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Research Paper

Teaching is More than Applying Knowledge: Developmental tasks of pre-primary and primary teachers and effects on teacher education

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Abstract: *Teaching is a challenging job, due to the changing requirements of changing times. Routine as a teacher is not possible. Student teachers need to be prepared to deal with challenging situations. The perception of requirements as challenges and problem-solving capacities are needed to master the job as a teacher. This article explains why problem-solving capacities are essential for teacher professionalization, what requirements challenge beginning teachers most, and how teacher education can foster student teachers to be prepared to deal with challenges of the first stage of their career. Based on the model of professionalization in which individual resources play a crucial role in the perception of challenge and the coping with it, results from a study on the challenges of beginning teachers were shown. The main finding that beginning teachers are most challenged by teaching that refers to individual students' needs leads to consequences for teacher education. Student teachers need to build up adaptive knowledge for school and reflection competences. Explanations on a course at Zurich University of Teacher Education show how student teachers are educated in a problem-based setting to build up knowledge and competence that are useful in order to teach considering individual students' needs. The article closes with a model of reflection on challenging situations that takes into account different factors of individual resources that are relevant for professionalization.*

Keywords: *teacher education, developmental tasks, requirement appraisal, individual resources, reflection, problem-based learning*

Introduction

The job of a teacher is a challenging one, due to the changing requirements of society and changing expectations on teachers (Darling-Hammond & Bransford, 2005). In addition, the uncertainty of teachers' effects on students' learning and behaviour is a characteristic of the teaching profession (Prange, 2000; Combe, Paseka, & Keller-Schneider, 2018). Teachers are challenged to be aware of the responsibility they have and the importance of taking these requirements as a challenge to foster children's development. The job of a teacher cannot

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be performed as a routine because of the uniqueness of every child and its development and learning. Especially in preprimary and primary education, teachers are challenged to meet individual students' needs (Heinzel & Koch, 2017) and respect their diversity and their right to learn in safe and favourable surroundings (Goetz, Frenzel, & Pekrun, 2008; Jennings & Greenberg, 2009). To treat the job of teaching as a routine is not appropriate to the requirements and the ethics of the profession (LCH, 2008).

Teacher education has to prepare student teachers as future teachers in a changing world. Our teaching today is based on knowledge from yesterday and should last for teaching and learning for tomorrow – but in a changing world, tomorrow's normality is not known. This is a fact that we are experiencing right now in the time of the Coronavirus pandemic, with closed schools and universities. Nobody expected that long-distance learning and the use of electronic tools for communication could be necessary and could work in the way it is doing right now; teachers are being challenged to find new ways of teaching and they are succeeding on a high level. This example shows the necessity of innovative teachers, equipped with professional knowledge and skills to be able to face challenges, dealing with the required processes and accepting that professionalization is going on throughout their whole life as a teacher. Reflecting on skills in action and on action is crucial, as Schön (1983) already pointed out in the 1980s. To build up professional knowledge and reflection skills in relation to individual and social resources are the main tasks for student teachers to meet the requirements of the teaching job in a changing world.

Starting a career as a teacher imposes requirements on beginning teachers, they are not able to experience during teacher education, despite the experiences gained during pre-service teaching practice experience (Keller-Schneider, 2010, 2016a). Due to structural characteristics of teacher education and core characteristics of the teaching profession reality cannot be simulated during teacher education. Student teachers are challenged by combining theory and practice to fill the gap (Gruber & Renkl, 2000) and transform elements from theory to practice and from practice to theory. As student teachers they experience school through the filter of restricted responsibility and limited challenge – appropriate to their preconditions in that specific stage (Keller-Schneider, 2016a), but not congruent with the full complexity of the requirements they have to deal with as fully responsible teachers. Beginning teachers acquire knowledge and competence during their education. But entering school as a fully responsible teacher, they have to meet requirements in a more complex dynamic than before.

"I couldn't imagine that there would be so much new and unknown for me." (Nathalie Türler)

"I learned a lot and I worked very hard during my teacher education, but I didn't work so much as I have in the last three months [as a teacher]! I didn't know that

this would be possible and that I would like to work so hard." (Nora Maag, in Keller-Schneider, 2018, p. 9).

Beginning teachers are challenged by stage-specific developmental tasks (Keller-Schneider, 2010; Keller-Schneider & Hericks, 2014). Especially in pre-primary and primary schools with young children and their needs to be cared for and understood, teachers are challenged to focus their teaching on considering children's preconditions and needs, find their role as a empathic and attentive teacher, build up a positive classroom climate, and be a cooperative and contributory part of the staff as a community of professional learners. *Student teachers* have to know about the irritations arising during their first years of teaching as fully responsible teachers (Keller-Schneider, 2014, 2017). They have to accept that teaching is a challenging job, with demands on a multi-perspective perception of the situation they are in. They have to accept the lack of recipes and routine, because of the uniqueness of every child in every situation. Teacher education is required to offer challenging learning situations and foster student teachers' ability to search for solutions, to be prepared for the challenging job of a teacher.

This article shows why problem-solving capacities of teachers are essential, what requirements challenge beginning teachers most, and how teacher education can promote student teachers to be prepared to start their career as a teacher. After explanations about teaching and learning and the components of professional knowledge (Section 2), the theoretical approach to the process of the perception of requirements and the impact of challenge appraisal is explained (Section 3). This model serves as a theoretical approach to the developmental tasks of the teaching profession and the appraisals of beginning teachers, which are explained in Section 4. To show how teacher education can contribute to the professional development of student teachers to equip them not only with competences as a teacher, but also with competences to deal with challenging situations and to build up basic competences for combining theory and practice, a course of Zurich University of Teacher Education is explained (Section 5). How to foster and to use skills of reflection to analyse situations and to find solutions to deal with them will be explained in the final section (Section 6).

Teaching and learning

On the basis of the fact that there are no recipes for handling situations, teaching is more than a matter of applying professional knowledge, and it is much more than just a matter of transmitting content knowledge to the students. To build up professional knowledge is indispensable for a teacher, but the appropriate use of this knowledge and the perception requirements are essential as well.

According to Shulman (1987), the professional knowledge of teachers can be categorized. *Pedagogical-psychological knowledge* helps to understand the child, its needs and its development. This type of knowledge is important to plan and con-

duct learning opportunities that match the child's potential and motivational states and the dynamics of the class (Sonmark et al., 2017; Voss et al., 2015). *Content knowledge* as a deep understanding of a phenomenon is essential as a basis to teach a subject as an expert. *Pedagogical content knowledge* focuses on the specific learning processes needed to foster students in their learning and dealing with subject-specific tasks. It enables teachers to prepare challenging tasks and learning settings, as well as to support and coach the students in dealing with these learning opportunities (Krauss, Baumert, & Blum, 2008).

These different categories of professional knowledge are represented in the *three different forms* of knowledge (Shulman, 1986, 10), all of them are essential to build up professionalism. The acquisition of *propositional knowledge* in different domains as scientifically based knowledge is a core task of teacher education. Student teachers acquire propositional knowledge in the different domains of pedagogical knowledge, subject knowledge, and pedagogical content knowledge. Propositional knowledge is an indispensable basis, but it is not enough to handle challenging situations at school; it cannot be transmitted to teachers' daily work; a bridge is needed (Gruber & Renkl, 2000). Specific or situated knowledge, called *case knowledge* as well, is connected with specific situations; propositional knowledge is embedded, but not visible. In casuistic approaches, working on cases in seminars and lectures at university and during activities at school, case knowledge grows. The case knowledge of teacher education enriches individually shaped case knowledge, which grows throughout the whole biography of a student (Helsper, 2018). To act in specific situations *strategic knowledge* is needed. It grows by dealing with the requirements of teaching and by reflecting on experiences

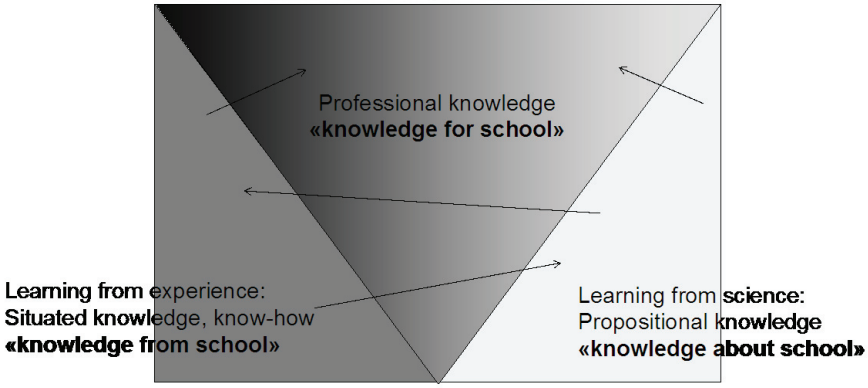

Figure 1 Cross-linked learning (Keller-Schneider, 2020a, p. 73)

and findings. Strategic knowledge relies on propositional knowledge as well as on case knowledge. Figure 1 shows the connection of these three forms of knowledge and the dynamic development of the growing strategic knowledge as *knowledge for school*, emerging from combining the proposition *knowledge about school* with the specific, situated case *knowledge from school*.

Teacher education aims to foster student teachers' competencies by teaching them propositional knowledge about school, letting them experience situated knowledge as case knowledge from school, and promote them to combine these two forms by reflection to build up their professional knowledge for school. To illustrate acquired knowledge with specific situations as a *deductive* learning approach and to analyse experienced situations, applying acquired knowledge in an *inductive* way helps student teachers to combine theory-based knowledge with specific knowledge from field experiences to build up strategic knowledge for challenging situations in school. Through combining these three approaches, their professionalism will grow.

Thus, professionalization is more than knowledge acquisition; challenging tasks are needed (Anderson & Krathwohl, 2001). Professionalism results from dealing with challenging situations, using knowledge in different domains and forms and of different (biographical) origins, appraising situations related to individual resources, dealing with requirements and integrating emerging findings as experience- and reflection-based knowledge (Keller-Schneider, 2020a). Professionalization is not just a growth of knowledge and insights; it is rather a process of restructuring and transforming the knowledge an individual disposes as a resource for professional action. Professional development as a lifelong and transformative process starts during the first contacts with the profession as a novice and grows until one reaches the stage of being an expert (Gruber & Degner, 2016). Dreyfus and Dreyfus (1986) developed a five-stage model to describe the transformation of knowledge on the way to become an expert. Berliner (2001) specified it for the teaching profession.

Novices differ from *experts* not only in the amount of knowledge and experience they have, but they rather differ in terms of the connections and synergies within the latent structure of their thinking (Keller-Schneider, 2010, 2015). Dealing with requirements at school, novice teachers try to follow the rules they learned during their education, but after their first experiences at school in the role of a teacher they leave the rules behind and develop guidelines to deal with challenging situations. In becoming more professional they think in plans with wider references and read situations based on built-up synergies. As an expert teacher they perceive situations in a holistic way, using their knowledge, their experience, and their professional intuition. Teachers in different stages of their professional development deal with similar situations, but they perceive them differently on the basis of their stage-specific experience and their individual resources framing their appraisals of professional requirements (Fig. 2).

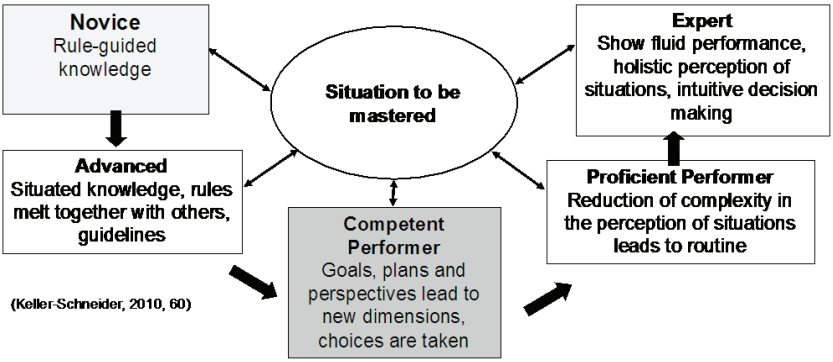

Figure 2 Stages of professional development (Keller-Schneider, 2020a, p. 74)

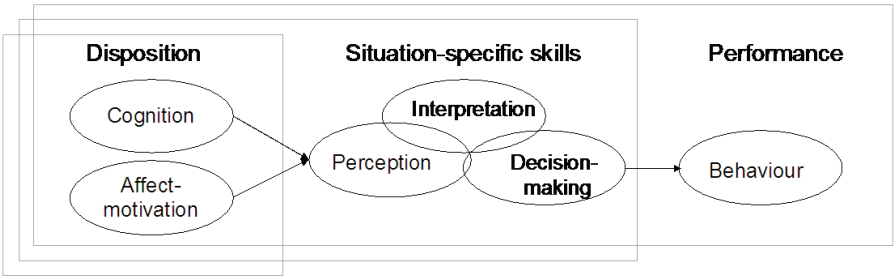

Figure 3 Competence as a continuum (Blömeke et al., 2015, p. 7, after Keller-Schneider 2020a, p. 85)

Competence in these different stages cannot be described by explicit knowledge; knowledge is just a part of it. Competence as a potential covers the whole process from competence as a hidden disposition for acting, visible as competence profiles (Oser & Renold, 2005), and according to standards. On the basis of the definition of competence as a continuum (Blömeke, Gustafsson, & Shavelson, 2015), competence encompasses cognitive and affective *dispositions*, situation-specific *skills* to perceive and interpret situations for decision making and *performed behaviour* as a professional (Fig. 3).

Competence is not just a *cognitive basis*, it is a *dynamic process*, based on cognitive and affective potentials, related to specific situations and how these are perceived and coped with. It results from combining propositional knowledge with case knowledge and leads to strategic knowledge for acting (Fig. 1). But *individual resources* shape competence, defined

as a continuum according to Blömeke, Gustafsson, and Shavelson (2015); competence as a cognitive and affective disposition, mobilized by situation-specific skills such as perception, interpretation, and decision making, is performed in behaviour. Competence grows through emerging experiences and insights gained from performing. According to the model of different *stages of professionalization* (Fig. 2), competence changes during one's professional life. It is not a reachable status at the end of teacher education and not a status kept throughout one's whole life as a teacher. Competence is a dynamic process and the main resource for perceiving and mastering requirements (Fig. 3). The appraisal of requirements is shaped by the resources of an individual (Fig. 4).

Process of requirement appraisal and the role of competence and challenge

Following the understanding of competence as a continuum from disposition to perception and interpretation and further on to performance, professionalization can focus on several points of this continuum. Cognitive dispositions can be enlarged by knowledge acquisition and reflection affects motivation, but the situation-specific skills are dependent on situated and individual factors that shape the process of the perception and interpretation of a situation. On the basis of Lazarus' theory of stress and coping (Lazarus & Folkman, 1984), requirements are appraised according to the individual's *relevance* and its *resources* to deal with it. On the basis of Hobfoll's theory of the conservation of resources (Hobfoll, 1989), dealing with requirements leads to a *gain* or a *loss* of resources. For further professionalization, a gain of resources is essential. If an individual loses more resources (strength, knowledge, well-being…) than he or she gains, professional development is not possible. The interpretation of requirements and its regulation according to individual resources is essential.

The perception-oriented stress- and resource-theory-based model of *professional development* of Keller-Schneider (2020a) focus on unconscious decision making during dealing with a requirement or denying or avoiding it (Fig. 4). Primary appraisals interpret the requirement according to its *relevance* for the individual, while secondary appraisals focus on its *manageability,* using the individual's competence as cognitive and affective dispositions. Individual resources shape primary and secondary appraisals and comprise the following elements. *Beliefs* and *values* frame the requirements' relevance, *knowledge* and *self-efficacy beliefs* are important preconditions for dealing with them, *motives* and *goals* as dynamic factors drive the acting, and the *self-regulation-capacity* controls the commitment and the use of energy. *Personality traits* stabilize the process of perception and interpretation; *emotions* shape the perception in an affective way. *Context* and others' expectations frame this process and allow a requirement to arise as a challenge. To

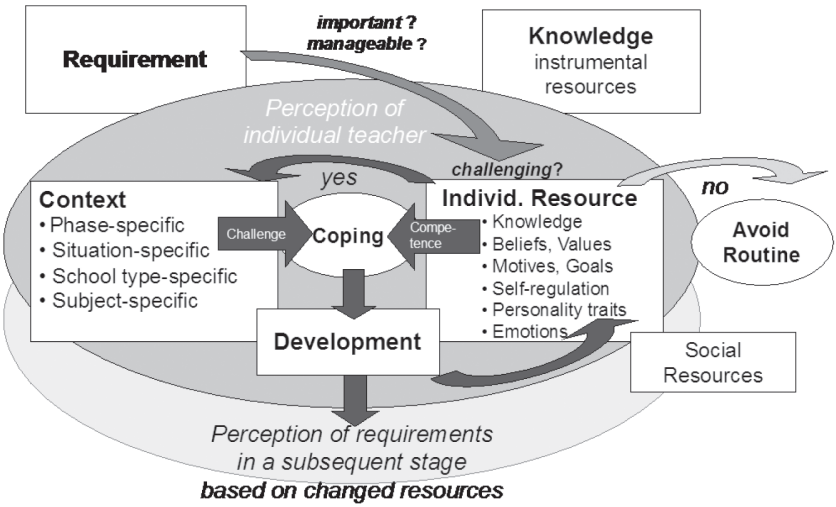

Figure 4 Appraisal-based model of professionalization (Keller-Schneider, 2020a, p. 151)

deal with requirements according to the expectations of society or specific actors, accepting requirements as challenges and dealing with them is essential in order to gain experience and new insights (Keller-Schneider, 2020b).

To apply knowledge and to deal with requirements with *routine* or to *avoid* requirements as challenges stabilizes resources and one's self-concept as a teacher, but it does not lead to insights and does not promote further professionalization. For teacher education it is crucial to impose challenging requirements to involve student teachers in their learning; requiring problem-solving skills enables student teachers to enter the profession prepared to meet the challenging requirements of the teaching profession.

Developmental tasks of beginning teachers

Teachers build up their competences during teacher education (Fig. 3). But as the model of the changing latent structure of knowledge and competences through different stages of professional development shows (Fig. 2), requirements are perceived individually different, as shown in the appraisal-based model of professionalization (Fig. 4), but there are stage-specific characteristics as well.

Following the *model of developmental tasks*, founded on the developmental psychology of Havighurst (1948), *stage-specific* developmental tasks are imposed by the *society* and perceived as challenges by the *individual*, according to the devel-

opmental stage of the individual. To deal with these developmental tasks is essential for further development, to acquire competence and gain skills. Developmental tasks are like milestones in the biography of an individual. Solved developmental tasks lead to insights and open new perspectives. Progress, based on new insights from solved developmental tasks, is irreversible (Keller-Schneider, 2020b).

Transferred to the professional development of teachers by Hericks (2006) and Keller-Schneider (2010), *the developmental tasks of the teaching profession* are the main tasks of teachers. They shape a teaching career within four fields, going through the whole career as a teacher in developmental lines (Hericks, Keller-Schneider, & Bonnet, 2019). Developmental tasks cover requirements on the *person* of the teacher and his or her role and professional identity. They focus on the *knowledge and skills* teachers have in order to teach and enable them to deal with students, and on the *students* as learning and developing individuals. As a fourth field of requirements, teachers have to become a part of the *institution,* to connect as a staff member and as a promoter of the school as a public institution to guarantee education for all children (Hericks, 2006; Keller-Schneider, 2010; Keller-Schneider & Hericks, 2014).

To start a career as a teacher, beginning teachers experience professional requirements in a new complexity. Due to the full responsibility, they have to master them all at once. Beginning teachers are

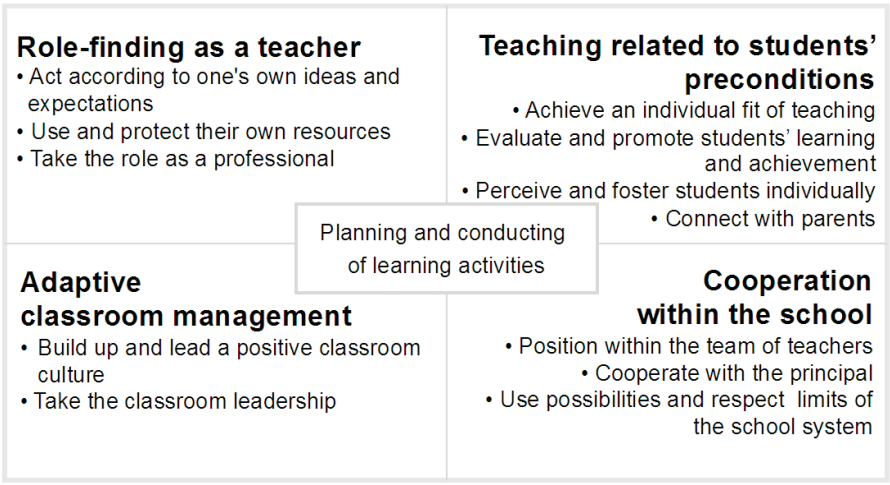

Figure 5 Professional requirements of beginning teachers with four main developmental tasks and twelve subtasks

challenged as fully responsible teachers. They solve professional developmental tasks as beginning teachers on the basis of the developmental tasks they solved as student teachers (Keller-Schneider, 2020b).

In the study of Keller-Schneider (2010), the developmental tasks of beginning teachers in their first years of teaching were identified on the basis of a list of requirements developed from the analysis of notes on counselling sessions during their first two years of teaching. These requirements were evaluated by a group of Swiss beginning teachers (n=155). Using exploratory factor analysis a model of requirements on two levels was identified, reflecting the latent and unconscious structure of the understanding of synergies and the relations between these requirements (Keller-Schneider, 2010). In a second bi-national study involving Swiss and German primary school and high school teachers the model was replicated by confirmatory factor analysis (Keller-Schneider et al., 2019). The requirements are grouped into four main areas to be dealt with as developmental tasks during the first years as a teacher after graduation (Fig. 5).

The developmental task of *role finding* includes requirements that relate to acting according to one's own expectations, using and protecting one's own resources at the same time and take actively the role as a fully responsible teacher. Beginning teachers have to find an identity as a professional, based on their acquired knowledge, competence, and reflected experiences and reframed by their role as a teacher, with a reflective distance to their own experiences as a student.

Teaching referring to individual students' needs includes the requirement of achieving an individual fit of teaching; non-fitting teaching ends up in disciplinary difficulties and a loss of learning time. Evaluating and promoting individual students' learning process and achievement is needed in order to find individual-specific approaches to promote their learning. Teachers are required to focus on the students learning individually and to perceive and foster them in a positive relationship. In addition, teachers have to establish a professional relationship with their students' parents, focusing on their child's learning, achievement, and development as well as explaining the expectations of the school to them.

Adaptive classroom management requires the building up of a positive, safe, and fostering classroom climate. Teachers have to establish rules and rituals to regulate students' behaviour, appreciate their desires, needs, and preconditions, and give them the experience of respect and safety as well as letting them participate in decision making within the community of the class and the school. In addition, beginning teachers are required to take over the classroom leadership by acting, reacting, and interacting in relation to the students' needs, development, and learning, respecting their ability and their need to develop.

The task of *co-acting cooperation with and within the school system* includes the task of taking a position within the staff of a school as a fully responsible and co-

acting teacher, finding an identity as a staff member, and taking responsibility for the school. Beginning teachers have to cooperate with the principal, respecting his or her expectations as well as to bring in their own ideas and goals. To be a staff member, beginning teachers have to know about and use the possibilities within the school and the school system as well as to respect its limits and goals.

The results from a survey with Swiss beginning teachers from primary schools on their requirement appraisals of *relevance*, experienced *competence* in dealing with them, and *challenge* in dealing with them are shown in Figure 6.

The results show that beginning teachers experience these professional requirements as *relevant*. Building up and leading a positive classroom culture and take the classroom leadership actively are evaluated as the most relevant ones, followed by the requirements to use and protect one's own resources and to cooperate with the principal. To protect one's own functionality as a teacher is the most relevant requirement.

Beginning teachers feel *competent* to master these requirements. To cooperate with the principal shows the highest grade for competence, followed by the two aspects of classroom management and the

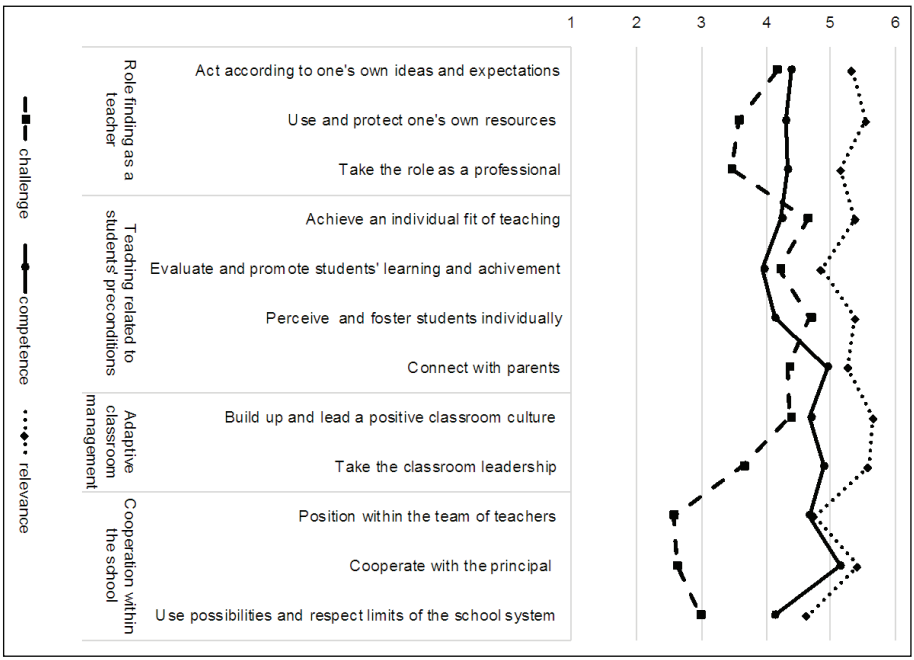

Figure 6 Perception of requirement of Swiss beginning teachers from primary schools (n=244)

requirement to connect with parents by establishing and maintaining contacts with them. The requirements of teaching related to individual students' needs receive the lowest grade for competence.

Beginning teachers are *challenged* to an appropriate extent. To achieve a differentiated fit of teaching *referring to individual students' needs* challenges them most. They perceive the challenge of cooperating as a staff member as low.

Analysing the relations of these three perspectives on the professional requirements, using the theory of resource conservation of Hobfoll (1989), the requirements of *role finding*, of *classroom management,* and of *cooperation as a staff member within the school* show resource-gaining dynamics. The requirements are of high relevance, managed with competence, with a lower experience of challenge than competence. There is a *gain of resources* that results from dealing with these requirements. But dealing with requirements to *teach referring to individual students' needs* is more challenging than the experience of competence to do so. In this field, where there is a risk of an energy loss, pre-primary and primary teachers are especially challenged. Compared with Swiss high school teachers (n=127) from the same study (Keller-Schneider et al., 2019), primary school teachers are more challenged by this professional requirement than Swiss high school teachers. *Teaching referring to individual students' needs* seems to be of high relevance and a major challenge for primary and pre-primary teachers.

The results of a previous study on primary school teachers in three different stages (n=719, Keller-Schneider, 2017) show that experienced teachers are most challenged as well by the requirements of teaching *referring to individual students' needs*. To meet these requirements appears to be an important and challenging requirement throughout the whole career as a teacher.

A further interesting finding focuses on the differences in competence between student, beginning, and experienced teachers. While student teachers finish their education with an experience of high competence in dealing with these requirements, beginning teachers feel less competent than student teachers and experienced teachers do (the differences are significant). Their self-concept seems to be irritated by the high level of complexity of the requirements of school reality. A longitudinal study over the first year of teaching shows, that the evaluation of one's own competence at the point of starting one's career is higher than its evaluation looking back to this period one year later (Keller-Schneider, 2014).

All in all, beginning teachers feel competent in dealing with professional requirements, but they feel less competent than student teachers at the end of their education do. Looking back one year later to the initial period of being a teacher, beginning teachers evaluate their competence more critically than they did at that time.

For *teacher education* these findings are of relevance. It is important to prepare student teachers and give them a solid ba-

sis of knowledge, experience, and a positive self-concept. The experienced ability to deal with requirements as a teacher is a solid base and a precondition of high necessity. But student teachers must also know that they will be confronted with challenging situations they have to master on their own, using their built-up competence, but not expecting to master challenging situations by rules and recipes ore by routine. Student teachers must be equipped with *problem-solving* and *reflection competences* to combine what they learned at university with what they experience at school to find solutions that fit their students' needs, focusing on their learning and development. To prepare student teachers for these characteristic challenges of the job, teacher education is obliged to create problem-based learning opportunities student teachers are challenged by. Propositional knowledge serves just as a basis, but reproducing it is not enough to meet the requirements of challenging situations.

Challenging tasks to foster the professionalization of student teachers

If professionalization is driven by student teachers' dealing with challenging tasks, teacher education is challenged to develop such tasks in order to foster student teachers' commitment to their learning. *A high quality of teaching at university* is a precondition for the learning output, but *student teachers' motivation* to deal with challenging requirements and their volition to reach learning goals of high complexity are even more important, as

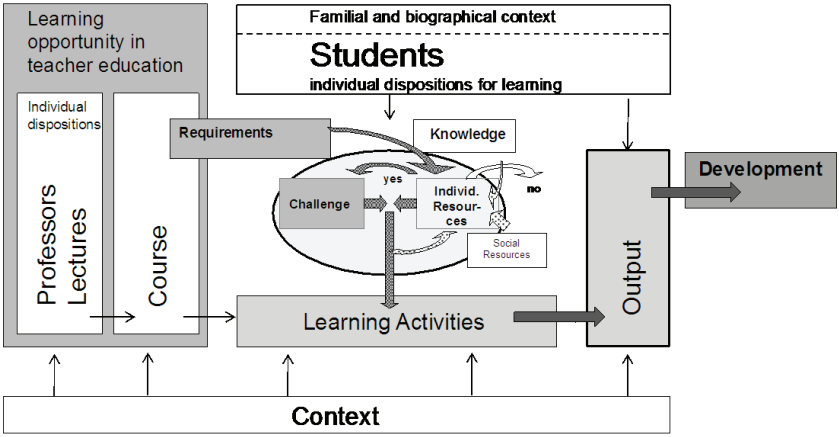

Figure 7 Learning opportunity to activate student teachers' commitment to their learning (offer-and-use-model with requirement appraisal process)

a study on the self-regulated learning of student teachers in a problem-based setting shows (Keller-Schneider, 2016b).

Figure 7 shows an *offer-and-use-model*, as proposed, for example by Helmke (2009) and Seidel (2014), enriched with a *requirement appraisal process* based on individual resources. With this addition of the impact of individual factors on dealing with requirements and affecting the learning output and the learner's development, the model emphasizes the commitment of the learners and the fit of the requirements to their resources.

Challenging requirements from a specific course designed by teacher educators activate student teachers' appraisal of relevance and manageability. If the requirements are perceived as relevant and fitting the interests and the beliefs of the student teachers as well (Blömeke et al., 2008), and if they are evaluated as manageable, using individuals' resources, and activating social and instrumental resources as well, challenging learning activities lead to insights as an output. These insights enrich student teachers' competence as professionals.

Teacher educators are challenged to develop problem-solving tasks to promote insights. Just teaching knowledge and asking the student teacher to remember it is insufficient. According to the taxonomy of learning goals in learning activities (Anderson & Krathwohl, 2001), remembering knowledge is the basis for further steps but not the goal. *Knowledge*, remembered when asked for (e.g. in exams), must be enriched with *experienced situations* to gain a deep understanding of the phenomena concerned. On the next level of complexity, this knowledge helps to analyse

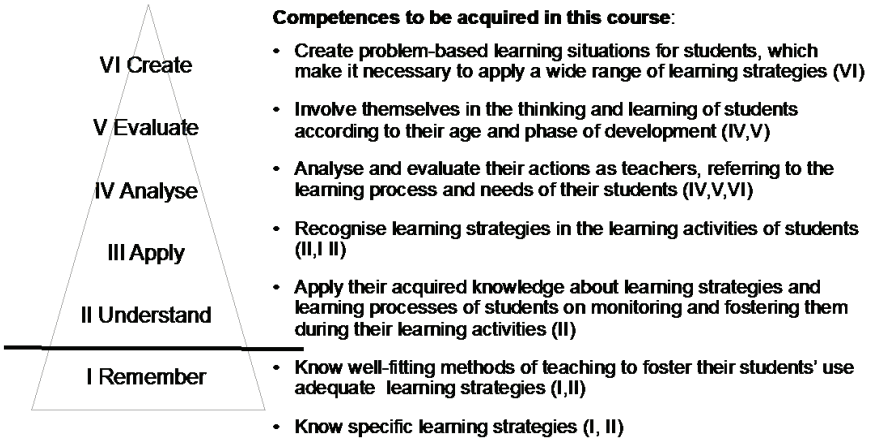

Figure 8 Competences to be acquired in the course

situations from different perspectives and to combine different aspects in order to understand the whole complexity. Based on such an understanding, the evaluation of effects and interactions is possible. But during teacher education it is crucial that student teachers have to work on tasks on the higher levels as well and to create situations, based on the acquired knowledge, in which the experiences are evaluated and analysed in order to gain findings and insights.

At Zurich University of Teacher Education, we try to prepare and foster our student teachers for pre-primary and primary schools within a setting following the goals of Bloom's taxonomy, enriched by Anderson and Krathwohl (2001), as shown in the left part of Figure 8. The learning goals of the seminar are presented on the right side, with the numbers of the levels enclosed in brackets.

In a problem-based learning setting focused on learning strategies and adaptive teacher support for the students dealing with open tasks, student teachers build up *knowledge* and a *deep understanding* of learning strategies to create a sequence with which they will teach students at school and observe them in their activities.

The course starts with a scene-setting presentation by the teacher educators. In the role as teachers they discuss a sequence one of them had with her pre-primary students working on an open task. She talks about the different strategies the children used and about her surprise that all of them found solutions, even the one

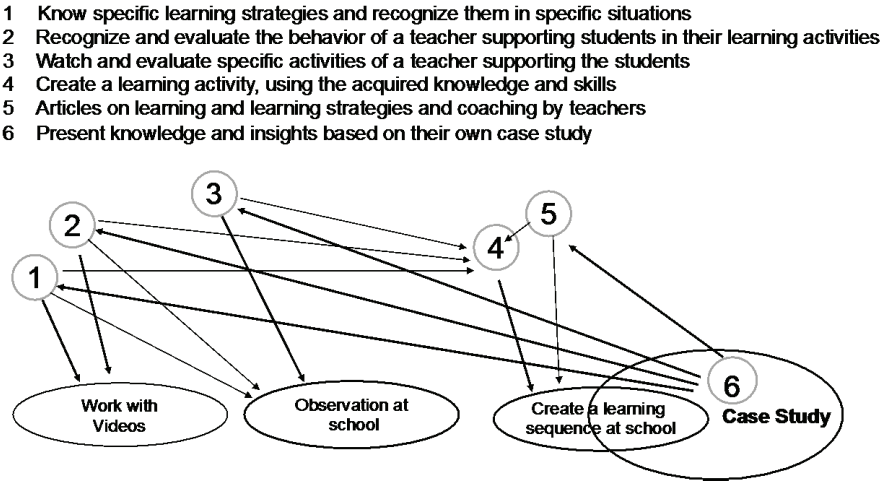

Figure 9 Tasks in the course on the learning strategies of students and teacher support, using deductive (Tasks 1 to 5) and inductive approaches (Task 6)

that was just walking around in the first ten minutes.

After this thematic introduction and the presentation of the goals of the course, the student teachers start to analyse their own use of strategies, working on a list of 72 learning activities, using an electronic survey. As a first theoretical approach to learning strategies, these activities were grouped into categories, illustrating the different categories of learning strategies. On the basis of their individual results concerning their use of learning strategies, they discuss on task-specific possibilities of the use of appropriate learning strategies as well as on their advantages and disadvantages (for more information about this step, see Keller-Schneider, 2019). Based on these two experiences (the thematic scene-setting presentation and the analyses of their own use of learning strategies), the student teachers start to build up specific competences (Fig. 8) in different steps (Fig. 9).

In the *first part of the semester*, student teachers work on several tasks, using *deductive* approaches to build up a scientifically informed professional knowledge basis. They apply this knowledge to situations experienced through videos or classroom observations (Tasks 1 to 5). By dealing with these tasks and embedding the knowledge into reality, they develop a deeper understanding of students' learning activities and appropriate teacher support.

In the *second part of the semester* the approach is changed from a deductive to an *inductive* one. The student teachers create their own case study to show the knowledge and competence they have acquired through their realistic case study. As a first step they develop a learning sequence, using an open task (a task with different solutions) for pre-primary or primary students at school. They plan a lesson and discuss their ideas. They discuss their planning with the teacher educators as well, focusing on pedagogical content knowledge and pedagogical-psychological knowledge. Through this discussion the student teachers should get more insights into a variety of challenges perceived by the individual students and the appropriate support of teachers. They also gain ideas as to how different students might work on this task and how a teacher could support this working and learning processes without hindering them by inappropriate interventions or help that was not asked for. After this reflection, the student teachers go to a school and teach children.

The student teachers work in groups in co-constructive settings (Keller-Schneider, 2018; Keller-Schneider & Schnebel, 2018), to enrich their knowledge and insights by discussing and searching for solutions. Going into a school as a group gives them the possibility of observing the lesson in shared roles to get more information. One of the student teachers act as the teacher, while the others contribute as observers, taking a specific perspective on the interactions. One of them focuses on the teacher, another on the class as a whole, and a third and a fourth one focus on specific children to follow what they do. This experience and its observations serve as a case study, to show the competences they have built up (see Fig. 8) on learning strat-

egies, appropriate settings, useful tasks, and teachers' activities to support the students in their work on the tasks, searching for solutions, and sharing their solutions within the class. After an oral presentation on their case study the student teachers get feedback from other student teachers and from the lectures or professors to get a deeper understanding of their own case study. In a final paper, worked out in the group, they present their case study, as well as their findings, and show their acquisition of competence. A setting like this should activate the student teachers to involve themselves in their learning as a knowledge- and experience-based understanding of a phenomenon and to use it to analyse their own case study.

The requirements of learning opportunities during teacher education should be set up as challenging tasks, following all levels of the taxonomy of goals, to foster the student teachers' development as professionals. Reflection as a core competence of teachers should be trained in all courses focusing on knowledge, beliefs, motives, and self-regulation to understand situations and to combine knowledge and individual resources throughout one's whole biography as a teacher.

Reflection on situations as a core competence of teachers

Teacher education enables student teachers to enter the profession as a teacher. But the requirements they have to meet as fully responsible teachers are more complex than expected, even though they got experience as a student teacher during periods of pre-service teaching. Student-focused activities and requirements are especially challenging because of the situational conditions of the learning activities. Student teachers need reflection competences to deal with changing and challenging situations. The teaching profession is characterized by the uncertainty of the effects of teaching on students' learning (Combe et al., 2018). Based on the knowledge built up during their education as teachers (Hohenstein, Köller, & Möller, 2015; Tachtsoglou & König, 2017; Brühwiler, Hollenstein, & Affolter, 2017), they perceive and handle situations according to their beliefs and values (Cochran-Smith & Zeichner, 2005; Blömeke et al., 2014, De Vries et al., 2014) that emerged from the habitually shaped socialization process throughout their whole biography (Helsper, 2018). In challenging situations individuals react spontaneously, with unconscious decision making (Keller-Schneider, 2010; Blömeke et al., 2015). Reflection on the situation and acting as a teacher is essential to understand interactions and possible reactions. Reflection supports professionalization as a responsible and accountable teacher. To act according to individual values that are shared within the profession leads to a high level of professionalism, satisfaction, and well-being. Tension between values and one's own actions indicates required changes and a searching for a solution that fits teachers' goals and

values. Expressions such as 'I had to punish the student' indicate high pressure on the teacher, the value of not punishing, and a lack of options for how to react in another way. As a result of reflection, this gap will be visible; reflection leads to efforts to solve problems and search for solutions (Keller-Schneider, 2018).

The model below shows the impact on specific situations (Fig. 10). To reflect on *knowledge* helps one to be aware of the knowledge base built up so far. To analyse underlying *beliefs* shows their restricting frames, *motivation* highlights the drivers, *self-regulation* points out what a teacher is ready to invest, and *emotions* colour the whole experience. Changes in any of these fields indicate changes in other fields and facilitate new possibilities.

Teacher education has to prepare future teachers to reflect on how they act as a teacher and to deal with challenging situations because of the heterogeneity of the children, especially in pre-primary and primary school. Young children's metacognitive and self-regulating skills are lower; they act emotionally. Teachers of young children have to respect this and have to foster and promote young children not only on the content level but on the metacognitive level as well.

The developmental task of teaching *referring to individual students' needs* is the most challenging one for pre-primary and primary teachers, not only in the first years of their teaching but for experienced teachers as well (Keller-Schneider, 2017). The results from a comparison with high

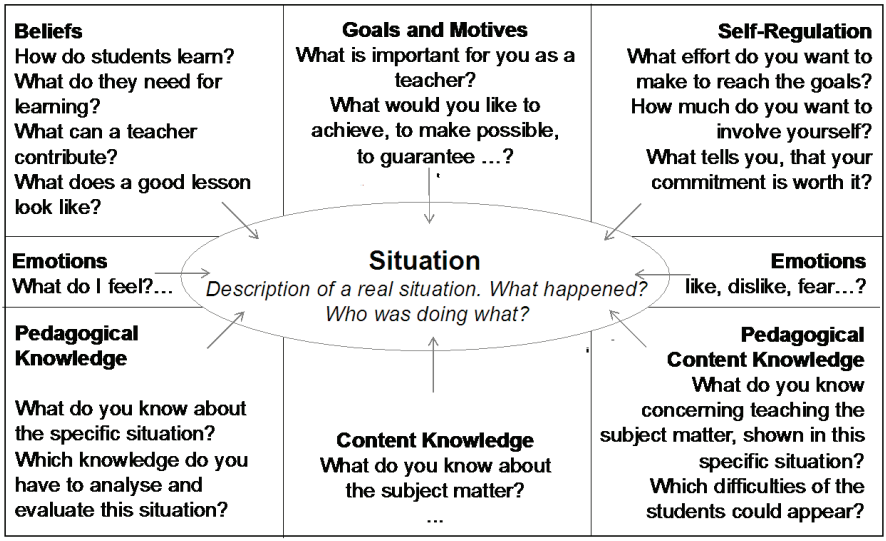

Figure 10 Model of reflection, using different factors of individual resources and their relations

school teachers show that teachers of primary schools are more challenged by this requirement than high school teachers are (Keller-Schneider et al., 2019). So, especially for pre-primary and primary school teachers it is crucial to be able to analyse situations and to be conscious about one's own resources, such as knowledge, beliefs, motives, and self-regulation skills. To accept the complexity of specific situations is the gateway to reflection to recognize different factors that impact on the situation and lead to different solutions. Rule-based knowledge cannot be applied to handle situations. Individual beliefs frame the perception of situations (see Fig. 4), goals and motives promote how they act, and self-regulation skills control the intensity, the duration, and the adjustment of their activities. Reflection on all the factors that shape the perception of a situation and motivate how one acts as a teacher (and how the students act as well, but this cannot be influenced) helps to detect tensions and contradictions, as well as possibilities and resources for coping differently.

Final comments

Teacher education for pre-primary and primary school teachers has to emphasize the individual skills and needs of the children, respecting their uniqueness and their individual preconditions. According to the growing heterogeneity of values and understanding of normality, school has to face this heterogeneity of families and childhood to show ways of connecting with the school community. The school needs teachers who are able to understand specific situations and respect the different origins of the children and their families. On the other hand, they need professionalism in order to handle challenging situations. Reflection in action and on action, connected with cognitive, affective, and motivational resources, is an important tool for teachers.

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KELLER-SCHNEIDER, M. Výuka je více než aplikace znalostí: Rozvojové úkoly učitelů preprimárního a primárního stupně a vliv na vzdělávání učitelů

Výuka je náročná práce vzhledem k měnícím se požadavkům a proměnlivosti doby. Rutina v učitelské profesi není možná. Studenti učitelství musí být připraveni na zvládání náročných situací. Pro zvládnutí práce učitele je zapotřebí vnímání požadavků jako výzev a kapacita řešit problémy. Tento článek vysvětluje, proč jsou kapacity pro řešení problémů zásadní pro profesionalizaci učitelů, jaké požadavky začínající učitele nejvíce ohrožují a jak může vzdělávání učitelů podpořit připravenost studentů učitelství zvládat výzvy první etapy jejich kariéry. Na základě modelu profesionalizace, ve kterém individuální zdroje hrají klíčovou roli ve vnímání výzvy a jejím zvládání, jsou v článku prezentovány výsledky studie týkající se výzev začínajících učitelů. Hlavním zjištěním je, že pro začínající učitele je největší výzvou výuka, která zohledňuje potřeby jednotlivých žáků, což má důsledky pro vzdělávání učitelů. Studenti učitelství musí získat znalosti, které jim umožní adaptovat se v prostředí školy, a reflektivní kompetence. Článek popisuje, jak jsou na curyšské univerzitě studenti učitelství vzděláváni v problémově založených přístupech, aby získali znalosti a kompetence užitečné pro výuku s ohledem na potřeby jednotlivých žáků. V závěru článku je uveden model reflexe náročných situací, který zohledňuje různé faktory jednotlivých zdrojů, které jsou relevantní pro profesionalizaci.

Klíčová slova: *vzdělávání učitelů, rozvojové úkoly, hodnocení požadavků, individuální zdroje, reflexe, problémové učení*