



Student teachers' professional growth

A case study of pedagogical practices used during the course Teacher as a Researcher

Outi Stüber and Anne Jyrkiäinen

This study examines student teachers' professional growth based on Mentkowi's and her co-authors' theory (Mentkowski et al. 2000). The aim of this case study is to explore, design and evaluate the curriculum and pedagogical practices to support professional growth through collaborative learning and knowledge building during teacher education. The case study follows the principles of Educational Design Research (EDR) and presents one cycle of the EDR. The research data consist of student teachers' project reports that were designed to bring on social learning among the student teachers and at the same time promote their professional growth. The results show that these types of pedagogical practices reinforce all Mentkowski's and her co-authors' four domains of professional growth: reasoning, performance, self-reflection and development (Mentkowski et al. 2000).

Eero Ropo & Riitta Jaatinen (EDS),
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Introduction

In Finland, the research based approach to teaching is a central principle in teacher education and it is seen as one of its strengths. Building on research, academic teacher education creates a platform for student teachers to become teachers who can reflect on, develop and renew their teaching and their schools. (Niemi & Jakku-Sihvonen 2009; Uusiautti & Määttä 2013). Therefore, in their profession teachers are expected to have the competence to analyse different circumstances and to explore and research educational issues from philosophical questions to practical solutions. In addition, teachers are presumed to develop their capacity in collaborative knowledge building and be prepared to develop their own work throughout their careers. The goal for teacher development and learning is, most of all, strengthening the teachers' abilities to promote pupils' learning. (Kaasila & Lauriala 2010; Beijaard, Korthagen & Verloop 2007.)

Southworth (2009) suggests that schools need to develop a culture characterized by collaboration, sharing of leadership, taking responsibility for individual and collective learning and professional development to become professional learning communities. This type of collaboration should promote openness, responsiveness and readiness for different views, ideas and innovations. (Southworth 2009, 103.) However, many teachers face struggles especially in the early years of their careers. Instead of learning from their experiences, they face issues of control, frustration, anger and confusion. This hinders and challenges their professional development. (Beijaard et al. 2007; Moate & Ruohotie-Lyhty 2014.)

These expectations for future teachers and challenges they face in schools place many demands on teacher education. One solution to develop teacher education is to develop its curriculum. According to Mäkinen and Annala (2011), in higher education a curriculum should be wide-ranging and integrative to balance the needs of the academic world as well as society and working world. In the context of teacher

education, this can be understood as the integration of theory and practice in a way that supports the development of students' expertise. In line with this, Kaasila and Lauriala (2010) argue that theory and practice should be at the heart of teacher education, in which various forms of co-operation provide opportunities, partnership and guidance for students from a variety of backgrounds and skills. Students should be encouraged to collaborate to enhance each other's learning. (Kaasila & Lauriala 2010; Niemi & Jakku-Sihvonen 2006; Niemi & Nevgi 2014; Moate & Ruohotie-Lyhty 2014.) Meaningful learning experiences can also be achieved in situations where student teachers' professional understanding, identity and agency are simultaneously supported (Ahonen, Pyhältö, Pietarinen & Soini 2015, 159; Moate & Ruohotie-Lyhty 2014).

Teacher education in Finland, and in this case at the University of Tampere, consists of theoretical and practical studies. This chapter focuses on subject teacher education, in which pedagogical studies are carried out within one academic year. According to the curriculum of the pedagogical studies, various courses offer opportunities to participate in learning communities that actively encourage teaching, studying and researching. The studies emphasize the research-based approach to the teaching profession and aim to support student teachers' professional development. (University of Tampere 2014.) However, the curriculum of the teacher's pedagogical studies can appear fragmented and the connections between various courses can remain shallow unless the students are guided in their professional growth. Therefore, the aim of this study is to explore ways to develop the curriculum to support the professional growth of student teachers through social learning during their studies.

The background of this study

Educational Design Research

Our interest is to explore and understand academic teacher education in order to support student teachers' professional growth better. As researchers, we understand the reality being socially constructed and therefore the research paradigm can be seen as constructive (MacKenzie & Knipe 2006; Schwandt 1994). The research stems from the perspective of societal, pedagogical and educational development, and encourages research-based dialogue among student teachers and teacher educators. The case study presented in this chapter is one part of an Educational Design Research (EDR) cycle. The premise of Educational Design Research is holistic, which means that despite the interest of studying specific objects, processes and contexts the goal is to investigate the subject as a meaningful phenomenon. (Plomp 2013; Van den Akker et al. 2006, 5).

The methodological frame of this study is Educational Design Research (EDR), which can be used to develop and confirm the planning of educational processes. EDR is based on continuous cycles of design, enactment, analysis and redesign. Educational design research supports authentic educational design processes and results in interventions, professional growth and development and even curriculum reform (Design-Based Research Collective 2003; Nieveen 2013; Plomp 2013; Van den Akker 2013). In other words, EDR aims to bridge a gap between theory and practice and is pragmatic in nature.

This case study is part of educational design research, the aim of which is curriculum development and thus, according to Van den Akker (2013), includes the phases such as

- 1) *Preliminary investigation*: This phase includes, for example, intensive and systematic familiarization with the curriculum, its challenges and the context. It can also consist of reviews of scientific literature and consulting of experts.

2) *Theoretical embedding*: In this phase, researchers aim to connect theoretical knowledge to the design of the curriculum development. This theoretical embedding can increase the transparency and reliability of the arguments.

3) *Empirical testing*: During this phase, researchers collect empirical evidence on the practicality of the intervention in the selected context. Cycles of empirical testing can be seen as small case studies (such as the case study presented in this chapter).

4) *Documentation, analysis and reflection on process and outcomes*: The final phase includes systematic documentation, analysis and reflection on the different phases of the process. (Van den Akker 2013, 64.)

According to Akkerman et al. (2013), Educational Design Research can contain different motives, which lead to different “epistemological cultures”. In formative design research, which this study represents, the design and change in practices are highlighted and thus the organic nature of the process, as well as the role of participants, become central. (Akkerman et al. 2011; Engeström & Sannino 2010.) Soini et al. (2013) write about different levels of the design research instead of motives or cultures. They argue that the process and the results of design research can be viewed through three levels, which are theoretical design, developmental design and empirical design. The way in which the premises, processes, innovations or the results appear depends on the chosen level. (Soini et al. 2013.)

Building the model of student teachers' professional growth

The first phases of this educational design study were built on examining and reflecting on the research on professional development in higher education and in teacher education (e.g. Mentkowski & et al. 2000; Ruohotie 2003; 2004; Korthagen & Vasalos 2005; Beijaard et al. 2003; Niemi & Jakku-Sihvonen 2006; Moate & Ruohotie-Lyhty

2014). The curriculum of the subject teachers' pedagogical studies was read through thoroughly and the different modules that support student teachers' professional growth were identified. In addition, the course assignments were created in association with those modules. Previous research shows that the teacher education that manages to convey coherent views on teaching and learning and in which these views are carried through different courses and practicums have greater impact on student teachers' concepts of being a teacher than the programmes where the courses are disconnected (Darling-Hammond et al. 2005, 392). Therefore, by developing and modelling the curriculum, teacher educators can reinforce the coherence of their teacher education programmes.

We started to place the themes we found in the curriculum and from the research literature (such as different pedagogical environments, the impact of student teachers' views on learning and teaching, practices and professional identity) into a picture based on the teacher education programme at the University of Lapland (Kaasila & Lauriala 2010; Lauriala et al. 2014, 102). In Figure 1, we illustrate the model of a student teacher's professional growth that we created and to which this case study is linked. It is noteworthy that the process of student teachers' professional growth can seem static when presented as a figure. Yet, in the model, we consider student teachers as active learners (Mentkowski & et al. 2000; Niemi 2002; Ruohotie 2004a). We have found the model a useful tool to understand and develop the pedagogical practices in teacher education, which can lead all the way into curriculum development.

In the center of the model, we placed themes found from previous research and curriculum analysis. On the right side of the model, we placed various essential pedagogical environments identified as important to teachers' understanding and in which the student teachers also do their teaching practice. Thus far, the model resembles the model of the University of Lapland to some extent (Lauriala et al. 2014). When looking at the studies, we discussed what scientific

methods and approaches could be utilized in each pedagogical learning assignment. The left side of the model was the last part to be completed when, during pedagogical studies, the accumulated data were grouped and collected for analysis. The learning assignments that we chose for the left side of the model illustrate how student teachers could be encouraged to seek connection between theory and practice.

In the model, the different parts interact with each other horizontally and vertically. Vertically viewed, the professional growth and development of a student's professional identity begins by reflecting the origin, orientation and ontological questions the student teachers have. Guided teaching practice provides the students with an opportunity to reflect on their experiences as teachers both with the supervising teachers and with their peers. Later on, during the studies, conceptions and beliefs are processed and analyzed. Horizontally viewed, the student teachers expand their understanding of the teaching profession and learn to see connections between different pedagogical environments. The goal of the pedagogical studies is to provide the student teachers with the knowledge and skills required for achieving a sustainable professional identity and personal praxis. It is noteworthy that teacher identity and personal theory are reconstructed during the professional life, and thus we do not argue that these are completed during the studies. Nevertheless, the aim of teacher education should be to give sufficient understanding and tools to create a professional teacher identity (van Huizen et al. 2006; Jakku-Sihvonen et al. 2014, 96).

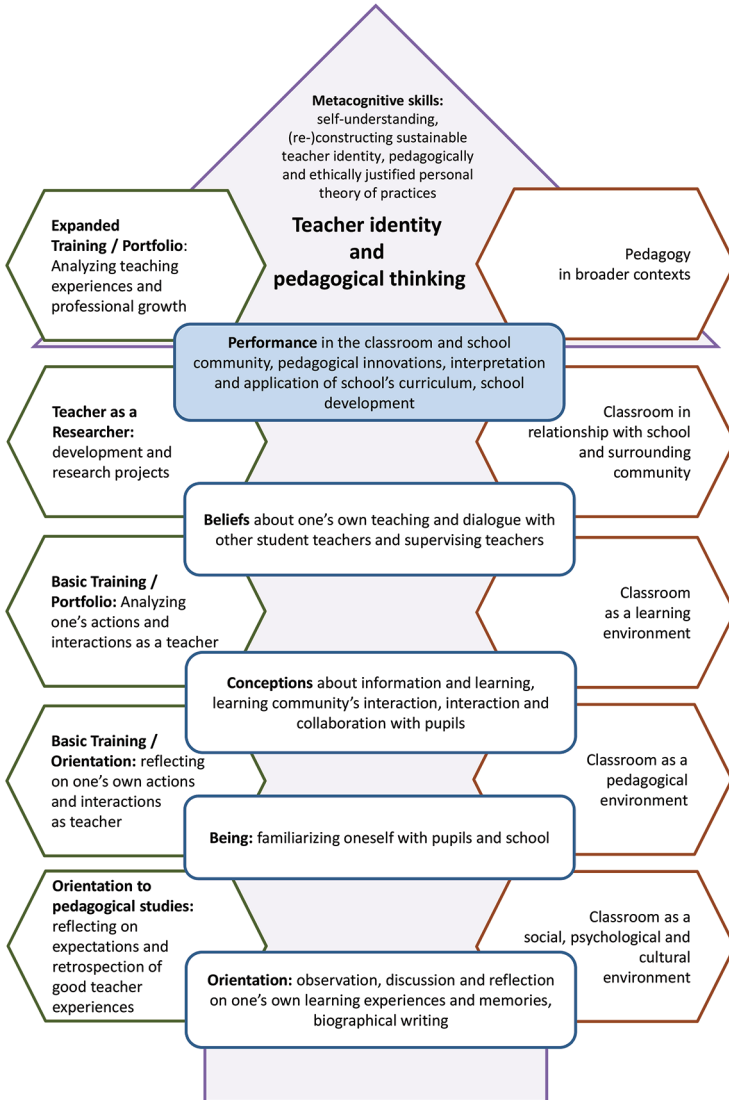


Figure 1. The model of student teacher's professional growth (Lauriala, Kyrö-Ämmälä & Ylitapio-Mäntylä 2014, 102) modified by Stüber & Jyrkiäinen

The case study presented in this chapter focuses on practices that were designed for a course called *Teacher as a Researcher* and were targeted to support the foundation of the model: *Performance in the classroom and school community, pedagogical innovations, interpretation and application of school's curriculum, school development*. Next, we will present the educational theories that guided our course planning and, hence, the case study as well.

Theoretical background

Professional growth

We build our theoretical framework of professional growth on the theoretical and educational model of Mentkowski and her co-authors (2000). According to them, an educational programme can simultaneously develop mastery of thought in the disciplines and professions, meaningful self-reflection, development of a person as a whole, and the performance in work, family and civic settings. In addition, educators who have a developmental perspective on students' thinking, reflection and growth can create a curriculum that fosters learning that lasts. (Mentkowski et al. 2000.) Accordingly, we find this framework useful as a tool to understand the process of professional growth and to plan pedagogical practices that support student teachers' learning.

Mentkowski and her co-authors (2000) present a model of professional growth that integrates learning, development and performance. According to them, there are four transformatively integrated domains of personal growth where an active learner is at the heart of the process. Those domains are 1) reasoning, 2) performance, 3) self-reflection, and 4) development. *Reasoning* focuses on the role of contemplation skills. It is linked to declarative knowledge structure, formal, abstract and systematic reasoning and basic cognition and its

underlying structures. Interaction activates thinking, understanding and reasoning during professional growth. *Performance* as a second domain is related to learners' interpersonally charged emotions and dispositions. The learner extends his or her experience by visualizing different possibilities of behavior beforehand and after action. Collaboration and analysing actions afterwards together advance performance skills. The third domain, *self-reflection*, lies on the construction of meanings in personal experiences. Learners can challenge and judge their assumptions and discuss their life experiences with other people. Doubts and questions are part of learning through self-reflection, as well. Development as a fourth domain can be characterized by deep enduring structures of the self. It focuses on how learners connect issues of personal integrity and purpose. Development requires learners to grow towards independence, collaboration and ethical responsibility.

These four domains are in a close relationship with transformative cycles of learning, in which learners move from one domain to another by using metacognitive strategies, self-assessment and by engaging in diverse approaches, views and activities. In addition, the domains mutually reinforce one another. Therefore, by supporting learning and growth in one domain an instructor can foster growth in the others as well. (Mentkowski et al. 2000; Ruohotie 2004a, b.) Although, we have used this theory of the domains as a theoretical basis especially for this research cycle, it is not contradicting with the model of student teacher's professional growth presented earlier in this chapter. The transformative cycles of learning support learning in different parts and aspects of the model and thus contribute to the professional growth of student teachers.

Learning in the social context

When learning is understood as a process of social construction, it should influence teacher education practices, because the way in

which student teachers understand learning has an influence on how they see teaching and eventually teach their pupils. (Hammerness et al. 2005; Darling-Hammond et al. 2005; Shulman 2000.) However, it seems that the social aspects of learning, such as the importance of cooperative action, collaborative problem-solving and sharing as tools for attaining deeper processes of learning, and practices supporting it are often missing in teacher education (Moate & Ruohotie-Lyhty 2014; Niemi 2002) and therefore, teacher educators should develop practices that strengthen this quality of learning.

Lee and Judith Shulman (2004) summarise the dimensions of teacher learning in the following way: “An accomplished teacher is a member of a professional community who is ready, willing, and able to teach and to learn from his or her teaching experiences” (Shulman & Shulman 2004, 259). Therefore, learning can be promoted if an encouraging community of learners supports one’s metacognitive awareness and reflection. (Shulman & Shulman 2004.) We believe this also applies to teacher education. In addition, Vygotsky who formulated his theory among school children, but whose theories are widely acknowledged in higher education as well, argues that communication between students guides learning towards students’ developmental levels. Thus, the Vygotskian perspective of teacher education (van Huizen et al. 2006, 274) emphasises, “Professional learning and development are best conceived and conditioned as an aspect of evolving participation in a social practice”.

The arguments above highlight the importance of social interaction and community in learning and there are many theories describing how learning occurs in social contexts (e.g. Lave and Wenger 1991; Vygotsky 1978; 1982; Säljö 2001; Scardamalia & Bereiter 2006). For example, Wenger (2006) describes collective learning with three attributes. First, the group has a shared domain of interest. Second, the members of the community build relationships that enable them to learn from each other. Third, a community of practice develops shared repertoires of resources. In addition, according to Scardamalia

and Bereiter (2006), when students are members of a knowledge building community, discourse can be seen as collaborative problem solving (Scardamalia & Bereiter 2006). Hence, collaborative learning requires situations where interaction and knowledge building are possible. Niemi (2002) concludes that active learning requires participation in discussions, dialogues and responsible cooperation with others. In our case, the pedagogical methods that we used during the course, Teacher as a Researcher, supported practices of active, collective learning and collaborative knowledge building, but also drew from the other theories of social learning. Furthermore, we believe that these pedagogical methods and practices that spring from the theories of social learning can promote student teachers' professional growth.

Case: Promoting student teachers' professional growth

In the curriculum of the subject teacher's pedagogical studies, there is a course called Teacher as a Researcher (University of Tampere 2014). We decided to use and test the model of student teachers' professional growth in the first phases of the design study as a tool and core for the course. In this case study, we have adopted an interpretative approach and focus on analysing student teachers' project reports from the perspective of different domains of professional growth. Even though the developmental process of professional growth does not happen during one course only, we believe that these domains of growth can be reinforced with pedagogical methods. Therefore, we framed our research question in the following way: *In what ways are the domains of professional growth (reasoning, performance, self-reflection, and development) presented in the project reports produced by the students.*

The participants and the research data

The participants were a group of 16 student teachers with different teaching subjects, both females and males, participating in pedagogical studies during one academic year. All student teachers had been working as professionals in different fields prior to teacher education. The students were between ages 27 and 51 (mean 38 years, mode 36 years). As research data, we used project reports written by the student teachers. Beforehand, we described the background and aims of this study to the participants and emphasised that participation to the study was voluntary. We received permission to the data used in this case study, although the student teachers knew that the reports would be published and, therefore, the data would be available to anyone. We have aimed to execute the EDR process ethically and without causing any harm to the participants.

Course outline and data collection

We started the course by asking the student teachers to place their meaningful and significant experiences during teaching practice in the different pedagogical environments presented in the model. We also asked them to write down questions and problematic experiences. This phase was done individually, but the topics were discussed in small groups. After that, we asked the students to choose one or two topics that were meaningful to them and form groups based on common experiences and interests. In those groups, the students were asked to create a research question they would like to investigate more. The goal of this process was to spur the processes of learning and reflecting on the professional growth so that the students would be more aware of their development.

After the planning sessions, the groups started their small projects. The four projects made during the course Teacher as a Researcher were:

1. Collaboration among different subject teachers: What types of narratives are found in subject teachers' stories about collaboration?
2. The future of teaching mathematics in upper secondary schools: How teaching mathematics should be developed and what the future of mathematics education should be? How teaching should respond to the evolving technological possibilities?
3. Group dynamics among pupils: How pupils experience and understand group dynamics?
4. Drama as a pedagogical method: How drama can function as a teaching method and enhance language studies in a multicultural group?

The groups executed the projects using different methodological approaches and methods, such as interviews, surveys and action research. The students wrote reports of their projects and designed posters. The reports were published in a book called *Circles of Collaboration* (Jyrkiäinen, Kovalainen & Stüber 2014). The projects and the posters were presented in a seminar at the end of the semester. One of the students made a summarising analysis of the projects looking for common themes and theories. He placed the project in the context of social constructivism and found various connections between the projects. Those connections were research-based learning and knowledge building, group phenomena, democratic education and integrative learning. (Kovalainen 2014.) However, we focused our analysis only on the reports of the four projects and on identifying the different domains of professional growth.

Analysis and results

The students' reports show how student teachers were building their collaborative work from the first ideas and questions to different types of projects. In addition, the processes described in the reports indicate research groups' thoughts of their professional growth. The reports do not present any problems in the groups' collaborative working process, but as educators, we witnessed and supported negotiations in challenging phases during the process. This type of overcoming of challenges can be seen as an important element in professional development and in collaborative learning processes (Lave & Wenger 1991; Säljö 2001). When we examined the reports in the light of Mentkowski's and her co-authors' four domains of professional growth, we found different domains in each report, but each of them emphasises the domains differently. We did this theory-guided content analysis (Miles & Huberman 1994) of the reports together discussing and negotiating what constituted each domain of growth.

In Table 1, we describe Mentkowski and her co-authors' (2000) four domains in student teachers' projects and give examples of them. By using citations from every project, we want to show the richness of the students' pedagogical experiences. The domains of growth were found mainly in sections where the students described the premises and motives of their projects and contemplated the results and the meanings of the results. When the four projects are being viewed together, one common feature in them is social learning. On the one hand, social learning has been an object of the projects and on the other hand, the process itself has produced opportunities for social learning. This supports the starting position and theoretical background of our study – collaborative knowledge building (Scardamalia & Bereiter 2006) taking place during the course.

Although all domains of professional growth were presented in the reports, it was characteristic to the reports that two domains were

emphasised more than the other two. The emphasis was either on reasoning and development or on performance and self-reflection. In the domains of reasoning and development, growth happens in the inner structures, whereas in the domain of performance and self-reflection, growth is linked to the context. This difference in emphasis can be a result of the project theme or the ways the projects were executed. It is also important to consider that the reports were written as course assignments and the instructions were not to describe the students' professional growth. Despite these limitations and different emphasis on the domains, the data indicate that professional growth took place and as Mentkowski and her co-authors (2000, 190) argue, growth in one domain promotes growth in other domains as well.

Student teachers' professional growth

Table 1. Student teachers' projects in relation to Mentkowski's and her co-authors' (2000) four domains

<i>Domain</i>	<i>Project</i>	<i>Form</i>	<i>Citation as characterization</i>
Reasoning abstract, sound, insightful	The future of teaching mathematics	Interest in understanding content and pedagogy of teaching mathematics	"In order to develop the teaching of mathematics into more practical mathematics, the mathematics teacher education should also be more practically oriented."
Performance effective	Drama as a pedagogical method	Interaction between student teachers and multicultural group	"It was noteworthy that we, as teachers, also participated as equals in the exercises instead of just instructing."
	Group dynamics among pupils	The influence of teacher's actions on group dynamics	"Teacher is the primus motor of group spirit and he/she is an example of how to respect others."
Self-reflection perceptive, insightful, adaptive	Group dynamics among pupils	Reflecting group dynamics as a phenomenon and through that develop pedagogical skills	"Our research shows that teachers' attitude and actions have an impact on the pupils' feeling of safety, which then has effects on group dynamics. --- Thus, by understanding group dynamics, how it forms and its components, teachers can have an impact on their pupils' learning processes."
	Drama as a pedagogical method	Reflecting on the feedback	"We could imagine that any one of us could continue with the same group of students after successful drama session."
	Collaboration among different subject teachers	Reflecting on collaborative teaching	"We felt that this topic (collaboration) was meaningful, because none of us wanted to teach only one subject but teach collaboratively."
Development integrative, ethical	Collaboration among different subject teachers	Understanding pedagogical themes that were profoundly significant to the group	"Becoming a good teacher is a similar process as becoming an expert in any other field. --- That is why teachers should co-operate with other teachers in order to develop as experts."
	Drama as a pedagogical method	Understanding the learning process	"The drama process gave us a new view of the everyday life of immigrants. The learning process became a collaborative experience."

Conclusion and discussion

In this study, we have presented a cycle of Educational Design Research where the focus has been on supporting student teachers' professional growth. Based on various studies on the development of student teachers, we constructed a model of the student teacher's professional growth (Jyrkiäinen et al. 2014). We used and tested one part of the model during the course, Teacher as a Researcher. The theoretical background of this empirical testing phase leans on professional growth (Mentkowski & al. 2000) and social learning (e.g. Lave & Wenger 1991; Vygotsky 1978; Scardamalia & Bereiter 2006). During the course, the student groups executed projects that were based on their common interests. The written project reports served as data for this study cycle. As a result, the projects indicate that these types of academic pedagogical practices support student teachers' professional understanding in different domains: reasoning, performance, self-reflection and development. In addition, these types of pedagogical practices provide a good example of social learning and collaborative knowledge building.

The general aim of our design research has been to develop the curriculum of the pedagogical studies at the University of Tampere by modelling student teachers' professional growth. In our research and in this research cycle, in particular, the emphasis has been on developing pedagogical practices. When the research cycle is viewed through the different levels defined by Soini et al. (2013), the results of the study indicate that on theoretical level, it is possible to support student teachers' professional growth by creating possibilities to act as a responsible member of a community. Therefore, we argue that the theory of Mentkowski and her co-authors (2000) can be viewed and examined together with theories of social learning. On the developmental level, the model of a student teachers' professional growth allows teacher educators to create various pedagogical experiments and innovations. However, to strengthen the theoretical

background of the model, it needs further cycles of empirical testing. The results on each level imply that the model and the theory of professional growth by Mentkowski & et al. (2000) could bring a useful perspective to developing the curriculum in teacher education.

According to van Huizen et al. (2005), a student teacher's professional identity develops in guided participation when the participation consists of a commitment to an image of teaching that is personally and publicly meaningful and that underlies and directs the acquisition of professional knowledge and skills. This type of Vygotskian perspective requires that teacher education can ensure fruitful interaction between practice and theory, action and reflection, and where individuals can develop personal meanings through social practices. In our implementation of the course *Teacher as a Researcher*, we encouraged student teachers to find their own views, reflect on their experiences and thoughts and to implement them into their collaborative projects. Consequently, we managed to find bridges between theory and practice and successful collaboration between student teachers. During teacher education, educators can strive to create an atmosphere of togetherness where students can study and do research together in a productive and professionally stimulating atmosphere.

Finally, the substance of teacher education and its basic tone leans on community, theoretical and practical connection to support student teachers' professional growth. This study shows that using and developing social and collaborative pedagogical practices allows a broad spectrum of different possibilities to support student teachers' professional growth.

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