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Understanding the Development of Teachers' Professional Competencies as Personally, Situationally and Socially Determined

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Introduction

Research on teacher education, teachers' professional development and the necessary prerequisites has become a prolific and productive field growing with enormous speed. Large-scale assessments such as the Teacher Education and Development Study in Mathematics (TEDS-M) (Tatto, Schwille, Senk, Rodriguez, Bankov, Reckase et al., 2012) have triggered a series of national and international follow-up studies examining the competencies necessary to teach different subjects at different school levels. Substantial progress has therefore been made in understanding that teacher competencies are personal traits (i.e. individual dispositions relatively stable across different classroom situations) but that they also include situational facets (Jenßen, Dunekacke, Eid, & Blömeke, 2015). Furthermore, they play out in social contexts which determine to some extent how competencies can be transformed into classroom performance. Research is, thus, increasingly integrating the two different paradigms on teachers' professional competencies, which can be characterized either

as cognitive or as situated approaches to professional competencies of teachers (Rowland & Ruthven, 2011).

These developments are in line with trends in subject-related discussions like mathematics education, where, in their survey on the state-of-the-art of teacher education and teachers, Krainer and Llinares (2010) identified three trends in the literature on prospective teachers, practicing teachers and teacher educators, namely teacher educators' and researchers' increasing attention to the social dimension of teacher education, to teachers' reflections and to the general conditions of teacher education. The trends are based on the shift from a perspective on the education of individual future and practicing teachers and their cognitions towards emphasizing the social dimension in teacher education based on sociological and sociocultural theories.

The cognitive perspective on the professionalism of teachers focusing on knowledge facets of teachers has been dominant in recent decades. Its characteristic is a strong focus on teachers' knowledge and the distinction of a limited number of knowledge components, treated as personal traits. These studies mainly come from mathematics education, for example, the Mathematics Teaching and Learning to Teach Project (MTLT) developed by the Learning Mathematics for Teaching Project (LMT) (Ball, Thames, & Phelps, 2008; Fauskanger, 2015) or the Cognitive Activation in the Classroom Project (COACTIV) (Kunter, Baumert, Blum, Klusmann, Krauss, & Neubrand, 2013; Bruckmaier, Krauss, Blum, & Leiss, 2016), or the Knowledge Quartet (Turner & Rowland, 2011), in addition to the already-mentioned Teacher Education and Development Study in Mathematics (TEDS-M) (Blömeke, Suhl & Kaiser, 2011).

However, new studies such as the follow up study to TEDS-M (Blömeke, Busse, Kaiser, König, & Suhl, 2016), the Learning to Learn from Mathematics Teaching Project (Santagata & Guarino, 2011; Santagata & Yeh, 2016), or the Classroom Video Analysis (CVA) Instrument (Kersting, Givvin, Thompson, Santagata, & Stigler, 2012; Kersting, Sutton, Kalinec-Craig, Stoehr, Heshmati, Lozano, & Stigler, 2016) have shifted the focus of research to the inclusion of situated and social aspects of teaching and learning and the professional development of teachers. These studies assume 'the act of teaching being multi-dimensional in nature' (Depaepe, Verschaffel, & Kelchtermans, 2013, p. 22), referring not only to subject-based cognitive aspects, but including pedagogical reflections on the teaching-and-learning situation as a whole. The context in which teaching and learning is enacted is in the foreground (for an earlier project describing teachers' professional knowledge as situated, see Fennema and Franke, 1992).

Integrating these different approaches, Blömeke, Gustafsson, and Shavelson (2015) presented a framework of teacher competencies that took this interaction of personal, situational, and social characteristics into account. They showed that former conceptual dichotomies were misleading in that they ignored either the stable dispositional or the more variable situational competence facets. By systematically sketching conceptual controversies, competing definitions of competence were unpacked. The resulting framework revealed how the different approaches complement each other. Competence can hence be viewed along a continuum from personal dispositions such as teachers' professional knowledge and beliefs, which underlie situation-specific cognitive skills such as teachers' perception, interpretation, and decision-making, which in turn give rise to observed teacher performance in the classroom.

Complementing this view on teacher competencies, which was still limited in the sense that it solely focused on a teacher's individual potential and his/her interaction with the situation, Scheerens and Blömeke (2016) included in an extended model on teachers' professional competencies the social context and its impact on the development of teacher competencies and their transformation into classroom performance. The present article summarizes this integrative conceptualization of personal, situational, and social determinants of teacher competencies and provides, thus, a multi-level, multi-dimensional conceptual framework of teacher competencies (see Figure 45.1). In the following, results from major studies on the development of teachers' professional competencies are linked to this framework, and conclusions of what it means to understand competencies as personally, situationally, and socially determined are drawn for future research and pre-service/in-service teacher training.
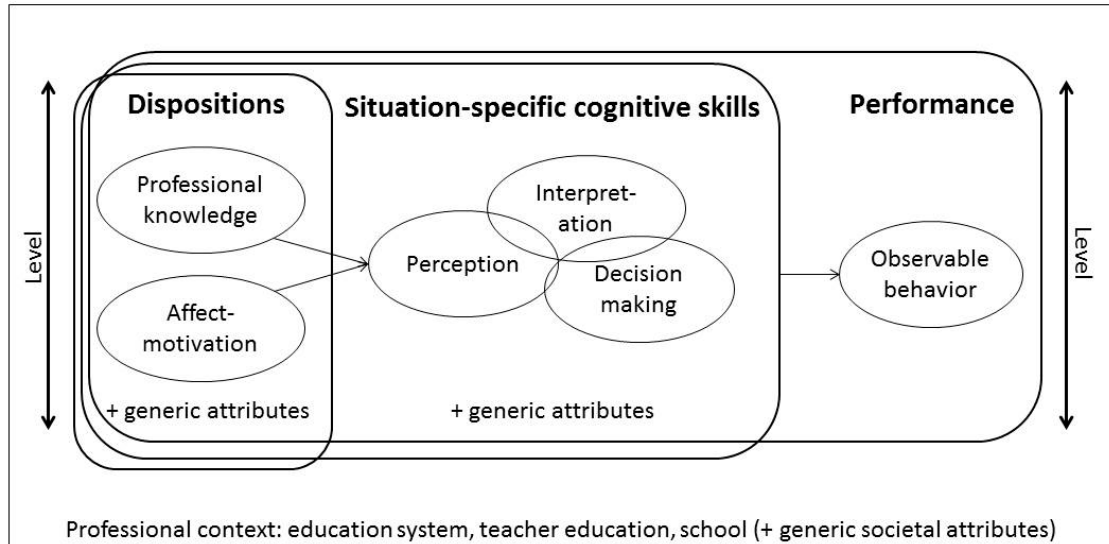

Figure 45.1. Personal, situational and social determinants of the development of teachers' professional competencies (extended version of Blömeke, Gustafsson & Shavelson, 2015)

Structure and development of teachers' professional competencies

A person-oriented framework

Although the term 'teacher competencies' is widely used, its precise meaning remains often unclear. The notion of competence became prominent in the US during the 1960s and 1970s (Grant, Elbow, Ewens, Gamson, Kohli, Neumann, Olesen, & Riesman, 1979) and meant successful performance on tasks sampled from real-life situations: 'If someone wants to know who will make a good teacher, they will have to get videotapes of classrooms, … and find out how the behaviors of good and poor teachers differ'. (McClelland, 1973, p. 8). A contrasting perspective stressed competence's dispositional, and in particular its cognitive nature, either in a generic sense, for example intelligence or information-processing abilities, or in a domain-specific sense, for example knowledge. These discussions relate to the two paradigms described above on the nature of teachers' competencies as being either socially or cognitively shaped (Depaepe et al., 2013).

We suggest overcoming such simplified conceptualizations and regard competence more as a continuum with dispositions closely related to observable performance (see Figure 45.1). Spencer and Spencer (1993, p. 9) defined competence in this sense as 'an underlying characteristic of an individual that is causally related to criterion-referenced effective and/or superior performance in a job or situation. Underlying characteristic means the competency is a fairly deep and enduring part of a person's personality'. Furthermore, we suggest considering dispositions as a multi-dimensional set of not only cognitive but also affective-motivational characteristics. Finally, we propose regarding the transformation of dispositions into performance as fully or partially mediated by situation-specific cognitive skills.

It is important to note that in this conceptualization teachers' competencies and their observable performance in the classroom are distinguished but they are assumed to be functionally related to each other because the former underlie the latter. In addition the conceptualization is limited to *professional* competencies of teachers. In order to succeed, they would most likely also require generic attributes all higher-education graduates need, such as creativity, ethical responsibility, or communication skills (Strijbos, Engels, & Struyven, 2015). Furthermore, teachers have, like all human beings, everyday knowledge not related to their job tasks. By definition, this knowledge is not part of their professional competencies.

A developmentally-oriented framework

The different competence facets and their dimensions may change over time, for example during teacher education, but also while teachers gain practical experiences. Thus, teacher competence is not only a horizontal continuum including a range of dispositions and skills functionally related to classroom performance but also a vertical continuum in terms of higher or lower achievement levels on the one hand, as well as of earlier or later developmental stages on the other hand (Blömeke et al., 2015).

Growth and loss resulting in higher or lower achievement levels may happen with respect to each single competence facet or dimension but not necessarily in the same way (Braeken, 2015). A teacher may reach a high achievement level on one dimension but only a low one on another (Baltes, Lindenberger & Staudinger, 2006). Taking a developmental perspective increases complexity. A teacher may reach an advanced developmental stage on one dimension but remains on a premature one on another. Furthermore, it could be that the development of the different dimensions are

related to each other, that for example some basic knowledge has to be in place before situation-specific skills can be developed, because neuropsychological research reveals that perception happens in the visual cortex and is connected to pre-frontal cortical structures that represent specific knowledge (Riddoch & Humphreys, 2001). This would mean with respect to preschool teachers, for example, that he or she needs a basic understanding of mathematics to be able to perceive opportunities to foster mathematics literacy of small children in a preschool situation. However, once a basic level of professional knowledge exists, practical experiences and practical training may be sufficient to increase situation-specific skills and performance.

Many teacher education programs are built on the assumption that knowledge has to be delivered first before students undergo practical training to develop situation-specific skills. But it might be that change happens on all dimensions all the time (Baltes, Reese, & Lipsitt, 1980) and that an integrated approach would facilitate development in a better way. Furthermore, development can happen continuously in terms of incremental processes or it can happen as jumps once a threshold has been reached (Braeken, 2015). Besides quantitative incremental or jump-like growth and loss in each facet or dimension, qualitative changes may happen in that dimensions become more differentiated/specialized or more integrated, as it is assumed in the novice-expert paradigm (Berliner, 2001; Chi, 2011). Expertise is characterized by a well-connected knowledge structure that can be retrieved quickly (Calderhead, 1984). In such cases of differentiation or integration, one pedagogical content knowledge dimension may, for example, be split up into several sub-dimensions so that a teacher reveals strength in diagnosing student achievement but weaknesses in dealing with heterogeneity in a classroom. In contrast, the pedagogical content knowledge and the content knowledge dimensions could develop into more integrated ones over time.

Developmental trajectories would imply structural changes in the nature of competence, for example concerning various sub-dimensions such as deepening and broadening of school-related pedagogical content knowledge, which may become more strongly connected to general pedagogical knowledge, and is more strongly bound to a conceptual and structural understanding of the teaching subject (Schoenfeld & Kilpatrick, 2008; Schoenfeld, 2011). A serious lack of research has to be pointed out in all these respects regarding teacher competence.

Besides such intra-individual developmental differences, inter-individual differences between teachers exist. This means that each teacher can be characterized through a specific profile of stronger or weaker dispositions, stronger or weaker skills, and stronger or weaker classroom performance. A teacher can, thus, be characterized as more or less competent. A competence profile characterizes teacher competence as a whole (Oser, 2013), which raises the question of thresholds: how much is enough so that a teacher can be called 'competent'? An important but open question in this context is whether the different dimensions of competence can compensate for each other (i.e. are additive by nature) or whether strength on one dimension cannot compensate for weakness on another (i.e. a multiplicative nature; Koeppen, Hartig, Klieme, & Leutner, 2008). Does a teacher need to have all types of dispositions and skills to be able to perform successfully in class or is it sufficient, for example, to have strong pedagogical content knowledge? If developmental stages exist, do teachers need to reach a certain stage before they can show certain classroom performance? If different achievement levels on each developmental stage exist, do teachers have to pass a minimum threshold before they can succeed (Blömeke et al., 2015)?

State-of-research regarding teachers' dispositions

Professional knowledge

Based on Shulman (1986), teachers' professional knowledge is commonly categorized into content knowledge (CK), pedagogical content knowledge (PCK), and general pedagogical knowledge (GPK). CK and PCK are specific for each subject whereas GPK includes knowledge about generic teaching and learning tasks such as classroom management. All knowledge dimensions can be regarded as relatively stable dispositions in that they are not related to a specific classroom situation. In that sense they represent the potential a teacher brings to the classroom. It should be noted that professional knowledge is only one facet of teachers' cognitions. These represent a multi-dimensional system and include in addition professional cognitive skills such as perception or decision-making (see Introduction) and generic cognitive facets such as memory or processing speed (Carroll, 1993). By definition, generic attributes are not part of the competence model presented in this chapter.

Research about teachers' professional knowledge has heavily focused on their CK. Mathematics teachers are of particular interest, from preschool teachers through to high school teachers. Mathematics content knowledge (MCK) covers school mathematics such as number or geometry, which teachers should be able to view 'from a higher point of view' (i.e. with a conceptual understanding that also includes prerequisites and following steps; Klein, 1932) and mathematical processes such as argumentation or modelling (Common Core State Standards Initiative, 2014).

The level of MCK gained during teacher education varies across groups of teachers and countries. High school teachers have on average more MCK than middle school or primary school teachers (Tatto et al., 2012) and these in turn have more MCK than

preschool teachers (Dunekacke, Buhl, Jenßen, Baack, Grassmann, & Blömeke, 2014).

Similar to country differences on the student level, teachers from East Asian countries such as Taiwan or Singapore have at the end of teacher education on average more MCK than teachers from Western countries such as the USA or Germany, and teachers from these countries have again more MCK than teachers from developing countries such as Georgia or Botswana (Blömeke, Suhl & Kaiser, 2011).

Mathematics teachers were also those most often examined with resepct to PCK. Mathematics pedagogical content knowledge (MPCK) includes knowledge about how to teach mathematics to different groups of students, how these develop mathematical literacy, how to diagnose a specific type or level of achievement, and how to support students that struggle or are particularly excellent. MPCK is strongly related to MCK and GPK (e.g. Blömeke et al., 2015) and at the same time sandwiched between theory and practice. In the past, its conceptualization often depended on the group of teachers. With respect to high school teachers, the relation to MCK and theoretical knowledge dominated whereas the opposite applied to primary school teachers. Shulman (1986) argued for a more balanced view with respect to all teachers. He defined PCK as 'that special amalgam of content and pedagogy that is uniquely the province of teachers, their own special form of professional understanding' (p. 8). Concerning the level of MPCK that teachers have at the end of teacher education, international studies revealed similar results as regarding MCK.

GPK, which should not be mixed up with generic cognitive skills such as creativity or communication, includes principles and strategies for classroom management and organization that are not subject-specific (ibid.). An international study carried out in Germany, Taiwan, and the USA that covered knowledge about lesson planning,

classroom management, motivation, dealing with heterogeneity, and assessment revealed that German and Taiwanese teachers had more GPK than teachers from the USA (König & Blömeke, 2009).

Affective-motivational teacher dispositions

According to a modern understanding of competence, it is not sufficient to limit its conceptualization to cognitive dimensions. Interest, motivation, volition, values, beliefs, attitudes, and other mainly affective-motivational characteristics are also relevant when it comes to the transformation of knowledge into observable behavior. Teachers need to be motivated and willing to apply their knowledge. Take group work as an example. A teacher may have knowledge about different methods to implement group work but may not believe in their effectiveness. It is unlikely that he or she will implement any of the methods (Heckhausen, 1987). Note that the analytical distinction of affective-motivational characteristics on the one hand and knowledge on the other hand is to some extent artificial because the first ones often include a cognitive component as well (Richardson, 1996).

Much research work in the field of affective-motivational teacher characteristics has been done about beliefs, in particular about student- versus teacher-orientation in instruction. Strong agreement with the first orientation means that learning is regarded as an active process in which students conduct their own enquiries and develop their own approaches to learning the content. In contrast, strong agreement with the second orientation means that students are supposed to follow teachers' instructions. Teacher beliefs vary strongly between countries. In individualistic countries like Germany, teachers at the end of their education supported student-oriented beliefs more strongly than others, whereas in collectivistic countries both types of beliefs were supported

(Felbrich, Kaiser, & Schmotz, 2012; see for similar results with practicing teachers OECD, 2009).

Other crucial affective-motivational teacher dispositions are their self-efficacy and their anxiety. Self-efficacy refers to their confidence to be able to cope with challenging classroom situations based on their competence (Bandura, 1986). Self-efficacy influences the willingness to strive longer and therefore increases the chance to transform competence into successful performance. Anxiety is in contrast the 'feelings of tension and anxiety that interfere with the manipulation of [mathematical] problems in a wide variety of ordinary life and academic situations' (Richardson & Suinn, 1972, p. 551). Anxiety limits the transformation of competence in performance because it leads to a tendency to avoid situations regarded as challenging although they represent core teaching tasks (Chinn, 2012). Whereas comparative research about anxiety is scarce, international studies revealed substantial differences in teachers' self-efficacy between Northern Europe or English-speaking countries where high means were found on the one hand and Eastern Europe or East Asia where much lower means were found on the other hand (Vieluf, Kunter, & van de Vijver, 2013). Southern or Central European countries as well as South American countries ranged in between.

Generally, serious research gaps have to be pointed out with respect to affective-motivational teacher characteristics besides beliefs or self-efficacy. Recently, teacher motivation has come more into focus (Watt, Richardson, Klusmann, Kunter, Beyer, Trautwein, & Baumert, 2012) but otherwise we need to note that most of the attributes have only been studied in single countries, and these were mainly Western countries

(an exception is a study on expert teachers from mainland China and Hong Kong, Yang, 2014).

Transformation of teacher competence into observable classroom performance

To what extent the potential of teachers in terms of knowledge and affective-motivational characteristics can be transformed into classroom performance depends, firstly, on a match between cognitive and affective-motivational competence facets as pointed out above. Secondly, the transformation depends on teachers' situation-specific skills. These are conceptualized in this chapter as a facet of teachers' cognitions and not equal to observable teaching behavior. They are in addition distinct from knowledge in that they represent cognitive processes prior to, during, or following real-life performance. Readers with a philosophical background may want to associate these psychological constructs with Schön's (1983) notions of reflection in and on action.

Perception, interpretation, and decision-making are the most prominent cognitive skills discussed and examined (Blömeke et al., 2015). Although some commonalities exist, researchers have conceptualized these skills slightly differently. Carter, Cushing, Sabers, Stein, & Berliner (1988) stressed 'perception accuracy'; Goodwin (1994) distinguished in his concept of 'professional vision' between 'selective attention' and 'knowledge-based reasoning'. In any case, it is difficult to determine skill levels because – in contrast to knowledge – higher quality may not be determined by 'more' or 'more elaborate' skills but by qualitative differences in what and how something is perceived. Typically, in such studies an expert panel determines the correct solution to a task at hand.

Situation-specific skills are supposed to be organized along specific characteristics of classroom situations (Sherin, Jacobs, & Philipp, 2011). Given the multi-dimensionality and the speed of what happens in a classroom, perceptual skills are of utmost relevance for identifying in a first step what is going on, followed by analyzing and interpreting the situation to finally decide about teaching activities to be implemented based on the teacher's knowledge repertoire (Star & Strickland, 2008). Cognitive skills develop with more practical experiences and can be fostered through professional development. A systematic review identified twelve studies on teachers' perceptual skills, which all reported positive effects of professional development activities on skill development (Stahnke, Schüler, & Rösken-Winter, 2016).

Depending on the subject, the grade, the objective of a lesson, class composition, or other context characteristics, a teacher may perceive and interpret classroom situations differently or apply different sets of knowledge in the process of decision-making. Thus, it may be naïve to assume that knowledge is linearly transformed into performance. The knowledge needs to be restructured according to situational demands and adjusted to the needs of the students at hand. However, this does not mean that knowledge and performance are not related to each other. The question is more how strong this relation is. In psychology, a long-standing debate between two traditions exists in this respect. In the first tradition, traits basically do not exist, and behavior is almost exclusively triggered by the characteristics of a situation. A 'situationalist' would probably stress inconsistencies in teacher performance across different classroom situations. In contrast, a 'dispositionalist' would assume that on average a teacher with higher knowledge performs significantly better than one with lower knowledge, no matter how variable situations or behavior are, because the underlying dispositions overshadow all other influences. Transferred to the teaching

profession, this dichotomy means that situationalists would claim that you cannot infer a teacher's performance from an earlier situation, whereas dispositionalists would argue that a significant strong correlation exists between previous, current, and future performance.

The empirical evidence available supports a more modern view of the relation between dispositions and situations and points to interaction between the two. Teacher knowledge seems to predict directly the skill of perceiving classroom situations and indirectly following steps such as decision-making. Evidence exists with respect to MCK and MPCK and content-related situation-specific skills (Dunekacke, Jenßen, & Blömeke, 2015; Kersting et al., 2012) as well as with respect to GPK and skills not specific for a subject such as classroom management (Voss, Kunter, Seiz, Hoehne, & Baumert, 2014). Research also revealed the relevance of MCK and MPCK for observable teaching performance. Preschool teachers with more MPCK created opportunities to learn (OTL) of higher quality than those with less knowledge (Lee, Meadows, & Lee, 2003; with respect to other domains see for example Gold, Förster, & Holodynski, 2013; Stürmer, Könings, & Seidel, 2012).

Kersting et al. (2012) and Gold and Holodynski (2015) applied generalizability theory to further clarify the relation between teacher competence and situation by splitting the variance in teaching skills into trait- and situation-specific variance. Teachers had to watch video clips of classroom situations and take a skills test. Kersting's results point to stable cognitive skills rather than to inconsistencies across situations. In contrast, Gold's results point more strongly to such inconsistencies. The variance in teaching skills explained by the situation was often higher than the variance explained by the trait. Blömeke, Buchholtz, Suhl, and Kaiser (2014) and

Seidel, Blomberg, and Stürmer (2010) applied confirmatory factor analyses which supported an interaction effect of teachers' traits and situations. Overall, the studies suggest distinguishing between generic and subject-specific demands in a classroom because the situation-specific variability of the former seems to be larger than that of the latter. Studies taking a similar approach to teachers' professional knowledge are unfortunately lacking despite different views particularly on PCK's existence, namely 'whether mathematical knowledge in teaching is located "in the head" of the individual teacher or is somehow a social asset, meaningful only in the context of its applications' (Rowland & Ruthven, 2011, p. 3).

Social determinants of teachers' professional competence

This chapter has until now addressed only personal and situational determinants of teacher competence or the interaction of teachers and classroom situations. Thus, we have basically taken a view on the teacher as an individual. However, teachers are shaped and influenced by social contexts such as the teacher education program they took, the school where they are employed, the teaching staff they are working with, or a country's social norms regarding what a teacher should be able to do. Furthermore, the definition of competence itself requires a professional context (see Figure 45.1) since competence is functionally defined as a means of being able to handle professional tasks. How these professional tasks are conceptualized may differ by country, school type, or other context characteristics.

In a further development of the model by Blömeke et al. (2015), Santagata and Yeh (2016) emphasized the cyclic and context-related nature of perception, interpretation, and decision-making (see Figure 45.2). Deliberate practice and reflection integrating knowledge and beliefs encounter classroom practice. They

summarized their approach: 'According to this model, teacher competence seems better defined as a complex interaction of situated knowledge, beliefs, and practices that can be understood only in the specific context in which teachers work. (…) Community pressures might shape a teacher's instructional choices and even result in a behavior that contradicts knowledge a teacher might show in a different situation'. (Santagata & Yeh, 2016, p. 164) Such social determinants are discussed in the following section.
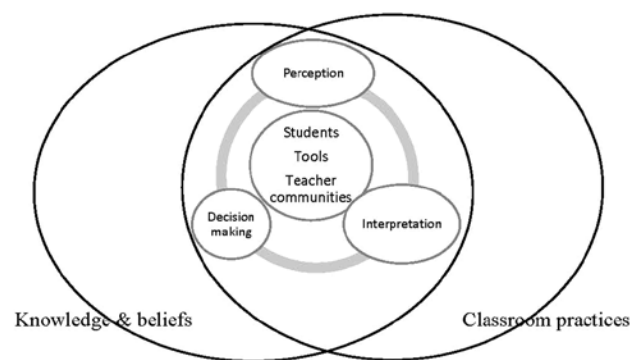

Figure 45.2. Enriched model of teacher competence by Santagata and Yeh (2016, p. 163)

Note that the distinction between teacher competence as a personal attribute (sections "State-of-research regarding teachers' dispositions" and "Transformation of teacher competence into observable classroom performance") and social determinants of their development (this section) is mainly made for analytical reasons. Learning and development does not happen in a vacuum or individually only but in embedded contexts, in interaction with peers and teachers, for example in terms of co-construction as a socioconstructivist perspective would describe it (Vygotsky, 1978). Still, competence is nevertheless an individual attribute that a teacher develops and brings with him or her to the situation.

Teacher education as a social practice that shapes teacher competence

The functional definition of competence as a teacher attribute that ensures successful job performance raises the question of how this job performance is defined in terms of teacher tasks. Although global influences have contributed to a circulation of teaching norms, these still vary between countries and cultures. To quote Paine, Blömeke, and Aydarova (2016, p. 731): 'How much teachers work within a single subject or multiple subjects, how much their work involves responsibility for students outside of subject instruction – such as in leading students in extracurricular activities – and how much their workload involves collaborating with colleagues vary depending on context'. In particular, on a surface level, research suggests that distinct patterns of teaching settings exist across countries.

However, looking deeper also reveals communalities. Paine et al. (2016) analyzed curricula from around the world and stated that 'the vision of good teaching increasingly has become a vision of teaching that is learner-centered, focused on active learning, and moving away from traditions of what is typically described as teacher-centered, transmissive instruction'. Furthermore, they identified fostering students' developmental growth of socioemotional as well as cognitive qualities as a shared objective of teaching almost worldwide.

Teacher education intends to develop the competence necessary to meet these objectives by providing theoretical and practical opportunities to learn (OTL). This happens in a social context with certain assumptions about *which* knowledge, skills, and affective-motivational attributes are needed to succeed as a teacher. OTL provided during teacher education are in this sense a manifestation of such social (or cultural) assumptions. This applies, for example, to the content offered or the

qualifications teacher educators are required to have or to the prerequisites students

need to bring with them when they enter teacher education (see Figure 45.3). Teacher

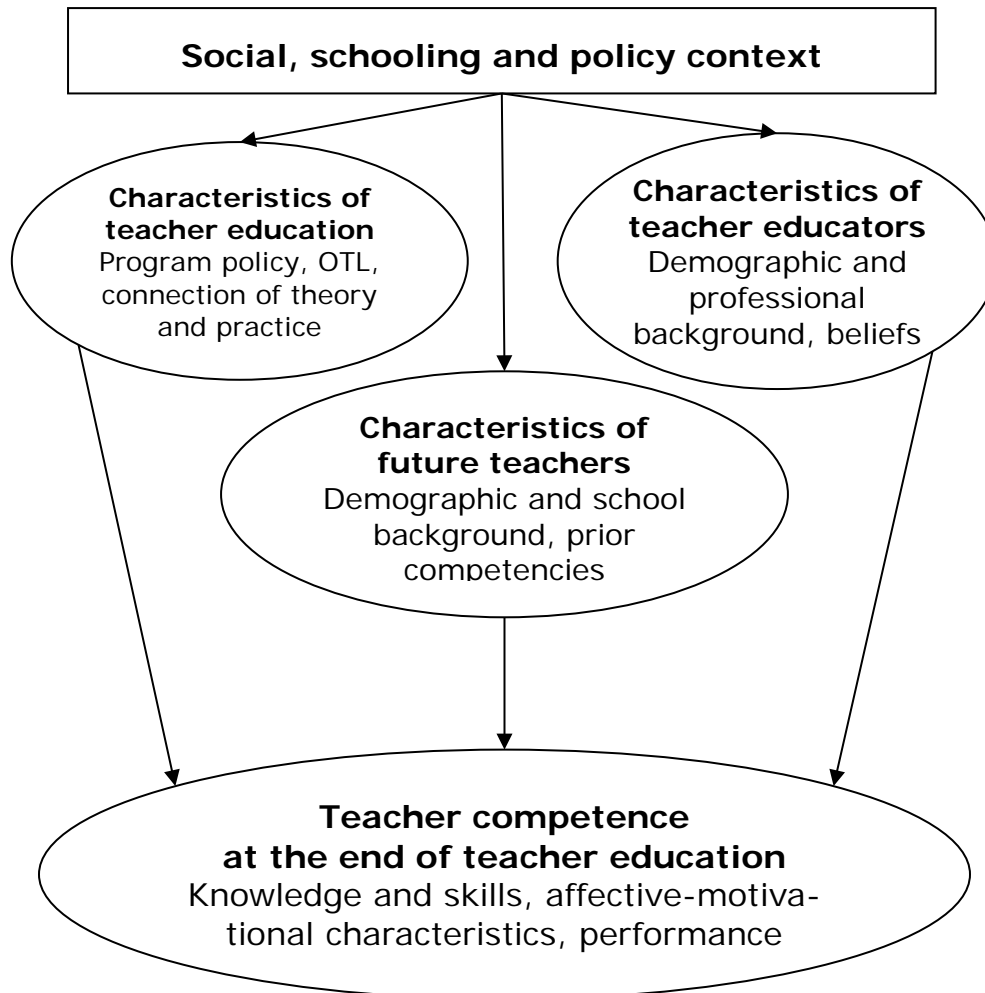education is, thus, a social practice that impacts how teacher competencies develop.

Figure 45.3. Conceptual model of the social context and the development of professional
competencies

For example, building on the basic idea that highly specialized experts need to

teach the different components of teachers' professional competence, Western

Germany has been organizing its teacher education programs for a long time in a

rather fragmented way. Delivering theoretical knowledge was the responsibility of

professors at different subject-specific or pedagogical departments at research

universities not really connected to each other, followed by a practical training at state institutions supervised by master teachers with long experience (Müller-Rolli, 1998). Only a few other countries in the world, for example France and Taiwan, followed a similar idea. In contrast, Eastern Germany and many other countries organized teacher education in an integrated way (Kemnitz, 2004). Educational colleges were responsible for teacher education programs where OTL in content and pedagogy as well as theory and practice were better connected with each other (Schwille, Ingvarson, & Holdgreve-Resendez, 2013).

How important the social context and socially shared beliefs for the development of teacher competence are is also revealed by within-country differences in the organization of teacher education programs for different school levels. Programs for primary school may have a focus on general pedagogy with limited subject-specific training in a broad range of subjects, whereas teachers for high school may be trained as subject specialists. Middle school programs are often sandwiched between these two ideas and may include OTL in advanced university mathematics, basic mathematics or school mathematics only (Blömeke, 2012). Preschool teachers, on the contrary, are often not trained in any content-specific topics, which points to the assumption that it is sufficient to have everyday knowledge to foster children's development.

The social context also determines who enters a teacher education program, for example based on differences in entry requirements or attractiveness of the profession. Cohort and longitudinal studies revealed that teacher competence grows during teacher education but that this development depends on cognitive and affective-motivational entry characteristics (positive: good high school grades and

intrinsic motivation) as well as on personality traits (positive: an instrumental and expressive personality) (Blömeke, 2009; Voss, Kunter, & Baumert, 2011). Thus, countries with a large pool of applicants to programs have an advantage because they can select among candidates (Schwille et al., 2013).

Role of the school context

Although two teachers may have entered the profession after completing their education with largely the same potential in terms of knowledge, skills, and affective-motivational attributes, the ways in which their competences are transformed into teaching performance may differ. Occupational research indicates that the proximate job environment significantly affects work quality (Hackman & Oldham, 1980). Feedback provided, autonomy given, and other characteristics of the context are strong predictors of work quality.

Teacher-related research suggests a similar relationship. A climate of respect, recognition, and appreciation contributes to how teachers report the quality of their work (Blömeke & Klein, 2013; Shen, Leslie, Spybrook, & Ma, 2012). Appraisal has a positive influence on teachers' development, too (OECD, 2009), and is particularly important for beginning teachers (Gimbert & Fultz, 2009). Job satisfaction plays a crucial role in this context as it contributes to teachers' commitment to stay in the profession (Lubinski & Benbow, 2000). Teachers report higher satisfaction when they have a chance to participate in decision-making at school (Perie & Baker, 1997). The role of the principal seems to be a particularly important characteristic in this context. Principals can set the tone of a school (Valentine, Clark, Hackmann, & Petzko, 2004). Teachers perceive it as supportive if principals show administrative leadership

through clear communication (Ma & MacMillan, 1999), empathy, and a climate of trust (Tschannen-Moran, Hoy, & Hoy, 1998).

Besides such within-school context characteristics, the state-of-research points to malleable context conditions at the system level that contribute to effective schooling (Scheerens & Blömeke, 2016). School autonomy in the instructional domain, national standard-based examinations and comprehensive secondary schools seem to be such conditions (Wössmann, Luedemann, Schuetz, & West, 2009).

Conclusions

Teacher competence was conceptualized as a multi-dimensional construct underlying performance in the classroom that includes knowledge, skills, and affective-motivational characteristics. Competence development and its transformation into performance were conceptualized as personally, situationally, and socially determined as well as embedded in a professional context. Several research traditions were brought together to arrive at such a complex framework that takes individual, classroom, school, and societal levels into account. Evidence from a broad range of studies including quantitative large-scale assessments and qualitative case studies supported this conceptualization.

An important analytical element of this approach is to distinguish teachers' cognitive skills such as perception, interpretation, and decision-making from professional knowledge on the one hand and classroom performance on the other hand. This analytical clarity should help us to understand the effects of teacher education and the transformation of competence into performance better than before. A reasonable hypothesis could be that cognitive skills predict classroom performance with a larger effect size than teacher knowledge because they are more proximal but

that this knowledge is a necessary precondition to have before skills can be developed. Another more established analytical element is the distinction of subject-specific knowledge and skills on the one hand and general pedagogical ones on the other hand, the latter not to be mixed up with generic (non-profession specific) teacher attributes. A reasonable hypothesis for further research here would be that the subject-specific attributes predict subject-specific learning with larger effect sizes than general pedagogical ones but that the latter are necessary for instructional quality features such as classroom management or student support. Instructional processes, the interaction between teacher and students, are always supposed to mediate the relations between knowledge and skills on the one hand and student outcomes on the other hand. However, further research in all respects is still needed because most of the studies available are limited to the field of mathematics. Furthermore, most of the studies took place in English-speaking or Western countries.

What do all these results mean with respect to teacher education and professional development? It may be that in some countries pre-service and in-service teacher training are mainly focused on the knowledge base of teaching, whereas in others practical training dominates – if one reviews the teacher education literature, it seems that a clash of paradigms exists. Our framework points to the need for a more comprehensive approach. Furthermore, intermediate cognitive skills are rarely addressed in either of the two paradigms, although interventions revealed that they are learnable and can be strengthened. The competence facets of perception, interpretation, and decision-making may be crucial to connect knowledge and attitudes to the classroom situation and vice versa. Teacher education programs and professional development activities are therefore well advised to offer comprehensive OTL in all these respects. However, in which form this should happen needs more

research. An important issue is the influence of a broad concept of teachers' competencies on the students' learning gains. Little research has so far been carried out on the way in which teachers' competence structure influences patterns of students' learning growth. What role does teaching quality play, and which aspect is strongly influenced by teachers' competencies (see Kaiser, Blömeke, König, Busse, Döhrmann, & Hoth, 2016)? These aspects are certainly not culturally independent as teaching quality may be differently understood in East Asian countries and Western countries.

Further research is also needed with respect to the generalizability of the findings presented in this chapter. Is it possible to generalize the structural relationships between knowledge, skills, instructional quality, and student outcomes developed in this chapter based mostly on research from mathematics and middle school teachers also across subjects such as language or history and across primary to upper secondary grades? What about cultural differences between English-speaking countries and others, for example East Asian countries such as Taiwan or continental European countries such as Germany? Do competent students become competent teachers and produce competent students? This is a vicious cycle that Leung and Park (2002) bring into the discussion. How influential are culturally shaped values which coin the development of the so-called Confucian Heritage Culture learner's phenomenon (Wong, Wong, & Wong, 2012)? To be able to answer these questions it is necessary to assess teachers' attributes and classroom performance in reliable and valid ways for different subjects and cross-culturally.

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