing subject” (p. 52) that are made available in a discourse (p. 53) and allows the person to take the position of *being* someone. Instead discursive positionings are understood as the actions; as expressions of *doing* something, of feeling something and of being something enacted within discursive practices. Nevertheless, my methodology aligns with Davies and Harré (1990) in the sense that I, in order to identify positionings, extract “the autobiographical aspects of a conversation in which it becomes possible to find out how each conversant conceives of themselves” (p. 48).

The personal pronoun “I” was very common in the data and therefore a lot of attention was paid to the students’ different ways of positioning themselves through expressing “I”. Intergroup positioning, following Tan and Moghaddam (1999) was less common in the data in comparison to personal positioning, however important to include in the analysis, since these positionings revealed strong power-relations in the discourses. Intergroup positioning is “fundamentally achieved through the use of linguistic devices such as ‘we’, ‘they’, ‘us’, ‘them’, ‘I’ (as a member of a certain group) [and] ‘you’ (as a member of a certain group)” (p. 183).

The expressions of pronouns were to a large extent identified in interview data, through statements like “I have always been good in doing mental calculations” or other comments, which referred to themselves or others as actors. In fieldnotes and during reflexive writings enacted positionings were identified from my descriptive account, as for instance: “She raised her hand, seemingly eager to contribute to the discussion”. Here the positioning is described from my observations, hence my written interpretation of a situation. Important to note is that several enacted positionings were expressed without any pronoun, however clearly characterised as personal positioning after having read the context well.

The commonly expressed pronouns “one” and “you” may indicate personal positioning on a general level, and need clarifications: Herbel-Eisenmann and Wagner (2010) states that the use of “you”, in the meaning “anyone” or “no one in particular”, indicates a “sense of generality” and by referring “no one in particular”, they suggest “that anyone would or must do or understand the same thing” (p. 27). In Swedish “you” and “one” can also mean “I” in third person, meaning that people talk vaguely about themselves in order to tone down the self-assertion. There are clear differences regarding how these pronouns are used by the students, which indicate that it may be contextually or even dialectically bound. This positioning could hence indicate power-relations in some instances and be almost neutral in

others. Therefore, in each instance where the pronouns “one” and ”you” make sense for the analysis I will clarify how the positioning was interpreted.

The students’ personal and intergroup positionings became a starting point in the process of coding the data. And also played a central role in analysing how students’ enacted positionings revealed power-relations in available discourses.

Power

Understanding power as dynamically flowing within and between discourses, following Valero (2004b), made possible to focus on how the students’ discursive positionings revealed power-relations. I made a distinction between positionings expressing empowerment and positionings expressing disempowerment, and took into account how the students’ positionings challenged or accepted available discourses by expressing feelings, doings and beings. This became a way to set power to a head in the analysis. The expressions: “Honestly, it feels quite bad... being in this class” and “Right now it feels good, actually” illustrate the dichotomy of disempowerment and empowerment. Still, to make a fair analysis of how power flows in the discourse, there is need to contextualise the utterances, even though the most obvious keys to understand positionings are feelings. By reading through the first utterance we may understand that something is not good as institutional constraints affect the student’s educational experience. The second example indicates that it is possible for the student to enact empowered positioning. However, there are subtle indicators in the wordings “Right now” and “actually” that this has not been the case before.

Context

Potter and Wetherell (1987) clarify the responsibility and autonomy of the researcher in the analytic work: “The analysis /.../ cannot be seen as a simple matter of categorizing pieces of speech, it depends upon the analyst ‘reading’ the context” (p. 33). Through the coding process, discourses, positionings, and power-relations, were identified as threads of data. These threads were situated in different contexts within the mathematics teacher education, and it is through those contextual lenses the concepts were interpreted and analysed.

Data production, coding and analytic process

In the following section, I describe the process of data production, coding and analysis and thereafter exemplify the coding through some examples

from the ethnographic data. The examples view different aspects of the analytic process and selection of data to open up for scrutiny. The presented data is representative for the two years of fieldwork, both in the sense of its characteristics and style, and that it exemplifies and illustrates the multiplicity of concerns that emerged as discursive strands; and also how empowered and disempowered positionings may be enacted.

Data production

Conducting long-term fieldwork is about gathering lots of information that has to be handled well. The amount of data increased fast, and the early reading through interviews and fieldnotes, parallel with tentative analyses were important for the further production of data.

I early saw some patterns of statements and concepts, objects and practices that made four broad discourses emerge. For instance, both fieldnotes and interview data indicated concerns about language. The students talked euphorically about mathematics education as more engaging than they experienced in school themselves. A mathematics discourse developed over time, and emerged differently through the course structures and through the students' expressions related to doing and understanding mathematics. And institutional constraints, structures and "rules" related to the educational programme and to initial teacher education discourse were identified in the data.

Four broad discourses emerged during this process: mathematics education, mathematics, language/culture and an institutional discourse. The characteristics of the four discourses served as a basis for the following stages of analysis. As the discourses often flowed into each other like I metaphorically describe as a Venn diagram I sometimes recognised that more than one discourse were working simultaneously; for example the mathematics and mathematics education discourses. Several discursive strands could hence interfere in students' talk about mathematics and mathematics education. Institutional issues were ever-present through all contexts, however more or less expressed. For example as the students responded to the amount of examinations or reflected on rigid structures at "their" schools, they expressed clear positionings within the institutional discourse, which hence became both relevant and necessary data to analyse and report. The interplay between the discourses was something I found important to communicate, since the available discourses affected the students' positionings, and vice versa. Through this broad limitation of discourses, including "everything" they talked about in relation to mathematics, mathematics education, language/culture and institutional constraints, it was possible to elicit strands of the discourses via the students' positionings.

Coding and description

Table 4 shows the structure of how data was categorised and coded. The table illustrates the dynamic relation between positioning, power and discourse; how several discourses can work simultaneously; and hence reveal empowered and disempowered positionings almost simultaneously. By four short pieces of interview data I illustrate each step of coding.

Data — Transcripts, field notes, reflective comments	Discourse — Mathematics education, mathematics, language/culture, institutional	Positioning — personal [pp] or intergroup [ip]	Power-relations expressed through empowerment or disempowerment
I always found it [mathematics] easy and therefore I didn't get so much help from the teacher. /.../	Mathematics — being good at mathematics means understanding and don't needing help.	[pp] [pp]	Empowerment
And I... I still found mathematics very easy. For me... it was like... It was almost like a competition, just to finish the textbook as soon as possible. /.../	Mathematics — is about being a “fast calculator”	[pp]	Empowerment
Academic writing is not my thing. I write much	Mathematics education — experiences from own schooling: mathematics education was steered by the books and competitive Language/culture — academic writing	[pp] [pp]	Disempowerment

like I speak which can sound a little childish /.../ I can feel very doubtful with regard to my writing. I have always been. I feel that I don't write so well, so I avoided sitting on my own and writing...	requires a mature language.	[pp]	
	Language/culture — academic writing is supposed to be performed in a specific way.	[pp]	Disempowerment
		[pp]	
		[pp]	Disempowerment

Table 4 Structure of how data was categorised and coded (Camilla, first interview after two weeks; second interview after first period of initial teacher education; the third piece was from fieldnotes during the fourth semester, and the last piece from an interview the fourth semester)

Data

The first column is dedicated data where the four discourses emerge, that is: interview transcripts, transcribed groupwork, field notes and reflective data from seminars or student teaching that I produced as participant observer. The data is presented in its plain format, however re-written with minor language corrections and translated into English. The example illustrated above shows two short pieces where Camilla talked about her experiences from mathematics education as a child and two short pieces where she expresses concerns regarding academic writing.

Discursive strand

The second column shows the discourse, which I identified through expressions about mathematics education, for instance, where the students had an opinion, a question or comment, which indicated that they engaged (or not) in the specific issue. Statements, concepts, objects and practices that appeared significant within the discursive strands were taken into account in the search for patterns of how the students engaged in talk about mathematics education. In the examples five discursive strands emerged; two within a mathematics, one within a mathematics education discourse, and two within the language/culture discourse. The available mathematics discourses made possible for Camilla to talk about mathematics as an easy subject and that being good in mathematics means being fast and not in need

of help. Through the available mathematics education discourse on the other hand, she could talk about mathematics as a competitive subject, which was taught by the book. Through the two strands within the language/culture discourse Camilla talked about academic writing as requiring a mature language and as supposed to be performed in a specific way.

Positioning

The third column shows personal and intergroup positioning (cf. Tan & Moghaddam, 1999). However these examples only show personal positioning. Coding of data that expresses oral or physical positionings requires attention to the students' use of pronouns in combination with verbs, and to fieldnote accounts that describe positionings. In the coding process I understood expressions like "I will continue...", "You cannot say...", "We who are...", "It feels good..." etc., as on-going positionings.

The dynamic character of positioning makes several positionings available almost simultaneously. Hence, there might be both personal [pp] and intergroup [ip] positionings enacted within each discursive strand. In the example there are nine instances of personal positionings in the different strands, expressed through personal pronouns, such as: "I always found it [mathematics] easy"; "For me... it was like..."; "I write much like I speak"; and "I can feel very doubtful".

Power

Camilla's discursive positionings expressed empowerment within the available mathematics and mathematics education discourses and disempowerment within the available language/culture discourse. There were no conflicting discourses, which challenged her positionings in each of the examples, and she did not challenge any discourse herself. Camilla referred to her experiences from school mathematics by using expressions, such as "mathematics was like a competition", and, talked about finishing the textbook as soon as possible. Hence she used wordings that were commonly used within the educational context. By doing so, she enacted empowered positionings both within the mathematics and the mathematics education discourse. She had possibility to position herself within a discourse of mathematics by talking about being fast calculator as child and not in need of help; and within mathematics education discourses by reflecting on competitions and book steered teaching.

The language discourse, on the other hand, made her express disempowerment, as she did not meet the expectations on linguistic maturation that was required to express herself in the specific academic way.

Analysis in textual flow

I will show a longer piece from a later interview with Camilla on the same theme. Through numbering within the table [1], [2], [3]... I thereafter write

my analysis in a textual flow, commenting on how I see positionings being enacted in available discourses and how they reveal power-relations. In this specific piece no disempowered positionings were identified, however interesting is, that the mathematics and the mathematics education discourses appear with a continuous flow into each other. Camilla talked about herself, as previous analysis showed, expressing herself as good at calculations. She told me that she always solves problems by mental calculation. She also brought forward her friend, Frida, as good at creating algebraic expressions and equations. In the following excerpt, I as interviewer positioned her within a mathematics discourse connected to what I showed in the previous excerpt:

Kicki: I return to mathematics and how one thinks about that. Do you think you have the benefit of, or not, to be forced to understand other ways of thinking? Is there anything you find useful? It was fun the other day as you said, "I have everything inside here" [points at the head]

She accepted the positioning and elaborated further:

Data	Discourse	Positioning	Power-relations
<p>[1] We should solve equations down at the seminar. I just [mumbles to show the activity], and thought a bit, and so on and [2] Frida sat down and wrote formal methods. I had an informal method and she worked on her formal method. [3] She... she wanted to know how I thought, so I explained my way, and then [4] I thought: The formal methods, how was the routines? Because you see, I... Especially when one SEES immediately, then it is very difficult to get this formal method. [5] It is better for me if the numbers are complicated or if the task is difficult. Because then I need to think about it and maybe use this formal method. Then I cannot solve the problem in my head.</p>	mathematics	[ip] [pp]	
	mathematics education	[pp]	empowerment
	mathematics	[pp] [pp]	empowerment
	mathematics education	[pp] [pp] [pp] [pp] [pp] [pp]	empowerment empowerment

[1] Camilla accepted my positioning of her in the mathematics discourse and began to tell me about the situation I referred to. She included her peer

student, Frida, in their collaborative work through intergroup positioning. [2] As they worked on the task, Camilla recognised that they used different methods as they solved the equations. Hence she positioned herself within a mathematics education discourse by being conscious about the wording as she talked about formal and informal methods for solving equations. By this awareness Camilla expressed empowerment in the mathematics education discourse. She knew that there were different ways to work on tasks and that one may choose the method that one finds useful.

[3] As Frida wanted to learn from Camilla, her empowered positioning in the mathematics education discourse was strengthened. Camilla's informal method became interesting and she could help her friend to find alternative ways to work with equations. [4] Then she returned to think about the routines for the formal methods and hence positioned herself within the mathematics discourse again. To see the solution immediately is connected with being good in mathematics as well as to be a fast calculator. She used the pronoun "one", which may refer to anyone or to no one in particular, but I understood this positioning to be her own experience, however put it more universal. [5] As it is good to be able to use different methods Camilla wanted to develop her skills in solving equations with formal methods. She positioned herself in the mathematics education discourse by analysing what would be best for her. She stated that there is a need for complicated numbers so that she is forced to use formal methods. This positioning expressed empowerment through her use of wordings, common within the discourse and her will to learn.

I need to comment a little on this analysis and draw some issues further. Related to the discourses, there are fine-grained borderlines between what discourses I interpret as available. Both [2] and [4] is about the methods for solving equations, however I did not code both as mathematics discourse. I will argue that since she in [2] foregrounded their work with formal and informal methods, she positioned herself in the mathematics education discourse by showing awareness of several possible ways to reach the goal. Typical for how the mathematics education discourse is articulated. On the other hand, as she in [4] talked about routines for the formal methods, she positioned herself within the mathematics discourse. She expressed awareness that there are formal methods, which are good to know well to be a good mathematician.

To enact empowered positioning within a discourse means positioning oneself as having the power to act. That is for instance, expressing oneself through knowing something, as in this example, but could as well be expressed by challenging a discourse or resisting a positioning, to mention some. Disempowerment, on the other hand is expressed as lack of knowing something, by having less possibilities to influence or affect his or her situation etc. This was not shown here, but will be prevalent through the results chapters.

Reflexivity

Even though I strive for transparency through all parts of the thesis I will in the following foreground some issues, which refers to my role in this project; my participation in different contexts and my visibility in writing up the research. It is necessary to discuss what implications and consequences this methodological approach can cause or attain, both regarding limitations of where information was gathered and the fact that this study has been conducted in familiar contexts such as university seminars and compulsory schools. In my ethnographic work I had to go behind the scenes in a well-known context (Hammersley & Atkinson, 2007). This required conscious decisions from my side and a high degree of sensitivity with regard to how to participate in different settings.

With regard to the deeply rooted anthropological traditions of exploring unknown social cultures where “fieldwork usually means living with and living like those who were studied” (van Maanen, 1988, p. 2), this study differs a lot. The fieldwork was conducted exclusively at the university and in related places, such as schools, cafés and in other common areas. The students’ private spheres were left aside in the sense that I did not involve relatives and their home environment. However, even though they sometimes chose to tell me about private concerns, and about how their actual family situation affected their university studies, I decided to ignore that discourse in this research.

The ethnographic approach requires a reflective stance also in the endeavour of analysing and interpreting the produced data in the process of writing the ethnography (Hammersley & Atkinson, 2007). Valero (2004b) argues that taking a critical approach on research requires awareness and visibility of the researcher through the whole process.

Researchers adopting these perspectives engage in the critical endeavour of examining not only the nature of the ‘objects’ of mathematics education research, but also the process of doing research, and proposing alternative — and complementary — forms of interpreting, explaining and understanding mathematics education practices. (p. 20)

However, it is important to stress; especially in relation to the present study, that being critical does not only mean that we should search for problems and oppressive situations. Being critical as researcher opens up for

challenging conventions and taken-for-granted conceptions of how we think about the world (Thomas, 1993). In this study, a large focus is put on a critical analysis on mundane situations in contexts that are well known. Moreover, the goal is to highlight potential opportunities for developing mathematics teacher education and to understand how student teachers articulate this potential.

The role of the researcher

A socio-political approach requires, as any other theoretical approach, awareness with regard to how power-relations impact the participants and an openness to negotiate the researcher's role. Valero (2004b) writes that adopting a socio-political approach not only is about theoretical and methodological choices.

It is an "attitude" that seeks for consistency between [theories and methodologies] and our activity as researcher. This attitude also shows that the researcher is in search of appropriate ways for communicating the interpretations of her or his activity. (p. 20)

To give an example, Meaney (2004) experienced the importance of self-reflexiveness regarding her professional relationships in her research in a Māori school community as being a non-indigenous educator. She recognised that good intentions might not be enough to get access to the field if the researcher is unaware of his/her role in the project, and, that power ebbed and flowed between her and the community members depending on how knowledge was "produced, modified and accepted" (p. 196).

Using ethnographic methods for data collection involved "direct and sustained social contact with agents" (Willis & Trondman, 2002, p. 398), and required reflection regarding my role as researcher (cf. Bryman, 2008). Since I wanted to participate in the becoming primary mathematics teachers' everyday life at the university, an overt role as researcher was a natural choice. The students allowed me to participate as observer in the educational context. As participant observer, I observed and listened to conversations among the student teachers and their university teachers, among student teachers, and among student teachers and the mentors at the pre-service school. I also engaged in conversations in which I was invited, not as a peer, and not as a teacher, but as a person who wanted to listen and participate in their discussions.

My starting point was that by doing research within mathematics teacher education I will influence what happens in each situation, regardless of whether I participated actively or tried to not disturb the situation at all.

Therefore I chose to act pragmatically. If I was invited in discussions or asked to contribute with my opinion, I sometimes did. At other occasions, I chose to just sit and listen. My role hence developed to be both participant and observer. Therefore, there was a need to take my role as researcher seriously under consideration and reflect on how power-relations within the research project could impact the process, as foregrounded by Meaney (2004). Also thinking about what it means by being an “outsider” (Chronaki, 2004) or the “other” (Meaney, 2004) was important in researching mathematics teacher education. Being an insider as student teacher was neither possible nor of interest. However, I was not a complete outsider, due to my profession as teacher educator. During the whole research process, awareness of my role and my way of posing questions, of interacting, of communicating and of writing up the research made me strive for openness and transparency; and tried, like Meaney (2004) and Chronaki (2004), to document how power relations were revealed within the research process.

However, referring to van Langenhove and Harré’s writings about a scientist asking people to answer items on a questionnaire (1999), the negotiated, enacted positionings only tells something about how people position themselves by being interviewed by a mathematics education researcher. It does not tell anything about how this student would position him or herself in an interaction with a peer about mathematics teaching. This highlights how present power-relations flow into discourses. One example of how power-relations are present in the researcher — interviewee relation is the expressed will to do “right”. The students chose to a large extent what they talked about and the biggest gain in giving time and space for elaborations was that their associations led further and put light on issues that I had not thought about. Despite this, the students always tried to answer my questions. Even though I encouraged them to talk freely, they often commented: “I don’t know if I have answered your question...” and “I don’t know if this is right...” Being aware of my role as researcher and of power-relations in the research context has strengthened the arguments for taking a socio-political theoretical approach and made the analysis clearer through continuous reflection on how my presence affected the discourses, how I positioned myself through the interactions, and how the students changed positionings during our conversations.

When there is a judgmental relationship between the researcher and the informants, i.e. if the researcher also is the teacher who is evaluating the informants/students achievements, there may be a risk that the informants adjust their utterances and actions to please the teacher. As stressed by both Adler et al. (2005) and Grevholm (2010), it is common that studies within mathematics teacher education involve university teachers’ own students, conducted in courses where the researchers themselves teach. In this study, one of the most important issues was not getting involved with the course teachers’ plans, evaluations and concerns during the period of fieldwork.

This means that I did not discuss their students' performances or utterances, I did not get involved in the planning or evaluation, and I did not act as a teacher in the courses. This also means that if I got questions from the students regarding course tasks, content, etc., I always referred back to their teachers. I believed that if my role was the curious researchers', the contact with the student teachers could be relaxed and they would let me share their concerns and experiences.

Ethical considerations

Continuous reflection on ethical issues and how to produce data during different stages of the research was central and important from the first contact with the individuals concerned, through data collection and in writing up the research. The Swedish ethical guidelines (Vetenskapsrådet, 2002) for social science and humanistic research contains of four areas which have to be taken into consideration before and during the research project, formulated as demands: the demand for information, the demand for approval, the demand for confidentiality and the demand for appliance.

The demand for information requires that the researcher inform the participants about the aim of the research as far as possible. The researcher is required to inform the participants about their role and conditions for participation; that their participation is voluntary and that they can choose to withdraw whenever they wish. This demand and the following, the demand for approval, were communicated by a signed agreement (Appendix 1). The agreement form included, in addition to information about the study, their rights to withdraw, information that all data should be handled confidentially, and not used in other purposes than for research, which are the third and fourth demand. All data was locked in and anonymized, so that no one, except I as researcher, has access.

Being ethical as ethnographer

Hammersley and Atkinson (2007) argue that in many ethnographic studies it is problematic to follow ordinary ethical guidelines. "Since ethnographers frequently study situations and groups, many of the guidelines on which ethics committees operate, such as opt-in consent and the right of withdrawal at any time, are inapplicable" (p. 43). Bryman (2008) discusses overt versus covert roles and what advantages each setting can have. He writes that this distinction is not unproblematic and that some researchers have to move between the roles, since their overt role only is known by some informants and not for others (i.e., doctors and students versus patients). My role as researcher following several university courses without revealing my

intentions would have been impractical, not to say impossible. For the purpose of this study, as written earlier, I decided it was necessary to adopt an overt role and to be as open as possible about my research in communications with the students.

Getting access to the field

The question of getting access to the field, as elaborated on in Hammersley and Atkinson (2007) was very important for me and as part of the preparation for conducting fieldwork I contacted both the principal of the department and the university teachers who were involved in the actual courses. I thought that if I got their permission to participate during lectures and conducting school visits, I would have a good opportunity to learn to know the becoming teachers, which I in turn thought would increase my chances to get positive reactions from them regarding their involvement in the study. Both the principal and the university teachers were interested and saw opportunities for all of us to learn more about mathematics teacher education. Adjacent to each school visit I spoke with the supervising teachers to introduce them to the study where the students were involved. The teachers, together with the students and the supervising teachers in the schools became the gatekeepers who invited me to participate in their practice, which made possible for me to get access to the field (cf. Hammersley & Atkinson, 2007).

... or not

Despite, or as a consequence of my openness about the project and my overt role as researcher, there were two occasions when students expressed uncertainty and asked for clarifications. Through the whole project I had been honest and open, and naturally chose to listen carefully and reply as honest as possible. The first occasion happened during the middle of the last period of fieldwork

One student sent me a text message to make an appointment. Since I felt it was urgent, I invited her the same afternoon and she started to talk: "I think you know what I want", she said. "No, I don't know Please tell me", I replied. It was silent for a long time and then she continued: "I do not want to read about how I was at the beginning. I had a very poor language and didn't get the high demands from the teachers. I was not able to express myself as good as my classmates." "But I think you have developed a lot since then", I said. I really meant what I said. I wanted to remind her that my goal with this project was to foreground opportunities, in order to understand how the education can develop. "I will not write anything that can put you in a bad light, but it would be interesting to write about the dedication one can see in your eyes". We had talked about that before and she seemed to remember the occasion I was referring to.

She left after some minutes and I did not know what would happen with our relation as researcher and student. However, I could happily conclude, that after our meeting she again was one of the participants that contacted me regularly, asking for advice or just initiated chitchats to tell something interesting she had on her mind.

The first signal that everything was okay came just a few days after the meeting. The student sent a message and we made an appointment the day after. She was already there as I came and we found a meeting room where we could sit and talk without disturbance. She started to tell me her story, but interrupted herself: "Why didn't you bring your audio-recorder?" she asked challengingly. "I have a lot of things to tell you." She urged me to go and get my audio-recorder, as she wanted to contribute to my research; and her story was important to tell

I knew parts of the story, since she earlier had told me about her bad relation with her supervising teacher. She had experienced tough resistance from her at school regarding her degree project. The student wanted to explore the role of a teacher when teaching problem solving in mathematics, but the supervising teacher immediately changed focus to peer assessment. "She does not dare to participate in my study," she said. "No one is allowed to study what she is doing and why. I do not know anything about peer assessment. Why do I have to change?" She asked me to read the tasks that she and some of her classmates had developed aiming at learning more about fractions through problem solving tasks. "Don't you think they are relevant?" she continued. "She [the supervising teacher] complained and said they were too difficult for her children. Why is it so, that her class always should be the best? It is not okay to let them work on tasks that they are not used to. What can go wrong?"

We talked about different ways for her to handle this situation, which was challenging, since she was dependent on the supervising teacher, as she needed access to a class for her degree project. I noted that this situation revealed several disempowered positionings and wondered what would happen in the student – supervising teacher relation. Suddenly she said: "Are you attending our seminar later today?" "Yes, that's my intension", I replied. "Then you will see my contribution. I will elaborate on a riddle". My last note during this meeting was "empowerment". Thereafter I went to their seminar. (Personal communication, October 2011)

The second situation occurred during one of the first seminars in the last mathematics education course wherein I participated.

One of the students wanted to talk to me during the pause and we went out in the corridor. We had been very friendly since we first met, but now I felt that she was worried about something. "Is it true that you do your research on us immigrants in order to find errors?" she asked, looking at me with her confident, but also challenging glance. I was stunned and did not know what to say. What signals had I sent out to make people interpret the project so cynically? What should I say to make her understand that there must be some misunderstanding? "Who said that?" I asked. "Some of the classmates", she replied. For a few seconds it felt like everything I had done in the project during the last one and a half year was lost and that my openness would serve no purpose to conduct the study. I thought of the overall aim that led to an

ethnographic study in order to understand... I chose to reply honestly and open, in line with my overall approach: “No, I want to understand more about learning to teach mathematics as becoming primary mathematics teacher. I am interested in all of you, wherever you come from. You are all different. You are all individuals, and I am not searching for errors. I want to understand what possibilities you see and what is important to you during teacher education”. She seemed confident with this and hinted that that was what she thought from the beginning and that she was happy to hear me articulate it again (Personal communication, November 2011).

There were moments when there was something “in the air” which made me take a step back in the fieldwork. As a leading principle, I always asked if it was okay for the students if I participated in or listened to a conversation and never tried to intrude if I got the sense of disturbing. However, most of the time I experienced the opposite: the students expressed openness towards my participation in the seminars; I was invited to listen to group discussions and problem solving; I was asked to come and visit during initial teacher education. The students challenged me mathematically as they knew I had experienced the same lectures and was up to date with their mathematical struggles. I also received a lot of oral response regarding the participation and how they interpreted the research:

If I believe that I have something interesting to say, it feels important to say it when you are at the seminar. I know that you write all the time and then I need to express myself as clear as possible. (Personal communication, spring 2012)

I like when you are with us, I trust you and I think that this is a work you have to do. (Personal communication, spring 2012)

You are the only one I trust here. I can tell you whatever I want and I know that you listen to what I say. I wouldn't have told you this entire story if I hadn't had confidence in you. (Personal communication, spring 2012)

Have you been to the conference yet? How was it? (Personal communication, spring 2013)

Please come and visit me again. You can come whenever you want to. (Personal communication, spring 2013)

Without the open and honest relation with the students it would have been impossible to carry out this study. And without the possibility to get access I would not have had so rich data to write about.

How did I deal with issues of validity and reliability?

Bryman (2008) draws parallels with four aspects of trustworthiness², which aims at proving alternatives to internal validity (credibility), external validity (transferability), reliability (dependability) and objectivity (conformability)

² From Lincoln and Guba (1985) and Guba and Lincoln (1994)

in conducting and reporting qualitative research. Björklund Boistrup (2010) transparently discussed the trustworthiness in her research based on Bryman's (2008) structure and also added ecological validity to discuss how her findings could be helpful support in teachers' work. Wolcott (1994) challenged the emphasis on validity, claiming: "I do not accept validity as a valid criterion for guiding or judging my work" (p. 369), and by asking "how valid is 'valid enough'?" (p. 370). He describes in 9 points what he does to meet challenges with satisfying the requirements of validity in the ethnographic research process. I find it fruitful to comment shortly on each of the points in relation with this research to discuss issues of trustworthiness. Some issues are discussed elsewhere (for instance in the Analysis) and are therefore given minimum of space here:

Talk little, listen a lot — During fieldwork and interviews this was one of my cornerstones. As the students' contribution was built on their concerns I had to let them talk.

Record accurately — Written notes, especially interactions, were verbatim constructed. Even though it took some time between the specific occasion reflective notes were written, I then had the specific utterances in its origin expression.

Begin writing early — I began writing early, and even if I found it difficult to "see" something in these first accounts, I can now state that several of the initial themes that emerged have developed and are now included in this thesis.

Let readers "see" for themselves — I have, in line with Wolcott, offered lot of primary data to allow the reader to interpret my findings, however not at the expense of presenting as thorough interpretations as possible.

Report fully — I have included data, which was difficult to analyse and interpret through the theoretical approach, however important for the contextualisation.

Be candid — Wolcott writes about subjectivity as strength of qualitative approaches, and about the importance of being present in the research setting. As shown earlier in the chapters of getting access or not, to be honest and frank was very central during fieldwork, and it has continued to be during the whole writing process.

Seek feedback — Data was coded and analysed from start and even since the early tentative attempts to analyse data from different theoretical groundings, I have involved peers and senior researchers to discuss possible interpretations. During the most intense period of analysis of discursive positionings and power-relations I presented and discussed varying sets of data in several research groups with senior researchers; with master students and teacher educators; and at two mathematics education conferences. The presentation of coding, analysis and results is the fruit of profound discussions and valuable response from those meetings, together with my own deeper understandings of the emergent phenomena.

Try to achieve balance — The balance between hours spent in the field, what was observed and what data that was produced is very condensed. The time span is not visible as it was not essential for presenting the findings, and therefore it may seem like what is written is what happened. There were for sure a lot more, both of interest for this study and peripheral phenomena which were not included. However, in relation to how the phenomena occurred I consider the balance is relevant in the results presentation.

Write accurately — Word choices and challenging translations have required persistent work (and good contacts with English speaking colleagues) as I have strived for coherence and internal consistency, clarity and accuracy throughout the writing.

Writing up the results

It is impossible to write about research from an “objective” or “neutral” perspective. As I have engaged in every word I wrote during my observations and in every interview I conducted, I have influenced the data that was produced. My references to what should be included or not as data has highly affected what would be possible to write about in this thesis. Emerson, et al., (1995, p.72) wrote that it is impossible to avoid a “tone of voice” reflecting one’s personal attitude. Like Andersson (2011), I have deliberately chosen to let my own voice be heard clearly in the thesis, because of my presence throughout the process. Firstly to ensure visibility of the choices I made, theoretically and methodologically, and secondly with regard to the production of data, wherein I participated actively.

Therefore, as I got personally involved in the experiences the students had from the educational context it became important to write descriptive and in ways that lead “to an empathetic understanding” (Emerson et al., 1995, p. 72) of this specific social setting and the students accounts. In writing up the study, it was important to make as clear descriptions as possible about every step to make the whole research process transparent. By doing this thoroughly “the researcher reveals, implicitly or explicitly, the (theoretical) framework in which she is operating” (Vithal, 2003a, p. 108) and hence opens up for scrutiny. I have taken Vithal’s advice seriously and strived for clarity and transparency through all steps of the research.

Vithal (2003a) stresses the importance of describing how data was selected for the forthcoming analysis and argues: “descriptions of practice that allow for critique can lead to both theory building and theory criticism” (p. 107). This makes possible to view descriptions that are tightly linked to the theoretical positions and to the specific research questions. The context is actualised and through this transparency it is possible to talk about transformacy, exemplarity and generativity. That is to see how concepts and theoretical ideas have that possibility to acquire new dimensions; to move

back and forth between theory and practice; and to inspire new forms of practice and theory building.

At the time when I began to write this thesis, I had to make a decision about language. As English is my second language, there were many obstacles for me to pass in order to write up the research in an appropriate and just way (cf. Andersson, 2011). As Meaney (2013) discussed in her MES 7 plenary in Cape Town, social and cultural meanings inherited in the Swedish language can be blurred due to translation, and wordings might be misinterpreted. However, I chose to take up the challenge and write up my research in English, mostly due to two reasons. First, I wanted to enable discussions about my research with a broad worldwide audience. And by taking this decision, it was necessary to consider if some parts should be written in Swedish as well. Inspired by Haglund's (2005), ethnography and her appealing way of presenting all data in both Swedish and English, I chose to keep the Swedish transcripts in original close to most of the reported interview data. However, I limited this bilingual approach to include interview data, since the written accounts from my participation in other settings sometimes became very integrated in the textual flow. It would probably confuse the reader more than make clarifications by adding strings of Swedish throughout the text.

A second reason to write the thesis in English related to the fact that most literature and research to which this work responds, are written in English. Thus, there is already a research language available in the mathematics education field concerning socio-political theories and ethnographic methodologies.

All transcriptions and analysis were made before I chose which accounts that should be included in the results chapter. Thereafter I translated them into English, but due to grammatical errors and word choice in the interviews the transcripts are not translated verbatim. However, all key words, pronouns and verbs that were important for the analysis were thoroughly translated. As the analysis of students' enacted positionings in available discourses foregrounded possible interpretations of occurring phenomena, single individuals' positionings were understood in relation to its context. Not as dependent on grammar, sentence structure or other linguistic details that was not transferrable into English. Therefore, there was no need to scrutinise every single utterance in detail (see the description of the analytical process). Instead, focus could be on understanding how and why discursive positionings were enacted, and to interpret revealed power relations within these discourses.

All students were given pseudonyms that fitted well according to their cultural and language background and also with their age. I named all students as females regardless of gender. The reasons for taking these decisions were twofold. Primarily: all participating students have contributed to this research; however, some will for different reasons appear more

frequently than others. The focus on discourses, positionings and power-relations is a focus on phenomena rather than on individuals, hence a way to safeguard their personal integrity. Second, I wanted the pseudonyms to mirror and keep the rich multiplicity of history culture and language background in this group when writing up the study; however gender was not an issue in this respect. And there were only two males that could have been recognised. In some instances students referred to teachers. I then chose to name them “she” or “the teacher”, as they became part of the context, however as representatives for the institutional discourse.

The whole thesis builds on thematisation around becoming mathematics teachers’ discursive positionings and the groupings of students were therefore made with regard to different phenomena, hence both multiple and unstable. Important to stress is, that this grouping was generated from how discursive positionings were constructed and emerged in the data and not from predetermined groupings of individuals.

The results chapters are organised as follows: First I outline what characterizes the discourses of mathematics education, of mathematics, of language/culture and of the institutional discourse. Technically, if there are clear descriptions of the discursive strands, they are in *italics*. I describe how they emerged as available in the educational contexts, that is: how the actual discourses were identified through the produced accounts of ethnographic data. Thereafter focus turns to how discursive positionings reveal power-relations and how the flow of power within and between discourses becomes visible through empowered and disempowered positionings. In the last results chapter I illustrate how and why some discourses open up for empowered positionings, whereas other narrow the possibilities.

Four prevalent discourses

In the chapter “Identifying discourses, positionings and power-relations — a tool box for analysis” I outlined how discourses, positionings and power dynamically emerged and interacted in the data. The broad discursive approach included how the students used their language to do things and to construct versions of their social life (cf. Potter & Wetherell, 1987) and an awareness of how large societal discourses trickle down and become visible in the students stories.

Four broad discourses emerged as prevalent in the educational contexts: a mathematics education discourse, a mathematics discourse, a language/culture discourse and an institutional discourse. The choice, to categorise data within four broad discourses, allowed me to group related discursive strands under different umbrellas, meaning that the discourses largely covered what the students chose to talk about. Hence, to elicit what characterised discourses that were available for the students to position themselves within (cf. Evans et al., 2006) in relation to the educational context.

As described earlier these discourses flowed into each other through the students’ positionings like a Venn diagram. Therefore, in the results chapters, strands of other discourses, say institutional constraints, will be visible and sometimes foregrounded even though the present focus is mathematics teaching, for instance. The students often enacted positionings within the institutional discourse simultaneously as they positioned themselves within the mathematics education discourse or the mathematics discourse. The discourses mainly emerged from what the students chose to talk about in interviews, what they discussed during groupwork and how they reacted oral or physically on or contributed to discussions within the context of whole class seminars. However, since my focus through the project was to listen to and to observe the students during seminars and, in several interviews, ask them about their education, about courses, about mathematics and mathematics teaching, it was not surprising that the collected information had that focus too. On the other hand, the critical approach helped me to see that language and institutional issues seemed to concern the student to a high extent. These discourses appeared both in the fieldnotes from seminars and from interviews as the students initiated to tell me about challenges they met during their education.

The results chapters are divided in three parts: *Four prevalent discourses; how do discursive positionings reveal power-relations? and how and why do discourses open or narrow possibilities for positionings?*

This chapter is structured around the four broad discourses, focusing on what I interpret as characteristic of the discourses; and, by using the Venn diagram as metaphor; several smaller discourses — discursive strands — emerged within each of the four. These smaller discursive strands sometimes were part of or in a borderline between two larger discourses, for instance the mathematics education and the mathematics discourse. This will be further developed in the second results chapter by focusing on how discursive positionings revealed power-relations and how the students enacted empowerment and disempowerment within and in relation to available discourses. In the third chapter I analyse and discuss how and why revealed power-relations open up or narrow spaces for empowered or disempowered positionings, which brings forward a discussion about available and dominant discourses in mathematics teacher education.

The first chapter contains data from interview transcripts, participant observation field notes and subsequent reflections, written after a situation occurred. As the students in the interviews were given more time to elaborate on a theme, in contrast to how dialogues during seminars were characterised by shorter sentences, were mostly presented the discursive strands through interview data. I have hence foregrounded the students' voices accompanied by field notes and reflective notations.

Each of the four discourses is in this chapter structured around the smaller discourses that emerged in the data. These smaller discourses were in some instances expressed by several students, and in some instances only represented by single students; however clearly connected with the large discourse. I chose to foreground transcripts that represented the whole range of small discourses without claiming that every nuance was included. By doing this, attention was directed to how the students positioned themselves by acting within these discourses, hence framed what was accepted to talk about (Foucault, 1971/1993). However, I also needed to scrutinize the data to analyse what was not said, and why. Another aspect that was of equal, or higher, importance was that the students sometimes challenged or expressed resistance towards the discourses. Through these positionings I could identify a flow of power within and among available discourses. Hence, this allowed me to analyse how enacted positionings revealed discursive power-relations and to ask why revealed power-relations opened up or narrowed spaces for empowered or disempowered positionings.

Identifying discourses included taking into consideration “everything” the students expressed in relation to mathematics, mathematics education, language/culture and institutional issues. Even though some data is excluded, i.e. not verbatim reproduced, I have strived for covering as many aspects of the discourses as possible in the descriptions. To conclude: the data in focus

through the analytical process were, as presented in the analysis chapter, enacted positionings that foregrounded what the students judged as important to tell.

In this first part I explore the discourses by scrutinizing their characteristics and the smaller related discourses. Therefore, the students' positionings will be exemplified but not further analysed in this first chapter. In the following chapters a more detailed analysis of characteristics of enacted positionings and revealed power-relations is presented. In the end of each chapter I sum up in order to present a basis for the next level of analysis.

Mathematics education discourse

During the first seminar the students were asked to list positive and negative characteristics they thought a mathematics teacher should have. As I listened to their stories I recognised that most students referred to earlier experiences as mathematics learners in school and most students had one prior teacher as role model for a good teacher. From fieldnotes this occasion the positive list both included mathematics competences and drew on issues of equity and inclusion.

The students had thought about the task for some minutes and were now asked to tell what the teacher should write as positive properties for a mathematics teacher. They asked the university teacher to write that a mathematics teacher should be able to handle all situations, as well as children with different backgrounds (language, culture, experience). It was important that the teacher could motivate, engage and that he or she had ability to teach on different levels in order to stimulate all pupils. They exemplified prior teachers who were interested in rock music or had a military background. In addition it was important to have a positive attitude: Teachers should show engagement, give the pupils positive feelings and by combining theory and practice make learning funny for many pupils. A mathematics teacher should be able to present simpler methods to the pupils. [At this stage the university teacher asked what the students meant by simpler methods and one student exemplified by the question 'how can we make $2 \times 9 = 18$ interesting.] In addition, it was important to have a positive attitude: Teachers should show engagement, give the pupils positive feelings and by combining theory and practice make learning funny for many pupils.

The negative list did not include mathematics as such. Instead the students emphasised even stronger the importance of being socially just and respectful as professional teacher. Several students gave examples of how their own schoolteachers punished the pupils or treated them disparaging. Being strict [One of the immigrant students explained what she meant: In some countries they hit the children]. To not adapt their teaching to the pupils, to force pupils to do homework, to be rigorous and to lack a sense of humour were also properties foregrounded as negative by the becoming teachers. Many students seemed to have experienced ability groupings during their school time and

expressed this grouping in good and poor students as bad. (Fieldnotes, spring 2010)

Several discourses were made available through this occasion and the students' positionings expressed empowerment by drawing on their own previous experiences, stating what they claimed as positive and negative characteristics for mathematics teachers. The main issues concerned inclusion and exclusion, and awareness of pupils' different needs. These issues were foregrounded from different perspectives as necessary for a good teacher to master. This engagement was tightly connected with the ability to teach mathematics on different levels and to make calculating interesting by using simpler methods. The students positioned themselves within a discourse where they were *allowed to talk about cultural differences, which highlighted that punishment on different levels was problematic in some countries, whereas ability grouping affected pupils' schooling in others.*

These students had not yet engaged in discussions about mathematics education at the university, since this was their first seminar. Despite that, they positioned themselves within a mathematics education discourse to point at what could be critical issues for mathematics education, such as *cultural differences, inclusion and exclusion and didactical ideas about mathematics.*

During all courses, spaces were allowed for discussions and questions; however the time to elaborate further was limited due to the schedule and course plan. Therefore it is clear that the institutional discourse affected the mathematics education discourse during their mundane activities at the university. Commonly, each seminar focused on a specific theme and the next was directed towards another, often with another teacher.

The mathematics education discourse was under continuous construction during the courses through the interactions among students and students and teachers. However, the students' reflections regarding mathematics content as well as didactic reflections were mostly expressed as short comments during the seminars. Therefore the interviews became a good complement to build on our common experiences on day-to-day basis. Some discursive strands became more prevalent in the interview data, such as differences between mathematics teaching in different countries, and examples of their own successful teaching. Some discourses developed over time, and the students never brought some forward again. Even though the small discourses flowed into each other I will here show different aspects of the mathematics education discourse and hence how the characteristics of the discourse emerged with regard to the students' enacted positionings within the discourses. First, I show how the produced data revealed different aspects that foregrounded a discourse of *new ways of approaching mathematics; by thinking, doing and talking about school mathematics differently* in comparison to their experiences in school.

Novel and inspiring – distancing from previous experiences of mathematics teaching

Very early, during the first meetings with the students they talked about new ways of teaching mathematics and very often, they drew on parallels between their background as mathematics learners and what they learn at the university. In interviews they got time to elaborate on their previous experiences and on their future profession as mathematics teacher, and to tell more about issues they themselves brought to the fore, hoping that they would feel free to deviate from the intended structure. They could, and often did, choose themselves what they wanted to talk about as I often asked them to tell what they found important at that specific time.

One such discourse that emerged from the interviews was that they expressed different methods to approach mathematics teaching and learning. What they now experienced made them distance themselves from their own school mathematics, which will be exemplified through data from interviews with Frida and Lisa. Further on, the discursive positionings Camilla, Tina, Charlotte and Sofia make, will show more explicit how this distancing from previous experiences were expressed by the students.

In the beginning of the first semester, during the first mathematics education course, the students talked about their own experiences as mathematics learners and they expressed a will to do different from that. The way Frida and Lisa expressed this was representative for how several students talked about mathematics education; through empowered positionings. As shown below they talked about mathematics teaching in a broad sense by taking in their own positive feelings. The students used wordings that related to the evolving discourse of mathematics education within which they positioned themselves.

This is not at all like I have learnt mathematics myself. It's a new way of thinking and teaching, so I am enjoying the new experience. Because this is just the way one would have been taught [mathematics] that one now learns to teach. (Frida first semester, January 2010)

Det är inte alls så som jag själv har lärt mig matematik, utan det är ett helt nytt tänkosätt och lärosätt och allt möjligt och det känns jättekul. För det är precis så man själv hade velat lära sig [matematik] som man nu får lära sig att man ska lära ut. (Frida first semester, January 2010)

Frida framed the discourse in a broad sense while talking about the *new methods as something better than what she herself experienced as mathematics learner in school*. During the seminars the students were offered to try a lot of hands-on material and were encouraged to try different approaches on the mathematics tasks. The mathematical environment may have affected the students to enact empowered positionings within the

mathematics education discourse. Several students commented on this as good for the pupils so they could understand in a better way than they did themselves as mathematics learners in school. Whereas Frida focused on herself as becoming teacher, Lisa also brought forward the possibilities to engage her pupils, through their curiosity, to understand mathematical relationships and applications.

I am excited, and think it is very interesting trying to capture the children's curiosity and interest... and trying to see relationships and gain understanding of what mathematics is... and learning to use mathematics in different contexts. And i find it exiting also because I grew up in the school [system] where one only calculates and calculates, but now the education is much broader and many different methods are included. (Lisa, first semester, January 2010)

Jag tycker det, det känns jätteintressant att försöka väcka barnens nyfikenhet och intresse. Eh, och försöka se samband och få förståelsen för vad matematik är. Eh, och eh... lära sig att använda också matematiken i olika sammanhang. Och jag ser det som spännande också för jag har mer varit uppvuxen med den (skratt) skolan att man bara räknar och räknar och räknar, men det känns som nu man har breddat undervisningen så mycket att det är så många olika metoder som ingår. (Lisa, first semester, January 2010)

Lisa expressed empowered positioning in the mathematics education discourse as she stressed her possibilities to capture the pupil's curiosity and to help them understand. Her positioning indicated that she was moving towards something new, which is better than what she experienced in school mathematics herself. During my first meetings, several students stressed the novel approach to mathematics as school subject, which they met in mathematics education courses, as something good and worth striving for. The variety of methods they were introduced to in the mathematics education courses; the students' first meetings with the course literature, and discussions during seminars, seemed to impact the way they expressed themselves regarding mathematics teaching. This novel and inspiring approach to mathematics was connected with positive words like curiosity (Lisa), new experience (Frida), etc. They talked about new ways of teaching mathematics and often they referred to background as mathematics learners in talking about what they learned at the university. Entering the mathematics teacher education hence means *entering a discourse of mathematics education that is different and seems to get insights in new ways of teaching mathematics*.

After some time, when the students had taken several mathematics education courses and had experienced own mathematics teaching, the discourse of a new approach to mathematics teaching developed and became more explicit with regard to previous experiences. Several students connected the new discourse to what they actually did in mathematics

lessons during their own schooling. They used wordings and formulations they had met in mathematics education courses and related their own experiences from school to their present view on mathematics teaching. For instance, that mathematics was a competitive subject, a subject where the teacher introduced new content shortly and thereafter all pupils were expected to work individually in the textbook.

I here let Camilla and Tina tell us about mathematics lessons during their first school years where the teacher introduced tasks shortly and let the rest of time be steered by the books. Both Camilla and Tina had difficulties in remembering the mathematics during their first school years, however drawing on different approaches. Camilla positioned herself as being good in mathematics. She liked mathematics in school, and told in this interview from the third semester that she was good at doing calculations; and therefore did not pay attention to how mathematics actually was taught.

It is difficult to remember my mathematics. We read in the books. The teacher, if something was new, the teacher explained on the blackboard: "This way. Now you shall think and do so... It works like this..." And then we calculated in our books. And for me, who knew, this mathematics was easy — addition, subtraction, multiplication and division — I hardly remember how it was, just that it was easy for me. /.../ If there was something new to be introduced, one [a teacher] showed it on the blackboard and then we worked in our books. It was just the way it was. That was the mathematics... (Camilla, third semester, May 2011)

Jag har väldigt svårt att komma ihåg min matematik. Det var mycket att sitta och läsa i boken. Läraren, om det var något nytt, så förklarade läraren på tavlan, att såhär. Nu ska ni tänka så och göra så. Nu funkar det så... Och sen så fick vi räkna i boken. Och jag då som hade, just den matematiken hade jag väldigt lätt för plus, minus, gånger och delat. Jag kommer nästan inte ihåg, asså, hur det var, utan jag kommer bara ihåg att jag hade lätt för det då. Så att... Det är lite tråkigt, eftersom de... man ska... det vore bra om man kom ihåg vad det är som var bra och sådär, men jag har jättesvårt för att komma ihåg. Det är kanske också för att det var väldigt... Det var verkligen så att om det var något nytt då visade man på tavlan och sen så fick vi jobba i boken. Det var bara det, som var. Det var matematiken... (Camilla, third semester, May 2011)

In the end of this transcript, as Camilla expressed what mathematics was for her indicated that mathematics teaching should be more varied. She positioned herself with empowerment in the mathematics education discourse as she stressed that just teacher introduction and work in textbooks is not enough. However, despite the monotonous form of teaching Camilla told me about, she was eager to tell that mathematics was fun and that she, as a child, could handle this well without getting bored. Camilla hence showed that she was aware of the "traditional" education; she positioned herself with empowerment even within the institutional discourse. Obviously, two

discourses flowed into each other, which means that I had to take into account more than one positioning.

Tina, on the other hand, was happy that she did not remember the mathematics during the first years in school. "That might be good", she said, "because then one maybe didn't see it as something negative". The pronoun "one" is here understood as "I" as she in the following only used "I" to talk about her experienced feelings. She positioned herself in the mathematics education discourse by expressing empowerment with regard to competitions and games. A discourse which she did not think was accepted anymore: playing a multiplication game may not fit with the way mathematics ought to be taught, since it both involved procedural training and became a competition. Tina told me in this interview, during the third semester, that mathematics became boring as the education changed to comprise of solving tasks in the textbook.

It was just embedded in... I remember one occasion we calculated... We had cards and tried to recite the multiplication tables... It sounds procedural and boring, but I found it quite funny anyway, because it was a game and we tried to compete. But then in... grade 4-6 the book was always there and the teacher stand [in the front of the classroom] presenting different tasks, and I think it was at that time it [mathematics] became a bit boring. And then I recognised that people calculated much faster than i did... And in grade 7-9, we were divided into groups /.../ There were very few teacher led instructions overall. We only calculated in the book and I got even more unmotivated and then they placed us in groups. So I ended up in a group who was... well, the worst. And then, from doing very little mathematics I turned to not doing mathematics at all... (Tina, fourth semester, December 2011)

Det bakades in... Jag kommer ihåg vid nå't tillfälle att vi räknade... Vi hade kort och försökte rabbla multiplikationstabellen. Eh... och det, det låter sådär procedurellt och tråkigt, men jag tyckte att det var ganska kul ändå, för vi hade det som en lek och försökte tävla och sådär. Men sen i... mellanstadiet så blev det mer det här med boken och läraren stod och presenterade olika uppgifter och det var nog där som det blev lite tråkigt och jag märkte att folk räknade mycket snabbare än mig och så där. Och sen så i högstadiet så, så blev det så att då blev vi indelade i grupper och där var det verkligen... där räknade vi bara nästan i matteboken. Det var väldigt lite genomgångar överhuvudtaget där. Men där räknade vi bara i matteboken och jag blev ännu mer omotiverad och sen så placerade dom ut oss i grupper. Så hamnade jag i en grupp som var... Ja, den sämsta då... Och då. Från att räkna väldigt lite matte gick jag till att inte räkna matte alls, liksom. (Tina, fourth semester, December 2011)

The students expressed a mathematics education discourse where teaching by the book was not preferable as main activity, and in addition Tina had to justify why she liked the multiplying game "It sounds procedural and boring, but I found it quite funny anyway, because it was a game and we tried to

compete.” “Procedural” hence became a signal for boring, bad and wrong within the mathematics education discourse.

High requirements on the mathematics teacher

After some time, when the students had taken several mathematics education courses and also experienced own mathematics teaching, another aspect of the mathematics education discourse was foregrounded. It related to their school mathematics experiences, and their discursive positionings became more explicit. They articulated differences they had recognized, and reflected on the connections between mathematics education in the university context and what it could be like in schools. As they had experienced own teaching, their positionings changed to become more critical, and they talked about mathematics teaching as demanding for the teacher and the importance of adjusting teaching so that every child can learn. *The teacher is supposed to teach his or her students so they learn, and not just telling them what to do or briefly explain tasks in front of the class.*

Tina pointed in the previous excerpt at how grouping of students with regard to their ability can be devastating for the students’ motivation and self-confidence. She depicted her own lack of motivation as being a consequence both of the mathematics teaching practice and of the institutional constraints regarding grouping of students. Two simultaneous operating discourses within which Tina enacted disempowered positionings, made her lose all her will to learn mathematics. At the upper secondary school things changed and Tina explained why mathematics became interesting:

Then it was a lot about equations and understanding the equations and solving the equations and finding shortcuts... It almost felt like a knot being tied in a strange way, totally incomprehensible, and that one had the task to untie it, and you couldn’t just untie it anyhow. Maybe one ought to start pulling one thread and check what happened, and then continue pulling... Eventually you had unfolded it. I felt this was like a game. An interesting and funny game... other than sitting and calculating... And he [the teacher] also made it so interesting, on several levels. But I felt it wasn’t at all like one had to sit and calculate, instead I felt it was interesting, funny. And actually... you felt that you got something out of it. It was stimulating and maybe that wasn’t always the case in grundskolan [grade 1-9]. (Tina, fourth semester, December 2011)

Men då handlade det mycket om ekvationer och förstå sig på ekvationerna och lösa ekvationerna och hitta genvägar och... Det kändes nästan som en knut som hade knutits på ett jättekonstigt sätt som var helt obegripligt och att man hade till uppgift att knyta ut den här och man kunde liksom inte bara knyta ut den hur som helst, utan man var tvungen att börja kanske med ett snöre och dra lite i det och kolla vad som hände och dra och fortsätta och så där. Till slut hade man vecklat ut den. Och det kändes som en lek, liksom. En intressant och rolig lek... än att bara sitta och räkna, liksom. Och just att han

[läraren] hade gjort det så intressant också. Det var fler plan som gjorde det intressant. Men det kändes inte alls som bara att man måste sitta och räkna, utan det kändes som att det var intressant, roligt. Och faktiskt att det... man kände att man fick nånting utav det. Det var stimulerande och det kanske det inte alltid var i grundskolan, liksom. (Tina, fourth semester, December 2011)

The mathematics education discourse was clearly expressed by Tina: *mathematics is more fun and inspiring when children are challenged and when they do not have to sit on their chairs, just calculating. The teacher should inspire the learners and not engage in traditional methods of teaching.*

However, meeting new ways of mathematics teaching made comparisons from the students' own experiences, as learners, possible. Both Charlotte and Sofia had negative experiences from school mathematics, and they talked about these experiences in relation to what they expressed as important for mathematics teachers to be aware of; and how mathematics should be taught. Charlotte mostly focused on the feeling of not being seen as an individual having her specific needs, but instead as one who was performing good, and therefore able to work in the same speed as the majority of pupils.

The way I was taught mathematics... I don't want to teach anyone in that way. In grade 1-6 I found mathematics too easy. I finished one book — what one did was working in the book — I finished one and got the next level book, aimed for them one grade over me. I finished that book and got the next all the time... I didn't like that. Mathematics wasn't fun anymore. In grade 7-9 I liked it again, but in the upper secondary the opposite happened. After a math test we were divided into the best, the middle and the worst group. According to the results I ended up in the best group, but the pace was too fast. It became a competition about who was the fastest. I couldn't manage all those text tasks. There was no longer time to read, and then... I didn't think it was fun anymore. It was a pain to go to a math lesson. And I wasn't allowed to switch... group either. I tried to talk with my teacher, but I wasn't allowed to change. [The teacher] found the other math group too elementary. So finally I..., well, I couldn't stand it. It was terrible. I stopped going to math classes. And... in the end I rather wrote poorly on a math tests to be allowed to change... I don't think that... you should write poorly to be allowed... to be placed [in a group] so that you can understand what you should learn. I understood, but the pace was too high. I was so stressed and... finally... it was all terrible. (Charlotte, first semester, February 2010)

Så som jag har lärt mig... matte vill inte jag att... asså, så vill inte jag lära ut någon annan. För på låg- och mellanstadiet så tyckte jag att matte var för lätt. Utan jag räknade ut boken — då räknade man bara i matteboken — och jag räknade ut den och jag fick årskursens över, deras mattebok, och jag räknade ut deras mattebok, så fick jag börja på nästa, hela tiden. Och det tyckte inte jag... jag tyckte inte det var kul. Då var inte matte roligt. Och, ja, på högstadiet så tyckte jag att det var kul igen. Men, sen vart det tvärt om på gymnasiet. Vi fick... vi fick börja med att göra ett matteprov och efter det resultatet så delades vi in i bästa, mellan och sämsta gruppen. Och, eh, på

grund av resultat så hamnade jag i den bästa gruppen. Men... det gick alldeles för fort, utan det var en tävling med vem som var snabbast. Och då var det ju... det var ju mera lästal och så, som inte jag riktigt hängde med, för att det tog lite längre tid att läsa. Så då... tyckte inte jag att det var något kul längre. Då var det mer bara en pina att gå på en mattelektion. För att jag fick inte byta... grupp heller. Utan det försökte jag med och prata med min lärare, men jag fick inte byta. Tyckte att den andra mattegruppen var för enkel. Så till slut så... asså, jag stod inte ut. Det var hemskt. Jag slutade gå på mattelektionerna. Och... till slut så skrev jag ju hellre dåligt på ett matteprov för att få byta. Så att... så tycker inte jag heller att... Man ska... man ska inte behöva skriva dåligt för att... få hamna så att man kan förstå vad man ska lära sig. Eftersom jag förstod det ju, men jag hann inte med. För då vart jag ju stressad och... till slut så... det var ju bara hemskt. (Charlotte, first semester, February 2010)

Charlotte here positioned herself within the available mathematics education discourse as she talked about her negative experiences of teachers' teaching by the book and ability grouping of students. She hence expressed resistance against two main problems. First, by letting her work on her own and continue with the next textbook as soon as the previous was done. Second, by dividing students into groups based on test results, expecting them to work in the same pace. Her changed attitude towards school mathematics as result of a culture, where the textbooks were steering and where competition in combination with lots of text-based tasks, made her give up. She instead chose to perform bad results in order to get a place in a slower group. The mathematics education discourse allowed Charlotte to question what happened during her schooling. Further on, since she expressed her experiences from the ability grouping of children, the discourse appeared strong with regard to equity and social justice, and hence indicated how this discourse affected her as mathematics learner. *Through the mathematics education discourse, available in the university context, the school is told to be for all and has to provide opportunities for all children to learn and develop in mathematics.* Charlotte's positioning showed that she was aware of and able to question teaching methods and ability groupings, an indication for empowered positionings in both the mathematics education discourse and in the institutional.

Sofia, on the other hand, did not like mathematics in school and told me that there were still some knowledge gaps to fill. Nonetheless, what Sofia expressed was a belief in a positive change regarding school mathematics and steering documents and that there were good possibilities to develop mathematics teaching in schools that would facilitate pupils' mathematics learning. She talked about competitions related to calculating with a high speed as something bad, and about math anxiety as an explanation why she did not like mathematics in school. The available mathematics education discourse encouraged her to make this analysis of her schooling.

I have an ambition to catch pupils that were like I, who didn't like mathematics, who still is not fluent at the times table, because I, through the course literature have found out that I probably suffered from math anxiety. And, since we had a lot of competitions and the like, on the times table, resulted in that I couldn't /.../ And I feel that my interest lies in including all [pupils] and broaden it [the mathematics education] a lot more from when I learnt [mathematics] – because then it was the book and nothing more – and try to do every-day mathematics, such as... The whole syllabus is very different now, compared to when I went [to school]. So I feel, this teaching, and the whole course we study now, differ extremely lot from what my teachers did. Then, it could be that they have read, but ignored it, I don't know. But I feel there is a new era in mathematics and I feel happy to be part of that. (Sofia, first semester, January 2010)

Jag har ju en ambition om att fånga upp elever som var som jag... som inte tyckte om matematik. Som fortfarande inte kan gångertabellen som flytande därför att jag har fått reda på via kurslitteraturen att jag nog led av matematikångest. Eh, och att vi hade ofta tävlingar och sånt som gjorde att, just i multiplikationstabellen, som gjorde att jag inte kunde. /.../ Och jag känner att mitt intresse ligger att få med alla och att vidga det väldigt mycket från hur det var när jag läste, för att då var det bara boken och ingenting mer, och att försöka, ja, använda matematik i vardagen, så som all Hela kursplanen är ju väldigt annorlunda, nu, jämfört när jag gick [i skolan] Så det känns som att hela den här undervisningen och hela kursen som vi läser nu, skiljer sig extremt mycket från det som mina lärare gjorde. Sen kan det vara att de (fniss) kanske hade läst, men struntade i det, det vet jag inte hur det såg ut då. Men, men det känns som att det är inne i en ny era i matematiken och det tycker jag känns väldigt kul att få vara med om. (Sofia, first semester, January 2010)

In the two excerpts, Charlotte and Sofia put into words a strong mathematics education discourse by foregrounding that *the mathematics teacher must be aware of what every child needs and be able to plan their teaching in order to meet these needs*. The new discourse made possible for them to talk about mathematics teaching for pupils like themselves and of the importance for the teacher to be sensitive to each child. Accordingly, the teachers must be aware of that a lot of work is required from them, and they cannot use the textbooks as basis for their teaching. This discourse recurred in the interview data over the years and seemed to empower them to stress that they, as becoming teachers, were able to take a step back from the books and create tasks on their own; and to bring in everyday mathematics to build their teaching on pupils' understanding. From their new insights the new syllabus made possible to abandon "traditional" mathematics teaching and competitions and teaching by the book could be questioned.

Problem solving and everyday mathematics

Problem solving permeated the mathematics education discourse from the very first semester. It was introduced as an important part of mathematics teaching to inspire and increase pupils' desire to learn mathematics; all in line with the directions from The National Agency for Education (Lindqvist, Emanuelsson, Lindström, & Rönnerberg, 2003), and previous research focusing on Swedish school mathematics as too much steered by textbook and individual work (see e.g., Johansson, 2006).

The students were invited to work on tasks, which could be defined as problems (i.e. it should not be a routine task for the one who works on it); to create their own tasks and also to work on creative strategies for solving the problem. Initially some students reacted on the wordings and interpreted problems as negative and worrying "Problem feels like big words. One will be scared. Negative; dangerous; disturbing. Does it need to have a negative connotation?" On the other hand their classmates took their stance in solving, which signalled that the problems ought to have a solution "Problems should have a solution. You have to think, too. What thoughts did you have?" (Fieldnotes in January 2010).

The discourse of problem solving that appeared soon became equated with lustfully learning [lustfyllt lärande] and goal achievement. These expressions were central in the actual syllabus and hence understood as important achievement goals for becoming teachers. They should be able to plan and carry out mathematics teaching that is problem based, inspiring and related to achievement goals for compulsory school. Monica stated after a few weeks in to the education that problem solving should be used...

... in a lustfully way. For me as teacher and, for them as pupils /.../ [in order to achieve the goals] I have understood from the little we have read till now, how important it is to interweave fantasy and practical activities and right kinds of problem solving tasks, and to individualize on right level and on right challenge level (Monica, first semester, February 2010)

... på ett lustfyllt sätt. För mig som lärare och för dem som elever /.../ [för att vi ska nå målen], så har jag också förstått att bara det lilla vi har läst hittills hur viktigt det är att blanda in liksom fantasi och praktiska övningar och rätt typ av problemlösningar och individualisera på rätt nivå och på rätt, liksom, utmanings... nivå (Monica, first, semester, February 2010)

Monica's expression grasped the problem solving discourse that emerged from interviews, fieldnotes and actual course literature. *Problem solving is good, it makes pupils engaged and they learn because they want to.* This approach was seen as a good way to teach mathematics coming from the new and novel approach on mathematics education that the whole education represented, the students talked about problem solving as a separate part of the mathematics subject. I asked the students to tell me about what she found

most important in mathematics education. Sofia positioned herself within the mathematics education discourse and, as we can see, included problem solving as one of the most important areas in mathematics.

I think almost everything is important... Primarily addition, subtraction, division and multiplication, but after that comes problem solving /.../ how you can address a problem and... there are unsolvable problems and... there are problems which can be solved in several ways. First and foremost that is a way of thinking [about mathematics]. So I think that is important. (Sofia, fourth semester, December 2010)

Jag tycker att det mesta är viktigt... Men framförallt kanske dom, liksom, addition, subtraktion, division och multiplikation, men sen problemlösning. /.../ hur man tar sig an ett problem och ... Att det finns problem som inte går att lösa och... att det finns problem som kan lösas på flera olika sätt. Det tänket är ju kring problemlösning, först och främst. Så det tycker jag själv är en viktig del. (Sofia, fourth semester, December 2011)

The discourse characterised problem solving as enabling the pupils to learn different areas of mathematics at an overall level. However, this overall level led to that problem solving was not talked about with regard to any specific content or any specific competencies in mathematics. Instead, problem solving could be used to hide the mathematics to play down the subject.

And for pupils this is, like, well they lock themselves because it is maths. Because maths is difficult, and if you try problem solving instead, not mentioning the word mathematics. Then things are getting much easier. (Sofia, fourth semester, December 2011)

även för elever så är det det här, ja men dom låser sig för att det är matte. För att matte är svårt. Och om man då försöker göra som en problemlösning som inte ens... man nämner inte ens ordet matematik. Då kan det helt plötsligt bli mycket lättare. (Sofia, fourth semester, December 2011)

Sofia talked from experiences she had made in school, and for most students problem solving soon became an important part of what they chose to tell me with regard to initial teacher education. On one hand, it became an argument for engaging the pupils in mathematical activities and also inspiration for the students themselves to develop mathematical confidence, however not explicitly expressed. On the other hand, there were underlying factors within the discourse, which challenged the work. Rita told me about a situation she was not so happy with initially.

I wrote some tasks on the whiteboard, which the pupils were supposed to solve on their own. And, when the results showed that they did not get at all what it was about, and that problems should be solved in different ways. After that I taught them and explained that one shall solve in different ways [inaudible] you solve a task in different ways. Then they had a test, which

proved to be good and they got it quite well... almost all succeeded. (Rita, first semester, May 2010)

Jag skrev några uppgifter på tavlan och sen eleverna fick lösa problemet på egen hand. Och sen när resultatet visade att dom fattade ingenting vad det handlar om och hur man ska lösa ett problem på flera olika sätt. Och sen jag gjorde en undervisning och där har jag förklarat för dom hur man ska lösa på olika sätt [ohörbart] man löser en uppgift på olika sätt. Och efter det gjorde en test till och resultatet av det visade att dom har fattat ganska bra och sen... nästan alla fick rätt svar. (Rita, first semester, May 2010)

Problem solving was supposed to lead to creative work. It involved practical activities – often with manipulatives or other physical tools involved — and many discussions among pupils. It presupposed possibilities to find several solutions, and all this would lead to that pupil learn. However, it was clear that problem solving activities must not be successful per se. The pupils did not understand what they should do and Rita therefore showed them that problems should be solved in different ways — in line with the available discourse. She did not talk about the mathematics the student could use or were challenged by. To be fair, the mathematics content was not always hidden in relation to problem solving. Tina, who often stressed oral communication and collaborative discussions as important parts of mathematics education wanted to focus even more on problem solving with “her” pupils; challenged by the next working area, which she found boring and difficult. However, engaging the pupils in the task was even more challenging and even though Tina foregrounded a discourse where *problem solving was presumed to be positive and engaging*, the implementation worried her.

[It is] geometry, which I find very difficult and very boring. That will be instructive. Then, one could work with problem solving. That's part of what lies ahead. The problem with problem solving is that it must be a qualitative task if you would want to work with it. So, I find it difficult to decide that this is what I want to work with and what I want to cover. I have some suggestions now and it depends on how they shape up in the class. As I said, I have several lessons to try and to improve and one can transform, and one changes the task completely. /.../ And it is... talking about problem solving, that engagement is required from the pupils. And it is difficult to provide engagement, especially from one single task. Well, of course you can find a task that engages, but when you have a task... to provide them with engagement to that task... that is very difficult. (Tina, fourth semester, December 2011)

[Det är] geometri, vilket jag tycker är jättesvårt och jättetråkigt, så det blir. Det blir, det kommer bli lärorikt. Sen så, så skulle man ju bara kunna jobba med, liksom, problemlösningsarbetssättet. ... Så det är lite det som ligger nu framöver. Eh... problemet med problemlösning det är att, asså, det måste

verkligen vara en kvalitativ uppgift för att man ska, liksom, känna att man vill jobba med den. Så att jag har lite svårt att bestämma mig. Att det är det här jag vill jobba med och det är det här jag vill beröra. Eh... men jag har några alternativ nu, så får vi se hur dom artar sig i klassen. Som sagt så jag har ju flera lektioner på mig att förbättra och man kan förändra och man byter ut uppgiften helt. /.../ Och det är... just med problemlösning så krävs det engagemang från eleverna. Och det, liksom... Det är svårt att ge engagemang, speciellt utifrån en uppgift. Asså det är klart man kan hitta en uppgift som skapar engagemang, men när man har en uppgift, att ska... att ge dem engagemang till uppgiften, det... det är väldigt svårt. (Tina, fourth semester, December 2011)

Through the strong emphasis on several possible solutions and on processes as central when solving mathematical tasks, the problem solving discourse opened up for challenging previous mathematics education discourses. The discourse opened up for contextualising the task so that the mathematics was “hidden”, but also as a way to make the mathematics more connected to everyday life. It made possible to think about mathematics as fun and inspiring, as something other than what they experienced as learners in school. Most students hence enacted empowered positionings as they expressed how they wanted to work with problem solving and why that work would benefit their work as mathematics teachers.

Mathematics teaching

Whereas the students expressed confidence through empowered positionings within the mathematics education discourse, in the university context, this discourse revealed concerns regarding mathematics teaching during initial teacher education. The students told me, that what they learned at the university did not fit with what they experienced as becoming teachers in “their” schools, and hence they needed to handle conflicting discourses. Institutional constraints at the schools made them challenge the mathematics education discourse. In the case of Leila this occurred from the frequent teaching by the book.

After the first period of initial teacher education I interviewed Leila at the university. She told me about the teachers’ choice to use textbooks as basis for teaching mathematics, in contrary to what they as students had read in the course literature and talked about during seminars. Leila’s discursive positioning initially indicated disempowerment since she met a somewhat contradictory discourse during her first period of initial teacher education: “What we read in the course literature is not true at all with reality”. She wanted to make changes and teach mathematics without books in order to consolidate conceptual understanding. As she told me more, her positioning within the mathematics education discourse changed, and through empowerment, which was recurrent in the data, she talked about how she

worked with the pupils who didn't understand; related conceptual understanding to her own experiences as a child; and clearly expressed that *learning mathematics should not be a competition between teachers or pupils*.

What we read in the course literature is not true at all with reality [she imitates a fictional university teacher] "But it depends on in which school you are." /.../ This school... They liked to use the textbooks a lot. And... I recognized that the teachers competed to be first to page 46... or 47... before Friday. Regardless of whether the children... I know... this [other] teacher will come and work with them who didn't understand enough during the lesson. But... they worked too fast... just to reach a special page. I would develop, if I get the chance in this school, to leave the textbooks for a while. And work a bit... make an own math [word] list, in order to understand the concepts they didn't know. I played games with them... in order to find the largest number and the smallest. I just want to see if they understand the concepts. The word difference... They said immediately that six minus three is... [Leila is now acting] "Six minus three is three." Most children in this group haven't got the number sense in the number range one to... zero to ten /.../ I let them play teacher and student [and ask] "Biggest number, which is the big...?", they asked. "Which is the biggest number and which is the smallest and what is the difference?" They enjoyed it a lot. But I cannot guarantee that they understood... in twenty minutes. I want [them] to understand the concepts, because I as child had large difficulties. I learned the... words. "This word means minus and this word means plus..." I wanna change that. (Leila, first semester, May 2010)

Det som vi läser i litteraturböckerna, det stämmer inte alls med verkligheten. [härmar en fiktiv lärare med mörk röst] "Men det beror på vilken skola man är i." Nej, men... det var inte det. Jag va... Alltså, det... den här skolan... dom gillade att använda mycket matteboken. Och... jag märkte att lärarna tävlade och dom skulle va klar till sidan... 46... eller var det 47... innan fredag. Oavsett om barnen först..., asså... Jag vet... hur den här läraren kommer och sen jobbar ned barnen som inte har förstått tillräckligt under den här lektionen. Men... dom jobbade för fort... för och hinna till visst antal sidor. Jag skulle utveckla... om jag får den chansen i den här skolan... att släppa matteböcker ett tag. Mm... och jobba mer eh... eh... göra egen mattelista, att förstå begreppen dom kunde inte heller... Jag spelade spel med dom eh... att hitta skillnad mellan största och minsta talet. Jag vill bara se... begreppen... om dom har förstått begreppen. Eh... ordet skillnad. Dom sa ju direkt sex minus tre blir... sex minus tre blir tre. Dom flesta barn i den här gruppen dom har inte fått den här taluppfattning i talområdet ett till... noll till tio. Jag försökte med dom sen... Att dom spelade lärare och eleven... och elev. "Största talet, vilka är störs..." Dom frågade varandra, alltså. "Vilket är det största talet, vilket är det minsta och vad är skillnad mellan dom?" Dom tyckte det var jätteroligt. Men... asså, klart... Jag kan inte garantera att dom har förstått det på... på tjugo minuter. Jag vill ut... asså, det här, ja... att förstå begreppen... för jag som barn... hade väldigt svårt för det... Jag lärde mig... orden. "Det här ordet betyder minus, det här ordet betyder plus" ... Det vill jag ändra på. Mm... (Leila, first semester, May 2010)

As shown in the excerpt Leila positioned herself in the mathematics education discourse by exemplifying how she herself carried out a teaching situation well. She recognised that some pupils did not understand the concepts clearly enough and therefore clarified the meaning of biggest number, smallest number and difference. Several students used this way of making sense of their experiences; by positioning themselves as actors. Harré and van Langenhove (1999) write about this phenomenon as *autobiographical narrations* (p. 65). Mostly their stories were presented as successful and positive, and hence rendered empowered positionings.

The mathematics education discourse Leila met in the first course made her reflect on disparities between what they talked about in teacher education and how things worked in reality. This did not only occur in the beginning of their education. The prevailing mathematics education discourse, framed in course literature, seminars and other oral or written communication, was by many students judged as good. These discourses made them renounce the use of textbooks in mathematics education and give prominence to problem solving.

By drawing on their own experiences during practice periods, the students expressed empowered positionings regarding mathematics teaching. Often their positioning took a stance from the classroom practice the children were used to and they expressed ways of changing this practice. Sara carried out, as she expressed it, a lesson very different from what the pupils were used to, which was a success. They usually sat *one and one and worked in their books in order to keep calm*, an institutional discourse Sara challenged by positioning herself in the mathematics education discourse.

The class is quite difficult, so they are taught by the book, nothing else, and sit calm and quiet to make things work. But as they were introduced to this task, they... All pupils got incredibly engaged. They looked happy and straightened up, and focused all their energy on... really... on the task. It was so fun to see that one could — just by introducing a task — one could make them raise that much. They were not used to this [approach to school work]. I was afraid that they should run around and that I would bitterly regret what I had initiated, but it all went very well. And it was really fun to see them... grow a bit. They did. (Sara, first semester, November 2011)

Det är en ganska stökig klass, så dom håller på med böckerna, bara. Och sitter lugnt och tyst för att det ska fungera i huvudtaget, men just när dom fick den här uppgiften, så... Alla eleverna blev så otroligt engagerade. Dom lös upp och blev glada och sträckte på sig och verkligen fokuserade all energi på... på... ja, verkligen på uppgiften. Och det var så himla kul att se att man bara... bara genom att ge dom en uppgift, egentligen, så kunde man lyfta dom så otroligt, men nå'nting som dom egentligen inte var vana vid. Jag var ju rädd att det skulle bli kalabalik och kaos och dom skulle springa runt och (fniss) och att jag skulle ångra mig bittert, men det funkade hur bra som helst. Och det var jättekul att verkligen se att dom... att dom växte lite. Det gjorde dom. (Sara, first semester, November 2011)

By articulating the discourse of *groupwork and discussions as positive, and that use of manipulative material and problem solving make students enjoy and therefore learn mathematics*, Sara stressed an eager to teach on an appropriate level, as well as getting the pupils to work well despite the freer form. She recognised that she was able to carry out teaching in a way she believed in; hence her positioning revealed empowerment in the mathematics education discourse. Further on, she justified her choices and made clear that she had some background knowledge about the pupils and the content so she could adjust the task to be on the right level. She also distanced herself from the “traditional” mathematics education discourse, where school mathematics is equal with just sitting and getting bored.

I wanted the pupils to realize that maths is not just to sit [and work] in the book and that it actually can be quite fun. And that was my starting point, really. I didn't want the task to be too difficult, but it should be a bit challenging so they felt... well, skilled, as they completed it. But I didn't want it to be too difficult so that they couldn't manage... I chose a level where I knew that they were able to manage each part of the task. They just needed to solve it in a new way. That was what I thought. I didn't want it to be too difficult. I wanted all pupils to manage. (Sara, first semester, January 2010)

Jag ville få eleverna att inse att matte inte bara är att sitta [och arbeta] i boken och att det faktiskt kan vara ganska kul. Och det var det jag utgick ifrån egentligen. Jag ville inte att uppgiften skulle vara för svår. Det skulle vara lite utmanande så dom fortfarande kände sig... Ja, dom var duktiga som slutförde den. Men jag ville inte att det skulle vara för svår, så att det blev... att dom kände att dom inte riktigt räckte till... Utan jag la den på en så'n nivå att dom kunde grejerna som var i uppgiften. Bara det att dom behövde lösa den på ett nytt sätt. Och det var det... Det var så jag tänkte, att det inte skulle vara för krångligt, utan alla skulle fixa det. (Sara, first semester, January 2010)

Sara's empowered positioning strongly emphasized her will to let all pupils succeed. However, she did not talk about how she approached them who found the task too easy, if there were any.

Jessica, who entered the study later than most of the other students, was eager to let me share as much as possible of her university studies. She was very engaged in her future profession as mathematics teacher and hence positioned herself strongly within the mathematics education discourse. We had several long talks and communicated every time they were scheduled at the university. She invited me to participate when she taught mathematics during her last period of initial teacher education. She had planned and carried out two lessons focusing on the relation between multiplication and division. My fieldnotes from this situation may illustrate the following interview:

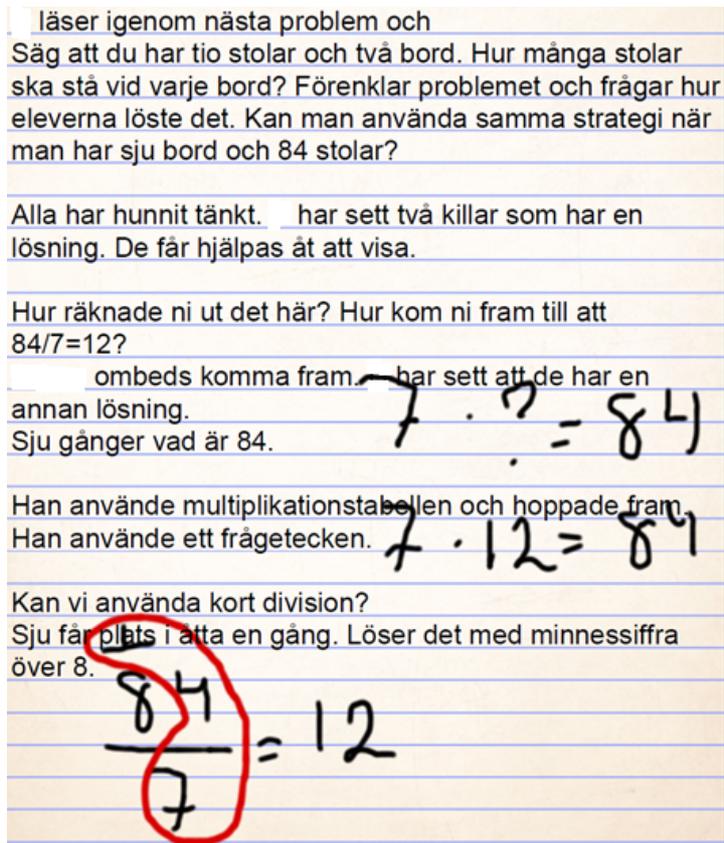


Figure 2 Fieldnotes, December 2011

Jessica reads the next problem and...

You have ten chairs and two tables. How many chairs fits to each table? Makes the problem easier and asks how the pupils solved it. Can you use the same strategy if you have seven tables and 84 chairs?

Everyone got time to think about this. Jessica has recognized two boys' solution. They help each other in the presentation.

How did you calculate this? How did you reach $84/7=12$?

One of the boys is asked to come. Jessica has seen that they have another solution.

[She talked while the boy wrote on the whiteboard]

"Seven times what is 84. $7 \cdot ? = 84$

He used the times table and jumped forward.

He used a question mark.

Can we use short division?

Seven fits in eight one time"

Solves it with memory number over the 8.

(Fieldnotes December 2011 — translated into English)

The pupils were expected to use short division and as this situation progressed I was curious about specific situation when two boys solved a

problem by sketching an equation and in the interview that followed she was asked to elaborate little more on her visions; what she wanted to achieve with this lesson; and possibilities and constraint for doing it? What was her motive for letting them show the solution; her impression of their contribution to solving strategies; and what did she find important to tell me about?

Jessica: One of the groups solved the task in a way I hadn't thought about. First I thought, "What are they doing?" I thought, "this is wrong, however, I let them continue, because... I cannot stop them because I think it's wrong." So I let them continue and found that they had got the right solution. How did he think? I had never thought like that. I don't know if the others understood either. I tried to, but didn't put so much effort in it. I tried once, I don't know. I was taken aback myself. Yes, this was an interesting solution.

What a luck that I let him continue. I think one needs to so even if things get wrong. I thought, "Well, I let it go wrong then", as I thought It could be from the beginning. "I can put things right..." Then he would maybe see "what did I do in the first steps?" However, he got it right /.../ and then, not everyone has to understand every other's strategy initially. Every one's methods... (Jessica, fourth semester, December 2011)

Jessica: Den ena gruppen kom ju på ett sätt som inte ens jag hade tänkt på. Jag tänkte först 'vad gör dom?'. Jag tänkte det här är ju fel. Men jag tänkte jag låter dem fortsätta, för jag... ja men, dom måste få fortsätta. Jag kan ju inte bara avbryta för att jag tror att det är fel. Så dom [fick] ju fortsätta och så kom jag på det att dom kom ju fram till rätt svar. Hur sjutton tänkte han? Jag hade aldrig tänkt så. Jag vet inte om de andra förstod hur han hade tänkt heller. Men jag försökte få dem [med] på det, men. Jag kanske inte la ner så mycket energi på att de skulle förstå heller, men jag försökte ju en gång. Jag vet inte. Jag blev så paff själv, tror jag. Ja, det var en spännande lösning. [denna är värd att ta med, positionering i klassrummet och efteråt kring matematiken i uppgiften och hur eleverna fick vara med och påverka lösningsarbetet]

Vad tur att jag lät honom fortsätta. Det får man nog göra även om det blir vajsing. Jag tänkte såhär "men jag låter det bli fel, då" som jag tänkte att det skulle bli från början. Så får man ställa rätt... Då kanske han upptäcker "men vad gjorde jag från början?" Men nu blev ju det rätt också./.../ Sen behöver ju kanske inte alla förstå allas sätt till att börja med. Allas metoder... (Jessica, fourth semester, December 2011)

The mathematics education discourse was, as shown earlier, strongly influenced by the importance of using problem solving as a method for learning mathematics, and to open up for solutions on different levels, including errors. Here, Jessica could choose whether to follow the pupils' initiative on solving a problem with an equation, or not. Jessica accepted this

discourse by expressing the importance of being aware of, that pupils should be given space even if they might be wrong. Jessica had not thought through possible variants of solutions, which might have made her express disempowerment. Instead, she positioned herself with empowerment in the mathematics education discourse arguing, “I cannot stop them because I think it’s wrong”, and instead prepared for how to sort it out afterwards.

It would be unfair to only scrutinise situations where competing discourses reveal power-relations and where the student in focus always is set in a troubling situation. The mathematics education discourse revealed empowered positionings in both university contexts and in school contexts, and it is necessary to show that positive and unproblematic positionings appeared. Such a situation will be shown through fieldnotes from a school visit the fourth semester. Camilla invited me to the first lesson one Tuesday in December.

I visited Camilla during her second period of initial teacher education and as I was about to enter the teachers’ office this early morning I heard her voice from the staircase. “Kicki! Welcome!” Her arms were full of buckets and cans of different sizes. “Wait a minute, I will get another bucket in the storeroom and make a copy of the lesson plan for you”, she said and I joined to assist her.

In class she showed me the electronic white board and told me that she uses it every day and has shown her colleagues how to work with it. Last Monday, for instance, they used it in mathematics problem solving, and another day they made a random number generator. She seemed confident and willing to share her experiences with her future colleagues, and she was also eager to tell me about her experiences.

As the lesson started she gathered the pupils on a carpet on the floor and showed the different buckets and cans she had brought to school. She began the introduction by elaborating on the concept of hold. “What does it mean?” She showed one bucket at a time and asked the class how much they thought it could hold; how much space there is inside. She invited the pupils to guess and estimate. She wanted them to tell her the names of different measuring cups and she asked them to think about which scoop that was preferable to use in measuring different volumes. “It takes ages if you use the smallest cup when measuring the bucket...” (Fieldnotes, December, 2011)

In this situation Camilla positioned herself with empowerment in the available mathematics education discourse, where buckets and cans should facilitate the pupils’ understanding of volume. Her introduction contained both teacher instruction, conceptual discussions, and space for the pupils to respond; she hence showed that she had accepted the mathematics education discourse fully. She did not experience any disturbances and was not challenged by other discourses, which could have constrained her.

The mathematics education discourse often made the students challenge available discourses in schools, which I will elaborate more on later. Therefore I believe that it is important to show that there were instances

where students enacted empowerment as becoming teachers during initial teacher education. However I find it important to note: this situation did not reveal any competing discourses and challenging constraints, which may explain the harmony.

Culture/History — Mathematics education was different in my country

Several students brought in historical and/or cultural aspects as they talked about mathematics teaching. In this chapter I will give a lot of space to students who have got their first school experiences in another country than Sweden. These experiences were often brought forward through comparisons of teaching culture, how the mathematics content was treated and what was required from the students to get good grades.

Rita is a young woman who moved to Sweden six years ago. I met Rita during her third semester and she had hence experienced mathematics teaching in Swedish schools during two periods of initial teacher education when the following interview was conducted. Rita was concerned about how differently mathematics teaching was implemented in Sweden in relation to what she experienced in school. She also had noted the different attitudes to mathematics that Swedes seemed to have in comparison with pupils in her country of birth:

Well, in my country it was different compared to Sweden. There, one should read books and then read... learn different rules by heart without understanding anything. And I was quite good at managing such things. And I always got good grades, even though... I lack in... thinking. I just learned the formulas by heart. But I think, when you see the relationships, it becomes even more fun to learn /.../. We have learnt mathematic rules by heart, but... I don't think that's good. I don't know, maybe the others have understood [inaudible]. For me, I learned by heart, (Rita, fourth semester, September 2011)

Asså, i mitt land det var..., liksom annorlunda om man jämför med Sverige. För att där man ska läsa böcker och sen lära sig dom olika reglerna utantill, utan att förstå nånting. Och jag var ganska duktig på att behärska såna saker. Och jag har alltid fått bra betyg, /.../ jag bara behärskade formlerna utantill. Men, jag tror, när man ser sambandet så blir det ännu mer roligare att lära sig nånting. /.../ Asså, vi har lärt oss utantill när det gäller matematikregler. Men... det tycker jag inte är bra. Jag vet inte, kanske dom andra har förstått [ohörbart]. För mig, det var, liksom utantill. (Rita, fourth semester, September 2011)

Rita positioned herself within the mathematics education discourse by comparing mathematics teaching in her school, in her country of birth as a young learner, with experiences as becoming teacher during her first two

years in the Swedish teacher education. She underlined the importance of learning by heart in her country of birth and also that she managed to learn and to get good grades. However, this new mathematics discourse made her, through empowered positioning, challenge her previous experiences of teaching and learning, by stressing that it is more fun to learn when one understands and when one can understand the mathematical connections. The dominant mathematics education discourse is clear: *It is not good to learn by heart without understanding* (which she did as a child) *and it is fun to learn if you understand the mathematical relationships*. Despite this, there was a conflicting discourse, which represented Rita's experiences from school mathematics. Learning by heart without understanding was possible, at least for her.

In the following we will see how Rita attempted to explain success and failure in mathematics on the basis of the two conflicting discourses. Rita argued that pupils in her country lost their motivation due to how mathematics teaching was conducted. The pace was too fast and, influenced by the Swedish mathematics education discourse, she emphasised that it is important to give the pupils the time they need. On the other hand, she always managed well, even though "it might not be good". She always learned by heart and again stressed that she got good grades. In the interview she made further comparisons between her two home countries:

I think most [pupils] did like I /.../ they also learned by heart. Since... the teaching methods wasn't the same, in my country... In mathematics, for example, the teacher comes and "did you read this chapter? Okay, now there are some tasks for you to solve." And then, she wrote some tasks on the blackboard for us to solve". This is how it works, and if someone had problems... Well, the task was gone through the day after. The pace was too fast, compared to here. For me it worked well, because I... leaned by heart and always got good grades, but... It might not be good... (Rita, fourth semester, September 2011)

Jag tror dom flesta gör samma sak som mig, /.../ dom läste också utantill. För att... undervisningsättet är inte samma. I mitt land som... Till exempel när det gäller matematik. Läraren kommer och sen: 'Har ni läst det där kapitlet? Okej, nu får ni göra uppgifter'. Så hon, eh, skrev några uppgifter på tavlan och sen vi fick lösa. Det är så. Och när någon hade problem i nån uppgift, eller, ja, hade svårt, så... Just uppgifterna tog läraren upp nästa dag, kanske. Och sen går igenom det. Det var, asså... Går för snabbt. Om man jämför med här. - För mig, det funkade jättebra, för att jag... Jag, eh... lärde mig utantill och sen fick alltid bra betyg, men... Det kanske inte är bra... (Rita, fourth semester, September 2011)

Through personal positioning Rita articulated empowerment in the mathematics education discourse, as she put emphasis on teaching based on pupils' understanding. In addition, she positioned herself within a discourse about differences in teaching practices between her two home countries, a

discourse that emerged in several interviews with immigrant students. Two simultaneously working discourses hence allowed her to express empowerment as she had experiences from mathematics education in the two countries. Through her positioning Rita showed awareness of the differences and even if it seemed like she distanced herself from the way she was taught, Rita expressed empowerment in the sense that she was able to manage and to get good grades.

Central here is that Rita's positionings within the mathematics education discourse flowed as she altered between different perspectives. She expressed herself through talking about "we and you", and therefore kept distance from the actual discourse of mathematics education in Sweden. For example by saying "the way mathematics is taught in my country" and "the way you do in Sweden" her personal positioning as immigrant was empowering and made possible for her to question "why most Swedes have problems in mathematics" despite good teaching. Through intergroup positioning within the mathematics education discourse Rita also discussed the consequences mathematics teaching had in her first home country. The discourse that focused on differences in mathematics teaching and attitudes to mathematics developed towards questioning why Swedes are not successful in mathematics when the education is so good. Rita's personal positionings within the mathematics education discourse showed empowerment in the way she talked about having experiences from different cultures and contexts.

There were some similarities between the discourses Rita and Theresa expressed, grounded in their experiences from schooling in two countries. Like Rita, Theresa enacted empowered positionings in relation to differences between her two home countries, but Theresa focused stronger on the mathematics content, however without explicitly defining which content she referred to. By stressing the significant differences in complexity of the mathematics content, she had the power to argue that the mathematics she was taught as a child and youth in the country of birth was more complicated than in Sweden. Theresa found mathematics easier in Sweden and therefore she liked the subject better now. There were also differences among the countries with regard to available tools and the support children got in schools. Here the concept of creativity strengthens what Rita talked about in the previous paragraph: *creativity was seen as something good and worth striving for to facilitate learning in mathematics.*

I liked mathematics here in Sweden /.../ I didn't like mathematics so much earlier. But here, as I came here, I have had a good math teacher. It is much easier than in my country. Almost nothing [is similar] compared with our... Mathematics is much more complicated /.../ We have a lot... It is much... Everything! We read a lot... What you study...in gymnasium, we read in lower secondary, I think. Yes, it is the degree of difficulty. We read a lot. We don't use calculators either. We don't use much support. And I feel sorry for

them, who study [mathematics] in my home country. Because, they don't get it... the right way as here in Sweden. If they did, they would be very creative and... It is a big difference, I think. /.../ Maybe I found it easy. Too easy. I can this, and maybe that is why I... I think that affects me. It was too easy for me and I felt... I felt that I can. (Theresa, fourth semester, September 2011)

Jag gillade matte här i Sverige. /.../ jag gillade inte så mycket matte tidigare. Men här, när jag kom här, har jag haft en bra mattelärare. Här är mycket enklare än i mitt hemland. Nästan ingenting [är lika] jämfört med vårt. Matematik är mycket komplicerat [där]./.../ Men vi har mycket... Vaddå. Nej, det är mycket gu... Allting! Vi läser mycket... Det som ni har, kanske... på gymnasiet har vi på högstadiet, tror jag. Ja, det är svårighetsgrad. Vi läser mycket. Vi använder inte miniräknare heller. Vi använder inte mycket stöd. Och jag tycker stackars om... Det är synd om dom som läser i mitt hemland. För att dom får inte det... på rätt sätt som här i Sverige. Annars dom skulle vara väldigt väldigt kreativa och... Det är stor skillnad, tycker jag. /.../ Kanske tyckte jag att det var lätt. För lätt. Det kan jag. Därför kanske blir jag... Ja, det va...Ja, det tror jag kanske mest påverkar mig. Det var för lätt för mig, jag kände mig att jag... ja, jag kände som att det kan jag. (Theresa, fourth semester, September 2011)

The mathematics education discourse hence made possible for Theresa and Rita to reflect and compare on their early experiences as learners, in their countries of birth, to learning as adults in Sweden. Since there were no conflicting discourses working they had the power to make cultural comparisons, to identify relations between education and achievements and to draw conclusions; hence, they enacted empowered positionings within the mathematics education and the language/culture discourses.

I have illustrated the discourse of *cultural differences between Sweden and other countries with regard to how mathematics is taught* through two student interviews where somewhat different aspects were foregrounded. Only students with immigrant background could, for obvious reasons, talk about this. They had the power to choose how to talk about similarities and differences, and they also had the power to question one educational system in relation to the other. The other ethnographic data did not add much since issues about cultural differences and possibilities for the students to contribute with their experiences were rare in the courses.

Mathematics teaching is demanding

I have earlier showed (see “High requirements on the mathematics teacher”) how a discursive strand emerged through reflections about demands and challenges for the students’ future profession. They had reflected on their own background in schools — several with criticism — and they had through courses met new ways of mathematics teaching. In addition to that, their experiences from initial teacher education made them challenge what happened in schools. This made possible for the students to put high

demands on the supervising teachers. The students positioned themselves with empowerment in a discourse where *mathematics teaching requires that the teacher works hard and is engaged in his or her work; and one must meet every student on a level where they can understand and develop*. Leila and Sofia will here represent how the discourse made possible to criticise mathematics teachers and their efforts in schools; Leila drew on experiences during initial teacher education and Sofia on her own schooling.

When I came into the classroom the first day they had... They worked in the math book. It was quiet. I felt like when I was a child. Typical. An all-silent mathematics lesson. I... "is that what the course books say? It is... totally reverse" [Leila tells about a task when the pupils were supposed to work on their own] The pupils had to work on their own. There was no communication... there were no words for them to use... or to write on the chalk board "This glass is 8 kr [Swedish crowns]. If I buy things for [she meant pay] ten kronor, how much is left in your hand?" So I took paper and pencil as my tools and went to some who needed help. Yes, there were [inaudible] who didn't at all get what the task was about. "Shall I add... or shall I do subtraction?" I asked if they had play money. She could then work a little with the money. I don't know how much she understood, but she thought it was very fun to use money, and see it in reality... how much she gets. /.../ The math lessons were quiet. She [the supervising teacher] had a five to seven minutes introduction "then just [inaudible] the math book" I just feel so... No manipulatives, no pearls... The math book was important for them. (Leila, first semester, May 2010)

När jag gick in första dagen, dom hade en... Dom jobbade i matteboken. Det var helt tyst... Jag kände igen mig sen jag var liten. Typiskt. Helt tyst mattelektion, jag ba... ah... 'är det det som står i litteraturböckerna? Det... det är precis tvärtom.' /.../ [Leila berättar om en övning där eleverna ska arbeta självständigt] ...barnen fick jobba själva, asså det fanns ingen kommunikation, asså... det fanns inga ord att dom skulle använda eh... och visa på tavlan till exempel 'den här glaset kostar åtta. Om jag handlar för tio kronor, hur mycket får du kvar i handen?' Eh... Ja, det var bara och... använda papper och penna som verktyg Jag gick runt och kollade med dom som behövde hjälp. Ja, det var [ohörbart] som inte alls förstod vad uppgiften handlade om. "Ska jag plussa... eller ska jag göra minus?" Jag frågade om dom hade leksakspengar eller låtsaspengar. Då fick hon jobba lite med pengar. Sen vet int... asså, jag vet inte hur mycket har hon förstått, men hon tyckte det var jätteroligt att jobba med pengar. Eh... och se det i verkligheten... hur mycket det blir. /.../ Det var tysta mattelektioner. Eh... hon körde en genomgång på... max fem-sju minuter "sen är det bara (ohörbart) med mattebok". Jag ba... hallå... Jag blir bara så... Inga klossar, inga pärlor och jobba med eh... ja... Men... det var viktigt för dom med matteböcker. (Leila, first semester, May 2010)

Initially Leila's positioning within the mathematics education discourse allowed her to criticize and challenge the available discourse in school. They worked in textbooks and the classroom was silent. She felt like nothing had

happened since she was a child. No manipulatives was visible as the supervising teacher taught mathematics. Completely opposed to the university discourse of mathematics education, where manipulatives were talked about and used as tools for developing conceptual understanding. The overuse of textbooks was a strong discourse brought forward by the students over the two years, here in Leila's version. Like Sofia, she positioned herself as an actor in a drama (Harré & van Langenhove, 1999b) as she told me about how she turned bad teaching to be better for the pupils who needed more support. As several students were critical regarding teaching by the book and through their positionings within the mathematics education discourse they expressed empowerment by stating a clear view on how teachers should do when they plan lessons and teach mathematics. The mathematics education discourse allowed the students to argue that *teachers need to work hard in order to conduct good teaching and not relax. Teaching by the book makes teachers putting less involvement in their work.*

I will in the following illustrate the discourse through Sofia's reflections. It is her fifth semester and she drew on experiences from initial teacher education by positioning herself in the mathematics education discourse. Sofia initially expressed herself somewhat ironically, and the discourse made her question teachers' work. Then she changed approach and got involved in how a mathematics teacher might work in order to meet the needs of his or her pupils.

If you have a textbook... it is for sure practical if all [pupils] are on page 27... on Tuesday, but I think... what does that offer? Except for that it becomes easier for the teacher to correct? /.../ It's convenient. It's easy. It is really nice to have textbooks ready to use, and you have your Teacher's Guide. Then you can do exactly as it says. You don't need to think so much yourself and then you can sit and just tick off, so to say. "With reference to the teacher's Guide they have done page 27, which means they can add..." But, I think you have to watch out not to fall in to this. You should challenge yourself as teacher all the time, Of course using books. I don't mean we shouldn't, but I think that... one must think a little bigger. /.../ And use tasks where every pupil can place themselves and then grow within the task /.../ Really difficult. And you cannot do this every lesson, but... my thought and my ambition is /.../ to work like that. We'll see how things become. After two years... I sit there with my textbooks. (Sofia, fifth semester, January 2012)

... har man mattebok ... det är säkert jättepraktiskt om alla är på sidan 27... på tisdag, men jag tycker att... att... vad ger det, liksom? Förutom att det blir lättare för läraren att rätta ? /.../ För det är ju bekvämt. Det är jättelätt. Det är jätteskönt att ha färdiga läroböcker och så har du din lärarhandledning. Då kan ju... Då kan du ju göra precis som det står. Behöver du ju inte tänka så mycket själv. Och sen kan du sitta och bocka av, liksom. "Enligt lärarhandledningen", ba, "ja nu har dom gjort sidan 27, då kan dom addition blablabla." Men jag tror att man måste passa sig för att, såhär, falla in i det där. Att man, man ser till att utmana sig själv som lärare hela tiden.

Självklart använda böcker. Jag menar inte att man inte behöver göra det, men jag tror att det... att man... ja, måste tänka lite större. Och tänka mer på... ja men att ha uppgifter där alla elever placerar sig där dom själva är och sen kan växa inom uppgiften. /.../ Jättesvårt. Och det kan man ju absolut inte göra alla lektioner, men... mitt m... min tanke och min ambition är att det ska va... att jag ska jobba så. Vi får väl se hur det blir. efter två år: sitter jag där med mina matteböcker. (Sofia, fifth semester, January 2010)

After having positioned herself as strongly renouncing teaching by the book, Sofia clearly expressed awareness that a teacher cannot improve his or her teaching all the time. Through this empathetic interjection she told me that she had reflected on this and on the work she is expected to do after graduation. Nevertheless, she criticized teachers who wanted to make it easy for themselves by using the textbook as teaching material.

The most important thing is to be... engaged and inspiring. /.../ I believe, that one needs to, slowly but steadily, build a strong "all can do it"-basis. And then start gently. Not forcing, whatever you do. One starts gently so that all can feel "Yes... she was right", you see, "I have got it. I can understand that", and all the time try to raise the positive. I used... those thousand blocks [cubes]... and hundred blocks and then we calculated large numbers. The task was about exchanges. There was a boy in second grade /.../ I put the different blocks on the table and said, "If you take away one thousand two hundred" or the like. And he took it away. He was really good at exchanging... And I wrote all the numbers and said: [Sofia tells in her voice] "Have you seen this number? This is what you just calculated". He was so happy, and still is... This happened about a year ago. [Now she changes to sound more like an eight-year-old boy] "Sofia, will you come and calculate with me some time? All those large numbers I can do?" He was euphoric "Have I done that? Did I calculate that?" [Sofia tells in her voice] "If I had done it this way instead, do you think you had solved it then?" [Again Sofia seemed very engaged in telling this story. It seems like she remember this very clear.]. Well, I think one must begin with... the inspiring "Yes, here we go. This is going to be fun. You can do it. It will be..." The pep talk is the most important thing as teacher. Of course you need to be good at teaching too. You must know your subjects and... all that, but... I think that this is what is needed if... You learn better then. All of us... old and young [In this instance we both seem to think about her previous critique regarding the education]. (Sofia, fifth semester, January 2012)

Jag tycker att det viktigaste är att vara... engagerad och inspirerande. /.../ Jag tror, liksom, att man måste ... liksom, bygga upp sakta men säkert, med en väldigt positiv, stark 'alla kan'-grund. Och sen börja liksom smått. Och då inte börj... Inte gå ut för hårt, heller, i vad man än gör. Utan att man börjar smått, så att alla känner att, såhär, "Ja... det ja, hon hade rätt", liksom. "Jag har det här. Jag kan förstå det här", liksom att... hela tiden försöka lyfta det positiva. Jag gjorde en... med såna här tusenblock... hundrablock och... ja. Och sen så höll vi på och räknade, eh... med jättestora tal. Så höll vi på med växlingar då, var uppgiften. Den här pojken gick i tvåan. /.../ Jag la upp blocken och så såhär "men om du tar bort, eh... ettusentvåhundra", eller nånting. Och så tog han bort. Han var jätteduktig på att växla, liksom... Så

skrev jag hela talen, så sa jag "har du sett det här talet? Det är... Du har precis räknat ut det här." Han var så nöjd. Han var så glad så att han, fortfarande nu... Det här var typ ett år sen. "Sofia, ska... ska du komma och räkna med mig nångång? Alla dom där stora talen som jag kan?" För han var, liksom... han var helt euforisk: "Har jag gjort det där? Har jag räknat det där?" "Vad tr... Om jag hade gett det så här, tror du att du hade kunnat då?" "Nej, jag kan inte räkna så... Fast jag kan!" [Sofia är väldigt engagerad i denna berättelse. Det verkar vara en situation hon minns starkt] Ja, det gäller, liksom... Jag tror att det är så man måste börja... att ge det hära... "Yes, nu kör vi", liksom. "Det här blir kul! Du kan det. Det kommer bli"... Peppen, tror jag är viktigast som lärare. Eller viktigast... Det är klart man ska, ju kunna undervisa också. Man ska kunna sina ämnen och... Och allt det där, men... Jag tror att... att det är det som gör att det blir... Man lär sig ju bättre då. Alla... stora som små. (fniss) [här känns det som att vi tillsammans tänker tillbaka på Sofias kritik av undervisningen på utbildningen]. (Sofia, fifth semester, January 2012)

As teacher it is important to be deeply engaged in your work. As teacher one also needs to encourage your students and make them feel confident. The students often foregrounded their own engagement as mathematics teachers, and hence enacted empowered positioning, by retelling a sequence from one's own mathematics teaching experiences. The mathematics education discourses provided them with arguments for how to work with mathematics in class so that all pupils can learn and develop: "one needs to, slowly but steadily, build a strong "all can do it"-basis. And then start gently. Not forcing, whatever you do". The discourse also revealed norms for what is right to do and what is not, like Sofia exemplified: "The pep talk is the most important thing as teacher. Of course you need to be good at teaching too. You must know your subjects." She, like several of her peers foregrounded positive teaching experiences and hence enacted empowered positionings in the mathematics education discourse. These positive stories included more details about the mathematics content and about how the work progressed. The boy learned mathematics and she had observed that he still remembered, one year after.

The last comment in the interview excerpt shows that there are other factors that affected her during the education as she talked about requirements for teachers: "You learn better then. All of us... old and young [In this instance we both seem to think about her previous critique regarding courses she has taken at the university]." I commented on this in my notebook, immediately after the interview, since I related her interjection to her experiences at the university where the institutional discourse constrained and challenged several students. This will be further elaborated in the "Institutional discourse" chapter.

Finally, as Sofia highlighted the importance of conducting good mathematics teaching and that the teacher should have good subject knowledge she positioned herself with empowerment in two discourses. In

the end she expressed that institutional challenges affected her, since her reference to good teaching did not meet her expectations on the institutional level. I find it relevant to stress, that this excerpt clearly exemplifies how several discourses interact and may affect the students' positionings. In Sofia's case I could not identify any clear changes in positioning. However I will show further on that other students were noticeably affected by the power-relations among available discourses.

Mathematics discourse

The mathematics discourse differs from the mathematics education discourse in several ways. Firstly, the mathematics discourse revealed positionings regarding specific mathematics content in the courses and the students' own knowledge in mathematics. The mathematics education discourse allowed positionings regarding different approaches to solve mathematical problems and to teach from basis of pupils' experiences and understanding. Therefore, the students' positionings clearly changed when the two discourses were working simultaneously. They hence struggled a lot with how to apply the mathematics they studied when teaching their future classes. Prevalent were also the discourse of what was required to pass the exam, how to talk about mathematics, and different dimensions on mathematics as discipline. The following sections are framed from different discursive strands that emerged as students' enacted positionings within the mathematics discourse.

Understanding mathematics as becoming teacher

During the third and fourth semester the two student groups took courses that aimed at increasing their own mathematical competences. Consequently, lots of data during these periods concerned the mathematics content in different ways. From interviews mathematics was foregrounded with regard to themselves as learners, challenges they struggled with, and also mathematics as a discipline. From observations the data emerged from their questions to the teacher and from discussions among the students. However, the mathematics discourse was present from the very first course at the education and the students talked about mathematics and mathematics teaching as integrated. Naazim express the challenge in understanding not only the mathematics, but to understand how to teach other people.

It is quite interesting. First I thought it was easy. But now it has been shown that it is not enough if you know the mathematics. You also need to know how to teach it. And that is lot more difficult than to... learn, because one has... you can only understand yourself. But you need to understand the pupils' situation when you see them. It is more difficult then, but at the same

time interesting [to follow] their development. /.../ When I become a teacher. Mathematics is not only to teach symbols and formulas. Mathematics is also present in everyday life. (Naazim, first semester, January 2010)

Det... är ganska intressant. Så där. Först... tyckte jag att det var enkelt. Men nu har det visat sig att det är inte bara att man vet matematik. Man ska också veta hur man lär [ut] det. Och det är mycket mer svårare att... lära, för att man har en... man bara förstår sig själv. Men när man ser eleverna måste man förstå dem och deras situation. Då är det svårare att lära. Men på samma sätt intressant... hur deras utveckling går. /.../ När jag blir lärare. Att matematik inte bara är att undervisa dom olika tecken och formler. Att det också [finns] i vardagslivet. (Naazim, first semester January 2010)

From Naazim's positionings a mathematics discourse emerged parallel with a mathematics education discourse, within which it was *important to know mathematics, but even more important to understand the pupils' situation; and to bring in everyday contexts in mathematics teaching*. These discourses challenged her previous ideas about mathematics and mathematics teaching as teaching mathematics included so much more than knowing the content. Leila and Camilla articulated the discourse represented by two additional aspects on this integration. Their positionings within the mathematics discourse were cautiously enacted, nevertheless with an awareness of what was required of them as becoming teachers. Leila focused on the importance of understanding the mathematical concepts in order to interpret and use different teaching materials in her teaching.

I must know more about... grasp the mathematical concepts we talk about here [at the university]. Learn more and use... How to interpret the materials I will use for the children in my teaching. (Leila, first semester, January 2010)

Jag måste kunna mer om... Självt uppfatta mate... matematikbegreppen som vi pratar om här [på universitetet]. Eh Använda... Lära mig mer och använda, eh... Hur ska jag tolka de material jag kommer använda för barnen under min på min undervisning. (Leila, first semester, January 2010)

Early in the education these two discourses emerged as simultaneously working, meaning that the mathematics education discourse, which related to teaching pupils, was expressed interwoven with the need of own conceptual understanding. Camilla told me that it is hard to explain her own thinking so that she can explain for the pupils how to think. Even though Camilla expressed difficulties in explaining mathematics for children, she positioned herself with empowerment with regard to what she hitherto had learnt in her education.

It is very difficult for me to explain how I think. Just that feels much better already. How to explain for children... how they shall think. So... I feel... better than I thought I would do. It feels like I have already got so much more, well... [methods] to use. (Camilla, first semester, January 2010)

Jag har så svårt för att förklara mig hur jag tänker. Bara det, liksom, känns som redan att det går mycket lättare. Hur man kan förklara för barn – hur dom ska tänka. Så det... Jag tycker det känns, ja... bättre än jag trodde att det skulle vara. Att det känns som redan har jag fått mycket mycket mer, ja... som jag kan använda. (Camilla, first semester, January 2010)

These examples represent a mathematics discourse which recurred through all courses I attended, and was brought forward by the students in many interviews: *Mathematics teaching is not only about understanding the content; one has to understand how to use materials and how to explain so that the pupils understand.* Over time the discourse evolved with regard to actual course content and due to the students' experiences. But talking about and doing mathematics still involved that the students related the content to mathematics teaching and how the students could use their new knowledge as mathematics teachers.

However, despite that they had taken courses with stronger mathematical focus, they often articulated the discourse without explicitly talking about the mathematics content. I asked Sofia to elaborate on what mathematics a teacher needs to know to be qualified for teaching lower grades. As will be shown, she did not articulate specific mathematical areas or specific skills. Instead she took a broader perspective on why one has to learn mathematics on a high level.

You need to know mathematics on a quite high level to know why you do [teach] some moments earlier where I am [in the first classes]. Like in that mathematics course, I will never teach anything of that in the classes I teach, but it is more like an understanding of what comes next and... how I can work in order to avoid... when it becomes more abstract in grade 4-6. How can I in grade 1-3 start working with something which... prevents the chock many pupils get in fourth grade: "Ahhh, I don't understand anything." So I think the more mathematics you know, the better, in order to know how to prevent. But primarily it is important to know how I can explain in many ways, so that all [pupils] understand. That's what I think, primarily... And when we have got tasks, which children have solved in wrong ways /.../ and you start to unravel, and you see "it must be like this and this" and... yes, understanding why, so to say. Where they did wrong connections and see if it was careless mistakes or if they have learnt wrong... how to calculate or... how to solve a task. (Sofia, fifth semester, January 2012)

Man behöver ju kunna matematik upp på en ganska hög nivå för att kunna veta, bara, varför man gör vissa moment lägre ner... där jag är. För som den [matematik] kursen. Det är ingenting som överhuvudtaget kommer beröras i dom klasser som jag undervisar i, utan det är mer som en förståelse för... vad som kommer sen och hu... hu... hur kan jag arbeta för att det inte ska bli s... när det blir det här abstrakta på mellanstadiet. Hur kan jag på lågstadiet då redan börja arbeta med nånting som... ja förebygger att det inte blir den här chocken, som många elever får där i fyran bara: Aaah, jag fattar ingenting.

Eh... så... så jag tänker att ju mer matte man kan, desto bättre, för att veta hur man ska förebygga. Men sen så är det väl framförallt att veta hur kan jag förklara det på jättemånga sätt, så att alla förstår. Det är det, tycker jag, framför allt. Och när vi har fått sån... fall... ah... uppgifter som barn har svarat på och det är helt fel /.../ Och sen så börjar man nysta och så ser man, "jo, men det är ju såhär och såhär" och... ja, mer en förståelse för hur det kan liksom. Vart det kan koppla fel och gå in och se, är det slarvfel, eller det att dom har... lärt sig fel nånstans, liksom i... i hur man ska räkna eller... hur man ska lösa en uppgift. (Sofia, fifth semester, January 2012)

The mathematics discourse within which Sofia positioned herself with empowerment allowed her to express possibilities to become a better mathematics teacher. And she, by being more competent herself, could meet the pupils' needs by explaining in many different ways. This made her also highlight, that by knowing mathematics on a significantly higher level than her pupils, she can identify why errors occur in their solutions.

The mathematics discourse also revealed concerns regarding the students' own mathematical skills, both with reference to their own schooling and to learning mathematics as adults. Drawing from their own experiences it was an accepted discourse by many students that mathematics in school was both stressful and competitive. Therefore, the strategies for teaching future pupils became helpful for the students' own mathematical understanding. This was prevalent in what Tina talked about during the fourth semester. Mental calculation was very stressful in school and hence Tina expressed another aspect of the mathematics discourse as becoming teacher, which highlighted the importance of learning different strategies: *First and foremost it was necessary to feel confident with the mathematics content as teacher.*

I think we talked about different calculating strategies ... that were very useful. I have... great difficulties with mental calculation, since large focus is required and when I get stressed I lose focus. And when I got those strategies, it felt a lot a lot easier. I was not as stressed, I could make fast calculations, and that was so... Then I felt I had missed large parts of grundskolan [compulsory school, grade 1-9]. And then it was so fun that this education... when we started the level of the mathematics was so low- And then I felt... well, this is going to be quite boring and... lengthier and... But it was very fruitful and... if we worked on addition, for instance, we didn't just talk about it... We experimented and used many ways of calculating, and talked thoroughly about what it really was in a way one hasn't done before. That was fun. Then there was a continuous progression and we could discuss algebraic patterns and negative numbers, and understand those concepts too. (Tina, fourth semester, December 2011)

Nämen, jag tror vi pratade om olika räknestrategier... som jag tyckte var jätteanvändbara. asså, Jag har... jättesvårt med huvudräkning, eftersom det är ett moment som krävs mycket fokus och när jag blir stressad så tappar jag fokus. Medans... och när jag fick dom här strategierna, så kändes det.. mycket, mycket, mycket lättare. Jag blev inte lika stressad, jag kunde göra

snabba uträkningar och sådär. Och bara det var såhär... Då kände jag att jag hade missat stora delar i grundskolan då. Och då var det jättekul att den här utbildningen... för när vi började vad det på en så låg nivå, matematiken. Och då tänkte jag såhär att, ja... det här kommer bli rätt så tråkigt och... långdraget och. Men... men det var jättegivande och... om vi berörde ett område i addition, till exempel, så var det inte bara att vi pratade om det och den så var det bra, utan... vi laborerade med många typer utav sätt att räkna addition och pratade ut om vad det verkligen var och sådär. Så att man fick ett... ett, ja ett riktigt begrepp om det. Som man inte haft tidigare. Eh... så det var kul. Sen, den var ju progressiv hela tiden, så sen så kom man ju till delar när man eh, kunde diskutera algebraiska mönster och... eh, negativa tal och förstå det begreppet och dom koncepten och så. (Tina, fourth semester, December 2011)

Tina's positionings within the mathematics discourse were strengthened by the concepts that helped her to identify different parts of the school mathematics, such as calculating strategies and mental calculation that had been challenging for her in school. Even though mental calculation was very stressful, the new insights from the mathematics education courses made her express empowerment within the mathematics discourse: "when I got those strategies, it felt a lot a lot easier. I was not as stressed, I could make fast calculations." A discourse of not being good at mathematics as a child was complemented by a discourse of mathematics as an interesting and fun subject to learn. The eager to learn more and to understand well-known concepts on a deeper level was prevalent in field notes from all courses, and it is also visible in several of the interview transcripts that I present. I will elaborate more on this in the next section through analysing an excerpt from my observations in the mathematics course.

Learning for passing the exam in mathematics

A new mathematics discourse emerged during one of the mathematics courses. They had lectures every day and got tasks to work on in preparation for every occasion. In comparison to how they usually were scheduled during mathematics education courses, the institutional framing hence differed a lot. I participated in all seminars and tried — except for jotting down the structure and content of each lecture — to grasp what the students asked in whole group sessions and what they chose to talk about with regard to the education during breaks, before, and after the lectures. The reason for that was that I early recognised that the students were engaged in talks about the course even though the lecture was finished. From my fieldnotes the emerging discourse had a strong focus on technical terms and on catching every step the teacher writes. The students tried to understand connections between the mathematics they were taught and how this could be used in the school context. However, the longer the course lasted the more focus turned

from the students' future work as teachers, to what they need to learn to pass the exam as I will show further on in this section.

In the following I have chosen an excerpt from one occasion the first week, which illustrates these conflicting discourses. Usually, I came to the university about 15 minutes before each lecture started so I had some time to talk with the students and listen to their conversations, mostly in the café or outdoors if the weather was good. At this specific occasion I sat in the café reading through previous field notes. As two students – whereof Tina was one – were engaged in a conversation about the actual course I stopped reading and started writing instead:

Two students are having a conversation before the lesson starts.

Student 1(S1) finds it good that Tina is there and poses questions on the content, which none of the classmates say they understand. They are sitting in the café and goes through tasks they were supposed to work on till today. S1 says that everything is presented very fast, leading to that the teacher sometimes erase what was written on the chalk-board before they got time to write it down. (Fieldnotes, September 2011):

Tina commented on this later and told me that the classmates had said it was good for all of them when Tina asked the teacher about things they didn't understand themselves. As we went to the classroom I recognised that I needed to be even more aware of the students' response regarding the content, since I now had heard them express concerns regarding the difficulties they experienced in mastering the course content. The actual day they should be introduced to modulo computation. I judged these field notes as important to share, since there were several instances where I recognised that something was disturbing. The mathematics discourse was, for obvious reasons dominant, but what made the students challenge the discourse? The introduction started:

Teacher (T): Do you remember the Euclidean Algorithm?
Someone mentions the greatest common divisor (GCD)
The teacher takes GCD (112, 64) as an example. What do we do?
One student says that we shall divide.

In the beginning of the lesson the students were invited to participate in the introduction and it didn't take long until a student took the chance to do it. Based on the communication before the lesson started I decided to focus on how the students interacted in the mathematical discussions by posing questions and commenting on the actual mathematical content, hence on how they enacted their positionings in this communication.

The teacher writes: $82 \cdot 47 + 69 \cdot 29 = 5855 = 836 \cdot 7 + 3$
S3: I didn't get that. Are we supposed to calculate that?

The teacher divides all numbers with 7 and writes the remainders:
 $5*5+6*1=25+6=31$; $31/7=28+3$
S3: Is this a way to control that?
T: No calculation is easier this way. We will go through why. It is not obvious. We will talk about why. Did you understand the difference?

The group was silent. Single students whispered low. S3 posed a question to clarify the relation between GCD (112, 64) and the new expression. She asked for this clarification in order to understand the purpose of the second writing. None of the other students seemed interested in asking questions in whole class. The teacher continued:

T: Definition: Two numbers x and y are congruent modulo n if they have the same remainder when dividing with n
Jessica: What was this definition of?
T: Examples of numbers having the same remainder when dividing by ten.
Jessica: What does modolon mean?
T: congruent modulo n .

Jessica had not heard about the concept before and did not perceive the space between modulo and n , since the teacher had not yet expressed the concept orally. Her question thus made explicit how to pronounce the new concept. She was eager to understand and asked about details, which appeared to be important for the future discussion, at least for the students. The mathematics discourse strongly affected the questions and comments in class, and at this stage the students focused on technical terms, such as how to write and how to pronounce new concepts. In the forthcoming we will see how Jessica and Tina positioned themselves in the mathematics discourse by challenging and questioning what seemed to be taken for granted.

T asks: 11 and 21 mod 10?
S5: What? If we divide by 10?
T asks a new question: 11 and 21 mod 3?
Tina: $6*3$ is 18 and $6*5$ is 30... [Tina tries to make sense of this and speaks loud]
Tina raises her hand: I have a question. I don't really understand the concept congruent. [Poses follow-up questions to clarify]
T: Congruent modulus is just the name of the remainder. There are cases when congruence is used in other contexts, but in this case it is only the name. The same remainder when we divide by n .
Tina: Yes... [Is Tina happy with the teacher's response?]
The teacher writes the theorem as it is presented in the course book.
Tina: And this theorem explains the example above? [Checking for confirmation]
The teacher writes another example
Tina: And this is an example that follows the theorem? [Asks to confirm the relations]
T: It is directly applicable.

Tina's discursive positioning expressed a will to understand, but also that there was need for clarifications. She hence resisted the available mathematics discourse. They were used to a mathematics education discourse within which mathematics should be taught grounded in pupil's understanding and not in memorizing rules. They were also used to a mathematics discourse, which allowed "silly" questions and errors – all aiming at deepening their understanding in the long run. To receive clarifications from the teacher so that they could deepen their understanding was hence taken as normal, since they were used to that form of communication in the mathematics education courses. Empowered positionings within the mathematics discourse therefore allowed Tina to challenge *high-speed calculation and superficial learning*. Jessica now returned to the discussion.

T writes $(114)^{31}$
 $114=112+2=16*7+2$

Jessica: Why not write as one did earlier? [She uses the pronoun "one" instead of "you". Is that a way of distancing herself?]

T: Because I want to continue calculating here [starts with example A in the course book].

Jessica: But, how to write the answer then? [She wants to do right and is not happy with the new way of writing]

T: Well, the remainder of $(114)^{31}$ dividing by 7 are 2.

T: Any questions?

Tina: I have some difficulties in understanding how to apply the theorem in relation to these numbers. It doesn't matter which number it is... Does that mean that $n \mid 1$ is...? [Tina tries different numbers on the variables]

Tina: Does that mean that you can say $82+47 \equiv 5+5 \pmod{7}$ [This positioning signals that she takes responsibility for making this clear for the student group]?

T: This is congruent with $5*5$ and this is congruent with $6*1$.

The statements are equivalent

S5: What does it say? That means equal, doesn't it?!

Tina: What does c mean? And n is...? Ok, but the only difference is that it is multiplication and not division? [Wants to understand and goes back to previous calculations]

Jessica: Is it possible to do this with numbers? Will it be easier then? [She considers different ways of dealing with this in order to make them understand.]

T: Can we re-write the statement $14=2*6+2$? [Subtracts 2 on both sides]

S5: How did this help us?

The teacher returns to the two last lines and goes through it one more time.

The teacher invited me to interrupt or contribute to the discussion, but I declined as I found it better to listen to the discussions rather than to impact them. During the break several students talked with the teacher and asked if it was possible to present easier tasks and to be clearer about the aim of the different theorems. They also wished a stronger connection to everyday contexts and examples from how this can be applied. Jessica told me she

doesn't have time to work with this now. She will wait and do it during the weekend. (Fieldnotes, September 2011)

Jessica supported Tina as she contributed with her own questions. Her questions related both to details in the introduction: "Ok, but the only difference is that it is multiplication and not division?" and to connections with mathematics education: "Is it possible to do this with numbers? Will it be easier then?" Jessica's positioning within the mathematics discourse she was used to, allowed her to pose questions about how to make the task easier. Maybe she was empowered by the way Tina positioned herself in the mathematics discourse. However, with regard to an eager to understand and to clarify what they found difficult, I read the data such as both students challenged the dominant mathematics discourse by expressing empowered positionings in a discourse where understanding is important. They did not accept the rules and theorems without getting a chance to understand why; they hence expressed empowerment through their resistance towards the prevailing mathematics discourse.

The prevailing mathematics discourse was, like in Nolan (2012), characterized by condensed and exact information, definitions and theorems and not elaborated in everyday language. Both Tina and Jessica actively challenged the available discourse by asking for clarifications. However, this had minimal impact on the discourse, since both questions and answers focused on details and not on clarifying the reasons behind the benefits for them as learners, and when it might be useful knowledge for them. It may seem like they gave up what they believed in and accepted the discourse. Both Jessica and Tina talked about this at a later stage during interviews. As I had been present in all courses they referred to previous courses in comparing how mathematics was focused.

“Mathematics is...”

The mathematics discourse was for instance characterized by speed, by doing right and also by a wish to understand abstract phenomena, as exemplified above. In addition, there were other emerging discourses, which focused on the usefulness of mathematics and how the mathematics affects individuals. Why should we teach mathematics in school, and what do we gain by being mathematically knowledgeable? I here let Sofia and Tina depict the mathematics discourse from this point. Sofia talked about mathematics as useful in everyday situations. After a while, this discourse changed towards a view that you/one (Herbel-Eissenman & Wagner, 2010) becomes more logical, and that these properties are applicable in several other situations than those which are specifically mathematically.

I think mathematics primarily is benefitting for daily life. In order to go shopping, to progress in life and do mundane activities, you need to know mathematics /.../ I think mathematics makes you... One creates a rational way of thinking, so that you can... One becomes more logical and it is applicable outside mathematics too, and you get... You have a problem that you need to unravel from different ends, and you don't know how to do it. You start and you don't know if you are going to get things together, or... is it impossible to solve? /.../ Explorative and... not given, so to say. And logical thinking, as I think about it. (Sofia, fourth semester, December 2011)

Jag tycker att matematik framförallt är vardagsnyttigt. För att kunna gå och handla. för att ta dig fram i livet och göra vardags saker, så behöver du kunna matematik. /.../ Jag tycker att matematik gör att man ... man skapar ett rationellt tänkande, att man kan... Att man blir mer logisk och att det går att applicera i sånt utöver matte också och att man får det här att man ska... Du har ett problem du ska börja nysta i olika ändar och du vet inte hur du ska gå tillväga. Och då börjar du där och så där och du vet inte om det stämmer och kan du få ihop det där, eller... går det inte att lösa? /.../ Undersökande och... inte givna, liksom. Och logiskt tänkande, tycker jag är i det. (Sofia fourth semester, December 2011)

Sofia's description of what mathematics *does* with them who master the content reveals a discourse where mathematics itself has characteristics, which affect individuals: "One creates a rational way of thinking... One becomes more logical." This is consistent with the way Tina positioned herself within the mathematics discourse as she told me about when and why mathematics became an interesting subject for her to learn. Tina talked about mathematics as important with regard to its connection with personal progress, such as working life, and stressed, like Sofia, that mathematics *does* something with the individual. One becomes more intelligent and can use his/her properties of logical thinking and reasoning "in other situations but mathematics".

Mathematics is... except for the number thing, very tied to working life and all kinds of professions, and it feels like there is kind of an intelligence raising part of it /.../ all since the upper secondary, when I started to explore the mathematics. That it was not just about the numbers, but it was about finding patterns... Yes, I mean what mathematics really is about. /.../ then I noticed that I had a much better reflective ability in other subjects, since one tried to search for patterns all the time and tried to think logically /.../ But I feel that mathematics is undeniably intelligence raising and extends... if one wants to. One can for sure do mathematics without reflecting at all, but I think that if you work in such a way that... the pupil is expected to search all the time, then it is intelligence raising and... it extends to other subjects so that one can use the knowledge in other situations but mathematics. (Tina, fourth semester, December 2011)

Matematiken är ju... förutom det här med siffrorna att det anknyter jättemycket till arbetslivet och alla olika typer av yrken, så känns det att det

finns, liksom, en slags intelligenshöjande del i den/.../ ända sen gymnasiet, när jag började upptäcka matematiken. Att det inte alls bara handlade om siffrorna utan att det handlade om att hitta mönster... ja, men det här som egentligen matematiken handlar om, /.../, så märkte jag att jag hade en mycket bättre reflektionsförmåga i kanske andra ämnen, eftersom man hela tiden försökte söka efter mönster och att man hela tiden försökte tänka i logiska banor och sådär. /.../ Men jag ... jag känner onekligen att matematiken är intelligenshöjande och att den sträcker sig... i alla fall om man vill, asså det är klart att man kan beröra matten utan att reflektera alls, liksom, men... Men jag tror att om man jobbar med det på ett sån't sätt när man... när eleven får söka hela tiden, så är det intelligenshöjande och att man... att den sträcker sig över till andra ämnen och att man kan använda den kunskapen i andra situationer än just matte. (Tina, fourth semester, December 2011)

The two strands of the mathematics discourse that emerged in these sets of data show explicit assumptions that mathematics in itself empower people, a view that is discussed and criticized by Valero (2004b).

It is possible to argue that ‘power’ appears in association with statements of the type: Since mathematics is a *powerful* knowledge in our society, then it is important to improve the access of as many students as possible to a quality mathematics education. Such an assertion implies, in other terms, that mathematics and mathematics education *empower*. That there is empowerment associated with mathematics and mathematics education is sometimes an explicit assumption (p. 13)

I chose to illustrate these strands of the mathematics discourse in the end of this section for two reasons. First, even though this is not a view that pervaded and dominated the mathematics discourse, these discourses revealed assumptions about what characterises mathematics and what it does with individuals. It may hence contribute to our interpretations of the previous strands: understanding mathematics as becoming teacher; and learning for passing the exam. As becoming mathematics teacher one goal should be to empower pupils through mathematical confidence, and in so doing it is required that the teacher him/herself is confident with the mathematics content (cf. Persson, 2009) — hence owns the powerful knowledge. The students’ positionings showed that they were affected by this view on mathematics. Second, the students enacted empowered positionings within this discourse in contrast to when institutional constraints inflated the discourse, and speed became more important than understanding.

There is a discursive conflict though, since the tension between being knowledgeable in mathematics and the requirements of being able to calculate fast sometimes coincides in the students’ positionings, like Tina stressed earlier: “when I got those strategies, it felt a lot a lot easier. I was not as stressed, I could make fast calculations.” *Being able to calculate fast*

and to understand rendered empowered positionings and emerged as a strong, however not so frequent articulated mathematics discourse.

Language/culture discourse

From the first interviews several students talked about different aspects of the role of language, and its connection with mathematics as a school subject. This made me curious and I went back to my field notes to check how I had commented on language issues during my observations. I recognised that there were notations regarding oral and written language at several occasions with an emphasis on the first two or three weeks. A language/culture discourse hence emerged through both field notes and interviews, which highlighted the role of language and the importance of mastering the educational language, in this case Swedish. The discourses that emerged from the data mainly concerned variants of three themes. Firstly, *language was talked about as an instrument, clearly connected to mathematics, which the teacher must master and use so that the pupils understand.*

During the first week, language was talked about as an instrument for the teacher and that the importance of language in mathematics education is central. The teacher must master the language. I [as teacher] must take responsibility for ensuring that the pupils understand. The Swedish language was foregrounded as the language of instruction and the language, which should be used in written assessments. (Fieldnotes, January 2010)

Teaching is about communication and a second aspect of the language/culture discourse, well connected to the previous, emerged in the early fieldnotes. *A teacher should be able to express oneself in different ways, and it is important to know the subject so the content can be well communicated; hence there are requirements of both mastering the mathematics content and to communicate it well.* The importance of expressing oneself explicitly and clear pervades the discourse.

There are different ways of expressing oneself, which the teacher must master. The teacher must be competent and know their subject so it can be well communicated. The students practiced oral mathematical communication through exercises which required them to describe clearly so that the recipient understands. The terminology should therefore be exact and the language should be expressed clearly, both orally and in writing.

The students were given language related advices for initial teacher education, such as: to be well prepared and check the spelling, and to Practice their handwriting on the chalkboard in beforehand. (Fieldnotes, February 2010)

Thirdly: academic writing was introduced within this first course with the purpose to prepare the students for written assignments and the requirements of two independent degree projects during their education. During the interviews it became evident that many students were not used to reading and writing academically since this was their first education on university level. The discourse of *academic reading and writing required scholarly competencies*. For more assistance and professional advice, the students were encouraged to use the academic writing service that the university afforded for all students who might need support.

The academic writing service was warmly recommended by the teachers. The service is for everyone.

And about how to write: Everything you write should be linked to the literature and to steering documents. Choose how you want to write. Look in the literature. How do they quote or paraphrase? Compare and problematize what you have read and heard. Discuss with the literature.

Future requirements: Independent degree projects later in the educational programme. It was implicit that the students then were expected to manage their writings independently.

(Fieldnotes, February 2010)

The literature was mostly in Swedish, but some texts and one course book were written in English. Some students brought these language issues forward as problematic, primarily if Swedish was their second language. They then had to deal with two foreign languages in addition to the mathematics and mathematics education content. Most students who referred to language issues, due to their history of being immigrants also referred to cultural aspects. These were often tightly interrelated, which also is the reason for why I chose to include “culture” under this discursive umbrella.

Mathematics as a language

The connection between mathematics, language and mathematics as a language through which we can communicate was brought forward in mathematics education courses as important issues for the students to be aware of. Not all students had expected this in beforehand as will be shown further on. The prevalent language/culture discourse inflated the mathematics education discourse and presupposed conscious awareness of how concepts like volume and extension could be misunderstood; and of the importance of using correct terminology even with young pupils. I have shown how students positioned themselves by expressing positive statements and feelings with regard to the novelty and difference of mathematics education compared to their own schooling. However, this mathematical discourse challenged some students who had chosen mathematics as their subject of specialisation. A discourse of mathematics as a language revealed

from the data: *as becoming teacher in Sweden it is implied that one needs to master the language and to be aware of its importance for the pupils' learning in mathematics.* The focus on language was much larger than on mathematics and there seemed to be cultural differences in how tightly mathematics and language were connected. Samina, one of the students who were concerned about this, said that she had to think about the consequences for her continuation in the program, her disempowered positioning indicated that she did not have the power herself to change anything. She hence had to accept the requirements or leave the education.

Samina: The reason why I chose mathematics is just because... I thought I wouldn't need language as much. But now I understand that in Swedish schools one writes mathematics, and also oral tests, and I thought "My god, here you are supposed to describe a lot and also master the language too" So that was the reason [why she chose to become a mathematics teacher], and that I am good at mathematics. Before [she began] I taught other pupils mathematics and they understood. Then I thought maybe... this is good. If I choose to apply for teacher education, then the subject should be mathematics.

Kicki: Is this what you still feel?

Samina: Yes... Uhm... You know that a teacher should speak very well, so... one cannot... say the wrong things and the child... learn wrong all the time... from scratch. And I... The only thing I am afraid of is the language. If I don't master the language... what does the future look like... for me? We'll see. (Samina, first semester)

Samina: Nej, anledningen att jag valde matematik det är bara för att... Eh... Jag tänkte mig förut att det behöver inte så mycket språk. Fast nu fattar jag att i svenska skolor man får göra... asså, man får eh... skriva matte... och sen ska en, för... vad ska man säga, ... muntlig förhör och då tänkte jag 'men herre gud, här ska man beskriva massa och behärska språket också. Så... anledningen var det plus att jag var bra på matematik också. Och innan jag lärde dom andra eleverna matematik. Dom kunde förstå bra. Då tänkte jag mig kanske... det är nå'nting bra, som... Om jag väljer lärarutbildning, då det är... inriktningen ska vara matematik.

Kicki: *Känns det fortfarande så?*

Samina: *Ja. Mm... Du vet att en lärare ska prata väldigt bra, så att... man kan inte... säga fel och sen barnet... lär sig fel hela tiden, asså... från grunden. Och jag... Det enda som jag är rädd för är språket. Om jag klarar inte språket helt och hållet... hur ser framtiden u... ut för mig? Vi får se. (Samina, first semester)*

Even though the academic language/culture discourse brought forward common concerns in the student group, a strong discourse of being second language learner in mathematics teacher education emerged. This discourse, explicitly expressed by immigrant students, concerned the requirements of oral and written performance at the university; how language affected their participating in groupwork; and how language affected their communication

with pupils and the supervising teacher. None of the students born in Sweden did mention any of these issues. However, which is important to say, there were also immigrant students who did not position themselves within this discourse. I did not explore why they did not, since I focused on phenomenon and not on individuals. The grouping of students was, as outlined in the methodology chapter, dynamic and related to how discourses emerged through the students' enacted positionings. I will return to this group in next section. They became of specific interest since they, as second language learners, expressed disempowerment within the language/culture discourse.

“We, who are immigrants...”

When I met each student for the first time I opened the interview by asking: “How do you feel after the first weeks at the mathematics teacher education programme?” I hence positioned them within the institutional discourse including the mathematics teacher education. Many students accepted this positioning, and answered accordingly. Then some students challenged the discourse by enacting strong positionings in other discourses.

Evelyn, Nadia and Theresa moved to Sweden six years ago, Evelyn and Theresa as adults and Nadia as an upper secondary student. They all enjoyed mathematics and therefore chose mathematics as their main subject when applying to the teacher education programme. Let us follow how Evelyn, Nadia and Theresa brought the language/culture discourse to the fore by positioning themselves through personal and intergroup positioning.

Evelyn: How I feel? Right now I'm okay. Two days ago I thought about jumping off. Uhm... The first two weeks were very tough and maybe it was because of language, I don't know. It felt like this was not at all what I thought it would be and... I decided to not become a mathematics teacher /.../ I felt like this last week and now I think this course is okay. But I don't know how I will feel later... down the line as one says. I hope it will get better and better. (Evelyn, first semester)

Evelyn: *Hur det känns? Just nu känns det okej. Två dagar sedan (fniss) skulle jag tänkt att kanske hoppa av (skratt). Uhm... det var väldigt mycket de första två veckorna och kanske det var språket, jag vet inte. Det kändes som om det var inte alls vad jag tyckte att det skulle vara. Och... jag hade bestämt mig för att inte vara mattelärare. /.../ Det är bara att jag... ah... jag kände så här förra veckan. Och nu känner jag okej med kursen. Men jag vet inte hur jag skulle känna lite... senare — down the line, som man säger. Jag hoppas att det bara blir bättre och bättre. (Evelyn, first semester)*

Evelyn took up the position of feeling something in relation to the educational programme. However, she resisted the initial positioning of herself as becoming teacher and instead expressed concerns regarding language difficulties. Hence, Evelyn positioned herself within an available discourse of language by describing her experiences from the first two course weeks. Evelyn's personal positioning within the educational discourse: "Right now I'm okay /.../ I think this course is okay" showed empowerment. The shift in positioning indicated that power-relations within the language/culture discourse affected her and made her turn her focus on language instead of her future profession as mathematics teacher. Hence, within the working language/culture discourse her disempowered positioning is clear. These two different positionings made her express ambivalence in relation to mathematics teacher education.

Also Nadia took up the position of feeling in relation to the educational programme, especially of "being in this class":

Nadia: Honestly, it feels quite bad... being in this class.

Kicki: Okay?

Nadia: What happened was that eh... immigrants were grouped together with immigrants and the Swedes with them. This will lead to that we will not develop our language skills. And especially for us who want to become teachers and... because we are immigrants too. So we will kind of be... we will be assessed as students, not... as immigrants. But I think they mostly will focus on our language. How we speak Swedish, how we work together. I have difficulties in the Swedish language. Not only mathematics [is important] as the teacher told us. The language is the most important... tool. If one look at this, I don't think we will succeed... (Nadia, first semester)

Nadia: Om jag ska vara ärlig, så det känns ganska dålig och... Och gå på den här klassen.

Kicki: Okej?

Nadia: För att det har hänt så här att eh... invandrargrupp har indelats bara med invandrarna och svenskarna bara med dom. Och det gör så här att vi kommer inte att bli utvecklade i språket. Och speciellt för oss som vill bli lärare och... plus att vi är invandrare också. Så vi kommer typ bli... att dom kommer typ bedöma oss som elev inte... som invandrare. Men jag tror att dom kommer mest titta på språket också. Hur vi pratar svenska, hur vi jobbar tillsammans. Det... jag har svårigheter med svenska. Inte bara typ matematik som [läraren] har berättat på eh... seminariet. Språket är det viktigaste... redskapet. Men om man skulle titta så jag tror inte vi kommer klara oss... på det här sättet... (Nadia, first semester)

Nadia positioned herself with disempowerment in a discourse of institutional constraints, where structures seemed impossible to change. However, she challenged the discourse and through intergroup positioning she included her peer students as affected by this discourse. She hence included herself in a

group of immigrant students' who had language difficulties and foregrounded that the particular differentiation between native Swedish speakers and immigrants will lead to "that we will not develop our language skills". Nadia's intergroup positioning within the working language/culture discourse expressed disempowerment both in relation to the institutional steering –including the teachers' assessment – and in relation to language difficulties that will sustain. Nadia's disempowering intergroup positioning was also an example of that immigrant students not only were concerned with their own language development, but also included peers with whom they shared this problem. However, there is an important and empowering intergroup positioning in the midst of her talk about language. She said: "especially for us who want to become teachers", which I interpret as an empowering intergroup positioning expression. They intend to become mathematics teachers, despite the language struggles.

Theresa was concerned about her lack of Swedish language skills and expressed disempowerment as this obscured her strengths within other areas. In this instance, she told me about an occurrence where her supervising teacher neither took her mathematical nor didactical knowledge into account; a teacher who had told her that she would not succeed due to language difficulties. In an interview after the first period of teaching practice, Theresa referred to an interaction between herself and the supervising teacher:

Theresa: One bad thing happened, eh... as I showed... it was about dates [she planned a lesson focusing time and date]. I showed her one way and said, "It was this way." She said to me "It couldn't be. That's not correct". I said to her "Yes, it is correct". She said "No". I said, "Please, look in the book". She said: "Aha!"... If you can find it in the [math] book... She believed in the book more than in my words. I think it is because of my language. Do you see what I mean?

Kicki: Mm

Theresa: They... they don't trust me. I don't have the language skills; I don't know how to say... I don't think that is good. (Theresa, first semester)

Theresa: Det hände en sak som jag tycker är inte så bra. Eh... medan jag visa... det var... det var om datum [hon planerade en lektion om datum och tid]. Jag visade en sätt. Jag sa till henne "det var det här sättet" hon sa till mig "det stämmer inte, det är inte rätt". Jag sa: "jo det är rätt", hon sa: "nej", jag sa "titta på boken", hon sa till mig "aha...". Om det finns (ohörbart) i boken.... Eh... hon trodde på boken mer än mig. Jag tror det är på grund av mitt språk. Så... hon t... eh... dom... dom... jag vet inte. Du förstår mig vad jag menar

Kicki: (Mm)

Theresa: Att dom... dom litar inte på mig. Jag kan inte språket, kan inte vad jag säger... Det tycker jag inte så bra. (Theresa, first semester)

Through personal positioning within the mathematics education discourse, Theresa expressed empowerment and described herself as proficient in planning mathematics teaching. As the supervising teacher did not agree, Theresa eventually showed how the concepts were demonstrated in the book, which the supervisor then accepted. Theresa hence changed positioning towards explaining why this happened “I think it is because of my language”. As several students who referred to a situation that had occurred earlier and which had affected them, she positioned herself as an actor in a drama (cf. Harré & van Langenhove, 1999b). As she referred to “they” she expressed intergroup positioning within the working language/culture discourse, directed to people or institutions she did not specify. Important is that she had the feeling that “they” did not trust her: “They... they don’t trust me. I don’t have the language skills”.

What happened in this situation was that Theresa changed her personal positioning from being engaged in mathematics education to addressing her specific language problems. Theresa’s positioning within the mathematics education discourse showed empowerment in relation to her subject knowledge. But on the other hand her positioning expressed disempowerment since it became obvious that her language difficulties obscured her proficiency in mathematics.

Getting employed after graduation requires mastering the language

Three students took a study break over six months and their argument for doing that was to develop their language. They wanted to be well prepared when they finished their education so that they were qualified to get an employment. Rita told me about her plans for the coming semester during an interview the third semester. In addition to her wish to develop her language she stressed the possibilities of learning to know the school culture in Sweden better as important for her. Through intergroup positioning in the language/culture discourse, Rita included her immigrated peers in the need to develop their language.

Rita: If I get a job. I think it is important too, Kicki, to work. Because we who don’t have Swedish as our native language. You cannot just read and read and read. You must see... How the labour market works, how [school] business works, how... getting more professional experience. I think that is very important to have. You develop your language when communicating with others. That is what I think is very important. What do you think? (Rita, third semester)

Rita: *Om jag får jobb. Jag tror det är också viktigt, Kicki, att jobba. För att vi som har inte svenska som modersmål. Går inte att bara läsa*

och läsa och läsa. Man måste se... Hur, asså, hur arbetsmarknaden ser ut, hur verksamhet fungerar, hur man... lite mer arbetsliverfarenhet. Det tycker jag är jätteviktigt att ha. Så man också utvecklar sitt språk när man jobbar för man kommunicerar med andra. Pratar med andra, samtalar... Det som jag tycker är jätteviktigt för mig. Eller vad tycker du? (Rita, third semester)

Several students who immigrated to Sweden as adults talked about their limited possibilities to speak Swedish and, as Rita told me, they sometimes were divided into study groups where no one spoke Swedish good. Their chances to develop decreased even more. Here I could see that students' disempowered positionings in the institutional discourse affected their positionings within the language/culture discourse. There were few scheduled seminars and the students therefore had few possibilities each week to practice spoken Swedish. Despite the two discourses, which she had no power to change, Rita expressed empowerment through her way of approaching the challenges. Her decision to develop through a study break was one way. She also told me how she thoroughly prepared herself for the oral examinations, both with regard to content and expression. Hence, she directed her focus towards what she could change or influence.

Rita: When we have oral examination I use to talk with myself at home so I prepare for how to say, what I want to point at, how to highlight things and so on. And then no one is at home, so I am... at home... talking with myself. (Rita, third semester)

Rita: *Till exempel när vi har redovisning. Och innan redovisning brukar jag prata med mig själv hemma. Så jag, liksom förbereder mig hur ska jag säga, vad ska jag säga, vilka punkter är viktig, hur jag ska lyft upp den här grejen och så vidare. Och då var ingen här hemma, så det var jag som... Det är jag som är hemma och sen... börjar prata med mig själv. (Rita, third semester)*

Reading and writing academically

The way Rita talked about oral examinations and about not developing her language skills as fast as she wished to do, was specific for how the language/culture discourse was expressed by immigrant students. This phenomena did not only emerge in the beginning of their education, but recurred as long as I conducted my fieldwork.

The language/culture discourse clearly articulated *that the students should develop an academic style through the education*. Therefore all students were required to conduct two small-scale studies — one on ground level and one on advanced level — and write them up in an academic style. These mandatory tasks were often challenging since the students needed to work independently through all phases, from defining an interesting issue to

explore within, in this case, mathematics education, to defending the degree project ten weeks later.

Reading scholarly texts and writing academically was stressed as important in the university context and central in the evaluation of the students' examinations. These requirements revealed an academic language/culture discourse, which became challenging even for students born and grown in Sweden, and hence had a clear impact on the students' positionings. They needed to accept the discourse of citing and referring correctly; and of analysing texts using appropriate style as they took the courses and wrote the tests. These challenges affected the students' positionings within the language and institutional discourses and made them express disempowerment. However, as they accepted the available discourses they did not express resistance.

Camilla talked about academic writing several times over the two years, as here in the third semester: "Academic writing is not my thing. I write much like I speak which can sound a little childish" (Field notes, fourth semester). Later the same semester Camilla returned to this concern:

I can feel very doubtful with regard to my writing. I have always been. I feel that I don't write so well, so I avoided sitting on my own and writing... Because sometimes we had so much to do so "let's split the task", like "you write about this and your write about that"... and then I said, "I can do this stuff instead". Read something maybe, finding something in the books, and do such things, just because I think that... I think it is little scary to write because I don't think I have the academic language, so to say, when I write... (Camilla fourth semester, September 2011)

Det jag känner för mig, det är också, det var. Jag kan känna sådär att jag är väldigt osäker i mitt skrivande, det har jag alltid varit. Jag känner att jag inte skriver så bra. Så jag tog gärna avstånd från när man skulle sitta och skriva själv. För ibland var det så att nu har vi så mycket att göra så nu gör vi så att vi delar upp det, att du skriver just om det och du skriver om det... och då var jag såhär 'jag kan göra dom här grejerna istället. Läsa kanske, hitta nånting i böckerna och göra så'na grejer, just för att jag tycker att.... Jag tycker att det är lite läskigt att skriva för jag tycker inte att jag har den här akademiska svenskan, eller vad man ska säga, när jag skriver... (Camilla fourth semester, September, 2012)

Camilla's' disempowered positioning in the language/culture discourse made her avoid taking responsibility for writing tasks in groupwork. Despite this, Camilla was one of the students who participated most in discussions and who organised groupwork and oral presentations. She had the power to perform orally, and did not let the requirements of written performance impede her too much.

Tina told me that she was worried about the requirements of reading academic texts before the education began. Initially the language/culture discourse of academic reading and writing made her express

disempowerment, but as Tina got inspiration to read the course literature with engagement she changed positioning. The subject engaged her and therefore became important to learn more about. She hence enacted empowered positioning within the discourse of reading and writing academically.

I was worried that I was tired of school regarding reading. I have big difficulties in reading and [here she referred to how she expressed her worries before education] “it will be so difficult for me to read the course literature... You know professional literature and scientific, academic texts and such crap...” you see, and read a lot and understand and write, and... I was sure this would never work, but what I read was very interesting. Well it was a bit hard, but not at all like I couldn’t read. I could sit and dream a whole evening. I have never managed to do that before. I think it was because I thought it was interesting and that I felt a need to read, so to say. An inner motivation I have never felt in school before. Not even in the upper secondary. I had very few important theoretical subjects. Except for mathematics, maybe, it was quite fun, but not theoretical in that sense that one had to read, and the like. Mostly mathematics was about doing tasks. I haven’t felt like this before. The subjects I studied in upper secondary didn’t motivate me. There were no benefit and enjoyment... But I notice that I read very slowly. But I can read, I didn’t think I could. (Tina, fourth semester, December 2011)

Och jag var jätteorolig för att jag skulle vara så skoltrött på att läsa, [här refererar hon till hur hon uttryckte sin oro innan utbildningen började] ”jag har jättesvårt att läsa. och jag bara, det kommer bli så himla svårt för mig att läsa kurslitteraturen, just fack... fackkultur, eh... eh... ja, vetenskapliga, akademiska texter och sånt där skit”, liksom. Eh... och läsa mycket och förstå och skriva och... Det var jag helt säker på att det kommer aldrig funka, men det som jag läste var jätteintressant. Det är klart att det var lite jobbigt, men det var inte som att jag... inte kunde, liksom, läsa, utan jag kunde sitta en hel kväll och läsa. Det har jag aldrig kunnat förut. Det var väl för att jag tyckte att det var intressant och jag kände ett behov av att läsa, liksom. Men... en inre motivation som jag inte har känt i skolan överhuvudtaget, liksom. Inte ens i gymnasiet. Där hade jag ju inga teoretiska viktiga ämnen, enligt mig då. Förutom matten, kanske, var ganska kul, men den är ju inte riktigt teoretisk sådär att man måste läsa och så, utan där handlade det mest om att man ska göra uppgifter, liksom. Så det hade jag aldrig känt förut. För i dom ämnena som jag hade i gymnasiet fanns ingen inre motivation. Det fanns ingen nytta, liksom, eller nöje. Så det... Men jag märker att jag läser väldigt långsamt. Men jag kan läsa, det trodde inte jag. (Tina, fourth semester, December 2011)

As shown above the discourse of academic writing rendered disempowered positionings with regard to expectations they found demanding and partly unclear. Seemingly, this discourse was influenced by overall stated institutional “rules” which will be outlined further in the next section.

Institutional discourse

As shown in the previous sections there were institutional constraints that affected the students' positionings as they simultaneously positioned themselves within other available discourses. This phenomenon was depicted as it occurred, even though focus was on the mathematics discourse, for instance. Therefore this section provides stronger focus on how the institutional discourse emerged. In the following piece, institutional constraints seemed to impact Sara's positioning to express disempowerment. She could not change the incorporated working structure in class both with regard to her role as student teacher and with regard to her lack of knowledge about mathematics teaching.

/.../ since the pupils are used to work in a special way, it is difficult to change and to do it in my way. And as you are not so skilled yet, and don't know so much, it is difficult to find tasks to use parallel with the book. If they work on something in the book, one could do something alongside too, but it is hard to find something one could focus on instead. And then one was likely to stand by the chalk board, introducing the stuff. That... is also good, but then all [pupils] don't follow. (Sara, first semester, May 2010)

/.../ eftersom eleverna är vana vid att jobba på ett speciellt sätt, så är det svårt att komma och lägga om det och göra på mitt sätt. Och sen eftersom man inte är så duktig än, och kan inte så mycket, så är det svårt att hitta uppgifter som kan gå jämsides med boken. Om dom jobbar med en sak i boken, så skulle man kunna göra nånting vid sidan av också, men det var väldigt svårt att hitta nånting som man kunde satsa på istället. Och då blev det ju gärna att man ställde sig framför tavlan och gjorde en genomgång och så. Det... det är ju bra det också, men då är ju inte alla med. (Sara, first semester, May 2010)

Sara talked about solving the problem by conducting teacher-led instruction, that is, to accept the institutional discourse which "is also good, but then all [pupils] don't follow". What we see here is a tension between two discourses: *what works* and *how it should be*. Hence, *pupils need other forms of teaching than listening to a teacher who writes and explains on the chalkboard*. The mathematics education discourse here makes her challenge "traditional teaching". However, as she was the student teacher she felt obliged to align with the forms of work that her pupils are used to.

We have seen that the students initially talked about the extent to which their supervising teachers taught by the book. Still, after two years this was a prevalent discourse within which the students clearly expressed that the books should not be used as basis for mathematics teaching. This discourse, here reflected by Tina's positioning, was common with regard to how the students talked amongst each other as they returned to the university after the periods of initial teacher education.

After VFU, as we have discussions in class everybody says: “Well, my [supervising] teacher only teaches by the book. She doesn’t have time for planning” and... “My teacher had never worked with problem solving.” And you know all the time when you hear such comments you understand the distance between what mathematics educators want and what exist in school. And you understand the gap between knowledge and... the pupils, you know. (Tina, fourth semester, December 2011)

Efter VFU så sitter vi alla och diskuterar. Och då säger ju alla såhär: “Jamen min lärare går bara efter boken. Hon har inte tid till att göra någon planering” och... ”Min lärare hade aldrig jobbat med problemlösning” och du vet, hela tiden när man hör sånt så förstår man, liksom, distansen mellan det som matemat... matematikdida... didaktiker vill och vad som existerar i skolan. Och man förstår det här gapet som har blivit också mellan kunskap och eh... och eleverna, liksom. (Tina, fourth semester, December 2011)

The “gap” between what the students experienced at the university and at initial teacher education was here articulated as problematic so that “when you hear such comments you understand the distance between what mathematics educators want and what exist in school”. This discourse became a “truth” (Gutiérrez, 2013), an obstacle to overcome as they got employed and often, during initial teacher training, the students chose to accept the discourse and “just go with the flow” as Evelyn expressed herself in an interview the fourth semester. She had tried to develop the organisation of mathematics lessons in her practice school, but as her supervising teacher did not agree on her suggestions, she abandoned the creative ideas, and turned to work in line with her future colleagues. “After teacher education, I can do what I want to with my own pupils”, she said.

I earlier showed the excerpt from Jessica’s lesson and shortly commented on that she did not meet the boys as they solved $84/7$ different from how she thought they would do it. At this moment she chose not, with regard to her limited possibilities to follow up at a later stage. What we can see here is a recurrent phenomenon. The students’ empowered positionings within the mathematics education discourse was affected by institutional constraints, which were not questioned. Power-relations within the institutional discourse made her hold back her ideas about how to master the lesson.

Jessica: My goal is that they shall start with problem solving. To make it become their every-day mathematics to build on little by little. Sometimes I find it hard to enter a class that is not one’s own. Partly because I have not known them so long, I cannot do everything I want. It doesn’t work. That’s what I find hard... when you have to... (Jessica, fourth semester, December 2011)

Jessica: Mitt mål är att de ska börja med problemlösning. Att det ska bli deras mattevardag. Att man kan bygga på den undan för undan. Ibland tycker jag det är så svårt när man kommer in i en klass som inte är ens egen. Dels så har ju inte jag haft dem så länge heller. Jag

kan inte göra allt som jag vill. Det går liksom inte. Det är det jag tycker är svårt... när man får... (Jessica, fourth semester, December 2011)

This discourse recurred from other interview data and made me curious. How did Jessica relate possibilities and constraints to an institutional discourse? Did she accept or resist the power-relations and what space was allowed for the mathematics education discourse? I did not ask those questions, but since it was important to let her tell me more about her impressions. I asked Jessica:

Kicki: What was done the way you wanted and what was not?

Jessica: I would always have wanted... not necessarily every lesson, but often, [start with?] problem solving, and from there enter the operation, which they then continue to calculate. And give them this kind of task afterwards. But they have now calculated in their books for two weeks, so it's time for them to have some fun. Therefore I brought this game, because I feel that what we do now is having some fun for a while. Otherwise I had offered them another number/algorithm/task, let them practice a little and then play a little in the end. That's what I think I had done. (Jessica, fourth semester, December 2011)

Kicki: *Vad gjorde du som du ville och vad gjorde du inte som du ville.*

Jessica: *Jag hade velat ha... att alltid ha, inte kanske varje lektion, men ofta ha problemlösning och att man därifrån kommer in i räknesättet och sen börjar räkna vidare på det. Att dom får exempel på ett så'n't här tal i efterhand. Men nu har dom räknat. Suttit i nästan två veckors tid och räknat i boken. Så att nu är det dags att dom gör nå'nting kul. Så därför tar jag fram det här spelet, för jag känner att nu gör vi något som är lite kul ett tag. Annars hade jag nog gjort ett till så'n't här tal, låtit dem få öva lite och sen efter det kan dom få leka lite på slutet. Så hade jag nog gjort. (Jessica, fourth semester, December 2011)*

She stressed that it was time to do something else and not just let the pupils work in their textbooks. They needed to have some fun, which in this case was playing mathematics games. If this had not been the case she had let them elaborate more on the mathematics they did that day. This might seem like Jessica's empowerment within the mathematics discourse was not challenged at all by institutional constraints. However, in the following she motivated her choices, now clearly affected by the institutional framing, the class schedule.

If it was my own class I could have steered the lessons more, I mean all day and all week, so to say. Now I know that I have this lesson, and then I have nothing more until Monday. And then something else is planned, and I need to begin with the book again because that is what we have decided. Otherwise one could have turned back and given feedback... if one had a smart board,

which we have. So they could have written there instead and brought it back to this lesson. And also these girls [there were two girls who came up with interesting ideas about fractions] /.../That could be another lesson. It might take a whole lesson if you practice it too. (Jessica, fourth semester, December 2011)

Hade det varit min egen klass så hade jag kunnat styrt lektionerna lite mer, asså, hela dagen och hela veckan och det där. Nu vet jag att jag har den här lektionen, sen har jag liksom inget mer förrän på måndag. Och då är det något annat, för då måste jag börja i boken för att det är bestämt. Annars kunde man ju ha gått tillbaka med det här och återkopplat till... om man hade haft en smart board som man har. Att dom hade fått skriva där istället och tagit tillbaka den här lektionen. Och likaså de här tjejerna [Två flickor diskuterade bråk]. /.../ Asså då kan man ju ta en lektion till med det. Men det tar ju nästan en lektion och göra några övningar med det sen. (Jessica, fourth semester, December 2011)

The institutional discourse was clear. *It is not easy to rearrange the schedule and work more concentrated with mathematics than is predetermined.* As student teacher there were even less options to improvise and work in relation to the pupils' needs. On Monday something else was planned and then "I need to begin with the book again because that is what we have decided", Jessica said. Her positioning within the institutional discourse did not reveal disempowerment; however this discourse affected her motivations for developing the mathematics lesson further, since they had decided to start with something else — in the book — on Monday.

In this section, I have hitherto shown how the students' positionings revealed institutional constraints in relation to initial teacher education. I have also shown in previous chapters how the institutional discourse emerged as interwoven with mathematics education, mathematics and language/culture discourses, all related to the educational programme. In the following I will return to assessment and, through Anna's account, highlight some aspects that have not been highlighted yet. Several times as the students failed to pass an exam they talked about being concerned about not passing the re-exam and for not understanding the requirements. They did not know if the requirements would be the same next time or if they will change.

Anna: It's a pity that one part of the written exam affects the whole exam, actually. There are five parts and one part affects. So it is... [inaudible]. I hope that they will not assess as the first time. So that one single part affects. If I don't master one part... First it was like this "If you don't pass the statistics..." They had, eh... they had chosen which part... "If you don't pass the statistics you don't pass the exam". That was what... and that was the last...

Kicki: The last task?

Anna: Exactly! That was... I don't know... One should always put the most important first. Then one will put much time on that Subtraction:

one should analyse and explain how he thought, the pupils. How I as teacher should teach them. How I should work with that pupil. So... which tasks shall I give him to make him understand. It... it is a lot to write actually... But that was not important. And that is... I don't know. I don't know. I think it is not necessary to write what is not so important in the beginning. Then you put a lot of effort in that and when you see the last [task] you have just one hour. And there are lots you shall calculate and... statistics is not so easy. You should calculate a lot and again and again to control if you were right or not. But, it didn't work well the first time. But... I hope that it... gets better the second time. (Anna, fourth semester, November 2011)

Anna: Det är synd att en del på hela tentan påverkar hela tentan, faktiskt. Det är fem delar, och en del påverkar. Så det är... [ohörbart]. Hoppas att dom inte bedömer som första gången. Att bara en del påverkar. Om jag inte klarar en del... Först var det såhär 'om du inte klarar statistik...'. Dom hade, eh... bestämt vilken del... 'om du inte klar med statistik, du inte klar med hela tentan'. Det var det som är... och dom la det på sista...

Kicki: Sista uppgiften?

Anna: Precis! Det var... ja, jag vet inte... Alltid det viktigaste man ska lägga först. Då ska man lägga mycket mer tid i det. Subtraktion, man ska analysera och förklara och hur han tänkte, eleverna. Hur ska jag som lärare undervisa dem. Hur ska jag jobba med en sånt elev. Så... vilka uppgifter ska jag ge honom för att han ska förstå. Det... det är mycket man ska skriva egentligen... Men det var inte viktigt. Och det är ju... jag vet inte. Jag vet inte... Det är ju onödan att skriva det som är inte så viktigt i början. Då lägger man mycket tid. Du ser på sista, då har man bara en timme. Och det är mycket man ska räkna och... statistik, det är inte så lätt, egentligen. Man ska räkna mycket, man ska räkna om och om. Så att man... som kontroll. Men har du gjort rätt eller inte. Men det gick inte bra i första gång i alla fall. Men... hoppas att det blir... den andra gången bättre. (Anna, fourth semester, November 2011)

Anna challenged the institutional discourse by expressing that “It’s a pity that one part of the written exam affects the whole exam”. She was not satisfied with that one single part could scupper her chances to pass the exam. She was not either satisfied with how the exam was structured, since the “most important” task was the last one. “One should always put the most important first”, she stressed. She had put “lots of time” in a task which was not deemed as equally important and had too short time to solve the last task, However, even though she challenged the institutional discourse, she expressed disempowerment since she could not affect the structure: “it didn’t work well the first time. But... I hope that it... gets better the second time.”

The institutional discourse framed how examinations were constructed and the requirements for passing. The students’ positionings indicated that these structures were not as transparent as they wished and challenged the

discourse in communication with me. I never experienced this in dialogue with the teachers in whole-group settings, but they might have discussed it in private communications.

What characterizes available discourses in the actual mathematics teacher education contexts?

As shown four broad discourses were identified in the ethnographic data; these were more prevailing than others, and recurrent through the two years of fieldwork. My focus in the analysis was to elicit strands of smaller discourses from interview data and field notes, such as “Mathematics teaching is demanding” and “mathematics as a language”. Thereafter I cross-read the discursive strands in order to explore what characterized each of the four discourses that emerged from the data. I will shortly summarise each discourse, partly written as statements in bullet points, to illustrate how I interpret the characteristics of available discourses, and what is possible to talk about for them who are involved in the mathematics teacher education programme. Thereafter I take a stance in the next part of analysis, where I explore how discursive positionings revealed power-relations and how some discourses affected the students’ positionings more than others.

The mathematics education discourse

The students’ ways to talk about mathematics education reveal a discourse of what are preferable approaches to mathematics teaching. It is normative in clearly articulating a positive attitude to what Palmér (2013) writes about as reform oriented mathematics. The approach to mathematics was different from their schooling and therefore seen as better than traditional forms of mathematics teaching:

- Mathematics is talked about as a school subject that has changed character in comparison to the students’ own experiences as learners, which is seen as good. Mathematics is an inspiring and creative subject with regard to new ways of teaching. Groupwork, discussions, use of manipulative material and problem solving make students enjoy and therefore learn mathematics. Traditional teaching, such as teacher-led instructions, high-speed-competitions, textbooks, individual work, procedural learning by heart and ability grouping are not preferable in mathematics education. Consequently, the students talk about previous experiences of mathematics as competitive, repetitious and focused on individual work in textbooks. Thus, new ways of teaching and learning mathematics require distancing from earlier experiences.

- The discourse allows the students to talk freely and relaxed about obstacles and possibilities for pupils to develop confidence in mathematics. Mathematics should be taught from the basis of understanding. Therefore teachers must plan mathematics teaching thoroughly so they offer qualitative mathematics education on the pupils' levels, so that they can learn and understand. Hence, inclusion of all students with regard to individual needs is very important.
- What happens in schools is not how mathematics should be taught and this critique is articulated as disparities between the mathematics education discourses in university based education and the “real” mathematics education in practice schools.

The mathematics discourse

The mathematics discourse produces “truths” about mathematics which seem to perpetuate views about pure mathematics as a subject partly separated from their future profession:

- Learning mathematics is exiting and challenging and it is good to learn effective strategies in order to make fast calculations.
- Mathematics *does* something with the individual. One becomes intelligent, logical and develops properties, which are good for problem solving. Mathematics is hence important in order to manage everyday life.
- It is important for becoming mathematics teachers to know mathematics on a significantly higher level than the pupils.
- It is legitimate to have experienced mathematics as difficult, however it is preferable to master correct formulas than to use informal methods.

The discourse was challenged with regard to content and usability and the students talked about weak connections between pure mathematics and how to use it in school contexts. However, strongest resistance is enacted towards speed and lack of time for understanding. High speed learning for them as students, a strong focus is on technical terms and on catching every step the teacher writes in order to do it right gives little time for reflection and understanding the mathematical content.

The language/culture discourse

The language/culture discourse is characterised by a strong focus on mastering Swedish and on learning the Swedish school culture. In addition the academic discourse is inflated with requirements of scholarly reading and writing from the very first course.

- Language is an instrument, clearly connected to mathematics, which the teacher must master and use so that the pupils will understand both the

mathematics content and how to use the language to communicate problem solving strategies.

- A teacher should be able to express oneself in different ways, to know the subject content so this can be well communicated; hence to express oneself explicitly and clear in the language of teaching, which is Swedish.
- As becoming teacher in Sweden it is implied that one needs to master the language and to be aware of its importance for the pupils' learning in mathematics. If one has lack of Swedish language skills one needs to take responsibility for the progress so that, when graduating, language is not hindering employment
- There are cultural differences between Sweden and other countries. Mathematics is taught differently in Sweden both with regard to methods and to the attitude towards pupils learning. The way mathematics is taught in Sweden ought to facilitate learning.

The institutional discourse

When constraints and limitations, rules and framing concern the students, an institutional, discourse emerges.

- The institutional structures affect both the university context and the initial teacher education since schedules and course plans (including time limits, course tests and assessments) are predetermined and everyone is supposed to accept.
- Time limitations and course tests also hindered the fruitful discussions about the mathematics content.
- As student teacher it is preferable to accept institutional frames during initial teacher training. Otherwise the relation with the supervising teacher might be affected negatively.

How do discursive positionings reveal power-relations?

In this chapter I work further on some data from the first chapter, and on some “new” data in order to describe, analyse and interpret how power-relations emerged from the students’ positionings. In the descriptive accounts of the discourses I highlight the students’ positionings through spoken language as well as gestures and movements as performed actions, and show how the students’ positionings revealed power-relations and how these discursive positionings made possible to elicit patterns of how power flowed back and forth.

Personal and intergroup positionings

In interviews, the students often responded by referring to their own experiences. This was expected and the theory of positioning facilitated analysis and interpretations of their stories, as will be shown below. Personal positioning was mostly expressed by the pronoun “I”. In some instances the students involved other individuals — peer students — by using “we”, or distanced themselves by using “you” through intergroup positioning. There were also several occasions when students talked about themselves and others as “one” or “you”, at a first glance meaning anyone, but also meaning themselves, the “I”; “we”, as the student group; or “they/them” as some others. “This sense of generality, which refers to no one in particular, suggests that anyone would or must do or understand the same thing” (Herbel-Eisenmann & Wagner, 2010, p. 49).

The pronoun “I” was used in several ways and tightly connected with a verb, an action, which is very central in this work. The verb was helpful during the analysis as it said something about how the students positioned themselves in every single situation, or chose how they wanted to be understood. Notable here is that translating from Swedish to English became a challenge in itself because verbatim translation not always produces equal meaning. “I am”, for instance, is not always translated word for word, since the context and not the word order was in focus. How positionings of this kind are interpreted is briefly exemplified in the following.

“I am good/not good”, for instance, tells something about how the student identifies herself (Sfard & Prusak, 2005). The verb “am” was thus interpreted as a form of being; that is who someone is, or wants to be seen. Whereas expressions like “That is what I think is very important” is stressed as someone’s opinion. These kinds of statements were deemed as both relevant and important for understanding positionings of self within available discourses.

On the other hand, positioning by expressing “I feel” invited me as listener to a more personal view on the actual topic; “I think” could mean something the student had a special opinion about, but “I think” was also expressed to stress an argument or a view on something as ending an utterance. “I think” could also mean something the student had been thinking about and now choose to reveal. As shown here the pronouns initially were very helpful for understanding discursive positionings. Often, positionings were enacted without the use of a pronoun. Utterances like “It feels good”, “it doesn’t feel so good, actually”, and “mathematics is so connected to intelligence” etc., indicated that the pronouns were left out. Nevertheless, these expressions were discursive positionings with which “I think”, for instance could open the sentence.

The personal pronoun “you” was interpreted in line with “I”, however not expressed to a similar extent, since the students’ positionings more often involved themselves. In groupwork, during lectures and sometimes during interviews “you” were used as an enacted positioning and then taken into account as relevant data. This happened for instance when the students involved me, or the university teacher in an interaction. Intergroup positionings like “we”, “you”, “they”, “them” and “us” occurred often when the students talked about common experiences from the courses, backgrounds and about issues of inclusion and exclusion.

The examples show that discursive positionings were going on, but these short utterances gave little information about the context and hence no suggestion why this positioning occurred. Verbs and pronouns could not stand alone, and there was, as shown in Andersson (2011) a need for contextualising to understand positionings more broadly through descriptions that enclose the data. By taking the context as well as oral and physical positionings into account in the analysis, this understanding facilitated the analysis of how power-relations were revealed through the positionings. This chapter is organised around the dichotomy of empowerment and disempowerment, and each example is contextualised to involve the reader in what is going on. The results of the analysis show how positionings and power-relations emerge, and brings forward how positionings were enacted; which discourses were available and dominant — not necessarily one at a time; and what consequences I see for the further analysis.

Contextualising positionings of empowerment and disempowerment in competing discourses

In the previous chapter I highlighted that power was present in the discourses, in order to make visible how relations of power constantly flowed within and among discourses, illuminated by positionings. In this section I present four pieces of interview data, where this flow occurs. The presentation is structured around the context, analysis, interpretations and understanding of the analysis. In the four examples one or two discourses emerged as available through personal or intergroup positionings. Power-relations emerged differently in these four instances and Important to stress is, that these examples do not cover the whole range of discursive positionings in the data. However, my aim is to illustrate characteristics of the flow, which was prevalent in the data, and therefore necessary to present as transparent as possible.

Rita enacted empowerment despite language difficulties and institutional constraints

I now turn back to the interview with Rita the third semester. Parts of the transcript earlier illustrated requirements for getting employed after graduation. Here I foreground how this situation revealed empowered positionings even though two disempowering discourses interacted. Rita told me about her future possibilities to get employed as mathematics teacher, and asked for feedback on her thoughts. She thought about taking the decision to have a study break, as she wanted to get more experienced in the Swedish school system, and more fluent in the Swedish language. Rita was not the only student who had decided to take a study break for these reasons and I had a feeling that they supported and inspired each other to take this chance. This decision would lead to struggles when they returned to the university, since they were among the last that undertook this programme. However, they had the right to take a break and future problems were to be solved as they returned.

Rita: I told my [supervising] teacher that I want to take a study break. "I will be here with you and just see how you act in the classroom" and he just laughed and: "okay"...

Kicki: When, in that case, do you want to take the break?

Rita: If I get a job. I think it is important too, Kicki, to work. Because we who don't have Swedish as our native language. You cannot just read and read and read. You must see... How the labour market works, how [school] business works, how... getting more professional experience. I think that is very important to have. You develop your language when communicating with others. That is what I think is very important. What do you think?

This situation made me think about my role. Rita wanted my opinion and I was aware of that what I said would impact to some extent. What would be an appropriate way to respond? I was eager to share this with her and wanted her to know that whatever she chose I would support.

Kicki: Well, if I shall say something, I can understand what you mean. Then... you make your own decisions. But I understand your motives.

Rita: It is like this. We come to the lesson, read books, go home, and then nothing happens. And we don't have lessons every day, two days a week maybe. Then we have possibility to speak Swedish with the others. And when I come home I speak my language with my family, and then... this is how it is. (Rita, third semester, May, 2011)

Rita: Jag har också sagt till min lärare [i skolan] att jag vill ta paus från min utbildning 'jag ska vara med dig här och bara se hur du gör i klassrummet' och han bara skrattade och: "okej"...

Kicki: När, i så fall, vill du ta paus?

Rita: Om jag får jobb. Jag tror det är också viktigt, Kicki, att jobba. För att vi som har inte svenska som modersmål. Går inte att bara läsa och läsa och läsa. Man måste se... Hur, asså, hur arbetsmarknaden ser ut, hur verksamhet fungerar, hur man... lite mer arbetsliverfarenhet. Det tycker jag är jätteviktigt att ha. Så man också utvecklar sitt språk när man jobbar för man kommunicerar med andra. Pratar med andra, samtalar... Det som jag tycker är jätteviktigt för mig. Eller vad tycker du?

Den här situationen fick mig att fundera över min roll Rita ville höra mina åsikter och jag var medveten om att vad jag än sa så skulde et påverka henne på något sätt. Vad skulle vara ett lämpligt svar? Jag var angelägen att få vara delaktig i hennes funderingar och ville att hon skulle känna mitt stöd oavsett hur hon valde att göra.

Kicki: Jag tyck... om jag ska tycka nå'nting, så förstår jag dig. Sen så... så... eh är alla val dina. Men jag förstår dina... ditt motiv.

Rita: För att det här, asså, vi kommer till lektionen. Läser böcker, går hem, och sen det blir ingenting. Och vi har inte lektioner i alla dagar. Två dagar i veckan kanske. Och då har vi möjlighet att prata svenska med dom andra. Och sen när jag kommer hem använder jag mitt språk med min familj och sen... ja, det är så! (Rita, third semester, May 2011)

The language/culture discourse emerged as available in interaction with the institutional discourse. Initially Rita was concerned about not having cultural experiences from Swedish school “I think it is important too, Kicki, to work”. My understanding was that she had thought about this possibility for a while and stressed it as important for her and others who do not have Swedish as native language “we who don't have Swedish as our native language”. They must find ways outside the education to learn what is required from them to get employed. In addition, developing language is possible when there are enough opportunities to speak the language. It therefore seemed that it was important for her to not accept the institutional frames:

You cannot just read and read and read. You must see... How the labour market works, how [school] business works, how... getting more professional experience.

Rita expressed empowerment through the articulation of what she found required to get employed: "I think that is very important to have". And she was clear about that the one who can do it is the individual, who can take agency and choose how to do something to change the situation "That is what I think is very important. What do you think?" Her positioning within the available discourses was strengthened by her way of involving me in the discussion. She knew what she was talking about and had taken a well thought out decision.

Inflated in these empowered positionings there are strands of disempowered positionings in both discourses. She is one of them who do not have Swedish as her native language; a positioning that did not indicate disempowerment. However, language develops when one communicates with others and in that senses their possibilities were constrained. She accepted the institutional discourse, within which she expressed disempowerment, and which constrains her possibilities to develop her language skills:

We come to the lesson, read books, go home, and then nothing happens. And we don't have lessons every day, two days a week maybe. Then we have possibility to speak Swedish with the others ... this is how it is.

Rita's personal and intergroup positionings can, if we scrutinise each single utterance, be interpreted as enacted disempowered positionings. But, if we instead let the whole context colour her positionings there are other possible interpretations to highlight. First, the way Rita talked about her possibilities to take a break and work together with her supervising teacher in order to learn more about the Swedish culture and the Swedish language, made her express empowerment. In that sense she includes not only herself (personal positioning), but also her immigrated peers (intergroup positioning).

All in all Rita's positionings enacted empowerment and she did not let either institutional or language/culture discourses constrain her. Rita challenged the institutional discourse, since the possibilities to develop language skills and to learn more about professional life were limited in the education. Hence, if she just accepts what the education provides in terms of practicing oral communication she will not develop, and therefore she had identified new possibilities.

By taking in the whole context Rita's personal and intergroup positionings indicated empowerment. She did not accept that she and other peers would have less chance to get employed after graduation. She had to accept the institutional discourse at the university and decides to help herself

to develop further to develop her language and knowledge about the Swedish school system.

Rita's empowered positionings derived from her confidence in positioning herself and others in the challenging discourses; which in turn required fluency in language and knowledge about the Swedish school culture, as well as acceptance with regard to structural limitations. Instead of explicitly expressing resistance, Rita accepted the discourses and took the power herself to change the situation. In this example the institutional discourse emerged as inflated within the language/culture discourse. The institutional discourse framed what was possible and impossible to do within the educational context. Simultaneously, the language/culture discourse made her focus on herself and them as immigrants; they who did not have the language and did not practice language enough outside the university context. Both these instances made her express disempowerment. However, she knew that it is expected from a teacher to have the language skills, and accordingly that was what she needed to change.

Jessica is challenged by institutional constraints and a dominant mathematics discourse

The institutional discourse framed the education, courses, localities, scheduled lectures etc. However, the extent to which the institutional discourse permeated the students' mundane activities varied both within and among courses. What follows next is an example of how the students sometimes enacted resistance towards prevailing discourses. Jessica foregrounded challenges, which proved to be very common among the students in the context of a mathematics course, the institutional discourse emerged as more constraining than she had expected. This affected Jessica's positionings both within the institutional and the mathematics discourse

The framing of mathematics lectures was different from most courses I attended. The furnishing was theatre style seating instead of a U shape and the teacher lectured by active writing on the chalkboard. The students were invited to comment and pose questions and after a few sessions they interacted freely with the teacher. This lecture tradition contrasted with the common use of collaborative groupwork in previous courses. It seemed that there were traditions that were taken for granted by them who were used to them, however difficult for newcomers to grasp. It could range from scheduled teaching and course information to how a new topic was introduced or the expectations on their homework. Several students took their first mathematics course and, as they told me about their concerns, it was clear that they found the new cultural context struggling.

Jessica had recently resumed her studies and had experiences from two different educational programs. She often referred to earlier courses in mathematics education and related previous experiences to the present. During breaks, Jessica and the other students often continued chatting about

the content and asked me, peer students or the teacher, for clarifications on the content. The interview illustrates how available discourses challenged Jessica and made her position herself and her peers in competing discourses. She initially resisted the institutional discourse that constrained time and possibilities to understand and discuss the mathematics content.

Jessica looked at me, holding her fork and ready to eat the next bite.

Jessica: The way we sit here in the lesson isn't fun at all [she referred to both the traditional furnishing and structure of lectures]. Probably, because I don't understand, and don't see how to use this [mathematics].

Several students pass where we sit, since it is lunchtime and Jessica asked me if it was okay for me to sit in the restaurant and talk. The old stone building renders bad acoustics for small talk, but Jessica does not seem to take notice of that or of the other students (I thought their presence would possibly constrain her) and she seem to talk freely about the mathematics course and the education.

Kicki: What do you think about that? Is it just a frustration or...

Jessica: I feel a bit stressed. It's fun. I like to calculate if I have time, but now there are three weeks and then exam. And then you have family and children at home. I don't have time to study at home, neither in the evenings nor during weekends. Then I feel a bit stressed, it's hard. It's not fun. I do this only because I must proceed. One learns by doing it. I have done it before, but this feels just a bit harder compared to what I have done earlier. It's like a staircase. Now I just need to grab the bull by the horn and start. It will be finished sometime. I might do it again if needed. I cannot get so stressed for not missing the exam. In worst case I must do it again. I cannot let my family stand back too much. They must be first priority... (Jessica, fourth semester, September 2011)

Jessica tittade på mig. Hon höll i gaffeln och var redo att ta nästa tugga.

Jessica: Som vi sitter här på lektionen är det inte jättekul. [Hon hänvisar till både möblering och upplägg av föreläsning] Förmodligen för att jag inte förstår och för att jag ser inte riktigt användningen av det och så.

Kicki: Hur tänker du om det? Är det bara frustration, eller ...

Flera studenter passerar där vi sitter, då det är lunch och Jessica undrade om det var okej för mig att sitta i restaurangen och prata. Den gamla stenbyggnaden gör akustiken dålig för lågmält samtal, men Jessica verkar inte ta notis om det eller om andra studenter (jag trodde deras närvaro skulle kunna begränsa henne) utan talar fritt om matematikkursen och utbildningen...

Jessica: Det känns lite stressat. Det är roligt. Jag tycker om att räkna om jag har tid. Men nu är det tre veckor sen är det examen. Så har man familj och barn hemma. Det är fullt hemma och det är ju fullt hela tiden, både kvällar och helger. Då känns det lite stressigt, jobbigt. Det är inte roligt. Jag gör det bara för att jag måste komma vidare. Man lär sig ju i det också. Jag har gjort det innan. Det känns som

snäppet svårare än det jag har gjort innan. Det blir som en trappa. Nu är det bara att ta tag i tjuren vid hornen och sätta igång. Nå'n gång är det färdigt. Jag får väl göra om då om det är så. Jag kan ju inte stressa upp mig helt för att inte missa tentan. Då får jag göra om den i värsta fall. Jag kan ju inte ta ut det på min familj hur mycket som helst. Dom får gå först... (Jessica, fourth semester, September 2011)

The institutional discourse, which framed the lessons and tests, affected Jessica's positionings both within the institutional and the mathematics discourse. She started by positioning the whole group through disempowerment in relation to an institutional discourse, which predetermined furnishing, structure of lectures and in some sense how the mathematics content were presented. The students sat in their benches watching the teacher who wrote on the chalkboard and the institutional discourse affected Jessica's positioning to express disempowerment. Jessica could not see the connection between how they were taught mathematics and how she can use it as mathematics teacher in the future. This made her express disempowerment in the mathematics education discourse. She liked mathematics – when she had enough time. This made her positioning in the mathematics discourse express empowerment and simultaneously she enacted disempowerment with regard to institutional constraints, such as time limits. Jessica developed her arguments regarding their limited possibilities to learn the mathematics content within the stipulated time. As they have attended several courses in mathematics education the students were used to a discourse where teaching started from the pupils' pre-conceptions in mathematics or in every-day activities. The prevailing mathematics discourse did not focus very much on understanding. Instead the new content and related calculating procedures were foregrounded.

To conclude: the mathematics discourse as well as the institutional seemed strong and made her enact disempowered positionings. However, she became pragmatic as she talked about the pressuring time limits. It constrained her possibilities to manage what she could do due to family commitments. But if she failed, she could do the exam again later.

The institutional discourse seemed to constrain the mathematical discourse in several ways. Jessica stated that time limitations and course tests hindered fruitful discussions about the mathematics content and her disempowered positioning indicated that there was not much she could do about it. The constraining institutional discourse seemed to affect how the mathematics discourse was operating. Discourses, which both students and teachers accepted:

Jessica: Like in this course: we don't have time for discussions. If [the teacher] will have time for going through her theory, we will not have time for discussions, and then half the lesson is dedicated to

that, and then half the point with this course, to discuss the mathematics, gets lost. Hitherto I haven't seen much of that.

Kicki: Several of you pose questions...

Several times I had written in my notebook, that I was interested in how the students posed questions. I thought that this somehow indicated what they found important at that moment. Now I got possibility to listen to what Jessica said about the communication in class.

Jessica: The questions we ask are posed because [the teacher] writes so fast. I, and many others don't have time to see all the lines [the teacher] writes. And then [the teacher] elaborates some lines, all... and some of them [the teacher] merge and then it goes too fast. When [the teacher] begins with a new calculation we haven't had time to think through [the teacher's] lines. It is those questions we ask. There is more questions regarding how to calculate, not interesting questions, really... and discussions about the concepts, I think the questions are narrower: "What does it say there? What have you written there? "How did you get there?" and the like. The questions I have asked: "Can we discuss this? Can we relate this to everyday...?" "Yes I will think about that..." and then nothing more happens. So the discussions in class are mainly questions about how to calculate. So, I think I'll quit. It's only three weeks left. It doesn't work. I must continue calculating. That's the way... (Jessica, fourth semester, September 2011)

Jessica: Som i den här kursen. Vi hinner ju inte diskutera. Om [läraren] ska hinna gå igenom sin teori så hinner vi inte ta diskussioner och då går lektionen åt till det och då försvinner ju halva poängen med den här kursen att diskutera matematik. För det har jag hittills inte sett speciellt mycket av.

Kicki: Flera av er ställer frågor...

Flera gånger under kursen hade jag noterat i mina fältanteckningar att jag var intresserad av hur studenterna ställde frågor. Jag tänkte att det kunde indikera vad de tyckte var viktigt för tillfället. Nu fick jag möjlighet att lyssna till vad Jessica berättade om kommunikationen i undervisningen.

Jessica: De frågor vi ställer är för att [läraren] skriver så snabbt. Jag och många andra hinner inte se alla led som [läraren] gör. Så utvecklar [läraren] vissa led, alla och vissa led så slår [läraren] ihop. Då går det för fort. När [läraren] börjar med nästa tal så har vi inte hunnit tänka igenom [lärarens] led. Det är dom frågorna vi ställer. Det är mer uträkningsfrågor, inte intressanta frågor egentligen om... och diskuterar kring begreppen, eller. Jag tycker mer att det är petfrågor: Vad står det där? Vad har du skrivit där? Hur fick du det till det? och så. De frågor jag har ställt: Kan man diskutera det här, kan man ställa det här till vardags...? Ja, jag ska fundera på det... Och så blir det ingenting. Så att diskussionen i klassen är mer bara frågor om uträkningar. Så att nu lägger jag ner, Det är tre veckor kvar. Det funkar inte. Det är bara att räkna på. Det blir så. (Jessica, fourth semester, September 2011)

Through Jessica's discursive positionings we may understand how she made sense of what she experienced and why she enacted disempowered

positionings. First and foremost she was asking for connections between the university education and her future profession, which she did not recognise. What the course should offer was deep discussions about mathematics, but what she instead experienced was too high speed and superficial questions from herself and her peer students to the teacher. Questions, which she first and foremost claimed aimed at passing the exam and which lacked deeper reflections on the relationships between university mathematics and their future profession as a mathematics teacher.

Jessica expressed empowerment with regard to mathematics as she foregrounded the lack of deep discussions prior to high-speed learning. She hence challenged both the institutional discourse and the mathematics discourse. *Mathematics is not about asking questions to deepen our understanding. Questions about mathematics are about what to do and how to do. Mathematics is equalised with calculation, and being good means calculating fast. Everything was supposed to progress in a high speed, and this made the qualitative discussions she expected in this course absent.*

The analysis shows how discursive positionings in two dominant discourses revealed power-relations in the sense that the discourses became seemingly rigid and unchallengeable. Jessica's positionings within the mathematics and the institutional discourses indicated power-relations on a level she could not affect herself and through the whole sequence her positionings expressed disempowerment. Even though Jessica expressed empowerment within the mathematics education discourse — which enabled her to question the interactions between the students and the teacher — power-relations within the institutional and mathematics discourses made her abandon her ideals and, similar to Beach and Player-Koro (2012), pragmatically accepted the available discourses. These two discourses did not interact in a productive way and the mathematics education discourse became less prevalent with regard to the course content. Through short instances of empowered positionings she let us understand that it is more important for her to get this done than to challenge dominant discourses.

Leila's empowerment within the mathematics education discourse made her overlook institutional constraints

After the first period of initial teacher education several students reflected on disparities between the university context and the "reality" in schools and also expressed a will to develop school mathematics. This phenomenon was recurrent over the two years and prevalent was that the students often enacted empowered positionings in the mathematics education discourse. As shown by Palmér (2013) novice teachers need commitment to mathematics education to see themselves as mathematics teachers. These students were highly involved in mathematics education and seemed to easily relate to school mathematics even though other discourses emerged and interacted simultaneously. In this third example I show how Leila's positionings within

the mathematics education discourse were clearly affected by institutional constraints in her practice school.

We sat in the library and talked about Leila's first impressions from school. I asked her to tell me about what she was not satisfied with, and if she had any suggestions about how this could develop or change to the better. She seemed frustrated since the practicing school did not meet her expectations about mathematics teaching. With regard to the mathematics education discourse described in the previous chapter, it was neither preferable to teach by the book or to compete on basis of who gets done first. She had experienced that the teachers focused more on to complete the chapter than on the pupil's conceptual understanding. She had clear ideas what has to be done instead. Leila referred to a situation when she taught number sense to a small group of pupils and from that example argued for what she wanted to change.

I said to the teacher that what we read in the course literature is not true at all with reality [she takes the role of the university teacher] "But it depends on in which school you are." No... that wasn't what... I... This school... They liked to use the textbooks a lot. And... I recognized that the teachers competed to be first to page 46... or 47... before Friday. Regardless of whether the children... I know... this [other] teacher will come and work with them who didn't understand enough during the lesson. But... they worked too fast... just to reach a special page. I would develop, if I get the chance in this school, to leave the textbooks for a while. And work a bit... make an own math [word] list, in order to understand the concepts they don't know. I played games with them... in order to find the largest number and the smallest. I just want to see if they understand the concepts. The word difference... They said immediately that six minus three is... [Leila is now acting] "Six minus three is three." Most children in this group haven't got the number sense in the number range one to... zero to ten /.../ I let them play teacher and student [and ask] "Biggest number, which is the big...?", they asked. "Which is the biggest number and which is the smallest and what is the difference?" They enjoyed it a lot. But I cannot guarantee that they understood... in twenty minutes. I want [them] to understand the concepts, because I as child had large difficulties. I learned the... words. "This word means minus and this word means plus..." I wanna change that. Mm... (Leila, first semester, May 2011)

Jag sa till läraren att det som vi läser i litteraturböckerna, det stämmer inte alls med verkligheten. [Hon antar rollen som universitetslärare] 'Men det beror på vilken skola man är i.' Nej, men... det var inte det. Jag... den här skolan... dom gillade att använda mycket matteboken. Och l... jag märkte att lärarna tävlade och dom skulle va klar till sidan... 46... eller var det 47... innan fredag. Oavsett om barnen först..., asså... Jag vet... hur den här läraren kommer och sen jobbar ned barnen som inte har förstått tillräckligt under den här lektionen. Men... dom jobbade för fort... för och hinna till visst antal sidor. Jag skulle utveckla... om jag får den chansen i den här skolan... att släppa matteböcker ett tag. Mm... och jobba mer eh... eh... göra egen

mattelistan, att förstå begreppen dom kunde inte heller... Jag spelade spel med dom eh... att hitta skillnad mellan största och minsta talet. Jag vill bara se... begreppen... om dom har förstått begreppen. Eh... ordet skillnad. Dom sa ju direkt 6 minus tre blir... seex minus tre blir tre. Dom flesta barn i den här gruppen dom har inte fått den här taluppfattning i talområdet ett till... noll till tio. Jag försökte med dom sen... Att dom spelade lärare och eleven... och elev. 'Största talet, vilka är störs...' Dom frågade varandra, alltså. Vilket är det största talet, vilket är det minsta och vad är skillnad mellan dom? Dom tyckte det var jätteroligt. Men... asså, klart... Jag kan inte garantera att dom har förstått det på... på tjugo minuter. Jag vill ut... asså, det här, ja... att förstå begreppen... för jag som barn... hade väldigt svårt för det ... Jag lärde mig... orden. 'Det här ordet betyder minus, det här ordet betyder plus' ... Det vill jag ändra på. Mm... (Leila, first semester, May 2010)

Initially, Leila included her peer students through intergroup positioning as she problematized the conflicting discourses. They experienced school mathematics as something other during initial teacher education than they were taught at the university, and in relation to that she expressed disempowerment. She described an integrated connection between institutional and mathematics education discourses, where speed, time limits and organisation were tightly connected to what would be seen as mathematics education. The organization was built on that another teacher would come and help them who needed support, but this seemed not satisfy her view on mathematics education. In this case Leila enacted empowerment and challenged the prevailing and constraining discourses in school. She clearly expressed that conceptual understanding was necessary and positioned herself with empowerment in a mathematics education discourse by a wish to leave the textbooks for a while and thereafter exemplified what she would want to do with the pupils instead to facilitate their understanding. Leila also drew connections with her own schooling where she learned the words (e.g. minus) by heart; experiences she took distance from as becoming teacher. Another strong reflexive positioning, which indicated empowerment through appraisal of and justification of her own performance (Moghaddam, 1999), was the way she talked about her own teaching. She played games on number sense and illustrated the story by placing herself as a character (Harré & van Langenhove, 1999) in the dialogue, attentive to the pupils' response.

At first, I heard Leila's frustration and thought that power within the institutional discourse would make her express disempowerment within the mathematics education discourse and that she hence would abandon her own ideas about mathematics. This did not happen. Instead, her expressed confidence with regard to mathematics learning and teaching made her search for alternatives to the established routines. She also exemplified how she had worked herself. Leila did not accept the institutional discourse in school, which affected how mathematics was taught. Instead she challenged it and expressed a will to change and develop; strengthened by her

empowered positioning in the mathematics education discourse. The analysis exemplifies how available discourses not necessarily were taken for granted by the students and, that they, through referring to own schooling and experiences from university, could challenge norms in the school context.

Sofia enacted empowered positionings in the mathematics education discourse

The students' enacted positionings viewed the dynamic with regard to how power can flow within and among discourses. However, there is not a necessity that two or more discourses are available for this analysis. The fourth example shows how power could flow within available mathematics education discourses, and also shows how the students enacted empowered and disempowered positionings.

Sofia positioned herself within the mathematics education discourse and there were no conflicting discourses present. She took her time to elaborate on her visions as becoming mathematics teacher; both by referring to her own experiences from her schooling and to previous experiences related to the university courses. This interview was conducted during the first semester and one could argue that she had not met so many challenges, and therefore expressed empowerment. However, as we will see, Sofia posed critique towards her former teachers and she mentioned her lack of fluency at the times table. Nevertheless, on the whole, she enacted empowered positionings within the mathematics education discourse.

I have an ambition to catch pupils that were like I, who didn't like mathematics, who still is not fluent at the times table, because I, through the course literature have found out that I probably suffered from math anxiety. And, since we had a lot of competitions and the like, on the times table, this resulted in that I couldn't... I never captured it. And I feel that my interest lies in including all [pupils] and broaden it [the mathematics education] a lot more from when I learnt [mathematics] – because then it was the book and nothing more – and try to do every-day mathematics, such as... The whole syllabus is very different now, compared to when I went [to school]. So it feels that this teaching, and the whole course we study now, differs extremely lot from what my teachers did. Then, it could be that they had read, but ignored it, I don't know. But I feel there is a new era in mathematics and I feel happy to be part of that. (Sofia, first semester, January 2010)

Jag har ju en ambition om att fånga upp elever som var som jag. Som inte tyckte om matematik, som fortfarande inte kan gångertabellen som flytande därför att jag har fått reda på via kurslitteraturen att jag nog led av matematikångest. Eh, och att vi hade ofta tävlingar och sån't som gjorde att, just i multiplikationstabellen, som gjorde att jag inte kunde... jag fångade aldrig upp den. Och jag känner att mitt intresse ligger att... få med alla och att vidga det väldigt mycket från hur det var när jag läste, för att då var det bara boken och ingenting mer, och att försöka, ja, använda matematik i

vardagen, så som all... Hela kursplanen är ju väldigt annorlunda, nu, jämfört när jag gick [i skolan]. Så det känns som att hela den här undervisningen och hela kursen som vi läser nu, skiljer sig extremt mycket från det som mina lärare gjorde. Sen kan det vara att de (fniss) kanske hade läst, men struntade i det, det vet jag inte hur det såg ut då. Men, men det känns som att det är inne i en ny era i matematiken och det tycker jag känns väldigt kul att få vara med om. (Sofia, first semester, January 2010)

The mathematics education discourse based on inclusion and on teaching for understanding emerged as available and allowed Sofia to express empowerment with regard to her goals as becoming mathematics teacher. She saw possibilities to help pupils like herself: “who didn’t like mathematics, who still is not fluent at the times table”, and she had got some insights into what could be problematic: “through the course literature have found out that I probably suffered from math anxiety... since we had a lot of competitions and the like”. Sofia distanced herself from previous experiences and expressed empowerment through consciousness in relation to how she was taught mathematics as a child. She was very clear about that she wanted to act differently as mathematics teacher: “I feel there is a new era in mathematics and I feel happy to be part of that”.

The analysis shows how strong empowerment within the mathematics education discourse made Sofia challenge mathematics taught by the book and speed competitions in mathematics. She referred to literature they have read at the university, the mathematics education course and to the new syllabus as important for the development of her view on mathematics. This allowed her to reflect on “a new era” of school mathematics, seemingly undisturbed by competing discourses. New ways of engaging in, in this case, mathematics education enabled to take a stance from bad experiences and suggest possibilities for development; expressed with empowerment.

Summary

I have presented four examples of how discursive positionings revealed power-relations in the analysed data. I showed 1) how the language/culture discourses interacted with institutional discourses, and rendered empowered positionings, 2) how the mathematics and institutional discourses rendered disempowered positionings, 3) how empowered positionings within the prevailing mathematics education discourse enabled empowered positionings despite strong institutional constraints, and 4) how, while not competing with other discourses the mathematics education discourse allowed strong empowered positionings. In addition, I analysed how empowered and disempowered positionings emerged within and among the available discourses. The exemplified data drew from interviews, complemented by field notes and aimed at giving a sense of this phenomenon, which are to be seen as prevalent results in relation to the present study.

Empowered and disempowered positionings

The previous section aimed at contextualising discursive positionings and to describe how discourses, power and positionings are dynamically interrelated and in a continuous flow. In this section I present an overview of the distribution of discursive positionings, which emerged from the ethnographic data. The categorisation, framed by the four broad discourses and enacted power positionings, are not always obvious. The utterances are taken from their context and in this format. There might be more than one way to categorise each discursive positioning as expressing empowerment or disempowerment. In order to clarify the categorization on this level short comments or words are added to fill in what will give a sense of actual context, however in a superficial way.

All examples in the following overview were selected because they revealed strong empowered and disempowered positionings. For instance, when the students expressed personal positionings like “I want to be/do/develop...” and “I will do/be...” they enacted empowerment by placing themselves central in the educational context, whereas “I can manage...” “I am good...” and “I have no difficulties...” and more contextually bound statements, like “I always got good grades”, “I understand what the teacher says” and “one learns by doing it. “I have done it before”, indicated empowerment and a wish to be an active agent in his/her own learning process.

Empowerment through intergroup positionings included mainly peer students and fellow citizens as for instance “the way mathematics was taught [by the teachers] in my country” and “I don’t really get why most Swedes have problems in mathematics, they have so good education”. The positioning indicated awareness of a phenomenon and included others, who were considered to be involved. Notable is, that even if positionings are deemed as empowered they are not only “positive”. Rather, empowerment indicates awareness of what is at stake, confidence with the subject or context, and sometimes a way to take active agency in order to affect what is going on.

Disempowered positionings were more subtle to characterise and therefore in larger need of contextualisation. These positionings were seen as expressions of that power was situated somewhere else or by someone else, and that the students did not feel they had possibility to influence or change. There were some central characteristics though, to point at, to give a sense of what emerged as disempowered personal positionings in the analysis: As a first example, the student placed herself as dependent on decisions taken by others: “I thought we would/should...” “I don’t have time...” and “It feels ... I get a lot of stress really. What is it the teacher wants to know?” Second, there were circumstances that the students had not thought about or realised till now, which indicated disempowerment: “I haven’t got... I still don’t

know enough [about mathematics education]”, “I have not thought about...” Third, the students expressed marginalisation or being excluded in one way or another. For example: “I haven’t had any child in the Swedish school”, and “I, who didn’t like mathematics, who still is not fluent at the times table.” These examples do not cover the whole range of disempowered positionings. However, the main characteristics exemplify and illustrate how lack of empowerment was expressed through the study. When the students expressed disempowerment in the same way as the examples above, but through intergroup positionings, they often focused on language, such as “We who don’t have Swedish as our native language“, and institutional constraints “The way we sit here in the lesson isn’t fun at all...” Through these positionings the students expressed that they had identified discursive challenges, and whether they saw possibilities for change or to challenge the dominant discourses depended on the contexts, within which the positionings were enacted. Mostly, however, their positionings indicated that they just had to accept the discourse.

Without claiming this as fully covering the range of characteristics the overview is created to give the reader a sense of how the students orally expressed personal and intergroup positionings in the four discourses; of the spread of positionings, and also some characteristics of empowered and disempowered positionings.

Personal positioning, expressed through empowered positionings within the mathematics education discourse

By enacting personal positionings in the mathematics education discourse the students for instance expressed empowerment by talking about themselves as supportive: “I want to be the teacher who can support the children [in mathematics]”, and “a teacher who their pupils can trust”. “They can ask whatever they want to and I will answer”. Empowerment was also shown as they expressed interest in mathematics: “I wanted to study mathematics because I will work as a mathematics teacher”, and from new views on mathematics: “I wanted to develop this and I want to work on it. Now everything is math.” They expressed positive attitudes about their future profession: “I will be a good math teacher”, by having possibility to make mathematics interesting: “I am excited, and think it is very interesting trying to capture the children’s curiosity and interest”, and being reachable for all pupils: “I have an ambition to catch pupils that were like I, who didn’t like mathematics.” Thus, the students’ experienced possibilities to engage in creative mathematics education, and their will to do better than their own teachers in school, made them express empowerment in the mathematics education discourse.

Personal positioning, expressed through disempowered positionings within the mathematics education discourse

The mathematics education discourse mostly rendered empowered positionings when no other discourses were made available. However, as other discourses emerged simultaneously these sometimes affected students to express disempowerment. Institutional framings did not meet the students' expectations on the mathematics education course, for instance: "I have not thought that maths, that we will sit down and write an essay or... an assessment work or something" or that expectations on the content not were fulfilled due to the institutional and language/culture discourses, which affected them in working with mathematics content: "I thought we would work a lot with numbers. But it was not... There was a lot more with words, we should ... work." The institutional assessment discourse also rendered disempowerment due to assessment in mathematics education for instance when students misunderstood what knowing they should show and failed to pass the test: "I realized that [the teacher] had equal sharing in her mind. But I thought we should analyse the student's solution". Institutional constrains also affected their positionings with regard to begin teaching mathematics: "I haven't got... I still don't know enough [about mathematics education]."

Personal positioning, expressed through empowered positionings within the mathematics discourse

The mathematics discourse rendered empowered positionings in several ways, but most prevailing were the students' expressions of confidence regarding mathematics, such as: "I am really good at mathematics", "I will study addition and subtraction", "I have no difficulties at all in mathematics", and "When it comes to mathematics I can manage independently." Mathematics rendered positive feelings: "I feel that I have learnt [mathematics]"; "I am happy that I chose mathematics"; and personal achievements, such as "I am about to realize [connections in mathematics]", "I managed to do all parts [on the written exam]" and "I always got good grades". Empowered positionings were also expressed with regard to what mathematics *does* with the person who studies the subject: "I think mathematics is intelligence enhancement", "One gets more logical" and "One creates a more rational way of thinking."

Personal positioning, expressed through disempowered positionings within the mathematics education discourse

The mathematics discourse also rendered strong disempowered positionings, both regarding their own skills: "I, who don't like mathematics, who still is not fluent at the times table", and in relation to course content and relevance for their future profession "I don't understand why and how to use it later [as mathematics teacher]." The strongest disempowered positionings though,

appeared in interaction with the mathematics education discourse within which mathematics should be related to everyday contexts: “I have asked: “Can we discuss this? Can we relate this to everyday...?” and where questions were aimed for deepening their understanding: “I think the questions [in the lectures] are narrower [compared with mathematics education]”, “There are more questions regarding how to calculate, not interesting questions, really, and discussions about the concepts.”

Personal positioning, expressed through empowered positionings within the language/culture discourse

The students enacted empowered positionings in few instances within the language/culture discourse, and almost exclusively the positioning was related to immigrants’ concerns of being skilled in the Swedish language. “I understand what she says”, as well as the statement: “You develop your language when communicating with others. That is what I think is very important.” They also enacted empowerment by comparing different teaching and school cultures as they had experiences from schooling in at least two countries: “And I feel sorry for them, who study [mathematics] in my home country. Because, they don’t get it... the right way as here in Sweden.”

Personal positioning, expressed through disempowered positionings within the language/culture discourse

The language/culture discourse revealed strong disempowered positionings in relation to the requirements of mastering the language of instruction: “I do not understand [what they say]”, “I am a little unsure of the language”, “I don’t know how to pose questions”, and “I have difficulties in the Swedish language”, were all typical positionings. There were also instances where the language/culture discourse interacted with other discourses, thus hindered focus on mathematics and mathematics education. For instance in situations where cultural traditions and family commitments occur in intensive study periods: “One cannot say: “actually, I have to prepare for my exam, you can go home.” Regarding language vs. other discourses the emphasis is put on language. For instance “There is much more that I have to concentrate on than language” and “What I have learnt here is a lot more about language. That is my problem” shows how language obscures the content they expected to learn, whereas “I do not understand anything, still, of what is written in the compendium,” indicated disempowerment with regard to advanced mathematics in combination with academic language. Not being skilled enough in the language of instruction also rendered disempowered positionings in relation to the present study: “I do not want to read about how I was at the beginning. I had a very poor language and didn’t get the high demands from the teachers. I was not able to express myself as good as my classmates.”

Personal positioning, expressed through empowered positionings within the institutional discourse

The students enacted empowered positionings in the institutional discourse as expressions of emancipation: “I can manage independently”, “I don’t need the teacher” and of being skilled in mathematics, such as: “I have had many good grades” and “I like to calculate if I have time.” They also expressed autonomy “One learns by doing it. I have done it before”, which also means that the institutional constraints are challenged: “I cannot get so stressed for not missing the exam. In worst case I must do it again”, “I will move on. Yes, I intend to continue even if it was not what I expected from the beginning.”

Personal positioning, expressed through disempowered positionings within the institutional discourse

The institutional discourse revealed disempowerment regarding lack of experiences from the Swedish school: “I have no experience from Swedish school. That is my problem”, “I have not been working, either”, and “I haven’t had any child in the Swedish school”, exemplifies this concern. Another disempowering factor is time: “I feel a bit stressed”, “I don’t have time”, which also is visible in relation to lectures: “I, and many others don’t have time to see all the lines [the teacher] writes”. This expressions of disempowerment is strongly connected to the course content: “I haven’t seen much of that [content]”, “This feels just a bit harder compared to what I have done earlier”, “I do this only because I must proceed. The initial teacher education was also challenging: “Everything affects me”, “I have had a bad mentor”, “and it feels ... I get a lot of stress really.”

Intergroup positioning, expressed through empowered positionings within the mathematics education discourse

The students’ enacted empowered intergroup positionings within the mathematics education discourse mostly related to their backgrounds as learners in a foreign country: “The way mathematics is taught in my country, most pupils had problems in mathematics” “They, who couldn’t master the formulas or understand what it was all about [inaudible] lack of teaching, maybe.” They challenged the way mathematics was taught and claimed: “because of the way it was taught they lost all interest in learning.” These experiences were also related to the Swedish education: “The [Swedish] teachers, I think, are really good at explaining the rules”, and compared with their country of birth: “If this had been in my country ... maybe 99 % of the pupils would get good grades, or like mathematics if they... was taught the way you do in Sweden.”

Intergroup positioning, expressed through empowered positionings within the mathematics discourse

The mathematics discourse revealed empowered intergroup positionings regarding the collaborative work with mathematics in the courses. I here present a longer excerpt as it contained the mutual progress: “When we started, the level of the mathematics was so low... But it was very fruitful and... if we worked on addition, for instance, we didn’t just talk about it... We experimented and used many ways of calculating, and talked thoroughly about what it really was in a way one hasn’t done before... Then there was a continuous progression and we could discuss algebraic patterns and negative numbers, and understand those concepts too.”

Intergroup positioning, expressed through disempowered positionings within the mathematics discourse

Disempowered intergroup positionings within the mathematics discourse appeared tightly connected with institutional constraints, such as time limits: “We don’t have time for discussions. If [the teacher] will have time for going through [the teacher’s] theory, we will not have time for discussions”, and speed calculation: “I, and many others don’t have time to see all the lines [the teacher] writes”, “When [the teacher] begins with a new calculation we haven’t had time to think through [the teacher’s] lines.” This results in superficial questions regarding technical details in the calculations. “The questions we ask are posed because [the teacher] writes so fast”, “It is those questions we ask.”

Intergroup positioning, expressed through disempowered positionings within the language/culture discourse

There were few instances where intergroup positionings indicated empowerment, however it was visible in situations where immigrant students challenged the Swedish school culture through having experiences from both cultures: “I don’t really get why most Swedes have problems in mathematics they have so good education.”

Intergroup positioning, expressed through disempowered positionings within the language/culture discourse

The language/culture discourse rendered disempowered intergroup positionings solely in relation to being immigrant: “We who don’t have Swedish as our native language”, “Maybe it is just a problem for us as immigrants” and having Swedish as a second language, such as writing: “There is much to write all time and since we have a different background and we have not written or study so much here in the schools”, and the emphasis on language fluency as of equal importance as the course content:

“Not only mathematics [is important] as the teacher told us”, “The language is the most important... If one look at this, I don’t think we will succeed...”

Intergroup positioning, expressed through empowered positionings within the institutional discourse

There were few instances of empowered intergroup positionings within the institutional discourse. However, one example shows that assessment in relation to tests not necessarily is disempowering and related to one’s background: “So we will kind of be... we will be assessed as students, not... as immigrants.”

Intergroup positioning, expressed through disempowered positionings within the institutional discourse

The students expressed disempowered intergroup positioning regarding organisation and structure of lectures: “The way we sit here in the lesson isn’t fun at all”, including time constraints “We don’t have time for discussions.” Assessment was another factor that rendered disempowered intergroup positionings, both in relation to language concerns: “And especially for us who want to become teachers and... because we are immigrants too ... But I think they mostly will focus on our language. How we speak Swedish, how we work together”, and in relation to time pressure: “There are many [students] who... I mean, one can forget, one can perform poorly under stress... stressed situations and... I think many [students] do.”

Illustration of the flow of power within available discourses

Impact from societal discourses of mathematics education

We often engaged in long talks and as we met several times over the years, Tina often referred to previous teachers, teacher educators and supervising teachers who she had met during initial teacher education. She had earlier commented on teachers’ engagement in school and now told me that she had met teachers who she thought not engaged enough in planning and implementation of mathematics teaching. She did not want to be like them, however she was clear about that it was difficult to make changes on a societal level.

What I feel is that it feels motivating, like one gets... which feels important. That one may come out [to school] with new knowledge and... try to transform it and make something better /.../ Like teachers as a whole have a bad reputation and all that. It is sad, as you put four years of your life to come out to a... what is said... a low status profession. But, in some way one can understand why during initial teacher education. You understand why... why their reputation is so low, so to say. /.../ Then it feels like one’s own piece of this picture... That one should be able to raise the whole society and the

mathematics... that feels unrealistic, and... I think that mathematics will be very... very low, for a very long time. However, I feel that as long as I'm doing right, it still feels quite okay. (Tina, fifth semester; January 2012)

Det som känns, det är ju att det känns motiverande, liksom att man får... och det känns viktigt, liksom. Att man får komma ut med ny kunskap och... försöka omsätta den och göra någonting bättre /.../ Liksom att hela lärarkåren har ett dåligt rykte och sådär. Det är jättetråkigt, liksom, när man lägger ändå fyra år på sitt liv för att komma ut till ett eh... till ett... vad säger man... låg... låg ryktat yrke. Men på nåt vis kan man ändå förstå det när man är ute på VFU. Asså man förstår varför... varför dom har så dåligt rykte, liksom. /.../ Sen liksom, känns det att sin del i hela bilden, liksom att... man ensam ska kunna lyfta hela, liksom samhället och matematiken, det känns ju... orealistiskt, liksom och... och jag tror att det känns som om matematiken kommer vara väldigt... väldigt låg väldigt länge. Men på nåt vis då så känner jag att så länge jag gör Rätt, så känns det ändå helt okej. (Tina, fifth semester, January 2012)

Tina expressed awareness about this societal discourse of mathematics education. Through empowerment, she positioned herself within this societal discourse of mathematics education. She was clear about that the teachers' status was low, and that teachers' engagement could be one reason for this. As she talked about difficulties to impact for change, her positioning expressed disempowerment, but changed again as she felt she was doing the right thing, even if [school] "mathematics will be very... very low, for a very long time".

Sofia was one of the students who earlier had engaged in these questions, so during an interview I asked her to elaborate little more on her thoughts. I mentioned that media often reports from school, but did not give any concrete examples:

Kicki: You mentioned earlier that mathematics is quite loaded, so to say. The subject is quite debated in the press and... there is always something going on. How do you see yourself in it? I mean, do you react on it and if so, how? Do you feel touched by the debate, so to say?

Sofia: Yes, sometimes, absolutely... But I try... one tries to keep as neutral as possible and think about more perspectives than that. Even if they say, "Mathematics is fantastic, you can do this and that", one still has to think critically. When they say, "Mathematics is shit/crap, why should you teach..." whatever content. Then one needs to relate to that too. But... I don't know. It's difficult, since I don't know what I think myself. And I cannot say, "It is vitally important to get involved with equations". I cannot say so. I have no support for that (giggles). It is also difficult to know. Do you understand what I mean? I try to keep neutral and await, because I feel that I have too little... I must digest it, because I don't know what I think yet. I must... I feel that I must get more [to be able to say] "this is how it

is!” I don’t feel confident at all, because I haven’t got... I feel that I’m not skilled enough. (Sofia, fourth semester, December 2011)

Kicki: Du berörde här förut lite lätt det här att matte är ganska laddat och så där. Ämnet är ju ganska omdebatterat i press och... Det händer ju... det är alltid nånting som är på gång. Hur ser du... Hur ser du dig själv i det? Liksom reagerar du på det och i så fall hur och... Känns det som att du är berörd av debatten, liksom?

Sofia: Ja, emellanåt, absolut... Men... jag vet inte riktigt. Jag tycker att ja... eller, jag försö... man försöker hålla sig så neutral som möjligt och tänka på fler perspektiv än bara det. Även om dom säger såhär, matematik är fantastiskt, gör det här och det här. Då måste man fortfarande ha ett kritiskt tänkande. När dom säger matematik är skit, varför ska ni undervisa om... ja, vad det nu kan vara. Då får man förhålla sig till det också. Men sen så... Nej jag vet inte riktigt. Och det är svårt att veta... Jag vet inte själv riktigt... vad jag tycker. Och jag kan inte säga såhär; jo men det är Livsviktigt att hålla på med ekvationer, liksom. Jag kan inte säga så. Jag har inget stöd för det. (fnissigt) Också att det är svårt att veta, förstår du vad jag menar? eh... jag försöker nog hålla mig neutral, tror jag, och invänta lite. för jag känner att jag har för lite, jag måste... jag måste hinna smälta och veta, för jag vet inte vad jag tycker än. Jag måste... jag känner att jag måste ha mer för att kunna, ja men såhär är det! Eller, liksom, jag känner inte att jag är jätteövertygad åt nåt håll, för att... jag har inte fått... jag kan inte så mycket än, känner jag. (Sofia, fourth semester, December, 2011)

As Sofia talked about mathematics as a school subject, which is questioned and constantly under debate on different levels in the society, she took a distanced point of view. Through empowered positionings she described how different attitudes affected her, as for instance the discourses of mathematics as a problematic school subject and of mathematics as the most important subject in school. Sofia took a reflective stance and enacted empowerment by saying “one tries to keep as neutral as possible and think about more perspectives” and “one still has to think critically.” In this sequence she almost simultaneously enacted different positionings. Empowered positionings in relation to the “debate” and, if not clear disempowerment, a less empowered positioning in relation to her own attitude. Even though she was clear about that she did not feel confident and was not enough mathematically skilled yet, she could, without hesitation position herself by taking a step back: “I cannot say ‘It is vitally important to get involved with equations’. I cannot say so. I have no support for that”.

The two examples above show two extremes of positioning. Both Tina and Sofia were obviously engaged in how people talk about mathematics and what makes them engage in mathematics as a school subject. Tina was very clear about that she could contribute as becoming mathematics teacher to make mathematics better in school and this positioning made her express strong empowerment. On the other hand, she realised that she could do

nothing to change the societal attitude to mathematics, which disempowers her. Sofia reflected on herself in situations where she would have to defend school mathematics. Her approach where she related to different aspects, created blurred lines in the flow of power and shows that there is no definite line between empowerment and disempowerment. Hence, there are grey-zones to identify through this understanding of empowerment. On the whole both Tina and Sofia enacted positionings that revealed empowerment in the school mathematics discourse. Two different student responses to how school mathematics is seen and talked about, in society and by the students, have illustrated how different empowered positionings can be enacted despite that the topic is the same.

Constraining discourses affect students' positionings within the mathematics discourse

As shown in the previous chapter and the section Language/culture discourse, the language/culture discourse produced students' disempowered positionings to a remarkable high extent. This phenomenon emerged from the first course days and was prevalent over the two years I participated in the education. In the following I show how the language/culture discourse emerged as dominant and prevented empowerment in other discourses — in this case the mathematics discourse.

Theresa had attended the mathematics course for some weeks. She was not always present, due to her family situation with a young child and a full-time working husband. Sometimes she came about 15 minutes late, seemingly stressed. However, when she was present she was an active participant, though, and always acted with engagement. I early had a feeling that she liked mathematics and her attitude towards the tasks they were given in whole class during this course strengthened this impression. In comparison to previous courses she spoke more, both with her peers and in whole-class discussions. She got involved in discussions with the teacher and contributed with her thoughts during processes of problem solving. (Field notes September 2011). She contributed by enacting empowerment within the mathematics discourse — an attitude that differed from what she had expressed earlier — which made me curious about how she talked about this herself, since I have not experienced this empowerment earlier. In an interview conducted during the course I asked Theresa to tell more about the specific course and invited her to do this by saying that I had recognized that she is active during the lectures and that she sometimes poses questions to the teacher:

Kicki: How... this course you take... How do you feel about it?

Theresa: Well... quite good. I don't know... yes.

Kicki: You are often involved and respond to questions and... when it comes to mathematics and stuff. Are you confident?

Theresa: Yes, yes, yes! In KOMVUX [municipal adult education] I have had many... what can I say, eh... good grades all the time. I have not... But, what I have learnt here is a lot more about language. That is my problem. And... It is about life experience too... what one needs. Since I haven't had any child in the Swedish... eh, school, I have no experience of that. And I haven't been working either. Everything affects me from the beginning and I have had a bad mentor who pressed me very much. And... yes.

Kicki: In what way...

Theresa: I can imagine... Maths... it is so clearly...

Kicki: Den här kursen som du läser. Hur känner du inför den?

Theresa: Ja, ganska bra. Jag vet inte.

Kicki: Du är ofta med och svarar på frågor och... när det handlar om matematik och så. Känner du dig säker och...?

Theresa: Ja, ja... Jag har haft många... vad ska jag säga... höga betyg hela tiden i komvux. Den handlar mycket om språk. Det är kanske det som är... Det är mitt problem. Och... och det är också livserfarenhet också, som man behöver. Eftersom jag inte har barn som gått i svenska skolan och jag har ingen erfarenhet av det. Och jag har jobbat aldrig också. Allt påverkar mig från början och jag har haft en dålig handledare som pressade mig jättemycket. Och... ja.

Kicki: På vilket sätt...

Theresa: Det kan jag tro... Matte... det är så tydlig...

Theresa interrupted my attempt to pose the next question and continued to talk about mathematics and about her difficulties in understanding the content of the compendium (the compendium contained advanced mathematical texts and tasks at university level):

Theresa: I've been taught by two teachers and I do not understand anything, still, of what is written in the compendium. So [the teacher] said to me, what she explains is what is important, not what is written in the compendium.

Kicki: And you think you can follow along as [the teacher] explains?

Theresa: Yes, I understand what [the teacher] says, but I don't understand why and how to use it later. I don't know. But...

Kicki: [Poses a leading question.] Could you ask questions about that, when... because you sometimes do? Like "how... isn't it supposed to be like this?" or...

Theresa: Yes, but I am a little unsure of the language, and because of that I... I have many, many questions [giggles]. And since [the teacher] is a bit... I don't know... [the teacher] is a bit unsure. Or... this is the first time [the teacher] teaches this course. I don't know how to pose questions. Because... when it comes to mathematics I can manage independently. I do not need the teacher so much. I'll be fine if I study a lot myself. (Theresa, fourth semester, September 2011)

Theresa avbröt mig

Theresa: Jag har provat två lärare och jag fattar ingenting... fortfarande vad som står i kompendiet. Så [läraren] sa till mig att det är viktigast det som [läraren] förklarar. Inte det som står in kompendium.

Kicki: Och du tycker att du kan hänga med då när [läraren] förklarar?

Theresa: Ja, jag förstår vad [läraren] säger, men jag förstår inte hur jag ska använda det senare.

Kicki: [Ställer en ledande fråga] Skulle du kunna ställa frågor om det när du får...? Det gör du ju ibland 'Ska det inte vara så här, eller...?

Theresa: Ja, jag är lite osäker på språket... Därför, jag har många många frågor. [Läraren] är lite osäker, det är första gången som hon undervisar den här kursen. Jag vet inte hur ska jag ställa frågor. Men, när det gäller matematik klarar jag mig självständigt. Jag måste inte med läraren mycket. Jag klarar mig om jag läser själv mycket. (Theresa, fourth semester, September 2011)

In this excerpt several discourses emerged as available and Teresa's positionings revealed power-relations, which I considered important to show. What she said was not extra ordinary; however she brought forward several concerns, which seemed to affect her negatively.

From both fieldnotes and interview data Theresa enacted empowered positionings within the mathematics discourse and in relation to the mathematics she has learnt in Sweden. When I posed a leading question regarding Theresa's activity in class she initially took up the position of herself being an active student in the mathematics class. She shortly after changed position and instead expressed empowerment by positioning herself within the mathematics discourse. Theresa had always got good grades and liked mathematics here in Sweden. On the other hand, she expressed disempowerment with regard to her language difficulties, lack of experiences from the Swedish school system and bad experiences from initial teacher education. Hence, she had experienced lots of demands, which she expressed as difficult to handle. Several discourses were thus working simultaneously and through Theresa's enacted positionings within each of them, it was possible to reveal how power-relations impacted the discourse. Theresa's positioning expressed disempowerment with regard to language difficulties and institutional constraints, such as difficulties to understand written mathematical text in the compendium, as well as how to pose questions to her teacher with regard to the course material. The students were expected to manage the oral and written language and it seemed — from Theresa's perspective — difficult to ask for clarifications due to implicit institutional "rules". The institutional discourse hence prevented her from being as active as she wanted and she did not challenge the power-relations within the institutional discourse by posing questions; which possibly could have been misunderstood due to language confusion. In the case of Theresa both the language and the institutional discourse made her express disempowerment and the intimate connections between the two

discourses may have affected each other. It seems like what affected her negatively overshadowed what she expressed as strengths, since she focused a lot more on talking about language difficulties and institutional constraints. Still, in the end, she expressed empowerment regarding her mathematical knowledge and said that she will be able to pass the course without the teacher's help.

Institutional discourse constraints mathematical confidence

The previous section illustrated an interview context where dominant and constraining discourses seemed to affect empowered positionings within the mathematics discourse. I will elaborate little more on this theme, to show an example of how this emerged in the educational context. Again Theresa's positionings will be our starting point for the analysis. In several instances the mathematics discourse appeared as tightly connected with an institutional constraining discourse during the actual course. What follows below is a short extract from one of the first lectures in the mathematics course (Field notes, August 2011) where this phenomenon was prevalent.

The teacher talks about primes and prime factorization and asks: "What is a prime?"

Evelyn: A number one can divide by one and [the number] itself.

The teacher asks if the class can give an example.

Class: [in chorus] One.

Teacher: No, that is more like a convention. [The teacher writes 2,3,5,7,11,13,17,19,23, ... on the chalkboard]. Another number that can be written as a product of as small numbers as possible [writes $324=2*162=2*3*9*9=2*3*3*3*3*3$] Prime factorization is unique! There is exactly one way to prime factorize each number.

Theresa, who usually sits silently, raises her hand and asks:

Theresa: May I ask you a question? I understand the first line [$2*162$], but where does the three come from [$2*3*9*9$]?

The teacher re-writes $2*3*54=2*3*27=2*3*2*9*3=2*3*2*3*3*3$

Theresa does not get any response to her question. The teacher just corrects the mistake and returns to the agenda without considering whether the expression was correct — which it was not [$2*3*54\neq 2*3*27$]. Theresa did not ask for further clarifications.

In this excerpt Theresa positioned herself both within the institutional and the mathematics discourse by raising her hand and in front of the student group asking for clarifications. Through these actions she positioned herself with empowerment within the mathematics discourse and it was obvious that she intended to contribute to the mathematical conversation. Her actions made the teacher return to the task and change what was written, though without commenting. Despite Theresa's empowered positioning through her mathematical strengths, she did not question the new writing. None of her fellow students commented either, which indicated that there might be power

relations present that prevented questioning of the correctness of the teacher's writings. The teacher, in turn, did not either elaborate further on the definition of prime numbers.

For Theresa, three discourses were working simultaneously in these two examples, however somewhat contradictory and it was within the mathematics discourse she expressed empowerment. Despite that, power-relations within the dominant language and institutional discourses constrained her positionings in the mathematics discourse and this phenomenon was visible both in the interview and from this excerpt of fieldnotes. This in turn may have hindered her from expressing empowerment within the mathematics education discourse as becoming teacher in beginning of the interview.

Mathematics education discourses empower to overlook institutional constraints

Right from the first tentative analysis the students talked about mathematics education with a positive attitude. All students had chosen mathematics as main subject, as earlier mentioned, which could explain the positive attitude from start. The available mathematics education discourse seemed thus empowering the students and they could easily imagine themselves as being a mathematics teacher. In the previous sections I showed how institutional and language/culture discourses affected and sometimes hindered positionings within the mathematics discourse. From fieldnotes in September 2011 it was obvious that the students accepted the institutional discourse that framed the mathematics course. They did small attempts to move the written exam from the planned Saturday, but realised that it was not negotiable. They initially asked questions to make visible connections with the content and their future profession, but very soon changed and directed almost all questions towards technicalities and details around specific tasks — as they calculated tasks typical for the exam. What is shown next is that when the students' enacted empowerment with regard to mathematics education, seemingly constraining discourses were not as dominant and affecting as we have seen before. Rather, the students sometimes challenged or seemed to overlook the constraints. From fieldnotes in autumn 2011, it is clear that students challenged the institutional discourse of assessment. This happened for instance in relation to how written tests were assessed, and that some parts of a test was judged as more important than others.

The actual seminar focused on division; one of the seminars when the students conducted short presentations to practice how to introduce new concepts. At one occasion Sofia and a fellow student seemed apparently annoyed when the university teacher repeated which tasks those were mandatory during the course. I recognized that they showed displeasure as they turned to each other and started to whisper loudly. This positioning was strong and during the break they invited several classmates in the

problematique. They said that they just skim the surface and that many small tasks were harder to that few large. It would be better if they got time to deepen their engagement in the mapping task. Sofia brought this up several months later in an interview:

I don't like when there are these very small tasks. It feels like it has been like we... like I don't want to teach. That one just sniff on the surface and then next [task] and then... and then next. That one never gets time to immerse oneself enough. And then... [Sofia refers to the short time they have for reflections before they are expected to present their thoughts] I would need that afternoon to think about it, because that is how I am. I need time to... reflect. But you shall immediately, like, write down: what did you think about this, and what did you learn? I don't even know... I don't have... I don't know that yet. I will know in a while. I... I haven't understood it yet. I can recite the whole lecture if that is what is interesting, but I don't think that is what they... are after, and then, then I think the tasks are a bit misleading. (Sofia, fifth semester, January 2012)

Jag gillar inte när det är de här väldigt små uppgifterna. Det känns som att det har varit mycket som vi... s... som, som jag inte vill undervisa. Att man bara nosar såhär på på ytan och sen nästa, och så... och så nästa. Att man aldrig hinner fördjupa sig riktigt. Man hinner aldrig smälta intrycken. Det här att man har en föreläsning. Och då... [Sofia refererar till den korta tid hon tycker de har på sig för att reflektera innan de ska redovisa sina tankar] Jag skulle behöva den eftermiddagen att tänka på det, för att jag är sån. Jag vill hinna, liksom... reflektera. Och, eh... men då ska man direkt, såhär, skriva ner: vad tycker du om det här, och vad lärde du dig då? Jag vet inte ens... Jag har inte... Jag vet inte ens. Jag vet inte det än. Det kommer jag veta om ett tag. Jag... det har inte satt sig, liksom. Jag kan ju sitta och återberätta hela föreläsningen om det är det som är intressant, men jag tror inte att det är det dom... vill åt. så att då, då tycker jag att uppgifterna är lite missledande. (Sofia, fifth semester, January 2012)

As we several months later met for an interview I recognized that this still was a burning issue. What Sofia expressed then was strong disempowerment with regard to the prevailing institutional discourse. They were among the last that underwent this programme and even if they responded to evaluation surveys, things seemed impossible to change. However, this did not affect her empowered positionings within the mathematics education discourse. Instead I it was possible for her to challenge institutional constraints and express disempowerment without losing the focus of mathematics education.

The analysis was based on Sofia's positioning within the broad mathematics education discourse, eager to learn and to develop critical thinking as becoming [mathematics] teacher. Thus, she expected to be challenged as a student. What she experienced was a lack of tasks, which required deep thinking in favour of many small and superficial ones; and expressed this as frustrating. Her oral and physical positionings during the

seminar and in the break were, as I noted, only taken into account by her fellow students and by me. However, she did not question the system by involving the teacher. This may indicate that she had no expectations that her protests would generate any changes.

As students expressed empowerment within the mathematics education discourse this made possible to overlook institutional constraints. This phenomenon appeared very early in the education and I will exemplify this through Anna's story. Anna moved to Sweden six years ago. She had a teacher exam from her country of birth, and now complemented her prior foreign education to get a Swedish exam with mathematics as main subject. Anna showed a deep interest in mathematics with reference to her own schooling and she expressed a positive attitude towards mathematics teaching. In the first interview two weeks after the course started, she articulated that her expectations, to become a mathematics teacher, now were about to be realized. It felt good and she seemed satisfied and happy over her educational choice.

Kicki: Anna, you have been into this mathematics teacher education for two weeks. Can you tell me how it feels?

Anna: Eh... it feels good... I am about to realize the expectations I had before I was admitted to the mathematics teacher education. And... I am happy that I chose mathematics as my orientation. So... it feels good [giggles]!

Kicki: When you think of yourself as ... a teacher of mathematics, when you teach. How, how do you see yourself? How would you be?

Anna: I want to be the teacher who can support the students who need support. Not only support during lessons or related to teaching. Maybe they need other support. I just want to be the teacher who has her students as her family. So they feel safe when I am there teaching them. They can ask whatever they want to and I will answer... in a way they can understand. Making things easier and not so difficult for them, well, yes... I want to be a good teacher! Yes... (Anna, interview 1, spring 2009)

Kicki: Nu, Anna, har du gått två veckor ungefär på din utbildning för att bli matematiklärare. Kan du berätta hur det känns?

Anna: Eh... Det känns bra. Dom... förväntningar som jag har väntat mig, ja asså innan jag blev antagen till mattelärarytbildning, så... eh... asså, jag känner mig att jag är på väg och förverkliga dom... dom här förväntningar. Och... eh... Jag... jag är nöjd att jag valde faktiskt eh... matteinriktning. Så... det känns jättebra, helt enkelt! (skratt)

Kicki: När du tänker på dig som... lärare i matematik när du undervisar. Hur, hur ser du dig själv då? Hur vill du vara?

Anna: Eh... Jag vill vara den läraren som kan ge stöd till dom eh... elever som behöver det stödet. Även till dom som inte behöver det. Em... Det här stödet... em... kanske det inte är stödet vid, asså, ...

(ohörbart)... lektioner eller undervisningen. Kanske dom behöver stöd med nå'nting annat. Så jag vill vara läraren... eh... en eh... ja, asså, ja med mina elever som en familj, bara. Så... dom känner trygghet när jag finns och när jag undervisar, dom har den här... möjlighet, asså, och frågar vad dom vill. Jag svarar. Em... på det sätt som dom kan förstå. Eh... göra det enklare för dom, inte så svårt för dom. Em... ja... eh... ja... Jag vill vara en bra lärare! Ja... ja... (Anna, interview 1, first semester, January 2009)

Anna's interest in the mathematics subject and in teaching mathematics so that the pupils can learn was initially expressed without going deeper into details. However she clearly enacted empowered positioning in the mathematics education discourse through her expressed wish to become a caring teacher; a teacher who can support the children both with regard to mathematics and to their individual needs. The available discourse of mathematics education allowed her to talk about teaching so that all pupils can learn. This strand, which foregrounded issues of social justice was in line with what several students expressed initially, and what several students expressed as important by referring to their own experiences.

Language/culture and institutional discourses affect positionings in mathematics education discourses

The second interview with Anna was conducted after the first teaching practice period, eleven weeks into the first semester. She had thus experienced mathematics teaching in Sweden herself; however small-scale since it was the first time in the educational programme. Anna was at that point in time concerned about the strong focus on language within the mathematics education courses. She thought they were not taught the mathematics she expected and as we will see, the language/culture discourse obstructed the expected mathematics discourse and made her rethink what mathematics education could be like in Sweden.

- Anna: What I ... I think there is much more that I have to concentrate on than language... When I started this course I thought completely different about mathematics. Not this math. I thought we would work a lot with numbers. But it was not ... There was a lot more with words, we should ... work. So I... I think ... yes...
- Kicki: Can you tell me more? ... What do you mean by numbers... and what... what are the differences?
- Anna: Well, I thought, I wanted to study mathematics because I will work as a mathematics teacher. I will study addition and subtraction ... That's, much more advanced maths and yes ... This kind of thing in school that they use; fractions, decimal numbers and such, I thought. I have not thought that maths, that we will sit down and write an essay or... an assessment work or something. Much more I thought that we will be working with numbers and problem solving and such stuff. (Anna, interview 2, May 2009)

- Anna: Men det som jag... jag tror att det är mycket mer att jag måste koncentrera mig på språket, egentligen. Åve... Och det... det... När jag började den här utbildningen jag tänkte helt annorlunda matte. Inte den här matte (K - Mm). Jag tänkte vi kommer jobba mycket med siffror. Men det blev inte... Det blev mycket mer med ord vi ska... jobba. Så jag tror att jag... ja...*
- Kicki: Kan du berätta om det... eh... om... Först hur du tänkte då med siffror och vad... vad det är som har förändrats.*
- Anna: Ja, ja, asså, jag tänkte matte eftersom jag kommer att jobba som mattelärare. Då de... jag kommer att läsa plus och minu... asså, mycket mer fördjupning i matte och ja... Sån't här i grundskolan som dom använder, dom här bråk, decimal och så'n't här, tänkte jag. Jag har inte tänkt att matte, vi kommer sitta och skriva en uppsats eller eh... en examinationsarbete eller nå'nting. Mycket mer tänkte jag att vi kommer att jobba med siffror och problemlösning och så'na grejer. (Anna, interview 2, May 2009)*

Anna's positioning expressed disempowerment: both within the mathematics education discourse and in the language/culture discourse. Nothing was what she expected: They had had a lot of writing tasks and they did not work with the mathematics as she had imagined. The strong language focus in the mathematics education discourse revealed not only new ways of talking about mathematics teaching; a language/culture discourse emerged wherein it was necessary to be skilled in the Swedish language. The new demands were stressing and Anna related the language concerns to her background as immigrant and the situation revealed power-relations through her disempowered positioning. However, in the following piece from the same interview Anna's positioning within the mathematics education discourse changed. The language/culture discourse still disempowered her positioning and by using "we" she included other students in this discourse through intergroup positioning (Tan & Moghaddam, 1999). She talked about mathematics as more than numbers and that her view on mathematics was different from what she earlier thought. Through this new empowered positioning Anna talked about herself as becoming a good mathematics teacher.

Eh ... but when I started with this, it feels ... I get a lot of stress really. Very, very stressful. There is much to write all time and since we have a different background and we have not written or study so much here in the schools [in Sweden] and such, so it made a lot of the language skills if you say too ... I do not know /.../ I will move on. Yes, I intend to continue even if it was not what I expected from the beginning. Like, I thought about math, but it was not what I have figured in my head, but. I wanted to continue. I'm a bit like this stubborn man. I have never tired ... before. And I was teaching socio... civics, science ... like Swedish, but in my language, Arabic and such. But ... when I came to Sweden I thought maths, I haven't studied maths and that's

something new, so I wanted to develop this and I want to work on it. Now everything is math. When you go shopping, when you go... your computer. Everything, it's just math that applies. So I thought "I must". And ... yes ... I think I will continue with this ... yes ... I will be a good teacher [giggles]... math teacher! (Anna, interview 2, May 2009)

Eh... men när jag började med det här, det känns... Jag har... Jag får mycket stress egentligen. Mycket, mycket stress. Det är mycket man ska skriva hela tiden och eftersom vi har ett annat bakgrund och vi har inte skrivit så mycket eller läst så mycket här i skolor och så'n't, så det fattas mycket språket om man säger också... Eh... jag vet inte /.../ Jag tänker gå vidare. Ja, jag tänker fortsätta även om det var inte det som jag tänkte från början. Asså, jag tänkte matte, men det var inte det som jag har räknat i huve', men. Eh... Jag ville fortsätta. Jag är lite sån här envis människa. Jag har aldrig ledsnat... förut. Och jag var lärare även till socio eh... samhällskunskap, natu...eh... ah... som svenska, fast på mitt språk, arabiska och så'n't. Men... när jag kom till Sverige då blev det lite så'n't här att matte, matte har jag inte läst och det är nå'nting nytt, så jag ville utveckla den här och jag vill jobba med det. Och eh... nu är allting matte. När du handlar, när du går, datorn. Allt möjligt det är bara matte som gäller. Så jag tänkte 'det måste jag'. Och... ja... nej men. Jag tycker att jag kommer att fortsätta med den och eh... ja... jag kommer att bli en bra lärare (fniss)... mattelärare! (Anna, interview 2, May 2009)

As I have argued, power flowed within and among discourses, and the way Anna changed from expressing disempowerment to expressing empowerment illustrates how changed positionings indicated a change in power. Anna chose to move on, strengthened by that she not usually gives way to challenges. She will be a good mathematics teacher.

Not only language and institutional constraints affected the students' positionings. We saw earlier how Jessica referred to her family commitments and therefore did not have enough time to prepare for the mathematics exam. Two years into the educational program Anna told me about a written exam in mathematics. For Anna, both family commitments and culturally bound traditions made her abandon her preparation for the statistics exam. She had now failed two times and needed to pass next time to be able to continue her studies.

Anna: Last time. I had the written exam the day after my ... husband's father died. There were many... He is the oldest here and everybody came to our house. Well, one cannot say, "actually, I have to prepare for my exam, you can go home". One cannot say so. So I knew nothing. I managed to do all parts, except the statistics. And she wondered about that, because she knew that I knew this... median, mean value, type value. And I didn't see the question. It was a basic level task. If I had seen that task I would actually have passed the first time. It was a pity. It's not that difficult. But the second time, statistics was good, but now I failed on a fraction task that I misunderstood...

- Kicki: Do you think fractions are difficult in general?
- Anna: No, some... some tasks are a bit difficult to understand, actually. What is it the teacher wants to know? So, that's the problem. I don't know. Maybe it is just a problem for us as immigrants.
- Kicki: Do you mean how the questions are worded?
- Anna: Well, it was obvious, actually. It was obvious. That's at least what I think. Yes, after I realized that she had equal sharing in her mind. But I thought we should analyse the student's solution. That is what I did. Afterwards, when I came home, I read the question many many times and realized it wasn't was she wanted us to do. (Anna, interview 3, December 2011)
- Anna: Och så förra gången, det var sånt här. Jag hade tentan en dag efter min fars, eller min... mans pappa dog. Då hade jag jättemånga... Han är äldste här. Då alla kom hem och... Ja, man kan inte säga, ja, nu har jag tenta, faktiskt. Ni kan gå hem. Det kunde jag inte säga. Så jag visste ingenting. Jag klarade alla delar, förutom statistik. Och statistik hon... hon skrev också så, att [läraren] undrade, eftersom hon, hon visste att jag kan dom här... median, medelvärde, typvärde. Och jag såg inte det. Jag såg inte frågan. Och det var på grundnivå. Om jag såg den där frågan skulle jag... klarat den, faktiskt, första gången. Det var synd. Det är inte så svårt. Men andra gången, eh... statistik, jag tror att det har gått jättebra med det. Eh... med det är bråk som jag... eftersom det blev lite missuppfattning med det...*
- Kicki: Ja, men, men tycker du att bråk är svårt över huvudtaget, eller?
- Anna: Nej. Vissa... vissa frågor är lite svårt att förstå, egentligen. Vad är läraren [ute] efter? Så det är det som är problemet. Jag vet inte, kanske bara för oss som är invandrare, kan det va problem.
- Kicki: Tänker du på hur frågorna är formulerade och så där, eller?
- Anna: Jae, det var tydligt, faktiskt. Det var tydligt. Tycker jag i alla fall. Ja, jag visste att [läraren] var efter likaindelning, efter det. Men jag trodde att hon var efter att jag skulle analysera elevens svar. Det är det som jag gjorde. Sen när jag gick hem och läste frågan en massa massa gånger, då såg jag att det var inte det som hon var ute efter. (Anna, interview 3, December 2011)

Anna's positionings expressed disempowerment within several discourses simultaneously. Her family situation hindered her from studying as much as needed before the exam. As a consequence of time limits and family commitments, she failed on a statistics task the first exam. In the second exam there were some difficulties for her to understand what the teacher asked for. She felt that she knew the subject content, but due to language confusions she did not grasp the task as detailed as required. With regard to this, she failed again and now needed to write the exam for the third time. This situation stressed her and since she felt that she could have passed the first time if she had been able to study in peace she felt compelled to pass the exam. However, the available discourses interacted and Anna expressed disempowerment in all available discourses.

What we see here are several discourses – mathematics, language/cultural and institutional discourses –working simultaneously. All of them affected Anna’s disempowered positioning, which was visible through utterances like: “one cannot say “actually, I have to prepare for my test, you can go home””, which referred to a culturally bound discourse where she, as daughter in law, was expected to prioritize being the responsible hostess instead of studying; “the second time, statistics was good, but now I failed on a fraction task which I misunderstood...” This indicated disempowered positioning both regarding mathematics and language, since she did not solve an easy task due to language struggles. While: “some tasks are a bit difficult to understand, actually. What is it the teacher wants to know?” made both institutional constraints and language concerns visible and the reason why she thought these problems occurred: “Maybe it is just a problem for us as immigrants” positioned her in a language/culture discourse, where it is accepted that they as immigrants have difficulties in passing the tests. These utterances revealed power-relations in the discourses leading to that she did not position herself at all within the mathematics education discourse. Her only wish was to pass the exam.

Several discourses affected Anna’s positionings simultaneously and the language/culture discourses were dominant and influenced how she talked about her possibilities to pass the exam. It seems like this prevented her from positioning within the mathematics education discourse, even though she realised that she had misunderstood the task. I thought that she would want to elaborate more on the written exam and what she misunderstood, but she did not. However, as she felt compelled to pass the exam, several discourses interacted and revealed power-relations through Anna’s disempowered positionings. She could not influence what was going on, the institutional discourse dominated and made her try to understand what was required from her in order to avoid further failures.

Empowerment emerge through previous experiences

I now turn back to Rita to show how her previous experiences made possible for her to enact empowered positionings.

Rita: Well, in my country it was different compared to Sweden. There, one should read books and then read... learn different rules by heart without understanding anything. And I was quite good at managing such things. And I always got good grades, even though... I lack in... thinking.
(Rita, third semester, May 2011)

Rita: Asså, i mitt land det var... det är asså, liksom annorlunda om man jämför med Sverige. För att där man ska läsa böcker och sen läsa... lära sig dom olika regler utantill, utan att förstå nånting. Och jag var ganska duktig på att behärska såna saker. Och jag har alltid fått bra

betyg, även om jag... jag har brist... i själva tänkandet. (Rita, third semester, May 2011)

Through personal positionings Rita enacted empowerment on at least two levels within the available mathematics education discourse. First, she as becoming teacher had the power to say something about school mathematics and how it was taught in her two home countries. Second, as becoming mathematics teacher in Sweden, she knew that mathematics teaching should be based on pupils' preunderstanding. Learning by heart was not preferable. This discourse was strong both at the university and in school. Her previous experiences and the educational program allowed her to compare and contrast the different educational discourses, and reflect on them from a perspective, which was not possible for native Swedes. Through her positioning Rita showed awareness of the differences in teaching practices. This made take distance from the way she was taught, however she stressed that she had been able to manage learning "different rules by heart without understanding anything". Rita hence showed empowerment in relation to mathematics and stressed that she was able to manage and to get good grades. As the interview proceeded she made further comparisons between her two home countries:

Since, you know, the way mathematics is taught in my country, most pupils had problems in mathematics. And because of the way it was taught they lost all interest in learning, and maybe... I don't know what happened later, but my experience was that most pupil hated mathematics, in my country. They, who couldn't master the formulas or understand what it was all about [inaudible] lack of teaching, maybe... /.../ I don't really get why most Swedes have problems in mathematics. Well, they have so good education and they are... The teachers, I think, are really good at explaining the rules. But anyway... they've got mathematics problems. So I don't know... what is the reason? Why is it so? If this have been in my country – and I am 100 % sure, well maybe 99 % of the pupils would get good grades, or like mathematics if they... were taught the way you do in Sweden. (Rita, third semester, May 2011)

För att, asså du vet, undervisningssättet är så i mitt land. Så dom flesta eleverna, tycker jag, hade problem i matematik. Och på grund av undervisningen tappade dom intresse för matematik och kanske... Jag vet inte vad dom har hänt med. Vad som har hänt med dom, senare. Men, det som jag har upplevt att, de flesta hatade matematik, i mitt land. Dom som kunde inte behärska formlerna eller fattade inte vad det handlar om. [ohörbart] undervisningsbrist, kanske.... /.../ Jag fattar inte heller varför dom flesta svenskar har problem med matematik. Ass, dom har så bra undervisning och dom är... Lärare tycker är jätteduktiga att förklara reglerna. Men ändå... dom har problem med matematik. Så jag vet inte... vad är det för orsak? Varför är det så? Hade det varit i Mitt land, och jag är 100 % säker, asså, 99 % elever

*kanske kommer få bra betyg, eller tycker mycket om matematik om dom eh...
fick undervisa på det här sättet som ni gör i Sverige. (Rita, third semester,
May 2011)*

As she talked about differences in teaching practices, Rita enacted both personal and intergroup positioning (Tan & Moghaddam, 1999) within a “we/you” discourse. She focused on differences in mathematics teaching and attitudes towards mathematics, and she questioned why Swedes are not successful in mathematics when the education is so good. Immigrated students, who could compare education from own experiences, exclusively enacted this character of positioning. For example by saying “the way mathematics is taught in my country” and “the way you do in Sweden” her positioning as immigrant expressed empowerment and made possible for her to question “why most Swedes have problems in mathematics” despite good teaching. Through intergroup positioning within the mathematics education discourse, Rita also foregrounded consequences that mathematics teaching had in her first home country, since “most pupil hated mathematics” and stressed the differences even more by letting me know that if they “were taught the way you do in Sweden” almost all would like the subject.

By illuminating how Rita talked about having experiences from different cultures and contexts, I have showed how power-relations became visible through available discourses of mathematics education. From Rita’s story it was clear, that her previous experiences allowed her to judge mathematics education in Sweden as good, but also to challenge the Swedes’ attitude to mathematics.

Summary

In this chapter I have shown how the students’ enacted personal and intergroup positionings revealed power-relations in available discourses. A vast part was dedicated five students whose enacted positionings revealed both empowerment and disempowerment in available discourses. The analysis of how Tina, Theresa, Sofia, Anna and Rita positioned themselves and others showed the dynamic and unstable power-relations between the four discourses. Empowered and disempowered positionings revealed how relations of power were accepted and/or challenged by the students. The positionings hence showed how the students chose to express themselves within each discourse, what they emphasised more or judged as being of secondary importance. The dynamic relations opened up for a dynamic analysis that allowed elaboration on how positionings could change and develop in the interaction between, say, a strong language/culture discourse and an institutionally framed mathematics discourse.

What can then be said about how discursive positionings revealed power-relations? With reference to what I just wrote, I will not depict any “truths”

about discursive positionings in the educational contexts. However there are some central issues and patterns that will open for the further analysis in the next chapter where focus is on the question how and why available discourses open up or narrow spaces for empowered and disempowered positionings.

The analysis showed that empowered positionings within the available discourses allowed the students to express confidence with the course content and their current situation in mathematics teacher education; to express a will to change teaching practices; to reflect on mathematics education, with regard to their own schooling and in relation to actual experiences; and to express goals for the future profession, to mention some. In addition, it allowed them to look critically at mathematics teaching practices, to contribute to the discussion about mathematics education on a societal level, and to question institutional constraints, which hindered mathematics teaching. Empowerment was not merely about expressing harmony and satisfaction, rather about having the opportunity to resist or challenge available discourses by being part of change and development.

Disempowered positionings on the other hand, indicated positionings in discourses that seemed stable and unchallengeable and therefore were less open for development and change. The institutional and language/culture discourses have, through the whole analysis, affected the students' positionings towards disempowerment, and through that affected positionings in other discourses, for instance through time limits and predetermined test structures constrained students' possibilities for empowered positioning in the mathematics discourse. In some instances, though, where empowerment in the mathematics education discourse was expressed strong enough, the institutional discourse was challenged. This occurred both in relation to the school context and the university context. The language/culture discourse, still, was never challenged.

Immigrant students almost exclusively enacted empowered positionings with regard to language/culture and mathematics education discourses. Previous school experiences from two different countries allowed them to challenge the different educational systems, the mathematics education and the mathematics content. They included their peers or fellow citizens, and made positioning in a discourse of we – you possible, meaning “we as immigrants and you as Swedes” *or* “we in Sweden and they in my former home country”. This relates to León Rosales (2010), who wrote about this phenomenon as fragile Swedishness. In his study, being Swedish was mostly connected with advantages, however the dichotomy of we — they [the non-Swedes and the Swedes] revealed a discourse of the actual boys as subordinated. In relation to the present study I would rather argue that the possibility to choose positioning in the available discourse of language and culture revealed space for empowered positionings. Due to their previous

experiences, they could choose perspective, and hence, how they wanted to be understood.

Intergroup positionings, enacted through disempowerment, mostly related to institutional constraints at the university. Schedules, tests, course structure, time limits, to mention some, were not negotiable and therefore revealed power-relations through its rigidity. However, the institutional constraints were accepted as though nothing could be done to change and by including peers in the acceptance of the institutional discourse they together became a powerful and supportive group during the education.

How and why do discourses open or narrow possibilities for positionings?

Previous analysis showed that positionings in the available discourses illuminated power-relations among and within the discourses, revealed through personal and intergroup positionings. Power-relations were described through the dichotomy of empowerment and disempowerment, even though there is a grey-zone (cf. Tyrone, 1994) in-between and therefore difficult to draw a distinct line among the two. However, for the analysis this conceptual distinction was helpful and brought to the fore that interacting discourses revealed that power was present and that the students performed actions in relation to this. I have shown examples of how the students' enacted positionings were affected; both orally and physically, and how this was an interrelated and on-going process where a continuous flow of discourses, power and positionings had to be taken into account.

In this chapter I analyse and discuss how and why available discourses opened up or narrowed spaces for empowered and disempowered positionings in mathematics teacher education contexts. This, in turn, will lead to a discussion about discursive practices, what we focus on in mathematics teacher education and which discourses we need to challenge. Parts of this chapter are dedicated to discuss how power-relations might affect what is said and not in the educational contexts and the analysis then focuses on how and why this occurs to a higher extent in relation to some discourses than in relation to other.

Interrelated discourses sometimes supported each other and sometimes operated contradictory. In some instances, there was no negotiation about which of the discourses that was dominating, since the students enacted empowered or disempowered positionings through the whole sequence, so to say. In other instances, some discourses seemed constraining on others and hence prevented empowered positioning. The latter occurred more often which led to that the students enacted both empowered and disempowered positionings almost simultaneously. In the following I elaborate more on these power-relations and discuss why they affect the students' discursively enacted positionings.

Negotiating available discourses

This study shows that some discourses “invited” the students to challenge the available discourses, whereas other discourses constrained the students’ space for empowerment. The idea of the dynamic character of positioning (Harré & van Langenhove, 1999) starts from an assumption that people involved in a discursive practice can negotiate and act new positions. This involves, as I understand, also that people *not* negotiate and act new positions. The students’ possibilities to enact empowered positionings in the four broad discourses hence revealed how discourses emerged as negotiable or non-negotiable.

Disempowerment reveals non-negotiable discourses

The institutional discourse has been illustrated as constraining and dominant at various points. The students expressed disempowerment, as there were no possibilities to change what was decided, neither at the university nor in the schools. However, there were different aspects of institutional constraints in the different contexts, which are necessary to point at. While positionings within the institutional discourse related to the university context made the students enact disempowerment within the other discourses too, the students enacted more empowered positionings in relation to institutional constraints in the school context. At university, the institutional discourse framed scheduled teacher-led seminars, groupwork, examinations, grading etc. Hence, their education was strongly affected by the university discourse, whereas institutional constraints in schools seemed to be easier to take distance from.

First, the fact that the students found themselves in the midst of a reorganization of teacher education revealed an institutional discourse of being among the last and therefore not worth any extra effort. However, the students tried to challenge this discourse and as showed earlier, Sofia was not satisfied with all small tasks, which prevented her from depth learning. She expressed the feeling of being stuck by institutional constraints:

It is a feeling, which I think was confirmed in this last course, like this: “we had thought about [changing the examinations]. But then it was changed there and... And then... we did not have time so then, then it had to be like this.” And the teacher who told us: “Yes, I agree. It was better. All what you are saying. We did it that way from the beginning and that had been the best, but we didn’t have... We couldn’t fix it to this last.” And, yes... And sometimes, quite often, the teacher stands [in front of the group] and yes, “and this book... No, we will not have that one. It is not included anymore.” Or... that they don’t bring the books on our list. You know, one just ”okey. Do you have any plan at all for us?” It feels like we are running adrift, so to say. And that feels a bit disappointing. Because it is quite a lot time... and money one puts... into the education. (Sofia, fifth semester, January 2012)

Det är en känsla, fast vi fick väl det lite bekräftat nu också, den här sista kursen. Att, såhär: "ja det var ju tanken [att förändra examinationsuppgifterna]. Men så blev det ju ändrat där och... Och eh... då hann vi inte med så att då, då fick det blir såhär. Och läraren som sa det: ja, jag håller helt med. Det var bättre. All det ni säger. Det var så vi hade från början och det hade varit bäst, men vi hade inte... Vi kunde inte fixa det nu till den här sista. Och, ja. Och ibland, ganska ofta, så står läraren [framför gruppen] i början och ja, och den här boken... Och så ba, men den ska vi inte ha. Nej just det. Det var inte med längre. eller såhär, ja. Eller, ja... tar inte med dom böckerna som är i våran lista. Och du vet, man ba sådär, "men okej. Har ni nån plan överhuvudtaget för oss? Det känns som att vi bara driver såhär vind för våg, liksom. Och det... det känns också lite tråkigt. För det är ju rätt mycket tid... och pengar man lägger ner... i utbildningen. (Sofia, fifth semester, January, 2012)

This excerpt exemplifies a sense of powerlessness expressed with regard to institutional constraints. The feeling that the students were among the last was strengthened by the lack of possibilities to impact the institutional assessment discourse. This rendered resignation and hence disempowered positionings for several students at different times. A failure in passing a written exam, as in Anna's case, could result in several re-examinations, since new topics were tested and hence new targets were set for passing the test. However, even though there were few possibilities for change, I noted that many students were engaged in the arrangements of oral and written assessments. We have earlier seen that Camilla avoided writing tasks during groupwork, as she felt she had difficulties in writing academically. She did not, due to institutional power-relations, question the relevance of writing tasks — she just accepted the discourse of academic writing, but avoided writing herself, as long as she could.

Whereas academic writing was expressed as the most challenging form of examination for some students, oral presentations or written tests seemed to affect other students much more. This illustrates examples of non-negotiable discourses, and the institutional assessment discourse emerged as constraining and rarely open challenged. Tina expressed this from a different perspective than most students did. She talked about the importance of having different kinds of examinations, which provided several ways to express what one learns. The key point, though, in Tina's questioning was the assessment of written tests. Similar to what Anna foregrounded as she felt she had not been fairly assessed due to her interpretation of a task. This specific form of examination tested limited subject areas, predetermined by the course teachers. What the student had learnt in addition to what was tested never became visible.

Tina: It is good to have several kinds of examinations, so you don't get stuck, so to say... that you are not limited by having big difficulties in academic writing. So that, I think that is good. I think the variation and mixture is good. And I think written tests are totally worthless.

Kicki: Why?

Tina: I mean that... my answers... in very few... very few words they will be scored, and be assessed and there is a scale they relate to and... It feels like it is... It has to be very difficult to find out the judgment skills and it's sort of clear then that "this is the judgment skills we want you to be able to, regardless of what you have learned." But when you get to write, it depends on your own knowledge, that the teach... that the instructors may assess then. They can say: "This is not knowledge that is essential or important" or "you have not learned the key content in the course" and then they can decide, but here I get, so to say, I may decide what I have learnt and write about it... and make it my own. And then, if you had four errors... Have you got enough knowledge then? Or, if I wrote the right answer or partly right... Have I really got the right knowledge then? What score is the right knowledge? Like... I think that it's... it's a bit strange, actually. I mean written tests and point and such things. Actually. And then... there are many [students] who... I mean, one can forget, one can perform poorly under stress... stressed situations and... I think many [students] do and then... it's not possible to assess your knowledge from how you choose to perform on a written test. It's ... completely useless [to do]. Then I think it's better to assess knowledge from discussions and writings, so to say. It ... it becomes ... it is simply better. (Tina, fourth semester, December 2011)

Tina: *... det är bra att ha flera olika typer av examination, så att man inte fastnar, liksom, i... eh... liksom att man dras ner för att man har väldigt svårt för att skriva akademiska texter. Så det, det, det tycker jag är bra. Så den här variationen och blandningen tycker jag är bra. Och salstentor tycker jag är helt värdelösa.*

Kicki: *Varför då?*

Tina: *Men just det... att mina svar ska... på väldigt korta... korta ord så ska dom ges poäng som ska dom bedömas och så finns det en skala som dom ska gå efter och... Det känns som att det är... Det måste vara väldigt svårt att ta reda på dom kunskaperna och det blir liksom tydligt då som "det här är dom kunskaperna vi vill att ni ska kunna, oavsett vad du har lärt dig." Men när man får skriva, så är det utifrån ens egna kunskaper, som, som lär... som kursledarna får bedöma då. Dom kan säga såhär: "Men det här är inga kunskaper som är väsentlig eller viktiga", eller "du har inte lärt dig det som är centralt innehåll i kursen" och då kan dom ta ställning till det, men här får jag ju liksom, får Jag bestämma vad Jag har lärt mig och skriva om det... och göra det till mitt eget. Och sen så... Nä men. Det här med liksom, ja, om man har haft fyra fel... Har man fått tillräckligt med kunskap då? Eller, om jag har svarat rätt, eller*

halvrätt på en fråga... har jag verkligen fått den kunskapen då...? Hur många poäng är en korrekt kunskap? Liksom det... jag tycker att det... det blir lite märkligt, faktiskt. Just det här med salstentor och poäng och allt sån't där. Faktiskt. Och sen så där... är det ju jättemånga som... Asså, man kan få hjärnsläpp, man kan vara dålig under stress... stressade situationer och... Och det tror jag att många är och där, liksom... där går det ju inte att... att bedöma dina kunskaper utifrån hur du väljer att prestera under en salstenta, liksom. Det är ju... helt värdelöst. Och då tycker jag det är bättre att bedöma ens kunskaper just ifrån diskussioner och skrivande, liksom. Det... det blir... det blir bättre, helt enkelt. (Tina, fourth semester, December 2011)

Tina positioned herself and her peer students within an institutional discourse of assessment, which she said constrained the students' possibilities to express their learning as becoming mathematics teachers. The teachers had the power to decide which knowledge was most important and to grade what they were required to achieve 1, 2, 3 etc. points. However, she challenged this discourse as we talked: "if you have had four errors... Have you got enough knowledge then? Or, if I wrote the right answer or partly right... Have I really got the right knowledge then? What score is the right knowledge?" The possibilities for them as students to succeed were hence limited due to the narrow focus in written tests, a dominant and hence disempowering institutional discourse, which also rendered disempowerment with regard to mathematics education.

In schools, the institutional discourse framed grouping of pupils, planning, what was required of them as student teachers, and also the support they received from the supervising teachers. It was for instance not easy to rearrange the schedule and work more concentrated with mathematics than was predetermined, as in the case of Jessica. As student teachers they were dependent on the supervising teachers' willingness to relinquish control. They had to adapt their planning to fit with the supervising teachers', which some students expressed as constraints that gave them less options to improvise and work in relation to the pupils' needs. These struggles came to the fore during one of my school visits the fourth semester.

I visited Evelyn in her practice school during a period of initial teacher education. She was, together with a peer student, responsible for mathematics in 4th and 5th grade the actual period. After a lesson on measurement and unit conversions we sat and talked in the teachers' office. I wanted her to reflect on the previous lesson and her experiences so far during initial teacher education and was also curious about how she planned to continue the work on this topic in the 4th grade the following week. I met the supervising teacher shortly and recognised that Evelyn communicated very directly with her; respectful, but honest as she posed critique towards

the groupings of the class. The teachers' office was open and there was a continuous flow of teachers and pupils passing through. Evelyn was, as it seemed, used to this and talked freely about what she found both positive and challenging as becoming teacher in the actual school. She did nothing to hide the fact that she longed for graduation. Then she would be the one to decide how she wanted to work. This phenomenon was familiar as several students expressed equal wishes during the fourth semester. Sofia, for instance, commented on this: "What am I going to do here for two more years?" They had taken several mathematics education courses and now wanted to work independently of a supervising teacher.

Before the lesson started Evelyn told me that the supervising teacher had been sceptical, as Evelyn wanted to introduce volume measurement by working hands-on using three-dimensional shapes. She had formulated a task for the pupils to work on but, due to the teacher's response, felt she had to put it aside.

Kicki: What are the plans for next week in class 4?

Evelyn: Eh, We are into geometry now. That's why I told her about the task I created, which I thought would be fun. But...

Kicki: With the shapes?

Evelyn: Yes... it seemed like it did not really fit in.

Kicki: Ok, you think... You cannot make them change, or...?

Evelyn: What do you mean?

Kicki: I thought, if you feel that... if you have possibility to use it... later.

Evelyn: Yes... yes, maybe. I don't know. It was... We will use it shortly in the introduction and then they will work in the books (giggles). I feel like throwing it... No, but... I suppose it's good. The book is good, actually. They have good tasks and... Everything is included. As one looks at the steering documents, most things are included. And next spring they will have another book. (Evelyn, fourth semester, December 2011)

Kicki: *Vad kommer det handla om nu då i fyran den här veckan?*

Evelyn: *Eh, Vi håller på med geometri, just nu. Det var då jag tog upp den uppgiften som jag hittade på den uppgift som jag tänkte skulle varit kul. Men...*

Kicki: *Med dom formerna?*

Evelyn: *Ja... det, det verkade som om det passade inte riktigt in.*

Kicki: *Ok, du tror. Du kan inte få dem att ändra sig, eller...*

Evelyn: *Vad menar du?*

Kicki: *Jag tänkte, om du känner att... om ni har möjlighet att lägga in den... senare.*

Evelyn: *Ja... ja, kanske det. Jag vet inte. Det var mest... Vi ska bara ta det kort i början och sen så ska dom jobba i boken. (fniss) Jag har lust att slänga den... Nä, men... Jag antar att det är bra. Boken är ju bra, faktiskt. Dom har bra uppgifter och... Dom har allting med. När man sitter och tittar på styrdokumentet. De flesta saker är med. Och i vår kommer dom ha en annan bok. (Evelyn, fourth semester, December 2011)*

Despite that she had no power to affect; Evelyn positioned herself within the mathematics education discourse and challenged the institutional discourse of teaching by the book by offering an alternative. She had created a task as complement to the book but “it seemed like it did not really fit in”. This expression of disempowerment with regard to institutional constraints indicated resignation. There were few possibilities to make them (the supervising teacher and her colleagues) change and Evelyn said that it would not make any changes to just use it shortly in the introduction as she was promised: “I feel like throwing it...” What then followed shows that Evelyn changed from disempowered to empowered positionings as she expressed acceptance towards the institutional discourse. As it was impossible to challenge for change, she did not negotiate the institutional discourse of teaching by the book.

The students’ positionings within the mathematics education discourse allowed, in the three examples, critical discussions with regard to assessment and teaching. Though, the two contexts revealed different degrees of power-relations, and in comparison it was clear that institutional discourses were less challenged in the university context. The students’ empowerment within the mathematics education discourse allowed a critical discussion about assessment, however they did not claim for change. The school context allowed them to a higher extent to challenge the institutional discourse and I see mainly two reasons for that: First, the students positioned themselves with empowerment within the mathematics education discourse. They did their initial teacher education with the target to perform better and better as becoming mathematics teachers, and therefore, they could challenge institutional discourses that constrained their development. Second, they could talk more freely about institutional constraints in contexts, which they only partly were a part of. In addition it was possible to relate available mathematics education discourses in the school context with earlier experiences as a child; hence discourses they had distanced themselves from and thus could criticise.

While overall structures in areas such as assessment, and textbook-driven instruction was questioned and thereafter accepted; none of the students challenged the language/culture discourse. There were strong requirements on oral and written language proficiency, a discourse that I identified early in my fieldwork. In the following I draw from Rita and Theresa to exemplify how requirements on language skills were accepted and that requirements on becoming teachers were taken for granted by students who immigrated to Sweden few years ago.

In instances where language and mathematics education discourses operated, the dominant language/culture discourse prevented empowered positionings in the mathematics education discourse. It affected how the students talked about mathematics teaching, about being student teachers

and about their future as mathematics teachers. Not speaking Swedish fluently means that one cannot become a good teacher, which hence rendered disempowered positionings both in relation to language and to mathematics education. These power-relations affected several of the students who had immigrated to Sweden some years ago and now were about to educate themselves in their new home country. Rita told me about a situation that occurred during initial teacher education. She felt that she could not make herself understood and that she onwards needs to express herself clearer:

Rita: Well it happened; it was because of my language. I couldn't explain in a good way. That is something I need to develop, I think, more. And I think... as I have felt. I must, before I start to teach, I need to have a clear instruction. I mean how I shall introduce. Do you understand what I mean?

Kicki: Mm, mm, mm

Rita: Yes, that is very important; otherwise they begin to question and question and question, and then... time flies. (Rita, first semester, May 2010)

Rita: Ja, men det händer, alltså det var på grund av mitt språk. Jag kunde inte förklara på ett bra sätt (K- okej) Den behöver jag utveckla, tror jag, (K Mm) mer Och jag tä... asså m Som jag har känt Jag måste Innan jag börjar eh undervisa jag måste ha en tydlig instruktion. Asså, hur jag ska presentera först Förstår du vad jag menar?

Kicki: Mm, mm, mm

Rita: Ja, den är jätteviktig, annars dom börjar bara fråga och fråga och fråga och sen... tiden går fort. (Rita, first semester, May 2010)

The need of clear explanations, based on good language skills, in favour of clear explanations, based on mathematical ideas, revealed a dominant language/culture discourse, which successfully hindered Rita from telling me about the mathematics she taught. She did not challenge or even question the discourse of language proficiency. Instead, she put more emphasis on why language skills are highly valued: "that is very important; otherwise they begin to question and question and question, and then... time flies." If a teacher fails to instruct, then time, another institutional frame, will be even more limited.

As I asked Theresa about her view on her future profession she immediately changed positioning towards the available language/culture discourse. She was very clear that she could not talk about herself as mathematics teacher if she did not develop her language.

Kicki: How do you view yourself as a mathematics teacher? What is your dream?

Theresa: I do not want to present myself as a mathematics teacher, actually. Because I do not feel ... yes. Yeah when I meet someone who is unfamiliar, yes ... Because when you listen to me, I can not [speak] so much Swedish. It affects me a lot. I do not want someone to say: You are not ... You have not ... How will you learn ... Yes ... Yes, I do not know. You understand what I mean. (Theresa, third semester, May 2011)

Kicki: Hur ser du på dig själv som matematiklärare? Vad har du för dröm?

Theresa: Jag vill inte presentera mig som matematiklärare, faktiskt. För att jag känner inte mig lite... ja. Ja när jag träffar någon som är främmande, ja... För att när man lyssnar på mig så kan jag inte så mycket svenska. Det påverkar jättemycket mig. Jag vill inte att någon ska säga: Du är inte... Du har inte... Hur kommer du lära... Ja... Ja, jag vet inte. Du förstår mig vad jag menar. (Theresa, third semester, May 2011)

Despite my invitation to talk about mathematics education, Theresa immediately changed positioning towards her lack of language skills. She expressed concerns about how people would judge her professionalism, as she did not master the language of instruction fully. She took as obvious that I would understand how other people would react, and the fact that she included me as one who understood her reasoning also indicated a dominant language/culture discourse which, like constraining institutional discourses, not was open for negotiation. As the students rarely chose to talk about mathematics or mathematics education this may indicate that they did not connect academic reading and writing with their future profession as mathematics teachers, and therefore let the language/culture discourse remain unchallenged.

While the discourse of mastering the language revealed disempowered positionings among immigrants, I have shown in previous chapters how several students – both native Swedes and immigrants – enacted disempowered positionings within the discourse of academic writing. They seemed to accept that the institutional discourse of assessment affected the requirements on academic reading and writing with regard to time limits, assessments and style. They hence expressed disempowerment since they experienced minimal possibilities for change. However there were exceptions: not all students accepted the way institutional constraints affected the language/culture discourse. Somewhat bantering Sofia referred to what happens if a student does not attend a seminar:

I understand that one must have requirements in some sense, but... Well if you miss a seminar, then you should supplement with a five-sided essay. I think... I hope that...because I always attend... if I am not dying or there is something else that upholdeth me. Then you wish you that this seminar is so good so that it is evident [that I have not attended] when I then write my essay

or doing my exam, because it's so important stuff that comes up... during those seminars. And ... yes ... I think, as well, somehow.... it must show. It can not be ... it may not be a compulsion, but should be noticed [by the teachers]. (Sofia, fifth semester, January 2012)

Jag förstår att man måste ha krav på nåt sätt, men det här med att... Ja men om du missar ett seminarium då ska du komplettera med en femsidig uppsats, liksom. Då tyck... Jag hoppas ju... För jag går alltid... om jag inte ligger och är dödssjuk eller nånting annat som uppehåller mig... Då önskar man ju att det här seminariet är ju så bra så att det märks [att jag inte varit där] när jag sen skriver min uppsats, eller gör min tentamen. För att det är så viktiga saker som kommer fram... under dom här seminarierna. Och... ja... jag tycker, liksom, på nåt s... det måste visa sig självt. Det kan inte va... det kan inte vara ett tvång, utan det ska väl märkas. (Sofia, fifth semester, January, 2012)

Sofia did not express positionings within the mathematics education discourse; however, there were clear connections to her references of requirements. The seminars she mentioned was in mathematics education courses and as each seminar often had a special focus, I understood from her expression that it would be easy to judge whether the student had grasped the content or not in the final tests. This interpretation is subtle and could only be done from my experiences as teacher educator. More clearly is that she positioned herself within the institutional and language/culture discourses, apparently affected by disempowerment as she referred to the demands on writings they had to do to show that they had reflected on the content of the missing seminar. These discourses were challenged in communication with me, however never openly negotiated.

Empowered positionings in discourses open for negotiations

The previous section depicted how available discourses narrowed spaces for positionings in mathematics teacher education contexts. On the journey towards why this occurs, I will add a complementary picture through analysing instances where the reverse happens. Opening for empowerment does not necessarily mean that the enacted positionings indicate subject confidence, positive attitude or that some students took larger part than others during seminars. Instead, empowerment may be expressed through questioning subject content or working methods; in arguing for change or for being more involved in the school mathematics; and in questioning course content, examinations and institutional constraints.

I have already mentioned that the mathematics education discourse emerged as the most empowering of the four broad discourses. Through the whole analytic process the students' positionings in relation to issues of mathematics teaching and learning revealed empowered positionings and a will to understand and develop. This occurred both in contexts, which

immediately appeared as permissive, and in situations which initially indicated frustration and mistrust in the students' positionings.

Institutional constraints challenged Leila's work during initial teacher education. However, by expressing confidence with regard to mathematics teaching and learning the situation revealed empowerment through her positionings in the mathematics education discourse. She challenged the institutional discourse and expressed a will to change the educational structure, from teaching by the book and competitions among the teachers, to a stronger focus on conceptual understanding. Though her enacted empowerment new possibilities became visible and she — even though the institutional discourse constrained her work — could imagine how small, but important steps for change could be made.

Leila was one of many students whose enacted positionings in the mathematics education discourse expressed power to challenge and question constraining and disempowering discourses, such as time limits, assessment traditions and superficial learning in mathematics. Also Sofia and Tina enacted empowered positionings in the mathematics education discourse, which in turn allowed them to challenge teachers' lack of efforts in developing their teaching. Rita and Theresa positioned themselves in two mathematics education discourses and hence expressed power to challenge both the Swedish school and the mathematics education in their country of birth. It is also necessary to stress that positive and unproblematic positionings appeared. It would be unfair to only scrutinise situations where competing discourses reveal power-relations and the student in focus always is set in a troubling situation. This was illustrated through the fieldnotes from my visit at Camilla's school during initial teacher education. Her empowerment in the mathematics education discourse made her leave the textbook aside and instead let the pupils work independently in groups after a conceptual introduction about volume.

Even the mathematics discourse emerged as negotiable and possible to challenge, often as interwoven with the mathematics education discourse. The students' empowered positionings within the mathematics education discourse allowed them to enact empowerment in relation to mathematics. The following excerpt is from the first session in a mathematics course (Fieldnotes, August, 2011), where I show how the presence of both mathematics-, institutional- and mathematics education discourses could reveal empowerment, and open for negotiations both regarding course structure and mathematical content.

The first lecture in the mathematics course is intense. Lots of information regarding examinations and course structure are given and the students ask questions to clarify requirements. Tina notes that there is no initial teacher education (she commented on that as something that felt a bit strange when she talked with one of her peer students during the break). Tina wanted to

know what happens if they do not attend all seminars and asks “Are the seminars mandatory? What happens if one misses a seminar?” They were used to course structures that built on mandatory attendance so the question was relevant even in this context. “Aha, the only control of knowledge is the written exam.” A new course culture began to emerge and I wondered if this would affect their degree of attendance or not.

It is obvious that the students are used to connecting course content to their future profession as the teacher invites them to reason on the following task: *Three buns shared by four children*. I asked if I could join a pair of students who seemed engaged in the task. They draw on pictures and explanations from previous courses and experiences from student teaching: “How can one make it simpler? The key is to understand what $\frac{3}{4}$ means.” It seems like they need to make a detour around multiplication to identify the problematique: “it’s like fetching two pens three times. Understanding with the body.” It seems like this parallel made sense, because they turned over to discuss the concept of fractions: “Fractions aren’t whole numbers, are they?” they involved me in their reasoning and after some minutes they stated that they could include whole numbers in the group of rational numbers. “Oh, this is too much!” the student exclaimed. She wanted to turn the meaning around. “It feels like the rational numbers became bigger than the whole numbers.” She turns to the teacher: “May I ask: Is it so, that fractions always are rational numbers? Do you say rational numbers? Do math books say rational numbers?”

I noted that the students asked many questions this first session that concerned assessment structures and other institutional structures, such as what day they write the exam and how to approach actual course literature. They also seemed free to ask questions on the content and comment on its relations with school mathematics to make clarifications.

Tina showed that she was used to initial teacher education and to mandatory attendance in the courses and hence positioned herself with empowerment in the new institutional discourse. As I had participated in many seminars before this occasion I noted that they asked several questions to clarify the similarities and differences. Since they had some experiences from previous courses, they knew what usually was required if they not attended a seminar. The requirements differed a lot, which did not seem to confuse them. Rather, as Tina responded, she asked the teacher to confirm that the only requirement was to pass the written exam. The two students, who discussed the concept of fractions, enacted empowerment within the mathematics education discourse by the way they both related to importance of making simpler; of understanding with the body; and also by asking what the math books say about fractions and rational numbers. In the sequence where they asked about rational numbers and its relation to whole numbers, they enacted empowered positionings within the mathematics discourse. There were no indications of constraints or challenges, which could reveal disempowerment. The discourses were challenged and negotiated through the students’ actions, which opened for negotiation.

Several students, often with regard to previous experiences as mathematics learner, challenged the mathematics discourse. The following

excerpt illustrates this phenomenon by quoting Sofia, who challenged the mechanical learning she experienced as a child. Her message was clear: It is better to learn mathematics from the basis of understanding.

... and I have no difficulties at all in maths, I am really good at maths. It has never been... It is just that I cannot just accept... whatever one says: "That's just how it is." Why? I learned that for the first time during this education. Why... and equations... When one moves... It is not just changing signs! I have never learnt that. Never heard. And all those small things make you reach understanding. Then everything becomes logical. (Sofia, fourth semester, December 2011)

... ach jag har ju inte alls svårt för matte, jag är jättebra på matte. Det har aldrig varit... Det är bara det att jag har väldigt svårt att acceptera, eh... i asså, i allt, i vad man än säger: Det bara är så. Varför? Och det har jag för första gången fått lära mig under den här utbildningen, varför... det här med tecken i ekvationer. När man flyttar över... Det är ju inte att man byter tecken! Det har jag aldrig fått lära mig. Aldrig fått höra. Och alla såna här smågrejer som gör att man får en förståelse. Då blir ju allting logiskt. (Sofia, fourth semester, December 2011)

Positionings in the mathematics discourse increased for obvious reasons during mathematics intense periods. Sofia's positioning within the available discourses of mathematics and mathematics education made her question the quality of mathematics education she was subjected to as teenager. She expressed confidence with drawing on equality instead of "just changing signs" when it comes to equations. Her positionings did not reveal negotiation for change. Instead she challenged previous mathematics education discourses and expressed what was important for her to know as becoming mathematics teacher. As the students took mathematics education courses, they asked more questions, chose a more specific vocabulary and related different aspects of course content to each other. These experiences might have strengthened Sofia's empowered positioning and her expression of self-confidence in the mathematics discourse.

In the last part of this section I present a piece of what I experienced through my fieldwork, to illustrate what can be the core of *why* some discourses open up spaces for empowered positionings. It is a situation that occurred during the third semester when the students took a course aiming at deepening their own mathematical knowledge.

As every lecture in this course the actual learning goals were connected to the actual lesson and its structure. It is a pleasant atmosphere and the students seem engaged in a conversation regarding the varying difficulty between the English course book and the seminars and lectures. The lecture starts with the teacher commenting on a self-evaluation made by all individuals in the group. It is important that all students' hand in the evaluation, since parts of the

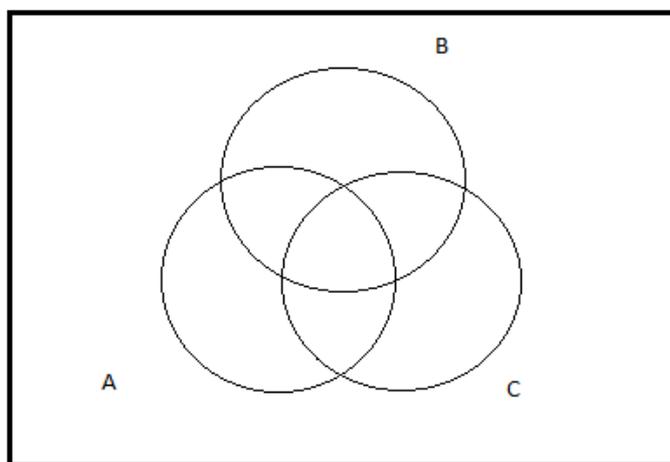
content builds on mathematical pre-understandings in the class. The teacher cooperates with the class on how to solve $13/((13)^2)^{-3}$ and which rules that was usable for them to know. One student considered the lectures easy to follow, but says that the tasks they get from the book, meant to process individual and in groups afterwards, are much more difficult. This seems to be a general opinion in the class. Today's subject (set theory) is obviously; with regard to the self-evaluation, something that is unknown by many or something that is not well understood. The plan is therefore to follow the structure in the book and present a thorough introduction.

The teacher talks for some minutes about the history of set theory. Some of the students pose questions are anxious about what will be tested on the exam. In this instance I reflect on how support from a university teacher can make a difference for adult students. What attitudes do these becoming mathematics teachers meet during their educational programme?

In the following the teacher introduces set theory by writing and exemplifying different sets on the digital white board. Almost every seminar room have these kinds of boards and the students are often invited to use them during lectures and for presentations.

Few minutes passed without any student interacting with the teacher. They usually interact quite a lot and therefore this must be challenging. I can see them whispering and nodding while working in pairs, but in whole class they kept quiet. The teacher sketched the following figure:

The task was to colour $B \cap C$



Suddenly Camilla stood up: "I can, so I'd better take the chance," she said and walked frankly towards the digital white board. She received a pen from the teacher and began colouring. She tried one solution, but hesitated and went disappointed back to her seat. She had forgotten to colour the middle piece. The teacher now asked if someone could colour $A \cap B$, and after half a second Camilla stood up again: "May I do it again – and do right?" She was already on her way to the digital white board when the teacher replied jokingly that this was her last chance. Camilla solved the task and sat down again, more pleased than some minutes before. [Camilla told me about this situation in an interview a few weeks later. It was important for her to get the possibility to show her knowledge. She wanted to be best in class "even if I know I am

not... /.../ I always want to get a star in the margin”]. As the lesson proceeded several students participated more frequently and discussed possible solutions on new problems. The openness to student interaction and the permissive atmosphere seemed to impact the group to more freely share their solutions and thoughts among each other. (Fieldnotes, April 2011)

As an example, this scene is exclusive with regard to mathematics content and its specific narrative. On the other hand, it is ordinary in the sense that no one seemed surprised or puzzled over the situation. Spontaneity, openness and friendly attitude among students and teacher characterized the situation. This atmosphere was also said to be one reason for why the students enjoyed the course.

In this set of data three of the four broad discourses — mathematics, mathematics education and institutional discourses — operated through almost the whole sequence. There were specific mathematical tasks to be solved, both in the introduction and as main focus of the seminar. Questions about the examination and freedom to use the electronic white board made the institutional discourse visible, and a discourse of teaching mathematics from the basis of understanding was present through the whole sequence — and even more emphasized through Camilla’s positioning. Camilla enacted empowerment, except for the moment when she disappointed turned back to her chair the first time.

Why was it possible to take this initiative and why could she change positioning shortly after her failure and ask for revenge? There were occasions when I observed lessons and nothing like this happened. What made this situation differ from them? In the last section I elaborate more on these and some additional questions to deepen the analysis of discursive practices in mathematics teacher education contexts.

How and why do some discourses open up for negotiation whereas others do not?

What is it that makes discourses open for negotiation and what hinders or narrows? I posed some questions in the previous section to put the light on what lies in the meaning of the “why”-question. We have seen that students enacted empowerment both in situations where discourses were accepted and in situations where the students were challenged by one or several discourses. Spontaneously, it is easier to understand that students express empowerment if there is nothing that provokes or constraints. However, as the phenomenon emerged in the data it is clear that the students enacted empowered positionings even in constraining discourses. Thus we can add another question to the previous: why is it possible to enact empowered positionings, even as available discourses seem constraining?

As a start, there were some key issues in the case of Camilla, identified through the analysis, that might have affected the discourses, the flow of power and hence the enacted positionings. By drawing on this concrete example a basis for comparison between different contexts and different scenarios of available discourses is created. Firstly, the students were expected to reflect on their own mathematical knowledge through a self-evaluation. The evaluation was followed up and discussed so that they got the opportunity to ask for clarifications and deepen their understanding in teacher led situations. The mathematics discourse hence revealed empowered positionings as the students were allowed to elaborate more on what they found struggling. Secondly, the students were free to ask about the written exam, to tell what worried them and also to say that it was easier to follow the teacher than to learn from the textbook. The institutional discourse hence opened for negotiation, even though the textbook still had a central role in the education. Thirdly, the students were in all courses invited to participate in the work with digital white boards, and therefore used to it. This might have eliminated potential hesitation for solving problems in public, even though the mathematics content was challenging in itself. And accordingly, the mathematics education discourse, based on understanding, allowed the students to try and re-try during the problem solving process.

The students often enacted personal positionings within the mathematics education discourse to challenge mathematical and institutional discourses. And they did so by posing statements and asking questions as for example Jessica and Tina in the mathematics course. However, this did not happen in the first courses. From fieldnotes the first semester, it is clear that the teachers asked the questions and the students replied shortly to confirm what the teachers asked; or asked questions to clarify. Another common scenario was that the students waited for the teacher to reply herself or to leave the question unanswered. The students rarely initiated a discussion about mathematics education at this early stage. Instead, they were often invited to think about the actual mathematics content and possible consequences for teaching as in the following sequence from the first course. This situation grasps what I want to foreground and what might be a step towards understanding the why-question:

The teacher introduces today's date, which is January 25th 2010, and asks the students to think about how they write dates. In how many ways can we write dates? Could that be a problem for the pupils? Camilla responds "250110." As I know that she is concerned about how to explain so that the pupils can understand, I understand her engagement. "Why do you write 01?" the teacher asked. I think that she meant to highlight 10, not 01, but no one seems to take notice and as she continues the question was probably only in my jottings. "Are there other ways of writing this?" The teacher writes another example on the digital white board: "Twenty hundred ten 200010 [Tjugohundratio 200010, in Swedish]. Discuss with the pupils: 2000 two

thousand, 2000 twenty hundred. There are some traps here and there. As a teacher you have to stay ahead.” Leila now raises her hand. She asks for clarifications so that it becomes clear what they are expected to do. “Should one raise the question to the students?” The teacher turns to the whole group: “What do you think? Should one... [What is] suitable in this context? [One has to] start from own planning and anticipate issues that may come.” (Fieldnotes, January 2010)

Here, the students were invited to think about how common expressions could be misunderstood and what they, as mathematics teachers, may be aware of in this situation. Early in the education the students also were invited to participate in a discourse of mathematics, which allowed them to discuss mathematical concepts in connection with their own experiences. This happened in several ways, but occurred mainly at the initiative of the teachers, as for instance in one of the first introductions: ”You are 17 students. Is 17 evenly divisible by 2? What is a number called that is divisible by itself and 1?” Some weeks later the teacher asked the students to think about 6000/2000. Naazim responds immediately: “It is exactly as 6/2. You just take away the zeroes”. The teacher did not seem satisfied with her suggestion; however the situation gave her opportunity to elaborate on content division and equal sharing. “We don’t take away the zeroes. You can give the task a meaning. Tickets, for instance: the price for a concert is 6000kr and each ticket is 2000kr...” The connection between the two discourses was visible in both fieldnotes and interview data throughout the study, and it became clear that this to a large extent revealed empowered positionings. Rita expressed empowerment both in the sense that she now understood how a formula was built, and satisfaction with not only learning formulas by heart, which was a dominant mathematics discourse in her country of birth.

So, as I took the last course... and I was very satisfied, actually. That I see, so to say how... How a formula is constructed, and how one should explain a formula /.../ because I just mastered the formulas by heart. But, I think, when one sees the relation it becomes more fun to learn. (Rita, third semester, May 2011)

Så, men när jag läste förra kursen... och jag var väldigt nöjd, faktiskt. Att jag ser, asså hur... Hur en formel är uppbyggd och hur ska man förklara en formel/.../ för jag bara behärskade formlerna utantill. Men, jag tror, när man ser sambandet så blir det ännu mer roligare att lära sig nånting. (Rita, third semester, May 2011)

I have shown how the students questioned, challenged and affected the mathematics discourse by asking questions, posing problems and interrupting the teacher. The mathematics discourse became, as the mathematics education discourse, open for negotiation. The mathematics

education discourse enabled space for empowered positionings, and, because of the possibilities to challenge, question, agree, emphasize and oppose the available mathematics education discourse, it is possible to approach the why-question.

Positioning in mathematics education discourse empowered the students to challenge institutional constraints

The most frequently asked questions from the students during the first course did not relate to mathematics or mathematics education. Instead they were concerned about issues related to initial teacher education [Nadia: Shall we contact the school if we have questions? Theresa: What happens during the special days for becoming teachers in school? Can we meet our supervising teacher then too?]; to examinations [Lisa: I have another question. The first oral exam, the process log — it is individual, isn't it?]; and other institutionally framed issues [Sofia: This way of presenting — the aquarium. Will we get more information about how to do this? Lisa: No moderator?]. Even though the institutional discourse to a large extent framed what was possible to do and not, I have shown that the discourse was possible to challenge in interviews and in talks between students. This revealed disempowerment and empowerment, however not to as high extent so that the students challenged the discourse in whole-group discussions or in public dialogues with the teachers. Positioning in the mathematics education discourse also seemed to empower the students to challenge institutional constraints even stronger. This phenomenon occurred mainly in relation to experiences from initial teacher education. We have for instance followed Evelyn earlier, who both challenged *and* accepted the institutional discourse of teaching by the book; and Tina, who posed critique towards teachers who did not put enough efforts in their work, and therefore did not make mathematics interesting for the pupils. Anna expressed herself fairly critical as she experienced different demands from the supervising teacher with regard to Anna's work and her own:

[The supervising teacher] demanded a lot more of me than what she does herself in class. One time I said to her that we must see... her teach, since I didn't get the opportunity the first week and the second week was about to end. So I told her that we must see a lesson. Because I cannot... first time I teach, or having a lesson, without seeing how you work with the children. But I really want... And I set the clock and it was only 5 minutes. And when I was about to... then I had a whole hour. I mean... that was too long. One whole hour to sit and work with manipulatives and show and /.../ But she... as she held... the first lesson, it was 5 minutes. That is what I am not satisfied, that... And I could not say to her that... If I took 5 minutes to a whole lesson... New lesson for 26 children, and I had only 15 children and needed one whole hour,

or they said to me, I have one whole hour. That was too much time. I mean 30 minutes would have been enough since it was addition, eh... doubling and halving. It wasn't that much, really. They had gone through it earlier as well. But I... I went on playing with them till time, well... I did a lot of tasks; so that we would keep time, yes... something to do meanwhile. That is what I am not satisfied [with]. That they demanded a lot from me, and had not so high demands on themselves. (Anna, first semester, May 2010)

[Handledaren] krävde mycket mer från min sida än vad hon gör i klassen. En gång, jag sa till henne att vi måste se... hon undervisar, eftersom jag fick inte den här chansen första veckan och andra veckan höll på att ta slut, så jag sa till henne att vi måste se en lektion. För att jag kan int... första gången jag bara undervisat en lektion, eller jag har en lektion utan att se hur ni jobbar med barnen. Men jag vill gärna här... Och jag satte på klockan och det var bara 5 minuter. Och när jag skulle... då hade jag en hel timme. Och jag menar... Det var för lång tid. En hel timme bara sitta och... och jobba med material och visa och/.../ Men hon... när hon håll... första lektion, det var 5 minuter. Det är det som jag inte är nöjd att... Och jag kunde inte säga till henne att... Tog jag bara 5 minuter till en hel lektion... Ny lektion till 26 barn, och jag hade bara 15 barn och jag behövde en hel timme, eller dom sa till mig, jag har en hel timme. Det var för mycket tid. Jag menar 30 minuter skulle räckas eftersom det var addition, eh... dubbelt och hälften. Det var inte så mycket egentligen. Dom hade gått igenom litegrann förut också. Men ja... Jag höll på hela tiden och leka med dom tills tiden ja... Jag gjorde massa med uppgifter, så att vi ska hålla tiden, ja... Nå'nting och göra under tiden. Det var det som jag inte var nöjd. Att dom krävde mycket från mig och dom hade inte så mycket krav på sig själva. (Anna, first semester, May 2010)

Anna knew that they as students were expected to observe mathematics teaching and to lead mathematical activities themselves. Therefore she had the power to question the few possibilities she was offered for auscultations. In addition, as the supervising teacher made a short introduction, while Anna was expected to lead the class for 60 minutes, the requirements of their expected performances differed too much. Anna's enacted empowerment in both the institutional and the mathematics education discourse allowed her to challenge the discursive practices at school.

Possibilities to challenge create space for empowered positioning

The possibilities to resist, challenge and negotiate discursive practices create, as I see, space for the students to express empowerment in constraining discourses. This was visible to a various extent in three of the broad discourses, whereof mathematics education seemed to empower most. The mathematics discourse was possible to challenge both by empowered positionings in the mathematics education discourse and in the mathematics discourse. With regard to institutional constraints, as shown earlier in the study, the students only challenged the constraining discourse in interviews and in dialogues among peer students. The following excerpt from a coffee

break during the first semester illustrates how the students themselves created space for empowerment by questioning how they had placed themselves in the room, and possible consequences for this.

The students had a longer coffee break between two teacher-led seminars during which they were expected to work with problem solving tasks. I stayed in the room to chat a little with them and listen to their communication during the groupwork. I sat beside Aniza. She had left her child at the pre-school and therefore came little late. She hence sneaked in to an empty chair and started to work. During the break she recognized the groupings of students. After a short reflection between the two of us she spoke loudly: "On this side, there are only Swedes. On that side, there are only immigrants. Our group solves the mathematics problems in Arabic. The teachers need to keep an eye on this. The teachers at Komvux, they mix immigrants with Swedes." The other students listened and agreed by nodding "Swedes immediately begin to answer the questions", Aniza continued. The group firstly seemed to accept the grouping however they agreed that a mix would have been better. As they did not move Camilla took the initiative: "Let's do it. Some get here and we change." This situation reflects how skewed the distribution was when the group got to decide for themselves. The Swedes had not thought about this and wanted to change immediately as the problem was surfaced. (Fieldnotes January 2010)

Through Aniza and Camilla's enacted empowerment in the institutional discourse they created their own space for empowerment in a discourse that may be constraining. None of the other students seemed to have thought about this as problematic (they might have, without expressing it in the whole group) but as soon as it was brought to the fore they moved and organized the mix themselves.

Acceptance may indicate non-negotiable discourses

Whereas the constraining institutional discourse was possible to challenge, I found the discourse of language completely unchallenged. From two years of fieldwork the produced ethnographic data did not reveal neither empowered nor disempowered discursive positionings through which the students could challenge the discourse of mastering oral and written language. The discourse was accepted by the students and communicated as a matter of course. In some instances the students enacted empowerment in relation to cultural differences; however that did not affect the consensus regarding language requirements. And with regard to the academic strand, i.e. reading and writing academic texts, the students merely described how they handled the requirements to perform in the discursive practice (e.g. practicing oral performance in front of a mirror as Rita did; or letting others take care of the writings as Camilla did during group-work, so that she could focus on the presentation). The students did not question or challenge the discourse.

Sometimes they asked for clarifications of the requirements, but mostly they adjusted their performance to fit within the available and dominant language/culture discourse. Elsewhere I have shown that the language and cultural discourses revealed strong disempowered positionings among a group of immigrant students and that the large focus on language requirements tended to overshadow the focus on mathematics during the education (Skog & Andersson, 2013b).

Summary

When available discourses are difficult to challenge, or seem non-negotiable with regard to institutional structures or academic traditions, it is not possible to enact empowered positionings to the same extent as when available discourses are negotiable. The analyses of students' positionings as two or more discourses interacted in educational, as well as interview contexts, show that the institutional discourse to some extent and the language/culture discourse, to a large extent, rendered disempowerment; expressed as unchallengeable constraints or as unquestionable "truths". This narrowed the discourses and therefore offered less possibilities to (re)negotiate the discourses. On the other hand, the connection between mathematics education and mathematics content seemed to affect the students' positionings not only in relation to mathematics education, but also in the mathematics discourse. The mathematics education discourse allowed the students to try and re-try, to solve problems in different ways and to scrutinize numerical tasks, to challenge and question the course content, and mathematics education practices in schools, to give some examples. The mathematics education discourse is, in comparison with the other three, characterised by a multiplicity of discursive strands that are available to position within. This characteristic — the multiplicity of available discursive strands — may be the main reason for why the mathematics education discourse opened up for negotiation and hence allowed the students to enact empowered positionings

Results summary

In this study I illustrated one possible way of conducting critical research in the field of mathematics teacher education. A socio-political theoretical perspective facilitated the analysis of complex processes where discourses, positionings and power-relations interacted simultaneously. The dynamic approach visualised that positionings changed due to how power at play determined the discourses, but also the reverse: that empowered and disempowered positionings affected how discourses were produced.

Four broad discourses emerged from the analysis and the results shows that these, to various extents, allowed and constrained empowered positionings. The mathematics education discourse proved to be the discourse through which the students had possibility to resist, challenge and negotiate available discourses in both university contexts and in school contexts. Even though novel approaches to mathematics education more or less were expressed as norms for how one should teach mathematics, the mathematics education discourse emerged as the most open to position within. The students expressed empowerment in a mathematics education discourse characterised by creativity, by a spirit of encouraging pupils to try different solutions, of collaborative work to develop their own knowing and thinking, as well as how to work with future pupils in schools. Learning mathematics required positive attitudes in permissive atmospheres and the students were set to create positive learning environments for their pupils. They hence expressed will and engagement in relation to mathematics education, and power to change and develop mathematics education in schools. Empowered positionings were also enacted for their own learning as they challenged teachers and peer students in collaboration, seemingly to develop deep conceptual understanding.

The mathematics discourse emerged as both challengeable and possible to resist, however not open for negotiation to the same extent as the mathematics education discourse. Most salient was students' empowered positionings through challenging the mathematics discourse. They often related to the mathematics teaching by trying to connect the mathematics content they were taught to their future profession as mathematics teachers. Hence, they challenged the discourse, since there were few possibilities to make this connection. Some other instances, showed for example how students expressed resistance towards speed calculation and superficial learning, a discursive strand related to their own schooling. As they had

experienced alternative approaches to mathematics teaching in previous courses, they had the power and possibility to express resistance towards these strands and to challenge the mathematics discourse. However, despite that the students had taken courses with stronger mathematical focus, they often articulated the discourse without explicitly talking about the mathematics content.

The institutional discourse, which mostly emerged as institutional constraints, seemed difficult to both negotiate and to challenge, whether it was about course content, student — teacher relations or written tests. Schedules, tests, course literature etcetera were not discussed or questioned by the students in terms of motives for the activities or relevance for their future profession. On the whole, the discourse of institutional prerequisites allowed the students to ask for descriptions of course work, clarifications of tasks, comments on scheduled occasions and the like. They accepted the institutional discourses both in the university context and during initial teacher education. However, there were instances in interviews and in peer interactions where students expressed resistance towards institutional constraints. Hence, the institutional discourse was, to some extent, open for resistance and challenge while the students positioned themselves within the mathematics education discourse. The discourse of mathematics education often related to possibilities and constraints for teaching, structural organisation in schools and how to organise for learning. And as the students gathered together at the university, after a period of initial teacher education they expressed resistance towards institutional constraints in schools. The possibilities for students to resist or challenge institutional constraints were available to a higher extent in relation to initial teacher education than to the university context.

On the other hand, while the mathematics discourse was available simultaneously as the institutional discourse, the discourses interacted, or cooperated, strongly and constraining, which mostly made students express disempowerment; ending up in accepting the discourses.

Three of the broad discourses, to varying extent, offered possibilities for resistance, challenge and negotiation. However, one particular discourse, the language/culture discourse, revealed positionings, which differed significantly from the other three. Prevalent was a sense of not being skilled enough in the Swedish language, of experiencing difficulties when meeting the academic tradition of reading and writing and how to express oneself clear enough orally, as this was what the discourse required. These discursive strands were left completely unchallenged by all students. On the other hand, students' cultural experiences and different backgrounds rendered empowered positionings, as it was possible to challenge different school cultural discourses through comparison among countries. The students also questioned and challenged the discourse in order to make sense of their experiences; all in line with what was “okay” to say and do within

the mathematics education discourse. This particular discourse was partly accessible for some students and not for others. The discursive strands of oral and written language requirements, cultural differences in schools and in approaches to mathematics, were only available for students who moved to Sweden as adults. Students who were born in or who moved to Sweden as children never initiated this discourse.

I have shown that the impact from language/culture and institutional discursive strands obscured students' possibilities to enact empowered positionings in the mathematics and mathematics educational discourses. This impact affected in different ways how the discourses were produced. While the mathematics discourse still was available, however constrained regarding time for deep discussions and to develop mathematical ideas, the mathematics education discourse was invisible as the dominant discourses interacted. Only in relation to comparisons between countries and cultural differences the discourse emerged and revealed empowerment.

Unchallengeable discourse

An unchallengeable discourse is a discourse that is not challenged by the students, even though there were apparent constraints visible. This phenomenon emerged strong, specifically in the strand of being fluent in the language of instruction (Swedish), and therefore there are some additional aspects that need to be addressed. First, the immigrant students accepted the language/culture discourse in a similar way as the institutional constraints, earlier discussed in Skog and Andersson (2013b). Second, even though there were apparent constraints for them as students, they did not challenge the language/culture discourse. And third, there seemed to be no options for them to affect or change the prevalent discourse. One possible interpretation may be that the students' avoided to challenge rigid structures and deeply rooted "truths" (cf. Gutiérrez, 2013) that collectively created the discourse; another interpretation is, that they did not even imagine that the language/culture discourse could be challenged.

Another puzzling question asked was *why* it was possible to enact empowered positionings, even in constraining discourses. This phenomenon clearly emerged within the language/culture discourse. This seems, as far as I can see, to be strongly connected with the previous paragraphs and the section above: Discourses of "truths" are not questioned. There were no possibilities to resist or challenge the discourse by asking *why* the emphasis on language was so strong, for instance. Neither to (re)negotiate what was taken for granted by asking *what if*, to suggest changes or propose alternatives. As an example no one challenged the discourse of language fluency by suggesting it as being of secondary importance. Instead these

discourses were seen as normal ways to talk about language in the educational contexts.

Space for empowerment

The results show that the mathematics education discourse first and foremost was characterized by a multiplicity of articulated strands. And, to a greater extent than in the other three discourses, the strands were articulated through students' empowered positionings. The mathematics education discourse allowed the students to both express subject confidence and a positive attitude towards the course content; and to question subject content, methods or other constraints that they found challenging. None of the other three discourses offered this, which was clear as the students challenged other discourses by placing themselves within the mathematics education discourse. Hence, the mathematics education discourse was open for resistance, challenge and (re)negotiation and offered possibilities for empowerment in a way that none of the other discourses did.

Empowered positionings could be expressed through confidence and positive attitude, or through challenging the discourse by arguing or questioning. This emerged completely different in comparing the mathematics education discourse and the institutional discourse, and I claim that this is important to consider when talking about "opening up discourses", and "creating space for empowerment". The mathematics education discourse was challenged in all contexts wherein I participated: in seminars, during initial teacher education, in interviews and groupwork. This means, that all involved could respond and act so that spaces were opened up for them to decide how to go further with what was at stake. The institutional discourse, on the other hand, was mostly challenged in the interview context. If this happened during seminars, which it rarely did, the students soon accepted the discourse, even if they not seemed happy with the decision. Thus, even if the discourse was challenged in a talk between me, as researcher, and them as students, the concerns they brought to the fore too seldom involved all stakeholders. Seemingly, despite the students' positionings expressed resistance in an interview context, it was not possible to open for empowered positionings if not all involved were informed and allowed to (re)negotiate the available discourses.

This, in turn, puts light on the language/culture discourse, that emerged as a constraining discourse that revealed few possibilities to be challenged. The acceptance was strong and there were no spaces for resistance even though the discourse revealed disempowering positionings to a larger extent. The language/culture discourse affected the production of other discourses and, in the most extreme case overshadowed all the other discourses, no matter how empowering they were.

Discussion

Power issues in mathematics teacher education

The present study has addressed a socio-political theoretical perspective by foregrounding issues of power within discursive practices in teacher education. As power may be understood differently depending on research focus, this study has shown a micro-level perspective (cf. Morgan, 2012), in the sense that focus was on individuals' positionings through empowerment and disempowerment in available discourses. Taking on such theories and methodologies means taking an "insider perspective" and writing from the becoming teachers' perspectives. The researchers then becomes...

... insiders in their own cultures and school systems and carry out the analyses from that position; also – the voices that constitute the data of this research are the voices of the insiders in the classrooms studied — the students and their teachers'. (Clarke, Keitel & Shimizu, 2006, p. 1)

Previous socio-political research (e.g. Adler & Davies, 2006; Nolan, 2011; Yow, 2012, Wager, 2012) almost exclusively takes the perspective of the teacher educator's, which also is research from "inside" education, however on organisational or content level. From such perspectives it becomes possible to focus on courses and student teachers' education towards increased awareness of power within mathematics education practices. The strong emphasis on social justice and equity within socio-political research may be one reason why focus is on the future profession as mathematics teacher, and not on the present situation within teacher education. It is deemed that students need to be prepared for their future profession and therefore they are offered courses, which educate them to be social just teachers. None of the published articles in the special issues on social justice (2009a; 2009b) and equity (2012) in *Journal of Mathematics Teacher Education* (JMTE) foreground equity within mathematics teacher education by drawing on these concerns from the student teacher's perspective.

However, as power is understood and used differently in these studies, compared with the present study, there is need to highlight wherein the differences lies and how this study contributes to previous understandings of power in mathematics teacher education. For instance Wager (2012) writes about "powerful strategies" for teaching and that "school mathematics offer powerful practices", whereas Turner et al. (2012) write about equipping

teachers “with powerful strategies to increase mathematics learning” (p. 68) and Yow (2012) focus on how teachers “empower students”, and writes about the power teachers have. Educating becoming teachers in equity and social justice risks turning focus on power as intrinsic within mathematics and mathematics practices, an assumption that is criticised by Valero (2004b):

The unquestioned intrinsic goodness of both mathematics and mathematics education represent the core of its “political value”: If students and citizens come to learn a considerable amount of mathematics properly, they will become *per se* better people and better citizens; that is, mathematics and its education *empower* or have the capacity of giving power to people. In other words, there is an *intrinsic resonance* between mathematics, mathematics education and power. (Valero, 2004b, p. 13, italics in original)

Taking an insider perspective by placing becoming teachers in the centre makes possible to ask other questions and to view power-relations that directly concerns them who are involved in the discursive production. Power is then understood as flowing among and within the discourses (Fairclough, 2010) and as “situational, relational and in constant transformation” (Valero, 2004b, p. 15). This study has brought forward issues of power through the dichotomy of empowerment and disempowerment to understand how power-relations emerge in discursive practices and why some discourses are more open for empowered positionings than others. Even though the discourses were produced in a small-scale study, these issues concern becoming teachers and teacher education on a societal level, and therefore the analysis on a micro-level perspective may contribute to understanding educational contexts on a macro-level (cf. Morgan, 2012). These phenomena might contribute to understanding struggles within teacher education on a societal level. Morgan argues:

... by locating the analysis of local phenomena within a macro-level analysis of relevant social structures, it becomes possible to see how hegemonic discourses and the interests of dominant groups shape the pedagogic discourse. (Morgan, 2012, p. 192)

Empowerment and disempowerment

Ontologically, empowerment is intimately connected with individuals’ performed actions, their sayings and doings and hence the discursive production (cf. Potter & Wetherell, 1987). Through “recursive movement between experience, reflection, and action for change” (Kesby, 2005, p. 2051), the concept of empowerment as performed action in available discourses (Potter & Wetherell, 1987) allows us to understand individuals’ negotiation and resistance within the discourse (cf. Gutiérrez, 2013; Medina,

2012). This study showed that by foregrounding students' empowered and disempowered positionings some discourses appeared as dominant and constraining. However it was clear that the students took the power to resist available discourses when possible. As methodological concepts the dichotomy of empowerment and disempowerment hence proved to illuminate constraining discourses.

Tyrona (1994) posed critique towards the dichotomy of empowered, disempowered and/or powerlessness, as educational research often label persons as either remaining disempowered at "the end" or having achieved a state of empowerment: "There is no room for manoeuvre, no shades of grey" (p. 10), hence quite rough and without nuances. This study has showed the possible richness in the grey nuances. As positioning was understood through actions and not as labels, this study showed that empowerment could be enacted by anyone who has access to available discourses, and almost simultaneously it was possible to express disempowerment within the same or another available discourse. On the other hand, this study also showed that disempowerment was expressed by anyone who did not have access to the multiplicity within a discourse, or not had possibilities to choose discursive strand, due to power-relations they could not resist. Important to note is that struggles and challenges were not factors that revealed disempowerment per se. More important was the narrowness where few discursive strands were available to position within. Hence, the possibilities to change positioning within and between discourses, frees us from the idea that individuals are either empowered or disempowered. From the analytical approach taken in this study the both/and perspective is central and might provide a richer description than the either/or.

Positioning as a verb

The move further with regard to how positioning was understood had consequences for the analysis and interpretations of the flow of power within and among available discourses. I want to stress that what differs is in line – however as a sidetrack — with the comprehensive view of positioning expressed as verbs: as doings. Davies and Harré (1990), for instance, separate positionings in two: as interactive and reflexive. Hence, when one positions another in an interaction the positioning is interactive. Reflexive positionings, as for instance autobiographies, identifies how individuals position themselves within available discourses (cf. Davies & Harré, 1990) by intentionally or unintentionally "unfolding personal stories told to oneself" (Moghaddam, 1999, p. 75). The approach taken in this study is a merge between the two, since positionings occurred in interactions with others, however mostly focusing on the self and groupings including the self.

I argue that positioning, understood as performance of actions (Potter & Wetherell, 1987), as sayings and doings, can be interpreted in at least two

different ways: First, as Potter and Wetherell (1987), through discursively available positionings. This approach is taken by Evans et al (2006) and Davies and Harré (1990), and seems to be most common in contemporary socio-political research. Evans et al (2006) use positioning and subject positioning by foregrounding how individuals take up positions that are available in the discourse. It could for instance be as evaluator or leader: “T’s initial statement (45) with its positive modality can be seen as a claim to authority through knowledge (*evaluator* position)” (Evans et al., 2006, p. 217, italics in original). This approach allows the analysis to be dynamic and the positions understood as ephemeral (cf. Wagner & Herbel-Eisenmann, 2009) since individuals can position themselves *as* something or taking a position *of* something as for instance: “[he] claimed the position of *leader* by moving on to the part of the problem stated above [italics in original]” (Evans et al., 2006, p. 216).

Second: In order to approach the aim for this study the analysis did not benefit from drawing on discursively available positions because, in studying what concerns individuals, focus could not be on positions taken during interviews, for instance. The concept had to be taken one step further to reveal how the flow of power became visible through the students’ *enacted* positionings — meaning that I focused on performance of actions that expressed empowerment or disempowerment without taking other labels into account. The analysis hence developed to be a continuous discussion between the data, and me as researcher where I focused on how positionings were enacted, which discourse(s) were available, and how the positionings revealed power-relations. I then turned back to explore if the positionings changed in the following data set, if the same or other discourses emerged and how the positionings revealed power-relations. And, whereas positioning occasionally came to include more people than the speaking subject, the intergroup positioning analysis identified who were included and who were excluded in the actual positioning.

I argue that this analytical approach taken on positioning contributes to the contemporary understanding of positioning and subject positioning taken by Davies and Harré (1990) and Evans et al. (2006), as it made possible to reveal power-relations within and between discourses without identifying specific subject positionings taken. In relation to the understanding of positioning as a verb I also argue that: by focusing on what enacted empowered and disempowered positionings can tell about the discourse, the level of analysis hence moves from analysing specific utterances, or lexical bundles (e.g. Herbel-Eisenmann et al., 2010), to include available discourses and power in relation to its contexts.

Reflections regarding the research process

Who benefits from taking such an approach? After being deeply engaged in this project for some years I claim that both becoming mathematics teachers, educators and institutions of mathematics teacher education may benefit. In this chapter, I discuss how the methodological considerations developed in interaction with the produced ethnographic data, and how the socio-political theoretical perspective affected both the analysis and my understanding of the emerging phenomena.

I as researcher have been involved in each of the decisions taken in this project, and as introduction to this chapter I recall how some decisions have coloured the endeavour of conducting Ph.D. studies: Contemporary socio-cultural theories (e.g. Engeström, 1998; Wenger, 1998), did not offer helpful concepts to scrutinise the how and why questions that were asked. Instead the socio-political-theoretical perspective provided other theoretical tools — dynamically interrelated — through which data was produced, analysed and interpreted from a critical perspective. As discourses, power and positionings were set in the centre for analysis, it was possible to elicit what students talked about, how it was talked about and who was allowed to talk about what (Foucault, 1969/2002). One central aspect of this dynamic approach was the possibility to focus on competing simultaneously working discourses in order to understand, for instance, why the students enacted empowered positionings in some discourses and not in other.

Within this dynamic there are patterns, which indicate that some discourses are open and easy to challenge, whereas others are more "closed" and difficult to challenge, as discussed above. The results show that all discourses revealed positionings that challenged simultaneously available discourses; however not always in the same direction. In relation to this there is need to bring in the importance of considering within which contexts the students enacted discursive positionings. Andersson (2011) claims that: "Researching only one type of context might give a misleading impression of a students' relationship with mathematics" (p. 213). The importance of taking several contexts into consideration has relevance also from the perspective of this study. I argue that the context within the produced data is of utterly importance in order to understand how students can take and enact empowerment in mathematics education contexts. Through participation in various contexts during the fieldwork, it was possible to see how discourses emerged, depending on situation, place and people involved. My understanding of discourses, as inherently connected to actual contexts (Foucault, 1969/2002) requires the contexts to be 'read' by the analyst in order to make sense of the discourses (Potter & Wetherell, 1987). As an example: connections with family life and the students' every-day commitments were sometimes included in the contextualization. This required awareness of the grey-zones where data might be categorized

within more than one discourse; that competing discourses might disturb or influence each other; and that the dichotomy of empowerment — disempowerment was blurred. The context is hence actualised and through this transparency it is possible to talk about transformacy (to see how concepts and theoretical ideas have possibility to acquire new dimensions), exemplarity (by moving back and forth between theory and practice) and generativity (inspiring new forms of practice and theory building) (Vithal, 2003a).

What I have described in the previous sections provided deep understanding of the educational contexts, available discourses and exercises of power. Through the two years of fieldwork I built close relations with the students and strived through the whole process for understanding their perspectives without exemption, and to write it up. The possibilities I had, through the many seminars, interviews and school visits, to produce a rich ethnographic account was invaluable to me and helped me to put becoming teachers, power and mathematics teacher education in the centre.

However, the time limitations and the choice to only participate in mathematics and mathematics education courses may have had some consequences for the results. If I, for instance, had participated in all courses during the two first years, the data would probably differed in character. I believe that I would have gathered more nuanced information about how language/culture and institutional discourses affected the students' positionings as other subjects were at stake. Another aspect, however impossible to solve due to limited time for data production, is that there were at least three mathematics education courses during the last two years, which were impossible to attend. This fact may raise lots of questions regarding if the results would have shown the same or other phenomena during the second half of their education.

These issues are impossible to answer at this stage, however it would be interesting to meet the students after graduation and in the entrance of working life. There may be other issues that concern them now, and as this study provided an alternative, a complement to how mathematics teacher education has been researched, I would use the same approach if I could continue the collaboration with the students.

There are both pros and cons in doing ethnographic studies. I have discussed this and the process of data production in the methodology chapter. There is however one issue that I want to bring forward in retrospect, which makes this research differ slightly from “traditional” ethnographies. That is the move from description of a culture to the endeavour of understanding the occurrence of prevailing phenomena, through analysing power-relations and taking the students' perspectives on mathematics teacher education discourses. The methodology is not so common even within socio-political research. The closest I have found is

Vithal (2003b) who, together with her students, taught street children mathematics and then collaboratively wrote about the project.

This merge between the ethnographic methodology and a socio-political theoretical approach creates the specific characteristic of this study, and I claim that the socio-political theories contribute fruitfully with ethnographic studies, as they supports asking the *why* questions even in well-known contexts.

The flow of power among the discourses determines discursive positionings — possibilities for resistance, challenge and negotiation

Power asymmetries between discourses resulted in that dominant discourses obscured, or hindered empowered positionings within others. In this section I separate the degree of openness in possibilities for resistance, challenge and negotiation, in order to discuss similarities and differences among the discourses.

A discourse that allows *resistance* is not necessarily possible to challenge through critical questions. It could be that the resistance consists of unwillingness to adjust to the discourse; however no alternative discourse is suggested. A discourse possible to *challenge* is open for questions and for being questioned, whereas a discourse that is open for *negotiation* or (re)negotiation, is the most open discourse. Hence, a discourse that allows both resistance and is challengeable is in the process of change.

So, what did I recognise as specific characteristics for challengeable discourses? In order to illustrate the differences I will pinpoint what I found critical within the four discourses. I will highlight how power-relations among discourses determine possibilities for empowered positionings and who has access to the discourse.

Adler and Davies (2006) highlight power asymmetries between courses in mathematics and mathematics education. Beach and Player-Koro (2012) showed that authoritative subject knowledge became visible through the use of textbooks, that the mathematics content rarely was challenged, and that there were no critical discussion about the textbook-based learning. Based on what this study has shown, both the study of Adler and Davies (2006) and Beach and Player-Koro (2012) indicate that there are institutional constraints that affect the mathematics discourses and hinder students from actively challenging it. In this study, power asymmetries of this kind emerged to a various extent in the interplay among all the four broad discourses, and before possible reasons for why this occur are discussed, I will provide an example:

The results showed that the four broad discourses, to various extents, were open for negotiation. Drawing on Foucault's notion of discursive power-relations (1971/1993) the analysis foregrounded what was possible to talk about within available discourses, hence how discourses were organized in the educational contexts. This implied, that some particular students could position themselves within discourses, which were not available for all, as the students who expressed concerns regarding language requirements. They had, due to cultural and historical background, possibility to take this position and express disempowerment within the language/culture discourse. However, they also had the power to analyse mathematics education critically by taking a stance within their previous school experiences in their country of birth. Students who did not have those experiences had no access to these strands within the language/culture discourse and therefore did not participate in that discursive production.

The mathematics education discourse appeared as most open and the language/culture discourse as most constraining. Even though the mathematics education discourse appeared as the most empowering in the meaning: open for resistance, challenge and negotiation, the results show that the language/culture discourse to large extent obscured mathematics and mathematics education discourses. While they were simultaneously working, the language/culture discourse emerged as dominant, and hence prevented positionings in other discourses, regardless of how empowering each of the other discourses were. Previous research has shown that some discourses are constraining, without further problematization (e.g. Nolan, 2012; Player-Koro, 2013). Beach and Player-Koro (2012) concluded that the students' participation in mathematics discursive practices was adjusted in line with the authoritative subject knowledge. That is, being successful as they got it right. The question why this happened was not highlighted and is therefore still a current issue. The results from this study show that discourses, wherein the students enacted disempowerment to a high extent, prevented positionings within the empowering discourses.

Both the language and institutional discourses were less multi-faceted than the others. While Evans et al (2006) would say that there were fewer subject positions available in these discourses, I understand positionings slightly different and argue that there were limited discursive strands available, and hence fewer possibilities to enact discursive positionings in the language discourse than in the mathematics education discourse. Less multi-faceted discourses allowed positionings within fewer discursive strands and, accordingly, to large extent rendered disempowerment. Due to the flow of power within and between the discourses, and due to the range of available discursive strands, there were more or less spaces for the students to challenge or (re)negotiate the discourse. The constraints that follow from having less discursive strands to position within render power asymmetries among available discourses, and this narrowness might be one possible

reason for why some discourses obscure or dominate others. I argue that one key issue for why a discourse appears to be challengeable or not, is the degree of multiplicity of discursive strands.

Empowerment is understood as actively achieved (cf. Kesby, 2005; Valero, 2004a) by the people involved. Due to the revealed constraints in this study I argue that there is need to challenge institutional power relations to open narrow discourses for negotiation. Both students and teachers need to be involved in this enterprise. Valero (2004a) writes:

Empowerment needs to be defined in terms of the potentialities for students to participate in school mathematics practices. They get empowered when, through that participation, they position themselves in ways that are significant for the development of the practice. (p. 49)

In educational contexts the teacher has a given power through his/her institutional position (Norén, 2010). She argues that power-relations in the classroom can be changed if the pupils are given space for agency and pupils and teachers jointly create that space for agency in discursive practices. I believe this claim is transferable to teacher education as well and it strengthens my claim that there is need to challenge the distribution of power in institutional contexts. This study offers an additional aspect on this space, which connects Valero (2004a) and Norén (2010). I argue that: joint creation of available discourses may increase possibilities to resist, challenge and negotiate available discourses on different levels, and hence open space for empowered positionings. Saying that, I also claim that there is need to ask *why* power-relations should be challenged and *who* benefits from doing that.

Contributions to the field of mathematics teacher education research

Contemporary research within mathematics teacher education has a strong focus on teachers' beliefs, teachers' learning and change over time, knowledge and practices, to mention some (cf. Adler et al., 2005, Grevholm, 2010; Sánchez, 2011). Research with an articulated social and political interest (e.g. Garii & Appova, 2013; Garii & Rule, 2009; Turner et al., 2012) often poses questions about teaching for social justice and equity in education. This was challenged by Pais et al. (2010) as putting too large focus on *how* to change or develop mathematics education practices and obscuring the questions of *why*, to question certainties in the field of mathematics education research. In relation to contemporary research within mathematics teacher education (cf. Adler et al., 2005, Grevholm, 2010; Sánchez, 2011) this study illuminated a partly different picture of becoming mathematics teachers. Actually, the focus is on occurring phenomena rather

than on the students, and the mathematics subject is illustrated as not only an isolated subject, but as affecting and as being affected by other working discourses. I agree with Pais et al. (2010) and argue that there is need to ask how to develop mathematics teacher education, however putting the gaze on why certain phenomenon appears may help teacher educators to scrutinize their own practices from a different perspective.

The strong focus on students' knowledge about specific mathematical topics (e.g. Bergsten & Grevholm, 2004; Hansson, 2006) and mathematical knowledge for teaching (e.g., Ryve, Nilsson & Mason, 2012, van Bommel, 2012) within mathematics teacher education often focus on the students' mathematical challenges. One central outcome of this study is, that it is not the mathematics that is the greatest challenge for the students. Instead, there are conflicting discourses on different levels that constrain and affect the students to express disempowerment. The mathematics education discourse was obscured by narrower discourses despite that the mathematics education discourse more often rendered empowered positionings. Consequently, power-relations constrained students' possibilities to develop mathematical knowledge for teaching, which often is foregrounded in contemporary research. Mathematics and mathematics education thus becomes secondary, due to institutional and language constraints.

From previous research we know that novice mathematics teachers are constrained by the degree of subject-oriented responsibility and work situation in schools (Palmér, 2013), and by concerns about their competence as mathematics teachers (Persson, 2009). This study showed, that it is possible to analyse how power-relations determine what is possible to talk about with respect to mathematics education as becoming teacher. Therefore, as institutional discourses proved to be less open for negotiation than the mathematics education discourse, it may be possible to claim that institutional constraints hindered Palmér's (2013) students from getting as much responsibility as they wished, both as teachers and in relation to the mathematics subject. I also suggest that institutional discourses affected the mathematics discourses described in Player-Koro (2013) and Beach and Player-Koro (2012). The authors showed that mathematics courses within Swedish mathematics teacher education are organised around textbook based education, which determines the mathematics discourse of high-speed calculations and superficial learning. Also Nolan's (2012) study illustrated available mathematics discourses as competitive and characterised by speed. The students did not challenge available mathematics discourses, neither in Player-Koro's (2013) nor Nolan's (2012) studies, even though it is clear that it constrained students' freedom to talk about mathematics as a creative subject.

Prevalent in this study is a discourse that, similar to Player-Koro (2013) and Nolan (2012) depend a lot on institutional constraints, such as superficial and high-speed learning, time constraints and lectures that are

traditionally bound to the educational context. However, in comparison with latter studies, I showed that the mathematics discourse were challengeable and possible to negotiate to some extent, and I argue that there is one important reason for that: As previous mathematics education courses had the strong focus on teaching for understanding, on creativity and problem solving open for errors and different solutions, the mathematics education discourses provided alternative ways to talk about and deal with mathematics. This made possible for the students to put higher demands on the teachers to clarify concepts and deepen the discussions. But, as the requirements increased and the closer the tests approached, the students aligned with the institutionally constrained mathematics discourse and accepted superficial learning. Consequently some students just wanted to pass the test to get the mathematics course done. Learning became secondary. This brings to the fore another issue to consider: if it is important that becoming teachers get deeply involved in mathematics during their education there is need to question how *and* why institutional discourses are allowed to affect mathematics courses and also what is possible to change to increase students' empowerment.

This study focus on possibilities for change, an approach taken by both Andersson (2011) and Norén (2010) in their studies within upper secondary school and compulsory school. Accordingly, this study showed that there are not only power asymmetries between mathematics and mathematics education discourses as Adler and Davies (2006) described. As mathematics and mathematics education discourses rendered empowered positionings while no disturbing discourses were available, the focus needs to be on how to change the constraints. This leads to two other aspects that I find important to highlight. First, taking discursive power-relations into serious account and foreground the students' voices may reveal constraints that are not apparent at an organisational level. Second, as institutional and language/culture discourses proved to obscure the core of education – mathematics education – we need to deal with these issues together with the students. Both students and teachers need to be involved in this enterprise.

If I were to be a “Big P” researcher

The theoretical umbrella allowed bringing forward power on different levels, from a societal macro perspective to an interactional micro perspective (Morgan, 2012). However, the methodological focus in this research was to take a micro-perspective to reveal power-related phenomena that emerged in the daily life of becoming mathematics teachers. I therefore took a “little p” stance as researcher, following Andersson (2011). This theoretical perspective addresses issues of power relations and political issues from a

micro-level perspective: that is from every-day activities students' experienced and from single interactions with and among the students.

A researcher with a "little p" adheres to the assumption that mathematics education is a social and political practice where power is exercised, and shows sensitivity for these questions through her researcher attitude. "Big P" researchers are in addition politically consistent in all "other stuff." (Andersson, 2011, p. 30)

The contexts encompassed educational settings wherein students participated, in small groups as well as in whole-class settings, and data was produced to show sensibility to discursive power relations within those settings. The "little p" allowed me to not take all the "other stuff" into consideration. Instead, this approach made possible to focus on power and empowerment, and how people use language "to construct versions of the social world" (Potter & Wetherell, 1987, p. 33), through positionings in available discourses. If I were to be a "Big P" researcher I would have needed to also include larger societal discourses (Foucault, 1971/1993) and hegemonic structures (Fairclough, 2010).

A Big P study would have changed research questions to also take power-relations at other levels into consideration. I could, for instance, have initiated the research by asking questions concerning issues of oppression, social justice and equity, aiming at understanding how these issues were reflected through steering systems for teacher education and how they trickle down to the discourses produced in student — teacher interactions. This was shown in Norén (2010), who argued that it was advantageous to take socio-political departure points since she then could create alternative pictures of multilingual pupils than what is commonly widespread in research. Even though she did not explicitly define her research, I would argue that she approached the research as a "big P" researcher, since she drew on how discourses within steering documents emerged in the classroom discourses.

However, the research itself needs to undergo critical scrutiny to ask why we construct research the way we do, as stressed by Pais et al. (2010). The enterprise of conducting this study, as critical researcher, required both presence and distance to my own work. The advantages of taking a "little p" vs. "Big P" approach are comparable with Morgan's (2012) connections between interactional micro perspectives and societal macro perspectives in analysing pedagogic discourses. The micro-level study (the "little p" approach) may provide us with insights about available discourses in the local contexts and how student teachers express their concerns through empowered or disempowered discursive positionings.

Implications...

... for mathematics teacher education

The overall aim of this study was to explore and understand what characterizes becoming mathematics teachers' concerns regarding mathematics and mathematics education, or — formulated within a socio-political theoretical grid — to explore how becoming mathematics teachers' discursive positionings revealed power-relations in mathematics teacher education contexts.

The results show that students' positionings in educational contexts are aspects that need to be taken seriously into account if we aim at understanding how discursive power-relations affect becoming teachers during their education.

In planning for how to develop mathematics teacher education I argue, that we — I include myself — as teacher educators, need to be more aware of which discourses that are made available for becoming teachers within the educational programmes, and that it is necessary to strive for opening up discourses to be challenged and resisted by the students.

The results raise some questions: Are there discourses of “truths”, as Gutiérrez, (2013) explained to be definitions of what we think of as normal that cannot be challenged? I suggest that following issues have to be considered in the endeavour of developing mathematics teacher education:

- Invite students in discussing the role of language and institutional constraints in the education. By opening up the possibilities to challenge what we think of as normal, it might be possible to overcome constraining and obscuring discourses so that becoming teachers can put larger effort in the core of education, which is mathematics and mathematics education.
- There is need to be aware of how available mathematics discourses are produced and why it is so. As mathematics is not the greatest challenge for the students, there is need to focus on how conflicting discourses on different levels, constrain and affect the students to express disempowerment.
- Which institutional frames are necessary and which are negotiable? Is it possible to question certainties? Why are tests structured as they are and why do we test what we do? How can

students get more involved in the structure of testing? How do we know when the students have reached the goals?

- Foreground cultural differences and international perspectives on mathematics education by involving and drawing on students' experiences as resources.

I believe that an informed discussion regarding mathematics, power-relations, discourses, and what thinking about those issues may lead to, is necessary; for those engaged in the research, and for future discussions about the role of mathematics in our society. For me, as the researcher, mathematics teacher education is one possible arena where we can open up the discourses of mathematics, and make them possible to resist, challenge and (re)negotiate.

... for forthcoming research

Which discourses needs to be challenged in mathematics teacher education?

First and foremost, there is need to scrutinize why the language discourse remains unchallenged. As the language discourse not allows empowered positionings to any higher extent, language issues becomes more important than mathematics in mathematics teacher education. Why does this phenomenon emerge and how can this knowledge contribute to developing mathematics teacher education? How can language become an essential part of the education; a discourse that is possible to challenge and to (re)negotiate in interaction with other discourses?

Second, I have illustrated possibilities and constraints for students to enact empowerment as becoming mathematics teachers. Both institutional constraints and language concerns may obscure possibilities for empowered positionings within the mathematics education discourse. We need therefore, as mathematics education researchers and educators, to be more aware of which discourses that are made available for becoming teachers and strive for opening up discourses for negotiation. I ask the question: how can mathematics teacher education become a space where all questions posed by students are brought into the education, where students' backgrounds are taken as resources for learning, and where discourses of "truth" are challenged by both students and educators?

Thirdly I want to foreground the students who made the strongest impact on this research. I talk about the students who, as adults, moved to Sweden for different reasons; who speak at least two languages; who have experienced schooling and culture in different parts of the world. The students who talked in favourable terms about education, and made

comparisons between educational structures in different countries, which were not possible for other students to do. There was little space within the courses to, through comparing and contrasting educational cultures, enriching the contexts and share experiences with peer students. Therefore there is need to study this phenomenon further.

Power and mathematics – discursive practices in mathematics teacher education

What are the most important results in this study, and what possibilities do I see for developing this research study further?

What I have argued is that this study revealed issues of power-relations that affected students possibilities to position themselves within available discourses; both by opening up and by constraining. The mathematics education discourse offers a plurality of available and empowering strands, and so does the mathematics discourse, if there is no influence from the dominant institutional discourse. Several discursive strands within the institutional and language/culture discourses appear as narrow and constraining, which has consequences for students' possibility to enact empowered positionings within the discourses. Becoming teachers have to accept dominant discourses as they prove to be unchallengeable; despite that there are other empowering discourses available. This may have consequences for mathematics teacher education as well — that is, if we want student teachers to enact empowered positionings. We therefore need to be aware of hegemonic systems as orders of discourse where relations of domination are sustained as part of the legitimising common sense (Fairclough, 2010). The “Big P” approach to researching mathematics teacher education would enable an analysis on both structural and interpersonal level. Power asymmetries in university settings constitute hegemonic relations that become “naturalised and commonsensical” (Fairclough, 2010, p. 129) conventions if they are not challenged.

The socio-political approach offers additional perspectives to contemporary socio-cultural research by placing power-relations in the centre of the analysis. Due to its historical constitution “in complex systems of action and meaning”, mathematics education is a social practice (Valero & Zewenbergen, 2004, p. 2). The exercise of power brings to the fore issues of social justice, equity and democracy as it is possible to ask “whose knowledge is being represented in society, schools and classrooms, and with what effects for the different participants in it” (p. 2). Some of these issues are brought forward within this research in the quest to reveal and understand how power-relations affect possibilities to challenge available discourses in mathematics teacher education. Accordingly, I want to encourage mathematics education researchers to bring forward issues of power in researching educational settings, and, if we want to understand how we can develop mathematics teacher education I argue that it is necessary to

ask *why* things happen: *why* students react as they do; *why* we chose specific content, course literature, examinations, and not other; *why* the education is organised in this way. And last: *why* power-relations should be challenged; *who* benefits from doing that; and *why* research within teacher education foregrounds some issues stronger than other.

*

Epilogue

For those of you who wondered — and still wonder — why the subheading “Climbing Lion’s Head” is there:

Apparently it has nothing to do with the text you have read, and it does not make sense in relation to any research that lies behind this study. The reason for keeping the working title on the thesis until it goes in print is symbolic. It is about contemplation, about seeing things differently, viewing things from other perspectives, and it is about managing a challenging task. However, it derives from experiences I made together with colleagues during the MES 7 conference in Cape Town, South Africa 2013. Except from sharing and discussing research amongst members of the Mathematics Education and Society group there was some time for social activities. I chose to climb Lion’s Head, one of two characteristic mountains in Cape Town.

Even though the climb was not such a challenge as to write up this study there are important connections, metaphorically described using the one/you pronoun: The climb is something one does by moving towards the goal on a path or in terrain that seems okay to force. Sometimes there is need to stop and rest, and sometimes the path ends and one has to go back, choose another track and see the mountain from a new perspective. These breaks also include looking back to where one came from; to see that there has been progression, however not straightforward. Those paths that seemed to be good in the beginning, but instead ended as blind alleys; which added necessary experiences but that had to be left behind because a more fruitful, however challenging path had to be walked. The company, the people with whom you climb, are there, as partners and supporters, but you need to climb on your own.

Climbing is challenging. As the peak often is visible from the foot of the mountain, it becomes obscured during the climb, because of rocks, trees and bushes. It does not appear until the mountain is climbed. I climbed Lion’s Head and by having reached the top rock I will now take a step back. To think about how these experiences will influence further moves. Which is the next peak?

Sammanfattning

Utgångspunkter för studien

Under de tio år som jag arbetat med lärarutbildning i matematik har jag mött många blivande lärare som uttryckt funderingar över matematikämnet och den egna förståelsen i matematik, över handledare på VFU-skolor, samt över tentor och andra examinationsuppgifter. Jag har också mött studenter som velat bidra till utbildningens utveckling genom att diskutera kvalitet och möjliga förändringar. Detta ledde till funderingar över vad blivande matematiklärare talar om som meningsfullt i utbildningen och vad de väljer att tala om. En vilja att förstå vad studenter anser vara viktigt för dem som blivande matematiklärare, är mitt huvudargument för att genomföra denna studie.

I denna svenska sammanfattning har jag översatt *power* med *makt* och *mathematics education* med *matematikdidaktik*. Dock har jag inte översatt empowerment och disempowerment, då jag inte funnit några begrepp som är jämförbara i mening på svenska.

Bakgrund

En genomgång av tidigare forskning, såväl i Sverige som internationellt, visar att studier som fokuserar socio-politiska frågor i matematiklärarutbildningen är få och att de då i första hand behandlar frågor om social rättvisa och likvärdighet som en del av utbildningsprogrammet. Den socio-politiska inriktningen beskrivs av Sánchez (2011) som en liten, men växande trend inom forskningsfältet.

De senaste åren har några studier genomförts på matematiklärarutbildningen i Sverige; alla med olika ansatser, vilket genererat olika resultat. Medan Palmér (2013) och Persson (2009) undersökte övergången från att vara lärarstudent till lärare, fokuserade Beach och Player-Koro (2012) Palmer (2010) och Player-Koro (2011) diskursiva praktiker och makt i matematiklärarutbildningen. På olika sätt har den

svenska forskningen bidragit med inspiration och kunskap i genomförandet av min studie.

Teoretiska utgångspunkter

Diskurser, maktrelationer, positionering, och "empowerment"

Jag tar ett socio-politiskt teoretiskt perspektiv i studien, vilket möjliggör att fokusera analysen på diskurser, maktrelationer och positionering i matematikutbildningskontexter. Detta teoretiska perspektiv möjliggör också att förgivettaganden kan ses med andra ögon och att makt förstås som ständigt närvarande och flödande i tillgängliga diskurser.

Diskurser är till sin natur förknippade med aktuell kontext (Foucault, 1969/2002), eftersom språk "är uppbyggt av särskilda yttranden som utförs i särskilda sammanhang" (Potter & Wetherell, 1987 p. 16, min översättning). Därför behöver kontexten bli "läst" av analytikern för att ge mening åt diskurserna (Potter & Wetherell, 1987). Som en följd av detta måste vi förstå kontexten där ett yttrande sker, så att det går att identifiera diskursens begränsningar och hur uttalanden relateras till andra uttalanden.

Positionering är ett centralt begrepp i socio-politisk forskning (ex. Evans, Morgan & Tsatsaroni, 2006; Herbel-Eisenmann, Wagner & Cortes, 2010, Walshaw, 2010), och används som indikator för hur maktrelationer styr tillgängliga diskurser och hur individer tar olika subjekspositioner som en konsekvens av hur maktrelationer styr. (Davies & Harré, 1990). Positionering är dynamisk, vilket betyder att vad en person säger eller gör för att positionera sig kommer vara olika och kommer förändras beroende på situation (Davies & Harré, 1990) eller kontext (Andersson, 2011). Flera positioneringar kan förekomma simultant. Positionering förstås i denna studie som muntliga och fysiska handlingar, alltså hur individer agerar empowerment och disempowerment genom att *göra* något.

I studien förstås maktbegreppet som "situerat, relationellt och i konstant transformation" (Valero, 2004b, p. 15, min översättning), vilket betyder att makt flödar kontinuerligt inom och mellan diskurser. Detta betyder också att vi inte kan se makt som stabilt eller inbyggt i klass eller kön. Inte heller att makt är inbyggt i matematiken själv, eller att man får makt genom att vara matematiskt utbildad.

Mitt sätt att förstå empowerment och disempowerment som diskursiva positioneringar, skiljer sig från hur empowerment och disempowerment brukar användas inom utbildningsforskning. Som teoretiskt begrepp och analytiskt verktyg används empowerment och disempowerment i min studie på samma sätt som Kesby (2005), genom individers muntliga och fysiska

handlingar. Kesby (2005) menar att empowerment inte enbart ska förstås som motstånd, utan först och främst i termer av kreativitet och positiv kraft.

Avhandlingens syfte och forskningsfrågor

Det övergripande syftet med studien är att belysa möjligheter och begränsningar som diskursivt producerade utbildningskontexter, för att undersöka och förstå blivande matematiklärares funderingar angående matematik och matematikdidaktik under lärarutbildningen.

Den socio-politiska ansatsen erbjuder teoretiska och metodologiska begrepp där känslighet för tillgängliga diskurser, maktrelationer och positioneringar är explicit uttryckt. Att rama in syftet genom denna ansats innebär att den dynamiska relationen mellan begreppen förstås på följande sätt: tillgängliga diskurser framträder genom studenternas maktpositioneringar och därigenom belyses flödet av makt inom och mellan diskurserna.

Den socio-politiska ansatsen erbjuder teoretiska begrepp som raffinerar beskrivningen av det övergripande syftet utan att ändra dess betydelse. Istället ger det möjlighet att uttrycka syftet mer precist: att undersöka hur blivande matematiklärares diskursiva positioneringar avslöjar maktrelationer i matematiklärarutbildningskontexter.

Följande forskningsfrågor har väglett hur data har producerats, beskrivits, analyserats och tolkats i matematiklärarutbildningskontexter:

- 1: Vad karaktäriserar tillgängliga diskurser, som framträder utifrån studenters tal om vad som är viktigt, vad som oroar dem eller känns angeläget, i matematiklärarutbildningen?
- 2: Hur avslöjar studenters positioneringar diskursiva maktrelationer?
- 3: Hur och varför möjliggör, respektive hindrar tillgängliga diskurser positioneringar som uttrycker empowerment?

Metodologi

Etnografisk ansats

Studien genomfördes med en etnografisk ansats och fältarbetet sträckte sig över studenternas två första år i utbildningen. Under den tiden följde jag 19

blivande lärare för årskurs 1-3 respektive 4-6 i alla kurser i matematik och matematikdidaktik genom deltagande observation (Bryman, 2008). Vid ett flertal tillfällen under fältarbetet genomförde jag semistrukturerade intervjuer (Kvale, 1997) med studenterna. En annan del av fältarbetet var förlagd till studenternas VFU-skolor, där jag i den mån det fanns möjlighet, besökte jag studenter när de undervisade i matematik.

Analytiskt ramverk

Sociopolitisk matematikdidaktik forskning, beskriver teoretiska konstruktioner som diskurser, positionering och makt som dynamiska och mer eller mindre beroende av varandra (jfr Gutiérrez, 2013, Valero, 2009, Herbel-Eisenmann & Wagner, 2010). Men hur begreppen konstrueras och förstås inbördes och hur detta i sin tur påverkar analysen skiljer sig åt. Ansatsen som tas i denna studie är inspirerad av tidigare forskning, men skiljer sig något från den forskning som jag hämtat inspiration från, då jag också analyserar dynamiken mellan diskurser, maktrelationer och positioneringar genom uttryck av empowerment och disempowerment.

Foucault (1971/1993; 1969/2002), Valero (2004a; 2004b; 2009) och Gutiérrez (2010) har inspirerat till att se maktbegreppet som sammanvävda med sociala diskurser. Harré och van Langenhove (1998), tillsammans med Tan och Moghaddam (1999), Davies och Harré (1990), Wagner och Herbel Eisenmann (2009), för att nämna några, har alla främjat min förståelse av positionering som begrepp. I den här studien förstås positionering som verb, vilket betyder att analysen fokuserar på händelser där individen positionerar sig själv eller andra genom att göra något.

Detta är i linje med den diskursiva ansatsen: att människor använder språket för att uttrycka handlingar, hur diskurser är organiserade och vad de gör (Potter and Wetherell, 1987). Fairclough (2001) synliggör hur det diskursiva flödet av makt inom diskurser, och hur makt – dold eller ”face-to-face” – utövas och ageras i tillgängliga diskurser.

Tack vare begreppens sammanvävda och dynamiska karaktär, finner jag att diskurs, positionering och makt är kraftfulla metodiska och analytiska verktyg för att studera maktrelationer i diskursiva praktiker.

Resultat

Fyra framträdande diskurser

Genom analysen framträder fyra diskurser utifrån studenters tal om vad som är viktigt, som oroar dem eller känns angeläget, i

matematiklärarutbildningen. Diskurserna fokuserar matematikutbildning, matematik, språk/kultur samt institutionella ramar.

Matematikutbildning

När studenterna talar om matematikutbildning framträder en diskurs om vad som anses vara bra sätt att undervisa.

Studenterna talar om matematik som ett skolämne som skiljer sig från matematikundervisningen de själva upplevt under sin skoltid och anses vara bättre än så kallad traditionell undervisning. Matematik är ett inspirerande och kreativt ämne tack vare nya sätt att undervisa. Grupparbete, diskussioner, laborativt material och problemlösning får eleverna i skolan att tycka om matematik och därför vilja lära sig. Traditionell, lärarledd undervisning, tävlingar, matematikböcker, individuellt arbete och procedurellt utantillärande är inte att föredra i matematikundervisningen. Genom att de distanserar sig från matematikundervisning som är tävlingsinriktad och med tydligt fokus på individuellt arbete i matematikböckerna, så tar de också avstånd från de upplevelser de själva har från sin skoltid.

Diskursen möjliggör för studenterna att tala fritt och avslappnat om hinder och möjligheter för elever att utveckla tillit till sin förmåga i matematik. Matematik ska undervisas baserat på elevernas förförståelse och därför måste lärare planera undervisningen noga så de kan erbjuda kvalitativ utbildning på elevernas nivå och inkludering av alla elever är väldigt viktig.

Den undervisning som sker i skolorna är inte i linje med hur matematik ska undervisas och kritiken uttrycks som skillnader mellan matematikutbildningsdiskursen på utbildningen och den "riktiga" undervisningen i skolorna.

Matematik

När studenterna talar om matematik framträder en diskurs som producerar sanningar om matematik som verkar bevara en syn på matematik som är delvis skilt från deras framtida profession:

Att lära sig matematik är spännande och utmanande och det är bra att lära sig olika strategier för att kunna göra snabba beräkningar.

Matematik gör något med individen. Man blir intelligent, logisk och utvecklar förmågor som är bra vid problemlösning. Matematik är viktigt för att klara vardagslivet.

Det är viktigt för blivande lärare att behärska matematik på en betydligt högre nivå än eleverna.

Det är legitimt att ha upplevt matematik som svårt, men det är att föredra om man behärskar formlerna korrekt istället för att använda informella metoder.

Matematikdiskursen utmanas av studenterna med avseende på innehåll och användbarhet, samt den svaga kopplingen mellan den avancerade

matematiken och skolmatematiken. Starkast motstånd mötte dock den snabba undervisningshastigheten och bristen på tid att förstå.

Språk/kultur

Språk/kultur diskursen karaktäriseras av ett starkt focus på att behärska svenska och att lära sig den svenska skolkulturen. Dessutom är den akademiska traditionen närvarande från första början med krav att läsa och skriva akademiskt.

Språk talas om som ett instrument, tydligt förknippat med matematik, som läraren måste behärska och använda så att eleverna förstår såväl matematiken som hur språket kan användas för att lösa problem.

En lärare ska klara av att uttrycka sig på flera sätt, att behärska ämnet så bra så att det kan bli väl kommunicerat; att uttrycka sig klart och tydligt på undervisningsspråket, som är svenska.

Som blivande lärare i Sverige betyder det att man ska behärska språket väl och vara medveten om dess vikt för elevernas lärande i matematik. Om man brister i språklig förmåga måste man ta ansvar för att utveckla den så att det inte blir ett hinder för fortsatta studier och framtida anställning.

Det är kulturella skillnader mellan Sverige och andra länder och matematik undervisas annorlunda i Sverige, både med avseende på metoder och på attityder till elevernas lärande. Sättet matematik undervisas på i Sverige borde vara bra för elevernas lärande.

Institutionella ramar

Den institutionella diskursen framträder när studenterna talar om begränsningar och regler i relation till utbildningen.

Institutionella strukturer påverkar både universitetskontexten och VFU, eftersom scheman, kursplaner, mm är förutbestämda och alla förväntas följa dessa riktlinjer.

Tidsbegränsningar och kursuppgifter hindrar fruktbara diskussioner om matematikinnehållet.

Som lärarstudent bör man acceptera institutionella ramar under VFU-perioderna. Om inte det görs så riskerar relationen med handledaren påverkas negativt.

Diskursiva maktrelationer framträder genom blivande matematiklärares positioneringar

Analysen visar att när studenterna uttryckte positioneringar genom empowerment i tillgängliga diskurser blev det möjligt för dem att uttrycka tillit till kursinnehållet och deras aktuella situation på utbildningen; önskan om att förändra undervisningspraktiker; att reflektera över matematikundervisning och jämföra tidigare erfarenheter med nya; och att

uttrycka mål för sin framtida profession. Det möjliggjorde även att kritiskt förhålla sig till matematikundervisningspraktiker, att delta i diskussionen om matematik på ett samhälleligt plan; och att ifrågasätta institutionella hinder för matematikundervisning. Att uttrycka empowerment handlade inte enbart om att uttrycka harmoni och tillfredsställelse, utan mer om att ha möjlighet att utmana rådande diskurser för att påverka och vara en del av utvecklingen. Den diskurs i vilken positioneringar genom empowerment framträder starkast är i matematikundervisningsdiskursen.

Positioneringar som uttrycker disempowerment framträdde tydligt i diskurser som verkade stabila och svåra att utmana och förändra. Språk/kultur diskursen och den institutionella diskursen som visade sig genom hela analysen påverka studenternas positionering på detta sätt, då de uttryckte oro för språkliga problem; för att inte räcka till i kommunikationen med eleverna; och för att inte klara av akademiskt skrivande, för att ge några exempel. Detta fick till följd att det påverkade studenternas positionering i andra diskurser, t ex. genom att tidsramar och förutbestämda examinationsformer begränsade möjlighet att uttrycka empowerment i matematikdiskursen.

När flera diskurser verkar samtidigt och studenten positionerar sig starkare i en diskurs än i en annan, gör det tydligt att det finns maktrelationer mellan diskurserna. Den institutionella diskursen verkade begränsande i viss mån, medan språk/kulturdiskursen begränsade studenternas positioneringar i hög grad. När någon av dessa två diskurser var tillgängliga tillsammans med exempelvis matematikutbildningsdiskursen, resulterade detta ofta i att den mer begränsande diskursen fick övertaget.

Hur och varför öppnar vissa diskurser upp för positionering genom empowerment?

Jag har valt att beskriva och analysera maktrelationer genom en dikotomi av empowerment och disempowerment (jfr Tyrone, 1994), även om det finns en gråzon som gör det svårt att dra en distinkt linje mellan dem. För analysen var det dock till hjälp då det synliggjorde att interagerande diskurser avslöjade ett flöde av makt och att studenterna utförde handlingar i relation till detta. Studenternas positioneringar påverkades av denna sammanhängande och pågående process, där hänsyn behöver tas till ett kontinuerligt flöde av diskurser, maktrelationer och positioneringar. Utifrån detta har jag analyserat hur och varför tillgängliga diskurser öppnar upp respektive begränsar möjligheten till positionering genom empowerment.

Studien visar att vissa diskurser "bjöd in" studenterna att utmana, medan andra diskurser begränsade utrymmet för positionering. När tillgängliga diskurser inte är förhandlingsbara på grund av institutionella strukturer eller akademiska traditioner, är det inte möjligt att uttrycka empowerment i lika

stor utsträckning som när tillgängliga diskurser är öppna för förhandling. De begränsande diskurserna erbjöd färre diskursiva stråk att positionera sig inom än de diskurser som i stor utsträckning. Språk/kulturdiskursen, t ex karaktäriserades av få icke utmaningsbara diskursiva stråk, eller ”sanningar” som inte gick att ifrågasätta. I jämförelse, så karaktäriserades matematikundervisningsdiskursen av ett brett spektrum av möjliga diskursiva stråk att positionera sig inom.

Diskussion

De fyra breda diskurserna

Variationen av diskursiva stråk i de fyra diskurserna är viktig att notera, eftersom den illustrerar hur de diskursiva stråken påverkar den breda diskursen. Som exempelvis tidsramar och examinationer i den institutionella diskursen. Resultaten visade att karaktären av diskursiva stråk skilde sig åt med avseende på såväl tillgänglighet som möjlighet att stå emot eller utmana, för studenterna.

Matematikundervisningsdiskursen framträdde mer frekvent och karaktäriserades av en högre grad av multiplicitet än de andra diskurserna. Denna diskurs framträdde som mest öppen att utmana och (om)förhandla.

Matematikdiskursen framträdde som både utmaningsbar och möjlig att stå emot. Den var dock inte öppen för förhandling i lika hög grad som matematikundervisningsdiskursen.

Den institutionella diskursen framträdde oftast som begränsningar som var svåra att (om)förhandla eller utmana. Jag vill påstå att det fanns maktrelationer som varken lärare eller studenter kunde utmana och det fanns få möjligheter till att förhandla för förändring. Diskursen var tydlig: Det som är planerat är vad som ska bli genomfört, även om det finns fullgoda lösningar tillgängliga.

Språk/kulturdiskursen skilde sig tydligt från de tidigare tre. Å ena sidan gjorde kulturella skillnader det möjligt för studenterna att uttrycka empowerment, då det fanns möjlighet att utmana den svenska skolkulturen genom jämförelser med andra länder. Å andra sidan lämnades språk/kulturdiskursen helt outmanad. Det var dessutom tydligt att inte alla hade access till alla diskursiva stråk, då endast de studenter som flyttat till Sverige som vuxna kunde delta i diskursen om språkliga begränsningar och vikten av att tala flytande.

Icke utmaningsbara diskurser

Både språk/kulturdiskursen och den institutionella diskursen var mindre mångfacetterade än de andra. Medan Evans m fl. (2006) skulle säga att det var färre subjektspositioneringar tillgängliga i dessa diskurser, så menar jag att det fanns färre diskursiva stråk tillgängliga och således färre möjligheter att positionera sig än i matematikutbildningsdiskursen. Dessa begränsningar kan ha påverkat studenternas positioneringar då språk/kulturdiskursen nästan utan undantag genererade disempowerment. Med anledning av hur maktrelationer flödade inom diskurserna och vilka diskursiva stråk som var tillgängliga, fanns det litet, eller inget, utrymme för studenterna att utmana eller omförhandla dessa diskurser.

Teoretiska och metodologiska implikationer

Dikotomin empowerment respektive disempowerment som analytiska verktyg kan verka ganska grov och utan nyanser. Tyrone (1994) kritiserar begreppen ”empowered” och ”disempowered” eftersom personer ofta etiketteras utifrån att vara det ena eller det andra utan några möjliga alternativ: “There is no room for manoeuvre, no shades of grey” (p. 10). Eftersom positionering förstås genom handlingar och inte som etiketter, har denna studie visat att empowerment kan uttryckas av vem som helst som har access till tillgängliga diskurser. Å andra sidan kan disempowerment också uttryckas av vem som helst som inte har access till multipliciteten i en diskurs, alternativt inte har möjlighet att välja diskursivt stråk på grund av maktrelationer som de inte kunde utmana. Denna ansats möjliggjorde en analys där studenternas möjlighet att positionera sig i tillgängliga diskurser var i fokus. Gråzonerna framträdde i möjligheten att ändra positionering, såväl inom som mellan tillgängliga diskurser.

Studiens teoretiska och metodologiska ansats rörande positionering bidrar med alternativ till den samtida förståelsen av positionering och subjektspositionering som antagits av Davies och Harré (1990) och Evans m fl. (2006), då den gjorde möjligt att avslöja maktrelationer inom och mellan diskurser utan att identifiera specifika subjektspositioneringar. Genom att fokusera vad handlingar genom empowerment och disempowerment kan säga om diskursen. Flyttar nivån på analysen från specifika yttranden, eller ”lexical bundles” (e.g. Herbel-Eisenmann et al., 2010), till att omfatta tillgängliga diskurser och makt i relation till dess kontexter.

Implikationer för lärarutbildningen

Resultaten visar att studenternas positioneringar i utbildningskontexter är aspekter som är viktiga att ta hänsyn till, om vi (jag inkluderar mig själv som

lärarutbildare och forskare) vill förstå hur diskursiva maktrelationer påverkar studenterna under utbildningen. Vi behöver bli medvetna om vilka diskurser som görs tillgängliga och blir "sanna" i utbildningen och hur dessa är möjliga att utmana.

För att möta dessa utmaningar ser jag följande möjligheter:

- Bjud in till samtal med studenterna om språkets roll och institutionella ramar i lärarytbildningen. Genom att ge möjligheter att utmana det som anses "normalt", möjliggörs utrymme för de diskurser som får stå tillbaka, och mer energi kan läggas på kärnan i utbildningen, vilket är matematik och matematikdidaktik.
- Det behövs ökad medvetenhet om hur tillgängliga matematikdiskurser produceras och varför det är så. Eftersom matematik inte är den största utmaningen för studenterna, behövs fokus flyttas till hur konkurrerande diskurser på olika plan, begränsar och påverkar studenterna så de uttrycker disempowerment.
- Vilka institutionella ramar är nödvändiga och vilka är förhandlingsbara? Vad är möjligt att ifrågasätta? Till exempel: varför är tentor utformade som de är och varför testar vi det vi gör? Hur kan studenterna bli mer involverade i teststrukturen? Hur vet vi när studenterna nått målen?
- För fram och använd kulturella skillnader och internationella perspektiv på matematikundervisning genom att involvera och använda studenters erfarenheter som resurser i utbildningen.

Jag anser att en välgrundad diskussion om matematik, maktrelationer, diskurser är nödvändig såväl för forskare inom matematiklärarytbildning och för att diskutera matematikens roll i samhället. För mig som forskare är matematiklärarytbildningen en möjlig arena för att öppna upp matematikdiskurser och göra dem möjliga att utmana och omförhandla.

Implikationer för fortsatt forskning

Studiens resultat pekar mot att det finns behov av att studera varför språkdiskursen inte utmanas och varför språket får en så framträdande roll i matematiklärarytbildningen och hur språket kan bli en central del av utbildningen: en diskurs som är möjlig att utmana.

Medvetenheten kring vilka diskurser som är tillgängliga för blivande matematiklärare måste öka för att dessa ska kunna öppnas för förhandling. Hur kan matematiklärarytbildningen bli en sfär där alla frågor från studenterna blir en del av utbildningen, där studenters tidigare erfarenheter används som resurser för lärande och där "sanna" diskurser utmanas av både studenter och lärarytbildare?

Såväl matematikundervisningsdiskursen som matematikdiskursen erbjuder en mångfald av diskursiva stråk om de inte störs av de betydligt snävare och dominanta institutionella eller språk/kulturdiskurserna. Detta får konsekvenser för hur studenterna positionerar sig, eftersom de accepterar diskurser som de inte har möjlighet att påverka och därmed uttrycker disempowerment. Detta kan även få konsekvenser för matematiklärarutbildningen – om vi vill att studenterna ska uttrycka empowerment – och vi måste öka förståelsen för hur hegemoniska diskurser skapas och upprätthålls.

Den socio-politiskt teoretiska ansatsen har möjliggjort att sätta frågor om maktrelationer i centrum för analysen och frågor som blir möjliga att ställa med detta perspektiv är varför olika händelser sker: *varför* studenter reagerar som de gör; *varför* vi väljer ett specifikt innehåll, kurslitteratur och examinationer och inte annan; *varför* utbildningen är organiserad som den är. Till sist: *varför* ska maktrelationer utmanas; *vem* som får fördel av att det görs; och varför forskning inom matematiklärarutbildning belyser vissa frågor starkare än andra.

Appendix 1

Fredag den 12 februari 2010

Hej!

Tack för att jag har fått lära känna dig och fått lyssna till dina första reflektioner kring den utbildning som du just har påbörjat!

Under min forskarutbildning har jag valt att fördjupa mig inom lärarutbildning i matematik för grunskolans tidiga år. Det är ett arbete som intresserar mig mycket och jag skulle därför gärna vilja följa dig under din lärarutbildning för att batter förstå hur det är att lära sig undervisa matematik.

För mig handlar det om att se utbildningen och lärarblivandet utifrån studentens perspektiv och jag är därför intresserad av att dela dina intryck på flera olika sätt. Det kan innebära att jag följer med dig ut i skolan när du undervisar i matematik. Det kan handla om att delta i undervisningen och grupparbeten ni har i matematikdidaktik på utbildningen och det kan även innebära att jag ber om dina reflektioner skriftligt eller muntligt vid några tillfällen.

Eftersom jag kommer vilja använda detta material i min avhandling, så behöver jag få ditt godkännande. Allt som sägs, skrivs och diskuteras stannar mellan dig och mig och när avhandlingen presenteras ska det inte gå att identifiera personer som deltagit i studien.

Du kan alltid höra av dig till mig när du vill. Endera grenom e-post Kicki.Skog@mnd.su.se eller via mobil 0763 27 29 91.

Vänliga hälsningar Kicki Skog

Kryssa för en av nedanstående punkter

- Ja, jag vill gärna bidra med mina upplevelser under utbildningen. Jag vet att jag kan avbryta mitt deltagande när som helst om jag ändrar mig och jag vet att allt material kommer att hanteras konfidentiellt och endast ingå i den forskning som Kicki Skog bedriver.
- Nej tack. Just nu är jag inte intresserad av att delta i arbetet, men vad att jag kan höra av mig när som helst till Kicki Skog för att få delta i projektet.

Datum _____

Underskrift _____

Ange kontaktuppgifter till dig nedan så att vi kan nå varandra.

E-post _____

Mobilnummer _____

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