

## 2 Theoretical Background

“Ensuring quality in and through teaching and learning has become a fundamental global concern.” (Niemi, Harford, & Hudson, 2012, p. 1). The issue of ensuring quality in educational settings – including having quality schools, quality teachers and quality students – is complex. This chapter encompasses the central theoretical foundations and the empirical state of research in classroom research that lay the groundwork for this study.

The theoretical foundations outlined in this chapter are closely based on the research questions of the study at hand. These are to analyse, whether the cascade training implemented in professional development was successful. The analysis of the research questions is guided by the overarching objectives to improve the teaching quality by means of teacher professionalism. This research interest is embedded in the international discussions for quality improvement and increase of teacher professionalism in the context of the post-Education for All movement. Besides the constructs of teaching quality and teacher professionalism, the empirical operationalization of both concepts is relevant for the theoretical foundations of this study.

Therefore, the chapter is divided into different sections. The first two sections focus on teaching quality (cf. Chapter 2.1) and on teacher professionalism (cf. Chapter 2.2). The internal structures of both of these sections follow each a similar line of argumentation. First, the concept and the state of research are described. Second, how the concept can be developed and improved is outlined. The third section presents possibilities of how to measure educational quality in regards to the concept of teaching quality and the concept of teacher professionalism (cf. Chapter 2.3). Based on the theoretical background described in the first three sections of this chapter, here the research desiderata of the study at hand are formulated (cf. Chapter 2.4), and as a result of the research questions and the hypotheses of this study, an analytical framework is set up, which describes the underlying theoretical ideas for the conception of the data collection instruments (cf. Chapter 2.5). The concepts *teaching quality* and *teacher professionalism* constitute the main foci of this research and are discussed separately in this chapter. Both concepts are closely linked to the role of quality in educational settings.

Quality in education is an intensely discussed topic in international educational research. There is little consensus of what quality refers to in terms of teachers and in terms of teaching.

The concepts behind the terms *teacher professionalism* and *quality teaching* are closely related. This is reflected in the intertwined and often interchangeable use of the two terms in academic literature. In this chapter, an ideal-typical separation is undertaken, although both concepts are combined in practice.

## 2.1 Teaching Quality

In the context of the post-2015 discussion on the improvement of teaching quality in development cooperation countries, this study aims to answer the question as to whether cascade training in professional development can contribute to the improvement of teaching quality. Therefore, this chapter aims to present central aspects of the theoretical construct of teaching quality (cf. Chapter 2.1.1). Since the study at hand focuses on the improvement of teaching quality, the subsequent chapter outlines what role the teaching principle of learner orientation can play for the development of teaching quality (cf. Chapter 2.1.2).

### 2.1.1 The concept of teaching quality

This section aims to present theoretical aspects of the concept of teaching quality, which constitute a relevant role for the study at hand. The teaching process and its quality are strongly influenced by diverse factors that relate to the classroom practice. In the following, the offer-use-paradigm is presented as the current state-of-the-art model to explain the modes of operations in the classroom. Afterwards, the relevance of context factors, which influence teaching quality, is outlined.

#### 2.1.1.1 The offer-use-paradigm

The theoretical ideas that underlie the offer-use-paradigm are relevant for the understanding of the conception of the study at hand. In research on teaching and learning, the theoretical understanding of teaching quality related to the process-product paradigm was further developed (Gräsel & Göbel, 2011, pp. 89–92). The current paradigm that shapes the understanding of classroom related processes is the *offer-use-paradigm*, originating from Fend and further developed and

brought into the current discussion by Helmke (2007). The underlying concept of the model is that the setting of teaching in school can be described as *offer and use situation*. From the theoretical perspective of this model, education is a complex framework that does not work according to monocausal relations – many different influencing factors have an effect on the educational chain. In this context, *offer* is understood as the actual presentation of content by the teacher. According to Helmke, the *use* is formed on the one hand by the process quality of teaching as well as by the quality of didactical material (Helmke & Schrader, 2006). The extent and the intensity of students using the offer of the teacher define the *use*. In regards to the quality of education, surrounding background factors also need to be considered. The usage of the presented offer in class is strongly influenced by the learning potential and the family background (socio-economic background, parental home, prior knowledge) of students. Helmke refers to the subject-specific and interdisciplinary competencies of students as *output* in the model (Helmke & Schrader, 2006; cf. adapted for professional development: Lipowsky, 2009; Reusser & Pauli, 2003, p. 8).

#### 2.1.1.2 The influence of context factors

It is important to be aware that educational processes are always embedded and also influenced by contextual factors. In the discussion of teaching quality, the influence of the school environment needs to be addressed. The process of teaching is, from a broader perspective, always situated in the culture of a teaching staff and of an entire school (Lieberman, 1995). Therefore, in all theoretical discussions on factors that influence teaching, school context factors also need to be included (cf. Drechsel & Senkbeil, 2004). It is agreed that in empirical research-based studies there is the need to control for context factors in research on teaching and learning. This is especially important in research that is conducted in the context of development cooperation countries, where the variability of individual schools is very high. Due to the large range of combined factors, school effectiveness studies are methodologically complex, since they involve statistical analyses techniques such as multilevel analyses (Riley, Craig, Poston, & Flynn, 2000; Saunders, 2000, p. 5).

Research has not brought about consistent results on what specific context factors influence teaching at the school level. The discussion on what influence the school context has on teaching and on student achievement was initiated by the US-American study known as the “Coleman Report” (Coleman, 1966). Since then, the discussions on the importance of influencing school context factors on teaching quality have been ongoing and controversial. Hanushek argues that the

differences between the available resources of schools are not strongly related to the students' achievement (Hanushek, 1997). Yet, in countries of development cooperation, this influence has been found to be markedly higher. Scheerens (2001, p. 361) summarizes three elements in regards to school effectiveness research in development cooperation countries:

- “1. considerably larger between-school variation in developing countries as compared to industrialized countries;
2. a more consistent and stronger effect of material and human resource input factors in developing countries;
3. inconclusive and weak evidence on the effect of instructional factors that have received empirical support in industrialized countries.”

Scheerens states that there are elements that potentially enhance effectiveness, including material resource factors (e.g. equipment, textbooks) and the human resource factor (e.g. teacher qualification) (2001, p. 366). However, he concludes that there is still insufficient research in development cooperation countries that specifically focuses on instructional processes at the classroom level (2001, p. 380).

In her meta-analysis of research conducted on school effectiveness in developing countries – focussing specifically on studies in sub-Saharan Africa – Yu (2007, p. 27) states that school context matters. Yet, the meta-analysis could not show consistent findings: “[There is] the urgent need for more empirical studies to be conducted for sustainable and sufficient understanding of issues surrounding school effectiveness in this area.” (2007, p. 14).

Recent research shows that particularly school leaders can have quite an influence on teaching quality and on student outcome by supporting professional learning and development at their school (Timberley, 2010, p. 8). The meta analysis from Robinson investigated the effects of different leadership practices on student outcome and showed that school leaders who themselves are engaged in and promote professional development are strongest related to positive student outcomes (Robinson, Lloyd, & Rowe, 2008, p. 667).

More specifically, the aspect of *professional leadership* is often related to research on school capacity. Research shows that principals can be a positive factor in influencing effective teaching and learning. Youngs and King (2002) studied the relationship between principal leadership, professional development and school capacity in a qualitative study. Their results point out, that principals can play an important role in fostering teacher learning. Their research points out that the promotion of trust among the teachers and between the teachers and the principal is foremost relevant in this context.

### 2.1.2 Developing teaching quality: Learner orientation<sup>3</sup>

According to the research questions of the study at hand, the development of the concept of teaching quality is of central interest. In this section, the process of teaching is addressed and the question arises: How can quality teaching be defined in terms of the process itself? When it comes to the question as to what quality teaching means in classroom practice, research reveals many conflicting answers. Often the quality indicator is output-related in terms of student achievement (this will be discussed in chapter 2.3). The previously mentioned aspects that form the concept of *teaching quality* lay the foundation for the discussion of how teaching quality can be developed. In this study, teaching quality is strongly related to the teaching principle of learner orientation. This means that the main indicator of the quality of teaching in this study is understood to be teaching that relates to the interests, the previous knowledge and the background of students and to the goal of student activation. Therefore, the following will outline how learner orientation – as one central *set screw* for teaching quality – can be developed.

Teaching is no solitary act, but always addresses recipients. In school, these recipients are the students. Therefore, the teaching process can be considered as linkage between the teacher and the students. Based on the concept of teaching as part of an offer-use-concept and dependent on many different influencing factors, the objective of quality teaching is in the following referred to participation opportunities that are offered to students in class. The principle of learner orientation directs the way teaching is structured and put into action. The implementation of learner orientation in classroom practice relates to the relationship level between teacher and students as well as to the didactical realisation. In classroom practice, the underlying principle of learner orientation is commonly put into practice by the use of activity-methods in classroom teaching.

Learner orientation as an element of teaching quality is a respected and lasting pedagogical concept in Western teacher preparation (cf. Grieshaber & Ryan, 2005, p. 9; cf. current critique: Langford, 2010, p. 114). According to Ginsburg (2010), the philosophical and theoretical foundations of active-learning methods encompass two dimensions: the behavioural dimension tracing back to Dewey's learning by doing (1938) and the cognitive dimension referring to Piaget's (1970) insights on a learner's individual construction of knowledge. Learner orientation can be understood as activity-oriented concept that implies that a students' learning depends strongly on visible activities (communication be-

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<sup>3</sup> In the following, the expression learner orientation is used as underlying umbrella term for the expressions student-centred, learner-centred or child-centred pedagogy/learning/instruction.

tween teacher and students in cooperative learning forms). The rather new concept of cognitive activation can be seen as a complementary addition. This concept refers to the non-visible processes that imply active cognitive confrontation with learning content (Lipowsky, 2007, p. 28).

Bringing both of these concepts together would mean to assume that students that handle a learning content interactively – for example in partner dialogue – also are activated in a cognitive sense. Both aspects are regarded as two sides of one element and therefore the term learner orientation as referred to in this study implies both aspects – the physical activity of students and its implication that students are engaged cognitively.

“Learner-centred instruction – defined as a system of instruction based on a student’s individual choices, interests, needs, abilities, learning styles and educational goals – encourages students to construct meaning and understanding at all stages of the learning process” (Yilmaz, 2009, p. 23). Besides its cognitive learning duty, school also has a societal responsibility, educating the future citizens of a society (Astuto & Clark, 1995, p. 244). In this context, learner-oriented teaching can be seen as a contribution to social learning and social cohesion, as it is believed to better equip students for their future participation in a democratic society (cf. IEA Civic Study: Torney-Purty, 2002; Yilmaz, 2009). Furthermore, the educational quality of schooling is hoped to be improved by student activating methods (Baessa, Chesterfield, & Ramos, 2002, p. 205). Research indicates that a lesson design that activates students as well as their cognitive abilities leads to better performance (Tangyong, Wahyudi, Gardner, & Hawes, 1989). Reasons for that may be better acquisition of learning content and on the other hand, a higher expected self-efficacy that has positive influence on learning. McCombs and Whisler suggest four stages of change for reaching learner-oriented teaching: “1) increasing awareness and inspiring change; 2) observing models and building understanding; 3) adopting strategies and developing ownership; 4) adopting and maintaining new attitudes and practices” (McCombs & Whisler, 1997, p. 73). Research showed that teachers need support in requiring skills to put the teaching principle of learner orientation into practice in their teaching (cf. Peters, 2010).

Since the 1990s, the importance of a change from a teacher-centred to a more student-centred teaching culture has been increasingly emphasized in the educational context of development cooperation countries (Beeby, 1966; Inter-agency Commission, 1990, p. 4; Levin & Lockheed, 1993, p. 16; U.S. Agency for International Development, 2005, p. 9; UNESCO, 2000, p. 17). Thus, learner-oriented pedagogy started to become a frequent part of in-service trainings in countries in development cooperation (Mulkeen, 2007, p. 55). Some researchers see Open Educational Resources (OER) as an opportunity for teachers in this

context to gain access to teaching material that supports the pedagogic innovation from teacher- to learner-oriented teaching as offered, for example, in the context of the TESSA initiative (Teacher Education in Sub-Saharan Africa initiative) (Atkins, Brown, & Hammond, 2007; Wolfenden, 2008, p. 6).

These developments resulted in the need for teachers to learn the new role of teachers in educational settings that focus on learner orientation (cf. on student-centred discussions: Hale & City, 2006; Tschannen-Moran, Hoy, & Hoy, 1998). The new challenge is to pay attention to students individually and to deal with the heterogeneity of learning situations adequately by enabling constructive learning processes (Ginsburg & Wlodkowski, 2000; Schieferdecker, 2016). This requires deep subject-based and diagnostical competencies. Furthermore, social competencies are needed to create a comfortable learning and school climate as well as competencies to deal with conflicts and those to promote the self-esteem of students (cf. Leroy, Bressoux, Sarrazin, & Trouilloud, 2007; Schnebel, 2003). Consequently, the quality of learner-oriented teaching is also highly bound to the dimension of subject knowledge of teachers and social interaction in school life.

Ginsburg (2010) reports on case studies (in Cambodia, Egypt, Jordan, Kyrgyzstan and Malawi) that investigated professional development initiatives promoting student-centred teaching approaches. The teachers reported changes especially concerning their rhetorical use, behaviour and interaction in class (Ginsburg, 2010, p. 72; similar findings in Russia and South Africa: Schweisfurth, 2002). However, research showed that there often are objections on the part of teachers about the approach's usefulness (Sriprakash, 2010, p. 303) and challenges towards the implementation of student-centred teaching approaches in non-Western cultures (de la Sablonnière, R., Taylor, & Sadykova, 2009; Ginsburg, 2006; on specific challenges in the Asian context: Holloway, 1999; Kwon, 2004; Mtika & Gates, 2010). Largely, the successful introduction of learner-oriented teaching depends on the quality of the teacher-training programme. A longitudinal study from Desimone, Porter, Garet, Yoon, and Birman (2002) showed that active learning opportunities of teachers during the trainings supported the effects of professional development on their teaching practice (cf. Yilmaz, 2009). Mohammed and Harlech-Jones (2008) identified failures in implementations of educational reforms and reveal relevant conditions for the successful implementation of learner-oriented teaching approaches.

## 2.2 Teacher Professionalism

For the further discussions on the theoretical foundations of the analysis as to whether the participation of teachers in professional development, which is implemented as cascade training, contributes to the development of professional competencies of teachers, a closer look is taken at the concept of teacher professionalism in the following chapter.

For the theoretical frame of the study teacher professionalism is understood as an instrument to achieve the overarching goal to improve teaching quality in the context of the post-2015 discussions. Hence, the concept of teacher professionalism (cf. Chapter 2.2.1) and following the potential of professional development for the development of teacher professionalism are outlined (cf. Chapter 2.2.2).

Internationally, it is agreed that among the complex conditions that influence educational quality, the teacher plays a central role (Scheerens & Bosker, 1997). In the field of international research on teaching and learning, the discussion about professional teachers centres on the terms *teacher professionalization* and *teacher professionalism*<sup>4</sup>. The term teacher professionalization mostly refers to the sociological perspective on the historical process of an occupation in developing characteristics towards the status of establishing itself as a profession in society (Hoyle, 2001, p. 145). Common characteristics of professions are e.g. academic education, specific professional content knowledge and a professional identity (e.g. by means of professional associations) (Lundgreen, 2011, p. 9). In regards to the teaching profession, the discussion as to whether teaching is a profession or a semi-profession continues up until today with no definite resolution (Goodson, Hargreaves, Goodson, & Hargreaves, 1996, p. 5; Whitty, 2000, p. 282).

This study follows the theoretical line of argumentation on teacher behaviour and teacher action. Therefore, in this study the term teacher professionalism is used to relate to the commitment to quality of service in teaching practice, rather than the development of status (Goodson et al., 1996, p. 7; Hargreaves, 2000, p. 152; Hoyle, 2001, p. 148). According to Demirkasımoğlu (2010, p. 2048) “it is possible to interpret professionalism as a multi-dimensional structure including one’s work behaviours and attitudes to perform the highest standards and improve the service quality”.

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<sup>4</sup> The differentiation between ‘teacher professionalism’ and ‘teacher professionalism’ as introduced by Hoyle (1975) is recognized, but not seen as necessary by the author and thus neglected. In the current research literature the concept of ‘teacher professionalism’ is often termed as “teacher quality”, e.g. Goodwin (2008) or ‘teacher capacity’, referring to “a teacher’s knowledge, skills and dispositions” Grant (2008, p. 127). This research work on purpose uses the concept of teacher professionalism.



The following section first describes the current state of research in regards to the concept of teacher professionalism. Thereafter, the development of the concept of teacher professionalism by means of teacher professional development is described.

### *2.2.1 The concept of teacher professionalism<sup>5</sup>*

The aim of the following section is to outline theoretical perspectives in regards to the concept of teacher professionalism as one of the central foci of the research at hand. Therefore, recent theoretical approaches discussed in regards to the concept of teacher professionalism are outlined. After that, consistent with the competence theory approach, current theoretical foundations as to which knowledge areas define a competent and professional teacher are presented. As professional development seeks to convey new knowledge to the participants, which can then lead to the reconsideration of prior teaching practices, the theoretical concept of conceptual change of teachers is discussed at the end.

#### *2.2.1.1 Theoretical approaches to teacher professionalism*

Terhardt (2011) describes three theoretical approaches to explain the concept of teacher professionalism: the structural theory approach, the competence theory approach and the professional biography approach. These theoretical lines are briefly explained in the following section.

##### *The structural theory approach*

This approach seeks to develop the structural logic of professional behaviour with the objective to reconstruct the core of teaching behaviour (Helsper & Timpelt, 2011). The underlying structures that form the context of teaching are often depicted as paradoxical or antinomic. Such paradoxical challenges are, for example, the relationship of tension between proximity and distance, organisation and interaction or the challenge of treating all students individually different, but also equally (cf. (Altrichter & Posch, 1994; Helsper, 2000)). From this perspective, teacher professionalism is manifested, if teachers show reflection in their dealing with these antinomic situations (Timperley & Robinsohn, 2000).

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<sup>5</sup> The construct ‘teacher development’ is often used as the more general construct for the continuing learning processes on how to teach students successfully cf. Bell and Gilbert (1996, p. 1). In this study, the term ‘professional development’ of teachers – closely linked and often used interchangeably with teacher development – is preferred.

### *Professional biography approach*

This theoretical perspective focuses on the development of professionals as influenced and dependent from their individual career biography. This approach to professionalism concentrates on how teaching competencies are developed during an individual's career, concentrating for example on aspects that have conducive or hampering effects on an individual's development. In addition, the aspect of continuing on-the-job development is addressed, since teacher education is not completed after pre-service education (Herzog, 2011, p. 314). In this context, the role of professional development is intensely discussed as a means to develop professionalism for teachers that are already on the job (e.g. Rogers & Scott, 2008) (cf. Chapter 2.2.2).

### *The competence theory approach*

The range of responsibilities that make up the teaching profession can serve as starting point to define the competencies and knowledge areas that a teacher needs to have. Professional competencies of action are frequently formulated in reference to empirical results in regards to areas of knowledge, beliefs, attitudes and practical routines, which have positive effects on student learning (McDiarmid & Clevenger-Bright, 2008; Shulman & Wilson, 2004).

In reference to the competence theory approach, the following section will focus on the professional knowledge areas that are relevant for professional teachers and that describe the current state of research in this field.

#### 2.2.1.2 Professional knowledge of teachers

According to Darling-Hammond the core principles for teacher professionalism are that teaching needs to be “client-oriented and knowledge-based” (Darling-Hammond, 1990, p. 25). The question remains: What knowledge resp. what competencies mark professional teachers? This question is discussed as one of the fundamental conditions for teaching quality – also in the context of development cooperation countries. The lack of qualification of many teachers in development cooperation countries is well known. One key aspect that influences teacher professionalism in the context of development cooperation countries is the level of qualification of teachers (Riley et al., 2000). Often teachers are employed in schools with no or insufficient training (Lewin & Stuart, 2003). The need for qualified teachers in countries in development cooperation is often hoped to be counteracted by means of professional teacher training programmes (UNESCO, 2012, pp. 133–134). Teacher in-service trainings focus on the competencies that professional teachers need to acquire. For the conception of teach-

er training programmes, it is important to be aware of which areas of knowledge are relevant for professional teachers and how different knowledge areas go hand-in-hand with each other. In the last decade, classroom research concentrated on the question as to what set of professional competencies teachers need to acquire.

“Teachers’ professional knowledge is defined as the knowledge comprising all the profession-related insights that are potentially relevant to the act of teaching. These insights can pertain to the formal theories often derived from empirical research of various types and often informed by various discipline based theories (knowledge for practice) as well as codified craft knowledge that has emerged from research into the beliefs, valued, practices and experiences of teachers (knowledge of practice).” (John, 2008, p. 18)

Theoretical models that describe the composition of central competencies of professional teachers were developed. One currently developed model of professional competencies of teachers originates from the non-hierarchical model from Baumert and Kunter (2006) and was further developed by Blömeke, Felbrich, Müller, Kaiser, and Lehmann (2008, p. 723) (cf. Figure 1). The focus of the model is to depict a competence model for the professional competencies of teachers. One central hypothesis that underlies the model is that the domains general pedagogical knowledge, subject-matter content knowledge and pedagogical content knowledge are central cognitive components of the professional knowledge of a teacher. In addition to the cognitive components, professional knowledge also combines affective-motivational components. These comprise, for example, motivational orientations, value commitments/epistemological beliefs and self-regulative abilities. Each of these competence domains can again be differentiated into knowledge and ability (cf. Baumert & Kunter, 2006, p. 482).

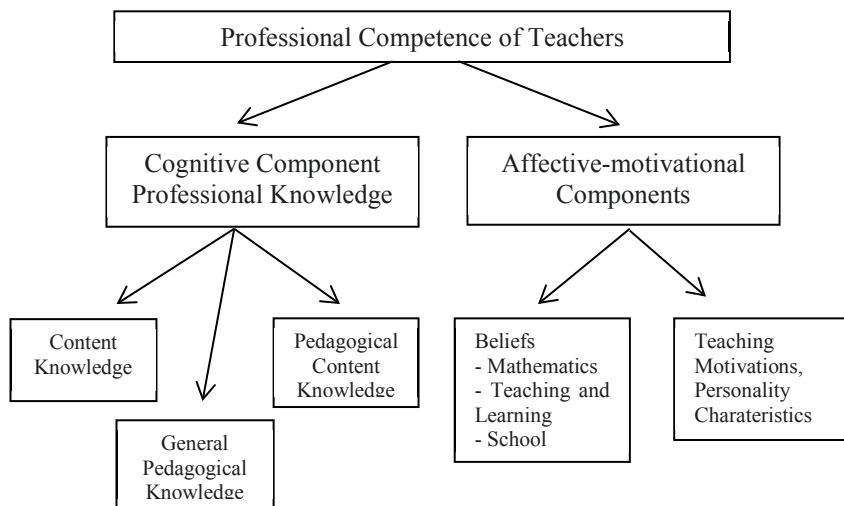


Figure 1: Model of professional competence of teachers (cf. Baumert & Kunter, 2006; Blömeke et al., 2009; Blömeke, Felbrich, Müller, Kaiser, & Lehmann, 2008; Blömeke, Kaiser, & Lehmann, 2008; König, 2010).

This model depicts the range of different areas of professional competence that play a part in teacher professionalism. In the context of the study at hand, the differentiation into cognitive and affective-motivation components is of importance. By drawing on research from Shulman (1987), the model differentiates between content knowledge, pedagogical content knowledge, and general pedagogical knowledge as components of professional knowledge. Besides a teacher's subject matter knowledge (content knowledge), effective teaching requires pedagogical knowledge on *how* to present the specific content of a subject to different learners (pedagogical content knowledge) (McDiarmid & Clevenger-Bright, 2008, p. 141). These subject-specific knowledge areas are complemented by general pedagogical knowledge “with special reference to those broad principles and strategies of classroom management and organization that appear to transcend subject matter” (Shulman, 1987, p. 8).

In the context of teacher pre-service training in development cooperation countries, this differentiation is commonly neglected. Many teachers work in school without pre-service qualification – in sub-Saharan Africa on average only 69% of teachers in primary school are trained and 78% in secondary schools (Glewwe & Kremer, 2006, p. 691). Due to the high demand for teachers, the

trend of hiring untrained teachers is on the rise. However, even teachers that have training certificates often have no training in pedagogical knowledge. Pre-service training in many sub-Saharan countries has a strong focus on content knowledge. Research shows that in countries of development cooperation, teachers are insufficiently trained in pedagogical knowledge. The cross-country research project MUSTER (Multi-Site Teacher Education Research project) analysed the situation of teacher training in five sub-Saharan countries. The results showed that learner-oriented teaching approaches are partly common objectives of the training curriculum, but these are not put into practice in teacher training. The focus of teacher training in colleges is the transmission of content knowledge (cf. Mulkeen, 2010, pp. 81–84). The authors state that the college training in the investigated countries has no large effect on the student teachers' competencies and skills compared to teachers that had no pre-service training (Lewin & Stuart, 2003). Professional development programmes that train teachers on-the-job and which focus on pedagogical knowledge can be seen as means to overcome this gap in teacher education.

### 2.2.1.3 Conceptual change of teachers

In the setting of the professional learning of teachers, the question of how teachers learn and how teachers change prior acquired knowledge and practices is crucial. In general, two different forms of knowledge are distinguished. The following paragraph aims to show that this separation is relevant for teacher learning. The one sort is practical or procedural knowledge needed for action and for handling situations. The other is propositional, declarative knowledge, which is needed to understand the meaning behind action. If professional development of teachers seeks to change thinking and behaviour, it always needs to encompass both sorts – procedural and prepositional knowledge (cf. Knight, 2002, pp. 230–232). In reference to the distinction of Broudy, who differentiates four modes of knowledge use in the relation to knowledge acquisition in professional development (replication, application, interpretation and association), Eraut argues that in relation to continuing professional education, the interpretation of new knowledge is the most important notion of use (1994, pp. 26–28). Teachers need to interpret or *translate* newly learnt content for their personal habitus before any knowledge use leads to changed behaviour.

Woodman and Dewett (2004, p. 33) provide one possible definition of “individual change”, saying that it “includes changes in behaviour and changes in both cognitive and non-cognitive individual difference characteristics”. Such changes on the individual level may develop into *grassroots movements*, which

lead to a bottom-up change process in an organisation, such as a school. Thus, change from one and then from more individuals can lead to changes in the structures of an organisation. Yet, individual change may also be a result of changes that happen on the organisational level, which influence the individual person in an organisation (top-down-processes). “An interactionist perspective on organizational behaviour and organizational change suggests the importance of understanding reciprocal influences in the change process. [...] As individuals act on their environment to effect change, so too does the organizational environment change those working within it.” (ebd.). The aspect that changes within an organization – such as in school – may function in both directions needs to be kept in mind in regards to any model of change for teachers.

To understand how teacher learning works, the cognitive theory of conceptual change needs to be considered. Conceptual change can be understood as cognitive action, which is taken in regards to a preferred concept and which is based on knowledge gain (cf. Smith, Hofer, Gillespie, Solomon, & Rowe, 2009, p. 161). “Therefore, it could be argued that professional change is best understood as coming about through a process of learning which can be described in terms of transactions between teachers’ knowledge, experience and beliefs on the one hand and their professional actions on the other.” (Fraser, Kennedy, Reid, & Mckinney, 2007, p. 7).

Depending on which author one follows, there are options of how to group the central factors that affect conceptual change of teachers. Smith et al. (2009, pp. 16–22) suggest grouping all influencing factors on conceptual change into two categories:

- 1) individual factors (teacher motivation, teachers’ concerns, self-efficacy, cognitive abilities, reflectivity, background)
- 2) school factors (school management, school profile, cooperation among teaching staff).

For successful conceptual change, learning situations are needed, in which a person experiences dissonances with prior beliefs or attitudes (cf. Timberley, 2010). Change can happen in various directions, also depending on the perspective. Clarke & Hollingsworth (2002, p. 948) formulate six dimensions of teacher change in the light of professional development:

- “Change as training – change is something that is done to teachers; that is, teachers are ‘changed’
- Change as adaptation – teachers ‘change’ in response to something; they adapt their practices to changed conditions.
- Change as personal development – teachers ‘seek to change’ in an attempt to improve their performance or develop additional skills or strategies.

- Change as local reform – teachers ‘change something’ for reasons of personal growth.
- Change as systemic restructuring – teachers enact the ‘change policies’ of the system.
- Change as growth or learning – teachers ‘change inevitably through professional activity’; teachers are themselves learners who work in a learning community.”

The authors reinforce the common state-of-the-art that a deficit-approach in professional development is neither appropriate nor effective and argue in favour of the last point mentioned above – change as growth or learning – stating that “[w]ithin this perspective, change is identified with learning, and it is regarded as a natural and expected component of the professional activity of teachers and schools.” (ebd.). Current research strengthens the point that teacher change can only be successful as an active learning process on the part of the teachers and not something to which teachers are subjected.

#### *2.2.2 Developing teacher professionalism: Professional development of teachers*

The previous chapter outlined central theoretical lines of the concept of teacher professionalism, which is central to the study at hand regarding the research question as to whether teachers’ participation in cascade training in professional development can contribute to the development of teacher professionalism and thereby have a positive effect on the teaching quality. In reference to the theoretical approaches on teacher professionalism (as described in chapter 2.2.1), the question arises as to how this concept can be developed.

The theoretical professional biography approach addresses the question of how teacher professionalism can be developed with view on the career of teachers. In the context of how to foster teacher professionalism, the need for professional development is widely acknowledged (Giordano, 2008; Riley et al., 2000; Smith & Gillespie, 2007a; Tatto, 2006; Villegas-Reimers, 2003). This study follows these lines of argumentation in that professional development is seen as a major instrument in developing teacher professionalism. The ideal objective of professional development is that it “enhances the preparation of new teachers, renews the professional skills and enthusiasm of classroom veterans, even those who may feel disenchanting or disenfranchised, and improves the professional expertise, self-confidence and commitment of all” (Day & Sachs, 2004, p. xiii).

Since the mid-20<sup>th</sup> century, the use of the term *in-service training* has been widespread. It is currently often replaced with the term *professional development*, comprising the different forms of on-the-job teacher training (Avalos, 1998; Villegas-Reimers, 2003). This change in the use of terms is linked to the rising awareness that short-term programmes demonstrate only limited impact. In this study, the term *professional development* is used in a broader way as an umbrella term for a variety of possible approaches of professional enhancement, whereas *in-service training* refers to the specific training activities that teachers attend.

Continuing Professional Development (CPD) can be defined as “the systematic maintenance, improvement and broadening of knowledge and skills, and the development of personal qualities necessary for the execution of professional and technical duties throughout the individuals’ working life.” (Construction Industry Council (1986) cit. in Friedman, 2012, p. 9; cf. Mulkeen, 2010, p. 96). During the last decade, the relevance of professional development of teachers has increased in the quality debate on education in the context of countries in development cooperation. The effective conception of in-service teacher trainings is seen as a core element for successful school development with the objective of improving quality teaching (cf. Verspoor, 2008, p. 92).

The following section will address common models of professional development with the goal of setting the framework for the professional development programme addressed in this study.

#### 2.2.2.1 Conception of Professional development

Former conceptions underlying professional development programmes depict the relation between input and output as linear. Guskey (1986, p. 7) described four elements as linear line of effect: staff development => change in teachers’ classroom practice => change in student learning outcomes => change in teachers’ beliefs & attitudes. Clarke & Hollingsworth (2002) argue that these elements intertwine and interact with each other and suggest a non-linear interconnected model (cf. Figure 2). According to the authors, *teacher change* can take place in each of the four depicted spheres. The *external domain* represents the input from professional development activities. The interlinkages between the domains represent a hermeneutic development of understanding. A newly acquainted piece of knowledge is put into practice (*professional experimentation*) and demonstrates a certain effect on students (*salient outcomes*). By means of mediating processes (*reflection and enaction*), this may lead to a re-conception of prior knowledge (*knowledge beliefs and attitude*) (Clarke & Hollingsworth, 2002, p. 951).



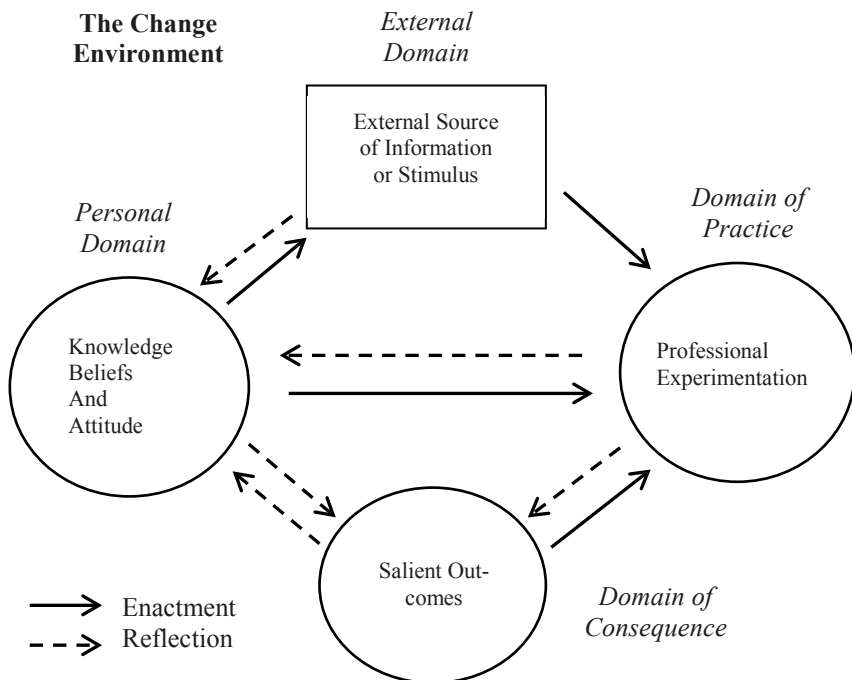


Figure 2: The interconnected model of professional growth (Source: Clarke & Hollingsworth, 2002, p. 951).

Knight (2002) argues that there is a need for a more systematic conception of professional development, including non-formal every-day practice learning situations and relating these to (usual) formal settings of professional learning.

#### 2.2.2.2 Types of professional development

The way in which continuing professional development is implemented varies largely in different countries and regions. Therefore, the following section presents common models and types of professional development. Various models of professional development can be differentiated. Avalos (2011, p. 17) demonstrates in a literature review of articles on teacher professional learning how

diverse teacher professional learning is conceptualized in different countries – concluding that there are many more models and types than the traditional in-service teacher training (INSET) model.

Well-known are for example models that train change agents (Schröck, 2009) or that follow the cognitive apprenticeship approach (Dunn & Rakes, 2010, p. 74). For the US-American school context, Smith and Gillespie (2007b) differentiate *Traditional professional development* and *Job-embedded professional development*. The traditional professional development models mostly consist of single workshops conducted off-site from the local school context. The distinguishing elements of job-embedded professional development models are the long-term continuing character and the location, since they are described to be mostly on-site at the local school (Smith & Gillespie, 2007b, pp. 214–216).

Another way to describe different models of professional development is according to the structure of the trainings. Kennedy (2005) defined nine models of professional development: the training model, the award-bearing model, the deficit model, the cascade model, the standards-based model, the coaching/mentoring model, the community of practice model, the action research model and the transformative model. These models can be grouped according to their purposes in terms of the professional autonomy that is conveyed with the particular model. Kennedy (2005) suggests that the above listed models can be categorized into three types depending on whether the purpose of the model is to transmit or to facilitate transformative practice (Kennedy, 2005, p. 16) (cf. Figure 3).


Model of CPD	Purpose of model
The training model The award-bearing model The deficit model The cascade model	Transmission <div>  <div>Increasing capacity for professional autonomy</div> </div>
The standards-based model The coaching/mentoring model The community of practice model	Transitional
The action research model The transformative model	Transformative

Figure 3: Spectrum of CPD models (Kennedy, 2005, p. 17).

In this context, Kennedy suggests a continuum that categorizes the learning opportunities through models of professional development in *transmissive*, *transitional* or *transformative*. Furthermore, the suggested spectrum characterizes the different levels of autonomy allowed to the participants.

The study at hand concentrates on a cascade model, yet, as chapter three will show, the investigated professional development programme also combines aspects from the above mentioned coaching/mentoring model and from the action research model.

## 2.3 Measuring educational quality

The context of the study at hand are the endeavours for Education for All of the international education movements to improve teaching quality with focus on the post-2015 phase and the awareness that teacher professionalism plays a central role in this context. For the operationalization of the research questions of this study, which analyse whether cascade training in professional development can contribute to teaching quality, it is important to explain how the main constructs of teaching quality and teacher professionalism can be operationalized empirically.

For the analysis and measurement in empirical research, the operationalization of the theoretical concepts central for the study is necessary. Therefore, the following section outlines how educational quality – set as a generic term – can be operationalized for empirical measurement. First, the measurement of the concept of teaching quality by means of video-based classroom observation is discussed (cf. Chapter 2.3.1). Second, challenges and means to measure the concept of teacher professionalism related to the professional development of teachers is outlined (cf. Chapter 2.3.2). Third, student achievement as indicator for teaching quality is discussed (Chapter 2.3.3).

This chapter focuses specifically on the measurement of cascade trainings in professional development of teachers, as this is the focus of the empirical study presented.

### 2.3.1 Measuring teaching quality

The methodological challenge of measuring teaching quality is due to the fact that the teaching process is often assessed by means of self-reported data from teachers or students that report about their perception of the quality of the teaching process. The subjective perception of the student or the teacher view can

provide useful information. In current research in teaching and learning, the data collection method of videotaping classroom processes has been discovered as a useful tool to gather information about the quality of teaching processes. Video-based classroom observation is a useful performance indicator of teaching quality.

#### 2.3.1.1 Video-based classroom observation

Teaching quality as defined in this study refers to the process of teaching and is characterized by the induction of learner-oriented teaching approaches that incite students to activity-method learning and to cognitive activation. Measuring such a process is a methodological challenge. By means of questionnaires or interviews, it is possible to get self-reported data from teachers that reflect their teaching behaviour or from students that reflect their learning process. Yet, classroom observations offer the chance to observe a class and to attain data that mirror the actual classroom activities (Aufschnaiter & Welzel, 2001; cf. Dinkelaker & Herrle, 2009; Knoblauch, Schnettler, Raab, & Soeffner, 2006). The first larger data collection of videotapes in educational research was the Video Survey 1995 (and the follow-up survey in 1999), which were part of the TIMSS (Trends in International Mathematics and Science Study) large-scale assessment. The goal of the cross-cultural study was to compare teaching practices in Germany, Japan and the United States of America (cf. Baumert et al., 1997; Baumert & Kunter, 2006). The TIMSS video surveys initiated a rising trend towards the use of video-based data collection in research on teaching and learning.

Besides the use of video survey as means to collect data in research, video data was found to be a useful tool in training teachers in professional development programmes. Borko, Jacobs, Eiteljorg, and Pittman (2008) report on the positive effects of the use of video tapes in professional development, since the discussions among the teachers enabled the teachers to examine one another's instructional strategies and thus fostered developing ideas for improvement. Clarke & Hollingsworth (2002, p. 949) describe teaching with video tapes "as a means to situate the professional development of teachers in realistic context". Darling-Hammond & Snyder state that video tapes can be used for "authentic assessment" and hereby "include opportunities for developing and examining teachers' thinking and actions in situations that are experience based and problem oriented and that include or simulate actual acts of teaching" (2000, p. 524).

The use of video tapes as data collection instrument in research on teaching and learning can be a fruitful tool for classroom observation with the aim to measure the quality of teaching processes. As a side-product, video data collected in research can be considered as didactical instrument in teacher education (Brophy, 2004; Seidel, Blomberg, & Stürmer, 2010).

### 2.3.1.2 Chances and challenges of video surveys

Some advantages of video surveys are that this method of data collection enables researchers to capture classroom interaction more holistically and increases greatly a researcher's possibilities for data analysis (in detail: Stigler, Gallimore, & Hiebert, 2000). Video data permits researchers to capture events more fully and greatly expands the researcher's ability to analyse complex human interactions, as video data can be coded and analysed various times by e.g. different researchers with different methods of analysis. Another advantage stated by Stigler et al. (2000) is that video data offers many opportunities for mixed-method research designs.

Of course, the data collection method of videotaping also has limitations (Roschelle, 2000). Video data provides information about the research object, which is a snapshot of the moment of data collection. There is no guarantee that the data delivers a reliable and authentic picture of the teaching process. In addition, video data may be in danger of being analysed without the frame or context of the teaching process, the teacher and the students. Although this critique is not unique to video data, the authenticity of the data may be affected by the so-called *camera effect*. The persons that are videotaped may act not *normal*, but according to the social expectations of the researcher team, that conducts the data collection. Yet, research has shown that the camera effect passes quickly within the first minutes of the video recording and that its influence is not as substantial as commonly assumed (cf. Stigler et al., 2000).

### 2.3.2 Measuring teacher professionalism

Professional development of teachers can be seen as means to develop teacher professionalism. The study at hand aims to analyse whether the teachers' participation in professional development contributes to their professional development. Therefore, the following section outlines the challenges and means for the empirical measurement of professional development and specifically focuses on cascade trainings in professional development.

Saunders identifies the training and professional development of teachers as one of eight key domains influencing effective teaching and learning (2000, p. 6). Professional development can play a key role in the development of teacher professionalism. Therefore, the question arises as to how the effectiveness of professional development can be measured. Research shows that there are non-linear and complex modes of operations at work between teacher knowledge, teacher behaviour and student outcome (cf. Lipowsky, 2010, p. 40). Therefore, when it comes to the measuring of effectiveness of professional development, many influencing factors have to be considered.

For the evaluation of professional development, Guskey suggests the following five consecutive levels: (1) the reaction of participants (subjective attitudes), (2) the cognitive learning growth, (3) the organizational integration and the support of the learner in view of the innovations in everyday school life, (4) the implementation in the lessons and (5) the influence on the students' learning (cf. Guskey, 2000). Due to the before mentioned complexity of the issue, many studies only focus on the evaluation of the subjective opinion of training participants (cf. Bessoth, 2007, pp. 31–34).

In reference to their model of factors, that influence the effectiveness of professional development, Adey, Hewitt, Hewitt, and Landau (2004, pp. 172–173) defined four blocks that according to the authors' opinion make up relevant influencing factors:

- 1) Nature of innovation: (e.g. the usefulness of the introduced innovation)
- 2) Quality of PD programme (e.g. the intensity, longevity and methods used in PD)
- 3) School Senior Management (e.g. the commitment and support of the principal)
- 4) Department or other group (e.g. communication among colleagues).

The first three blocks interact directly with the group of teachers (forth block). Adey comments that “each of the four main blocks has to be set in a positive condition for the PD to be effective. If any one of them operates negatively, there will be little or no effect on teachers, and therefore on students.” (Adey et al., 2004, p. 173).

There are many studies that analyse the subjective estimation of professional development and many conceptions of how professional development should be characterized to be effective (e.g. Birman, Desimone, Porter, & Garet, 2000). Current research points out that teacher professional development can be effective (Borko, 2004, p. 5; Yoon, Duncan, Lee, S., Scarloss, B., & Shapley, 2007). There are empirical indications that professional development can affect the teachers' practice in the classroom. In a longitudinal study Desimone et al.

(2002) report that specific features of teachers' professional development had effects on the change of the teachers' teaching practice. Along these lines are the large-scale survey results from Garet, Porter, Desimone, Birman, and Yoon (2001), who report that professional development is effective if the focus of the professional development activities is on the following three features: content knowledge, opportunities for active learning and coherence with other learning activities (cf. further empirical results: Wackermann, 2008). However, many authors emphasize the need for further research, especially in regards to specific features of professional development of teachers and their effect on the teachers' classroom practice and their students' learning (Garet et al., 2001; Helmke, 2009a, p. 311).

Showing effects of professional development activities on teaching practice or even the effect on student outcome is a methodological challenge, since showing causal effects requires e.g. randomly assigned treatment and control groups (Borko, 2004, pp. 11–12; Lipowsky & Rzejak, 2012, pp. 3–4). The next section will outline the complexity of theoretical effect models in professional development.

#### 2.3.2.1 The complexity of measuring professional development

Lipowsky (2010) gives an overview of current research results in regards to the different levels of effectiveness of professional development measured in the German-related and international empirical research.<sup>6</sup> The author concludes that current research shows that under certain conditions professional development can have an effect – even right on to the student level. Based on the empirical results summarized in his overview, Lipowsky developed an offer-use model (based on the offer-use-paradigm, cf. Chapter 2.1.1.1) that combines the relevant factors that are linked to each other and have an influence on whether professional development is effective or not (cf. Figure 4). The model depicts how complex and sensitive to failure effective professional development is. It comprises elements that are related to the training, to the context and to the teachers. Besides the teacher training elements contextual preconditions from the school environment (before, during and after the training) and teacher characteristics (their beliefs, knowledge as well as willingness and motivation to apply new practices) are also important determinants for the effectiveness of professional development.

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<sup>6</sup> In contrast to Guskey (2000), Lipowsky (2010, p. 40) differentiates four levels: (1) reactions of participants, (2) cognitive changes, (3) changes in classroom practice, (4) changes in student outcome.

These elements relate closely to factors dependent on the training, encompassing characteristics of the training related to the objectives and the conception of the programme. Then again the teachers' perception and the use of the training is crucial for the teachers' motivation to transfer the newly learnt skills into their own teaching practice. These interrelating elements affect the transfer into the teachers' classroom practice and are decisive in terms of whether the chain of effect continues on to the student level.



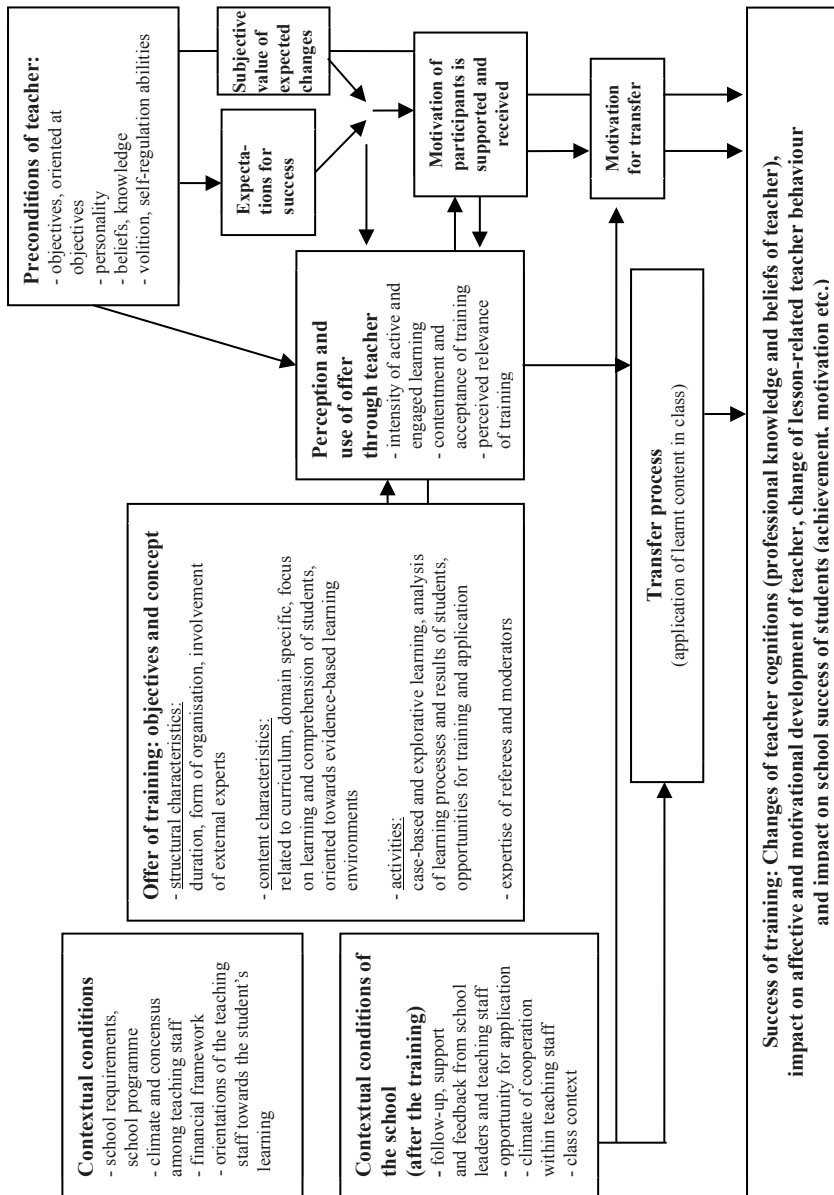


Figure 4: Extended offer-use model to explain the effectiveness of professional development (Source: Lipowsky, 2010, p. 51).

The scarce existing research on the effectiveness of teacher trainings in development cooperation countries demonstrates that there are only small correlations between years of teacher training and students' achievement (cf. Fuller & Clarke, 1994). But these studies were often not intended to show the effect of teacher trainings (McGinn & Schiefelbein, 2010, p. 438; Valle, 1982, p. 7).

Due to the rising need for teachers to reach the EFA-goals in many sub-Saharan countries in the secondary level, one suggested solution is to shorten pre-service training and stronger concentrate on in-service training. However, this would require a strong quality impetus in professional development for teachers in many development cooperation countries. Mulkeen's research showed that most teachers feel that their professional development prepared them to a lesser degree for their actual teaching practice compared to their pre-service training (Mulkeen, 2007, p. 52). The issue of effectiveness was not directly addressed in that research, but the results also demonstrated that the in-service trainings increased the teachers' professional confidence, offered them an exchange forum and kept them motivated to stay in the profession (Mulkeen, 2007, p. 53).

#### 2.3.2.2 The effectiveness of cascade trainings in professional development

The study at hand focuses on cascade training as a model for professional development of teachers. In general, cascade or multiplier trainings are seen as a cost-effective and economic way of passing on teaching reforms. The objectives pursued by cascade trainings are that selected teachers are trained as expert teachers (also called *multipliers* or *multiplicators*) who act as change agents. After their training, these multipliers return to assigned schools (often their home school) to pass on the training content they have obtained to the other staff members (Leu, 2004; Mulkeen, 2010, p. 97).

Empirical research on the effects of cascade approaches is scarce. One study showed that multiplier models are only efficient provided that specific conditions are met (Bergmüller, 2010). Although cascade trainings are widely spread in development cooperation programmes that focus on teacher training, research on its effective implementation in this context is a research desideratum. Research revealed that the crucial point for successful implementation of cascade approaches is often the structure and organisation (Navarro & Verdisco, 2000, pp. 3–4). Research provides evidence that short-term in-service training courses may be common and widespread in development cooperation countries, but their impact is not very significant (Cheng & Tsui, 1996; Giordano, 2008). According to Schwille, from a global perspective, teacher trainings also have to fulfil certain

characteristics to reach teacher effectiveness, pointing out that isolated training sessions and passive learning during the training is uncondusive (cf. Schwillé, Dembélé, & Schubert, 2007, pp. 103–105). An effective model of professional development needs to provide ongoing training provisions of teachers to realize sustainable change in the teachers' classroom practice.

The successful implementation of cascade training poses certain difficulties. A main challenge is that the lower levels do not receive direct training. This may lead to a dilution of the training content and thus hinder the desired long-term effects (McDevitt, 1998). Hayes set up five criteria for the successful implementation of a cascade training model. "To sum up, for cascade training to be successful, there appear to be a number of key criteria which the programme should take into account:

- the method of conducting the training must be experiential and reflective rather than transmissive;
  - the training must be open to reinterpretation; rigid adherence to prescribed ways of working should not be expected;
  - the expertise must be diffused through the system as widely as possible, not concentrated at the top;
  - a cross-section of stakeholders must be involved in the preparation of training materials;
  - the decentralisation of responsibilities within the cascade structure is desirable"
- (Hayes, 2000, p. 138).

Among these points, the spread of expertise to prevent high concentration of the training content on the top levels of the cascade turns out to be of central importance (Gilpin, 1997; cf. Wedell, 2005).

Wedell reports on a cascade approach in China and points out from that study that a pure focus on spreading the content is not sufficient. Educational planners of a cascade approach also need to focus on the context in which the trained teachers are supposed to introduce the newly learnt content. This should include planned continuing follow-up activities for the teachers and creating a supportive environment in the *home schools*. In addition, Wedell suggests that exchange structures among the trained teachers could be of help in fostering cooperation and interaction (Wedell, 2005).

In an evaluation of two cascade approaches in South Africa, Bax (2002) states that the integration of more social and cultural awareness during the training phases (which were held in Great Britain) may have hindered the reluctance of the trained teachers to hold workshops themselves after their return to South Africa. The collected data pointed out that content-wise the subjects of *role* and *status* would have had to be addressed in the teacher training. This indicates an important component for successful cascade approaches. Teachers that are

trained on the first level not only need training in the content, but also need to be trained as teacher trainers. A trainee that participated in training does not automatically turn into a teacher trainer. This change into the professional role of a teacher trainer can bring about cultural challenges in terms of *filling the new role* and accepting the new role as conductor of workshops with a certain knowledge advantage. Yet, this challenge can also be interpreted as an advantage of cascade models, since teachers very soon after their own training need to explain their new knowledge to other teachers. As known from learning theory, the capability to explain a piece of knowledge is the best test of whether a person understood what he or she thought to have learnt (cf. McDevitt, 1998, p. 428).

McDevitt points out further pitfalls for cascade approaches. There may be the danger that the content transmitted on to the first level is distorted when transmitted further in the cascade, since the trained trainers may choose and select content that they pass on. From its structure, the cascade model is a “one-way transmission”, which from its make-up prevents that “the final outcomes can feed back into the programme for further refinement” (McDevitt, 1998, p. 427). McCarney (2004, p. 65) points out that the quality of cascade models also depends on the quality of the trainers that train the first level of the cascade. Some authors refer to the cascade approach as an ineffective professional development model. This may be the case when carried out as e.g. described by McCarney, relating only to short trainings that last a single day (ibid.). These experiences from research in development cooperation countries point to many pitfalls when it comes to the successful implementation of cascade approaches. Yet, the argument put forward in the study at hand is that the effectiveness of professional development designed as cascade training depends strongly on how the cascade is planned, carried out and structured.

### 2.3.3 *Student outcome as indicator of quality*<sup>7</sup>

Professional development of teachers always has the underlying objective to reach the student level – conveyed through the trained teachers. For the analysis of whether the cascade training is successful, the student achievement is used as additional indicator to answer the research question.

The previously discussed concepts of *teaching quality* and *teacher professionalism* both relate to the effectiveness of teaching and learning in educational settings. Therefore, the terms quality and effectiveness need to be differentiated. According to Müller (1996, p. 18), the term quality is always related to subjec-

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<sup>7</sup> In this study, the term outcome is used and relates to long-term goals of education in contrast to the meaning of the term output, which is used for only direct imminent results.

tive norms and thus difficult to analyse in empirical research. As discussed previously, this leads to the challenge of a common definition of quality. Teacher effectiveness is mostly related to the successful output of teaching, which is commonly measured with student learning or achievement as main indicator (cf. Smith et al., 2009, p. 11). Teacher effectiveness can be defined as the changes that occur regarding knowledge, attitudes and behaviours of students due to teacher involvement (cf. Avalos & Haddad, 1981, p. 14).

The following section will discuss the theoretical idea of effect that underlies professional development activities and the complexity of the empirical measurement of student outcome. Since both concepts (teacher quality and teacher professionalism) have an inward reference to the respective outcome on students, this chapter can be seen as a linkage between the two theoretical concepts.

### 2.3.3.1 The chain of effects in theory

From a theoretical perspective, the relation between teacher and students in class is often characterized by a chain of effects that comprises according to some authors three main elements (cf. König, 2010, p. 43) (cf. Figure 5): The first element is the input delivered by the teacher. This input is influenced by the personal background of the teacher and by her or his attained qualifications (cf. concept of teacher professionalism, chapter 2.2). The second factor is the interaction between teacher and students. This interaction is understood to be the teaching process that happens in class. This process is influenced by social attitudes encompassing the school climate, the student-teacher-relationship etc. (previously defined as the concept of teaching quality, cf. Chapter 2.1). The third element is the output of teaching. The student learning comprises the social and the cognitive dimension of learning. The output of learning processes in school can be on the one hand social attitudes that students attain as well as their performance mainly measured through competence tests. The student output is strongly influenced by the individual background factors of a student, such as socioeconomic background, language competencies and parental support.

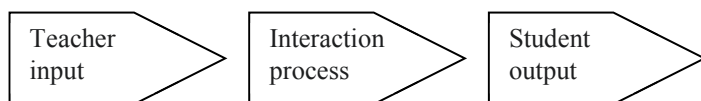


Figure 5: Framework for the relation between teacher effectiveness and student achievement (Source: own illustration).

This framework drafts the relation between teacher input and student achievement and can be interpreted as the foundation of the previously discussed offer-and-use-model.

The by PISA (Programme for International Student Assessment) introduced empirical turnaround in research on teaching and learning led to a strong interest in the outcome of learning – relating to the measurable factor of student achievement (Datta, 2004; Terhardt, 2002; for Latin America: Richter, 2010). In this context, the role of teachers in student learning outcome has also become increasingly focused in empirical studies over the last decades, with the objective of gaining knowledge about teacher effectiveness. This development also led to a growing assessment culture in educational settings. Educational assessments (mainly involving student achievement tests) are also used as a means for accountability of teachers or schools (cf. high-stake testing debate in the United States of America: Caffrey, 2009).

Research on educational effectiveness started with a study in the United States by Brookover, Beady, Flood, Schweitzer, and Wisenbaker (1979) and a study by Rutter (1979) in the United Kingdom (Creemers, B. P. M., Stoll, & Reezigt, 2007, p. 1). As literature reviews show, research studies first focused on features of effective schools as well as on aspects that result in effective education (Levine & Lezotte, 1990; Reynolds et al., 1994; Stringfield, 1994).

### 2.3.3.2 The complexity of measuring student outcome

The key role of teachers and teaching quality on student outcome is commonly agreed on. “Student achievement is believed by many to depend in large part on effective teaching” (Westley, 2010, pp. vii preface). “Students’ performance levels are seen as a reflection of teacher quality, competence, and preparation-better teachers are presumed to lead to better test scores” (Goodwin, 2008, p. 400). Teacher quality – when understood to refer to a teacher’s competencies, qualification and expertise – has a great influence on student achievement (cf. Darling-Hammond, 1997, p. 16).

Helmke stated that the characteristics of a teacher affect student performance in two ways: they influence the quality of the lessons and as role model the teacher has direct influence on the learning and the personality of a student (Helmke, 2009a, p. 112). Due to the previously discussed theoretical relation, student outcome is often used as indicator of teacher professionalism as well as of teaching quality (e.g. Timperley, 2008, pp. 8–10). With view on the outcome of teaching, much recent research focuses on how teachers and their teaching can be effective, often summarized with the term teacher effectiveness (Brophy,

1999). Yet, this results in the challenge that the empirical measurement of causal relations between teacher professionalism or teaching quality and student achievement is statistically difficult to establish due to the large range of covariates that need to be controlled. “There are numerous factors that influence student achievement, including past educational experiences, home and neighbourhood experiences, socioeconomic status, disability status, the classroom teacher, and so on” (Caffrey & Kuenzi, 2010, p. 60). Often the multilevel modelling needed for hierarchical data is not put into practice due to limited research resources.

In addition, education policy refers to the relationship between student performance and teachers. The American *No left behind Act* of 2001, for example, pursues as its main goal the raising of student achievement of low-performing students (Juenzi, 2010, p. 43). To achieve this goal, the policy also includes requirements to improve teacher professionalism (Westley, 2010, pp. vii preface). “It is widely believed that good teachers are critical to student learning. A large body of research had produced strong evidence that teacher quality is positively related to student performance. However, the strength of this research finding depends on the measure used to indicate ‘quality’” (Juenzi, 2010, p. 44). Besides the point that detailed indicators for the concept of teacher professionalism are missing, another aspect is that it is still unknown what factors really make up an effective teacher.

Nevertheless, there is recent research that indicates the empirical relation between teacher quality and student achievement. “Some studies examining teachers’ professional qualifications indicate a small positive relationship between the quality of their preparation and credentials and their students’ achievement” (cf. also Darling-Hammond & Snyder, 2000; Goldhaber & Brewer, 2000; Heck, 2009, p. 229). Greenwald, Hedges, and Laine (1996, p. 384) report in a literature review that among other teacher-related factors, teacher education has a strong influence on student achievement. There is broad evidence for the connection between competencies of students and teachers participation in trainings for the United States as well as for Germany, although with a less significant effect than in development cooperation countries (Baumert & Kunter, 2006; Rivkin, Hanushek, & Kain, 2005; cf. Wenglinsky, 2002, p. 19).

Research on the link between educational factors and their outcome has also been conducted in development cooperation countries. Early studies, as e.g. documented by the literature reviews of Fuller and Heyneman (1989) or Riddell (1989), show that “different paradigms of school effectiveness exist in developing countries where schools have a greater impact on achievement than home background factors” (Creemers, 1999, p. 39). However, since these first research

studies demonstrated methodological and statistical limitations, these results can only be seen as indicators.

Fuller mentions four studies that examined the effectiveness of in-service teacher training programmes on student achievement – among these, three studies show a positive correlation (e.g. for Brazil: Armitage, Batista, Harbison, Holsinger, & Helio, 1986; cf. Fuller & Heyneman, 1989). Chapman und Adams report from studies in the Asian primary school sector that show the connection between bad student performance and lacking expert knowledge, which could be led back to lacking pre- and in-service training (2002, p. 29). Yet, a detailed examination of the training's concepts is missing (Fuller, 1987, p. 281). Scheerens refers to the considerable higher influence of “resource input factors” – to which also the education of teachers belongs – on student achievement in development cooperation countries in contrast to *developed* countries (cf. Hanushek, 1997; Scheerens, 2001, p. 362).

For Botswana a significant connection was found between the subject competencies of teachers in mathematics and in reading with student achievement (Nguyen, Wu, & Gillis, 2005). In development cooperation countries, the evidence-based governance of educational systems by means of large-scale assessment studies can also be observed. Here PASEC (Programme d'analyse des systèmes éducatifs de la CONFEMEN [Conférence des ministres de l'Education des pays ayant le français en partage>] in the francophone countries of Africa) and SACMEQ (Southern and Eastern African Consortium for Monitoring Educational Quality in the Anglophone countries of Africa) should be mentioned, where experiences with respective test instruments in development cooperation countries were collected (cf. on the situation in Latin America: Küper, 2003; Postlethwaite, 2004; Scheunpflug, Thiel, Kuper, Stanat, & Hannover, 2009). One result from the SACMEQ data analysis demonstrated that “pupil achievement levels in mathematics were much improved in schools where teachers had received more years of pedagogical training and also had a better knowledge of mathematics.” (Duthilleul & Allen, 2006, p. 7). Research in developed countries has offered substantial evidence of the influence that teaching quality has on student achievement (cf. Stronge, Ward, Tucker, & Hindman, 2007). Further results are expected from the current conception to realize the PISA large-scale assessment in development cooperation countries (cf. for details on PISA for Development: OECD, 2013). Recent studies support the assumption that a teacher highly affects student achievement (Mendro, 1998; Nye, Konstantopoulos, & Hedges, 2004, pp. 253–255). In an US-based longitudinal study on factors influencing student achievement, “differences in teacher effectiveness were found to be the dominant factor affecting student academic gain” (Wright, Horn, & Sanders, 1997, p. 66) (cf. on challenges concerning the measurement of teacher effec-



tiveness: Heck, 2009, pp. 230–231). This shows that there currently exists little research on the effectiveness of teacher training on student learning in development cooperation countries (cf. Tatto, Lerman, & Novotna, 2010).

## **2.4 Research desideratum**

The previous sections of this chapter showed that in terms of teaching quality and teacher professionalism there are several research gaps. This is especially the case in regards to the effects of teacher professional development down to the student level. Furthermore, the effectiveness of professional development on the change of teachers' behaviour and their classroom practice is a field in which there is still a lack of empirical research. This is foremost the case when it comes to the effectiveness of specific models of professional development such as cascade trainings. These research gaps represent pressing questions in the quality debate in many countries. In the specific context of developing cooperation countries in which achievements have been reached in terms of access to education, a general research desideratum exists regarding the development of quality education. Therefore, with the objective to develop educational quality under economic and financial restrictions for education – such as in many countries in sub-Saharan Africa – it is necessary to overcome these research gaps consistent with the aim of the educational goals set out in the context of international movements for quality (e.g. Education for All movement; cf. Chapter 1.1).

This research will address these research gaps in various parts. It will contribute to the issue of how cascade models of professional development of teachers can be effective in changing the classroom practice of teachers in Cameroon. In addition, the chain of effects of professional development training to participating teachers as well as to the student level is analysed.

### *2.4.1 Research questions*

The research interest of this study focuses on the empirical analysis of the effects of a professional development programme, which is implemented in Anglophone Cameroon as cascade training. In the light of the previously outlined theoretical foundations and the existing research gaps, this study focuses on the following research questions:

a) *Effects of the cascade training on the self-reported teaching practice of the teachers*

The professional development programme presented in this study seeks to influence the teaching practice and the teachers' attitudes towards learner orientation. Therefore, the cascade training is considered to be effective if teachers that were trained in the programme show in their self-reported teaching practice and their attitude toward learner orientation more features of teacher professionalism than teachers that were not trained. In addition, the cascade training would be considered to be effective if the intensely trained multipliers display features of teacher professionalisation to a higher degree than the teachers trained by the multipliers.

b) *Effects of the cascade training on the actual teaching practice of the teachers*

In regards to the actual teaching practice of teachers that were trained in the programme, the cascade training is considered to be effective if teachers in programme schools show more features of teacher professionalism – relating to learner-oriented classroom practice – in their teaching. Furthermore, the cascade training would be considered to be effective if intensely trained multipliers show more elements of learner-oriented teaching in their classroom practice compared to teachers that were trained by the multipliers in school-based trainings.

c) *Effects of the cascade training on student achievement*

The cascade training is considered to be effective on the student achievement if students that were taught by teachers trained by the programme have higher achievement than students that were not taught by trained teachers. Furthermore, students that were taught by intensely trained multipliers are expected to have higher achievement compared to students taught by trained teachers

#### 2.4.2 Hypotheses

The previously described theoretical framework and the illustrated current state of research set the framework for formulating the following research hypotheses from the research questions at hand:

*Effects of the cascade training on the self-reported teaching practice*

It is supposed that the investigated professional development programme functions according to a cascade model. This implies that the intensely trained multipliers show a higher degree of effect of the professional development activities in their teaching practice and in their attitudes towards learner orientation than the

teachers trained by the multipliers. Yet, it is also assumed that the trained teachers show more effects of the training than untrained teachers.

This study investigates whether the cascade training has effects on features of teacher professionalism on the teachers' teaching practice and on their attitude towards learner orientation.

- Hypothesis 1: Teachers that were trained by the cascade training report to show features of teacher professionalism to a higher degree than teachers that are untrained.
- Hypothesis 2: Intensely trained multipliers report to show features of teacher professionalism to a higher degree than teachers trained by the multipliers.

### *Effects of the cascade training on the actual teaching practice*

This study investigates whether there are differences in the actual teaching practice of teachers that were intensely trained by professional development, teachers trained by the multipliers of the programme and teachers that are untrained. It is assumed that trained teachers have a more professional teaching practice than untrained teachers. Furthermore, it is supposed that according to the cascade model the teaching practice of intensely trained multipliers is more professional than the teaching practice of teachers trained by the multipliers. A professional teaching practice is understood to encompass a subject-oriented didactical structure of lessons, feature communication between teacher and students, offer participation opportunities, include microelements of democratic education into the lessons and make effective use of questions.

- Hypothesis 3: Teachers that are trained by the programme have a more professional teaching practice than teachers not trained by the programme.
- Hypothesis 4: Intensely trained multipliers have a more professional teaching practice than teachers trained by the multipliers.

### *Effects of the cascade training on student achievement*

It is assumed that the professional development of teachers has a mediated effect through to the student level. It is supposed that this mediated effect will be demonstrated through the higher achievement of students taught by teachers trained by the professional development programme compared to the achievement of students taught by teachers not trained by the programme.

- Hypothesis 5: Teachers that participated in the professional development programme have an effect on the students' achievement.

- Hypothesis 6: The school-based training of teachers in programme schools has an effect on the students' achievement.
- Hypothesis 7: The intensive multiplier training has a larger effect on the students' achievement than the school-based teacher trainings.

## 2.5 Analytical framework of this study

The underlying concept of the study is that the cascade training of the professional development programme effects the professionalism of participating teachers and that teacher professionalism has an influence on the teachers' practice. Following, it is assumed that the teachers' practice has a mediated effect on the student achievement. With the aim to show these effects, the teachers that participated in the professional development activities of the intervention (differentiated in the group of multipliers and the group of trained teachers) are compared to a control group of teachers that did not participate in the professional development activities.

Research on the effectiveness of professional development shows that there is a close connection between features of teacher professionalism and teacher practice (Bolam & McMahon, 2004; Reh, 2004; Tenorth, 2006). In the presented study, teacher practice was operationalized by collecting data on the trained teachers' participation and their perceptions of the usefulness of the professional development activities; in addition, data was collected on the teachers' perceptions of learner orientation in class (item scales: school climate, dealing with unfavourable conditions, teacher-student relation) and on their self-reported teaching practice (item scales: use of student activity methodology; learner-oriented goal-setting).

The theoretical chain of effect from teacher practice to student achievement was operationalized by collecting data on the students' achievement in natural sciences. The effectiveness of teacher training interventions is influenced by background characteristics of the teachers (e.g. pre-service qualification), of the schools (e.g. school resources) and the student body (e.g. socio-economic background). Data was collected on the background variables of the students, the teachers and the schools to control for the comparability of the programme and control group and to control possible confounding variables such as school pre-selection variables (e.g. school fee).

The following model (cf. Figure 6) describes the connection of the variables that were collected in this study and which form the foundation of the reported analyses. The relevant factors for this study are: (1) the school, teacher and student background, (2) the intervention programme, (3) the teacher profes-

sionalism, (4) the teacher practice, (5) the student achievement. Data was collected in this study on the thick framed elements marked in the model (cf. Methodological approach: chapter 4).

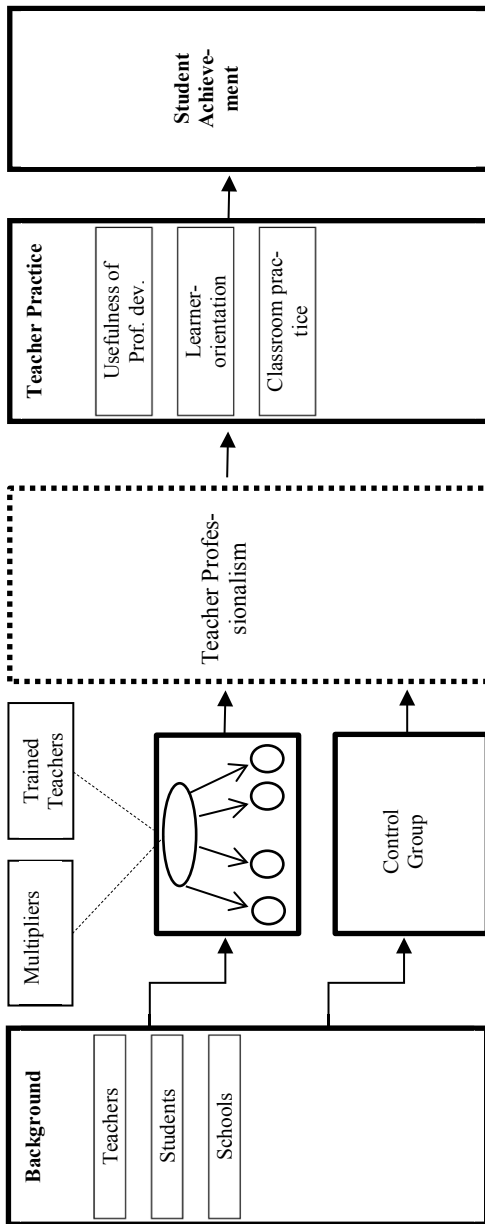


Figure 6: Analytical framework of this study (Source: own illustration).

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