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A large, stylized sunburst or fan-like graphic in a lighter shade of purple, positioned on the left side of the cover. It consists of a central vertical stem with multiple curved, radiating segments of varying lengths, creating a fan-like appearance.

SUPPORTING TEACHERS' PROFESSIONAL DEVELOPMENT THROUGH REFLECTIVE INQUIRY

lina Männikkö



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Kasvatustiede

IINA MÄNNIKKÖ: Opettajien reflektion ja ammatillisen kehittymisen tukeminen

Väitöskirja, 163 s.

Oppimisen, opetuksen ja oppimisympäristöjen tutkimuksen tohtoriohjelma (OPPI)

Elokuu 2019

Tiivistelmä

Väitöskirjassa tutkittiin luokanopettajien pedagogisia reflektioita kahdesta näkökulmasta. Reflektiot nähtiin hyvän opetuksen edellytyksenä ja prosessina, joka edistää ammatillista oppimista. Reflektiot kietovat opettajan opettamista koskevan käytännöllisen tiedon sekä henkilökohtaiset kokemukset ja taipumukset yhteen ja ohjaavat opettajaa tekemään havaintoja, tulkintoja ja toimintaa koskevia päätöksiä. Opettajan systemaattinen reflektointi ja herkkyys olla läsnä opetuksen monimutkaisissa ja nopeasti muuttuvissa tilanteissa nähdään myös adaptiivisen opetuksen lähtökohtana. Tämä väitöskirja koostuu kolmesta itsenäisestä kansainvälisestä julkaisusta, joiden aineistot on kerätty haastattelemalla opettajia. Aineisto I koostuu 10 luokanopettajan teemahaastatteluista, joissa käytettiin apuna kehyskertomuksia. Aineisto II koostuu 17 luokanopettajan video-stimulaatioon pohjautuvista teemahaastatteluista. Laadullisten tutkimusaineistojen analyysimenetelminä on käytetty sisällönanalyysia ja temaattista analyysia.

Tutkimuksessa I tarkasteltiin opettajien käsityksiä hyvästä opetustoiminnasta (aineisto I). Tulokset osoittivat, että opettajat hyödyntäisivät joko vuorovaikutteista tai ohjauksellista lähestymistapaa omassa toiminnassaan. Molemmat lähestymistavat sisälsivät toimintamenetelmiä, jotka koostuivat pienemmistä panostuksista. Panostusten lukumäärä yksittäisessä toimintamenetelmässä kertoi toiminnan intensiteetistä. Tulosten pohjalta on mahdollista syventää ymmärrystä opetuksen tilannekohtaisista vaatimuksista. Lisäksi opettajien tietoisuuden lisääminen opetuksellisista lähestymistavoista ja menetelmistä sekä niiden vaihtelevista intensiteeteistä voi tukea opettajien pedagogisen osaamisen kehittymistä.

Tutkimus II tarkasteli opettajien opetusta koskevia dispositioita reflektiivisen havaitsemisen kautta (aineisto I). Tulokset osoittivat millaisia huomioita opettajat

tekevät oppilaista ja opetettavasta sisällöstä opetustoimintojen kuvailun aikana, ja millaisia malleja huomioiden muodostavat. Opettajien huomioiden muodostamat mallit tulkittiin dispositioiksi eli taipumuksiksi havaita ja tulkita tilanteita tietyllä tavalla. Tulosten mukaan opettajien dispositioissa oppilasta ja opetettavaa sisältöä koskevat huomioiden kulkevat käsi kädessä, mutta huomioiden keskinäinen painotus oli vaihtelevaa. Tulosten pohjalta voidaan todeta, että kiinnittämällä huomiota reflektiiviseen havaitsemiseen, opettaja voi tulla tietoiseksi dispositioistaan, mikä puolestaan voi rikastuttaa opettajan kykyä tehdä interaktiivisia havaintoja ja tämän myötä kehittää dispositioita.

Tutkimus III keskittyi opettajien adaptiiviseen asiantuntijuuteen ja käyttöteorioihin (aineisto II). Tulokset osoittivat, että opettajien adaptiivisuutta voidaan tarkastella kiinteän tieto-orientaation ja avoimen tieto-orientaation kautta. Riippuen siitä, millaista orientaatiota opettaja painottaa käyttöteoriassaan, opettajan adaptiivisuus voidaan määritellä korkeaksi, keskitasoiseksi tai matalaksi. Tulosten pohjalta voidaan todeta, että kehittääkseen omaa adaptiivisuuttaan, opettajien reflektointiin, havainnointikykyyn ja rutiineihin liittyvään itsetietoisuuteen tulisi kiinnittää enemmän huomiota.

Kolme osatutkimusta osoittavat, että opettajan opetusta koskeviin reflektioihin vaikuttaa samanaikaisesti useita ulottuvuuksia. Opettaja joutuu tasapainoilemaan oppilasta ja opetettavaa sisältöä koskevien näkökulmien kanssa. Opettajan on huomioitava sekä yksittäisten oppilaiden että kollektiivisesti kaikkien oppilaiden tarpeet ja tavoitteet. Opettajan reflektioissa voidaan erottaa muodolliseen tietoon ja henkilökohtaisiin näkemyksiin liittyvät ulottuvuudet. Opettaja myös puntaroi kokemuksia, joita hänelle on syntynyt ennen opetustilannetta sekä havaintoja, joita hän on tehnyt opetustilanteen aikana. Lisäksi opettaja voi lähestyä ja tulkita tilanteita yksityiskohtien tai kokonaisuuksien kautta. On tärkeää huomata, että edellä mainitut ulottuvuudet ovat opettajan reflektiossa jatkuvassa vuorovaikutuksessa toisiinsa. Tutkimustulosten avulla voidaan lisätä opettajien tietoisuutta opetuksen moniulotteisuudesta ja siitä, miten opetustoimintaa koskevia reflektioita voidaan jäsentää.

Tutkimustulokset tuovat myös uutta tietoa aineistonhankintaan käytettyjen menetelmien hyödyntämisestä opettajien oppimisen tukemisessa. Kehyskertomusten ja video-stimulaation väliltä voidaan löytää tiettyjä ominaispiirteitä. Siinä missä kehyskertomukset tuottavat spekulatiivisia tulkintoja, video-stimulaatiot tuottavat selittäviä perusteluja. Kehyskertomukset suuntaavat opettajan reflektioimaan opettamista yleisellä tasolla, video-stimulaatiot puolestaan suuntaavat opettajan huomion heihin itseensä. Kehyskertomukset ohjaavat opettajaa visualisoimaan tulevia tapahtumia, video-stimulaatiot ohjaavat opettajan reflektioita menneisiin tapahtumiin. Molemmat menetelmät tuottavat monipuolisia reflektioita,

mutta siinä missä kehyskertomusten aikaansaamassa reflektiossa korostuu kontekstisidonnaisuus, video-stimulaatiot tuottavat tilannesidonnaisia reflektioita. Lisäksi opettajat toivat kehyskertomusten myötä esiin erityisesti näkökulmia liittyen oppilaan henkilökohtaiseen tukemiseen, video-stimulaatio puolestaan kytkeytyi vahvemmin oppilaan oppimisprosessin tukemiseen liittyviin näkökulmiin.

Yhteenvedona voidaan todeta, että opettajille on hyödyllistä saada tukea ja mahdollisuuksia systemaattiseen oman opetuksen ja oppilaiden oppimisen reflektointiin. Tutkimus ehdottaa, että opettajankoulutuksessa hyödynnettäisiin opetustapahtumiin pohjautuvaa reflektointimenetelmää, joka haastaa ja tukee opettajan ajattelua kiinnittämällä huomion kolmeen adaptiivisen opetuksen näkökulmaan. Opettajan reflektion on hyvä keskittyä (1) monipuolisten havaintojen ja tulkintojen tekemiseen, (2) kytkemään tavoitteet osaksi tulkintoja ja (3) pohtimaan vaihtoehtoisia pedagogisia vuorovaikutustapoja. Tällä tavoin opettajat voivat tulla tietoisiksi reflektioprosesseista, jotka edistävät adaptiivista toimintaa. Reflektiivisen tietoisuuden lisääntyminen mahdollistaa myös dispositioiden kehittymisen, mikä myös edistää adaptiivisen asiantuntijuuden kasvua.

Avainsanat: refleктоiminen, ammatillinen oppiminen, opetuksen käytännöt, pedagoginen ajattelu, adaptiivinen asiantuntijuus, opettajankoulutus

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Abstract

The aim of this doctoral dissertation was to examine primary school teachers' reflections from two perspectives: what teacher reflections consist of and how reflective practices enhance professional development. Teacher reflection was considered both as a premise for effective teaching and as a process, that supports professional development. Through reflection, teachers connect their practical knowledge with their personal experiences and dispositions in order to make successful observations, interpretations and action decisions. The teachers' ability to systematically reflect upon, and be sensitively present in, complex and rapidly changing situations is also a necessary factor in adaptive teaching practices. This dissertation was based on three original studies that collected data by interviewing teachers. Dataset I consisted of structured interviews with narrative scenarios (10 primary school teachers) and dataset II was collected by video-stimulated recall interviews (17 primary school teachers). The data were analysed using primarily an inductive approach and thematic analysis.

Study I explored the teachers' expected teaching actions in attention-demanding teaching situations (dataset I). The results identified two teaching approaches: an interactional approach and an instructional approach. Both approaches included separate methods of action, which further comprised smaller investments. The number of investments in teaching methods illustrated a continuum from low to high intensity. Based on the results, it is possible to achieve a deeper understanding of the situational demands on teaching and teachers' reflection. In addition, raising awareness about teaching approaches, and their respective methods and varying intensity among teachers, can support the development of teachers' pedagogical skills.

Study II examined teachers' dispositions through reflective noticing (dataset I). The results showed that the teachers referred to several observations of students and subject content when describing their actions. The observations formed patterns, which were categorised as dispositions for action. Five different dispositions showed that the teachers' student and content observations were integrated with different emphasis. Based on the results, it was concluded that, by paying attention to reflective observation, teachers may become aware of their personal dispositions, enabling the enrichment of teachers' interactive observation and thus developing their dispositions.

Study III focused on teachers' reflections of adaptive behavior and personal practical theories (dataset II). According to the results, teachers' adaptability was characterised by a varying emphasis on a fixed versus an open teaching orientation. Depending on which orientation was emphasised in the teachers' responses, the level of adaptability was defined as high, moderate or low. In order to develop as adaptive experts, teachers should flexibly practice observation and reflection of complex teaching events. In addition, more attention should be paid to teachers' self-awareness in their teaching routines.

The three studies showed that several core dimensions simultaneously influence teachers' teaching reflections. The teachers alternated between student and content orientation, considered students' needs and goals individually and collectively, and reflected upon formal knowledge issues and personal viewpoints. The teachers shifted their earlier experiences and interactive observations. The teachers also approached and interpreted events through details or comprehensively. It is important to note that all the described dimensions constantly interact and thus influence each other. With reference to the core dimensions of teaching, it is possible to increase teachers' awareness of reflection processes and their structures. The core dimensions can also be exploited for example, when designing and conducting pedagogical training or practicum sessions in teacher education.

The results of this study also provide a new understanding of how to use narrative scenarios and video stimulations as reflective tools to support teachers' learning experiences. Narrative scenarios provided speculative interpretations, whereas video stimulations elicited declarative statements. Narrative scenarios guided the teachers to visualise actions and consider future events, while video stimulations guided them to recall past events. Both methods generated insightful reflections, but narrative scenarios were related to context, whereas video stimulations were strongly situation-specific. In addition, narrative scenarios mainly supported student being and video stimulations focused on enhancing students' learning processes.

Overall, based on the results, it was concluded that teachers benefit from continuing opportunities for reflective inquiry in order to systematically analyse their

teaching and student learning. This study suggests a case-based reflection method through which teachers' reflections on adaptive teaching practices can be examined and supported in teacher training programmes. According to the presented method, teachers are encouraged to reflect upon teaching cases from three perspectives that are necessary for adaptive teaching: (1) the observations and interpretations the case generates, (2) the goals and intentions of the case and (3) alternative methods of pedagogical interaction that could be used in similar cases. Thus, teachers can become aware of their reflection processes and develop their adaptive actions. Increased awareness makes it possible to develop dispositions that promote the development of adaptive expertise and professional identity.

Keywords: teacher reflection, professional development, instructional practices, pedagogical thinking, adaptive expertise, teacher education

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List of original publications

This doctoral dissertation is based on the following three original publications, which are referred to in the text according to Roman numerals (I–III):

- Study I** Männikkö, I. & Husu, J. (2018). Uncovering Expected Teaching Actions in Attention Demanding Teaching Situations. *Teacher Development*, 22 (5), 651–667. DOI: 10.1080/13664530.2018.1464503
- Study II** Männikkö, I. & Husu, J. Exploring Teachers’ Relational Dispositions through Reflective Noticing. Manuscript under re-review in *International Journal of Educational Research*.
- Study III** Männikkö, I. & Husu, J. (2019). Examining teachers’ adaptive expertise through personal practical theories. *Teaching and Teacher Education*, 77, 126–137. DOI: 10.1016/j.tate.2018.09.016

Within all three articles IM contributed to the study conceptions and designs; data collections, analyses and interpretations; and was responsible for the writing of the manuscripts. JH revised and co-authored the manuscripts for submissions and publications.

1 Introduction

Teachers' interactive decision-making processes are complex and teachers are continually called upon to find solutions to problems. Kansanen et al. (2000) asserted that teachers are "constantly encountering problems or situations where they must immediately do something, make a choice among realistic alternatives, reflect on their own actions, and evaluate the progress of the whole instructional process" (p. 1). For example, the lesson may not go according to plans, students may behave unexpectedly, or the instruction tools may fail. In these situations, teachers need to respond quickly because they are responsible for students' learning. Research has shown that teachers must not only cope with unexpected situations, but also consider how they can adaptively enhance effective teaching actions for different kinds of learners (Bohle Carbonell, Stalmeijer, Könings, Segers, & van Merriënboer, 2014).

Effective teaching is an elusive concept and comprises the whole teaching-studying-learning process and highlights relations between a teacher, students and subject content being taught (Stronge, Ward, & Grant, 2011). Effective teaching demands teachers to continually develop ways to support students' active studying-learning processes but also their own professional development (Kansanen et al., 2000). Teacher dispositions with their moral commitments are also an integral part of teacher effectiveness (Schussler & Knarr, 2013). Thus, even if particular teaching actions would produce wanted learning outcomes, but the methods used are not constructive from an ethical point of view, teaching is not effective (Tirri, 2008). This implies that skills for effective teaching cannot be measured solely by focusing on teaching actions, and neither measuring only students' learning outcomes does not reveal adequately the effectiveness of teaching. More essential is to focus on how teachers intertwine their ideas and intentions into teaching: how and why teachers choose particular teaching methods for particular students, and what they expect to achieve with them (Darling-Hammond, 2012).

Thus, effective teaching does not involve particular teaching models or methods that have been shown to be effective, but depends on the context in which the actions are taking place (Stigler & Thompson, 2009; Verloop, Van Driel & Meijer, 2001).

Effective teaching means neither that teacher-centered teaching methods should be idealised or missed, but rather it refers to teacher-student interaction that considers students' ideas and beliefs as critical resources for actions (Forzani, 2014). Effective teaching can be considered as an educational aim that relies on teachers' willingness and ability to observe and interpret what is happening in their classrooms and to make successful and sustainable pedagogical decisions to support student learning (Wadlington & Wadlington, 2011). Effective teaching requires reflective ability of teachers and provides a solid foundation for the integration of educational innovations (e.g., co-teaching, phenomenon-based teaching and digital technology) with teachers' daily work practices. In order to promote effective teaching, it is essential to develop reflective tools for deepening teachers' practical knowledge and pedagogical awareness (Stigler & Thompson, 2009; Verloop et al., 2001).

This doctoral thesis focuses on teachers' reflections regarding their actions in attention-demanding classroom situations. The research examines teacher reflections and it contributes to teachers' professional actions and professional development. In line with these aims, separate studies focusing on teachers' reflections on their expected teaching actions (*Study I*), dispositions through reflective noticing (*Study II*), and reflections about adaptive behavior (*Study III*) were carried out. Teacher reflections are considered both as premises for effective teaching and as tools to support professional development. Through reflection, teachers connect their practical knowledge and dispositions with observations, interpretations and action decisions. The ability to systematically reflect upon, and be actively and sensitively present in complex and rapidly changing situations is also a key factor in adaptive teaching practices. The data for the empirical studies were collected by interviewing primary school teachers.

1.1 A pragmatic starting point for the study

A teacher's central task is to enhance students' active role in learning (The Finnish Ministry of Education and Culture, 2014; Vieluf et al., 2012). This study considers that the key factors enhancing students' active learning are teachers' practical knowledge and ability to make essential observations and interpretations, and that teachers' dispositions to use these components guide teachers' decisions regarding curricular aims and approaches for effective teaching (Biesta, 2012; Elbaz, 1981; Rodgers & Raider-Roth, 2006). This understanding also leads to condense a general point of education in line with Biesta (2012): "... [it] is never that children or students learn, but that they learn *something*, that they learn this for particular *purposes*, and that they learn this from *someone*" (p. 36). Based on this central idea of teaching (see also Kansanen et al., 2000), this study examines teacher knowledge

and teaching from a pragmatic philosophical perspective and views student learning as a component of educational pragmatism (i.e. transactional constructivism—Biesta, 2012; Biesta & Burbules, 2003; Sutinen, 2008).

The essential upholders of pragmatism, Charles S. Peirce, William James and John Dewey, stressed the importance of practice and experience and saw practical actions as manifestations of an individual's thinking processes (Biesta & Burbules, 2003; Kilpinen, Kivinen, & Pihlström, 2008). Pragmatists view life as it is, question the interface between theory and practice, and perceive thinking as a means to justify an action. This viewpoint is especially important in the context of teaching, wherein 'theoretical knowledge' is often seen as separate from, or even irrelevant to, 'knowledge that works in practice' (Cheng, Tang, & Cheng, 2012; Meijer, Verloop, & Beijaard, 1999; Zimmerman Nilsson, 2017).

In a pragmatic approach, human knowledge appears through interaction between individuals and their environment (Biesta & Burbules, 2003), with knowledge arising from subjects who constantly determine this relationship in an appropriate manner with respect to their objectives (Siljander, 2014). Biesta and Burbules (2003) refer to Dewey's notion by stating: 'knowledge lives first "in the muscles" —and not in the mind' (p. 11). Similarly, "knowing is doing" (Wong, Pugh, et al. 2001, p. 325) describes well what Dewey meant when he highlighted the relationship between action and practical knowledge and suggested how individuals' thinking processes and their representations (i.e., their ideas, knowledge building, and learning outcomes) should be evaluated on the basis of people working in practical settings (Creswell, 2003). In this sense, the truthfulness of knowledge arises from the ability to act according to that knowledge. However, it is crucial to understand that the intention of actions must be seriously considered when the 'rightness' and 'wrongness' of actions is reflected upon. Not every well-working practical decisions are necessarily right from a moral perspective.

Applying pragmatic notions to educational contexts brings the active learning experiences and knowledge building of both teachers and students into focus. Regarding teaching and learning in schools, it is important to understand how teachers' knowledge and thinking are created and manifested through teaching experiences and how teachers, through their active observation and constant support, are able to engage students in their learning (Nesher, 2001; 2002; Paavola & Hakkarainen, 2008; Sutinen, 2008). According to a pragmatic understanding, this processing happens especially in operational environments in which teachers are able to transform and restructure their actions by reflecting (Siljander, 2014).

The pragmatic view of education is also connected with adaptive teaching, with teachers constantly forming new interpretations and reinterpretations of students' actions and educational aims (Bohle Carbonell et al., 2014; Sutinen, 2008). Through

this kind of adaptive processing, teachers shape their working environment in order to support and promote students' learning. However, it should be stressed that teachers' active role in teaching does not automatically guarantee that students will learn according to the teachers' intentions. Instead, a pragmatic perspective tends to view student learning as an individual and unpredictable event (Siljander, 2014).

Similarly, a pragmatic view of (professional) learning emphasises the role of individual experiences, ideas and hypotheses in creating new understandings of phenomena (Biesta & Burbules, 2003; Wong et al., 2001). Learning occurs by facilitating inspirational ideas that seize the learner and lead to changes both in the learner and in the environment (Wong et al., 2001). Nesher (2001; 2002), in line with Pierce, suggests that this kind of abductive discovery focuses on achieving a balance between formal, rational logic and psychological disposition. Referring to the same premise, Paavola and Hakkarainen (2008) encourage blurring of the boundary between the human mind and its surroundings. However, caution is necessary because learning via experience does not necessarily support the intended aims. Experience may be effective, but it also has the potential to be non-educative and biased (Dewey, 1938).

As noted, creating new knowledge and understandings from a practical perspective means that teachers are able to flexibly interact with observation, reasoning and acting. This view holds that teachers' pragmatic thinking is a form of constructive action, with teachers identifying a problem, inventing possible solutions to the problem, and trying out ideas in practice in order to solve the problem (Sutinen, 2008). Teachers' ability to carry out their actions in this way is heavily dependent on the social context: what kind of situational interpretations exist, how the interpretations are shared, and how teachers interact with the environment (Paavola & Hakkarainen, 2008). Throughout the process, teachers need to harmonise their experience with a social context and simultaneously adjust the context to meet their educational aims (Siljander, 2014; Sutinen, 2008). Thus, while educational pragmatism highlights experience and social engagement, it must also be connected with particular times and places and, thus, with ever-changing structures and processes.

In summary, the pragmatic research tradition does not view knowledge through its intrinsic value, but instead through its instrumental value (Biesta & Burbules, 2003). Sound knowledge and action have meaningful purposes and are often useful.

1.2 Reasons for studying the phenomena

During the past decades, a growing body of research has suggested that the reflective intertwining of teachers' knowledge, beliefs and interactive thoughts is among the most essential factors affecting effective teaching practices (e.g., Beltramo, 2017; De Vries, Jansen, & Van de Grift, 2013; Fairbanks et al., 2010; Mena, Hennissen, & Loughran, 2017). The studies show that reflective teachers are well aware of students' needs and interactive demands. In addition, the studies indicate that reflective teachers are able to consider the details of a teaching context and integrate them meaningfully into their actions. However, as Beauchamp (2015) notes, previous literature also suggests that "we still need to understand reflection better as it applies to teacher education, and that a better and more comprehensive definition would be helpful" (p. 133). It is also frequently recommended that the importance of reflection should be emphasised in teacher education programmes (Korthagen, 2017; Moore-Russo & Wilsey, 2014). By paying more attention to active and systematic reflection, student teachers can learn to make adaptive decisions for effective teaching and thus support students' learning (Rodgers, 2002; Vesterinen, Toom, & Krokfors, 2014).

While researchers generally agree that teachers' reflections are crucial for shaping their adaptive actions, the concept has also been criticised and researchers have stated that teachers' reflections do not automatically produce more effective actions (Beauchamp, 2015; Korthagen, 2017). For example, teachers' biased expectations of students can cause unsuccessful teaching events (Babad, 2009; Timmermans, Rubie-Davies, & Rjosk, 2018). Teaching habits or the prevailing cultural traditions of teaching may also prevent teachers from identifying the right or necessary issues in choosing effective ways of teaching (Stigler & Thompson, 2009). In addition, the assumption that teachers will spontaneously assess and continually adjust their activities or contemplate their consequences is not self-evident (Onosko, 1992).

The integration of essential knowledge and beliefs with successful teaching actions is thus a demanding process that requires being immediately present to students and situations (Rodgers & Raider-Roth, 2006). It also requires teachers to have the ability to flexibly recognise insights during teaching and apply these insights to practical actions (Harlin, 2017; Verloop et al., 2001). Several researchers (e.g., Buehl & Beck, 2015; Chung & van Es., 2014; van Es & Sherin, 2002) have especially emphasised the importance of paying careful attention to the ways in which teachers perform appropriate observations, interpret them, and transform them into new instructional practices. Through observation and interpretation of those observations, teachers are more able to build enhanced connections with their

teaching aims and students' expected learning outcomes (Blömeke, Gustafsson, & Shavelson, 2015).

As several researchers have pointed out, adaptive processes are important, not just for effective teaching, but also for creating learning experiences for teachers. Teachers' sense making of their knowledge and beliefs facilitates their professional development and building of a teacher identity (Beijaard & Meijer, 2017; Gibson & Ross, 2016; Loughran, 2010; Spalding, Klecka, Lin, Wang, & Odell, 2011). This is necessitated by prevailing teacher education programmes that do not always place "teaching at the center of learning to teach" (McDonald et al., 2014, p. 513) or do not sufficiently take into account how teachers can develop as adaptive thinkers (Darling-Hammond, 2016; Grossman, 2007; Rodgers & Raider-Roth, 2006). In addition, more evidence is needed with regard to how the promotion of reflection in teacher education can contribute to effective teacher development (Beauchamp, 2015; Korthagen, 2017; 2010). Thus, there is a need for a better understanding of how teachers can learn from practice in order to support students' individual and diverse needs (Avalos, 2011; Lineback, 2015; Tirri & Ubani, 2013). It is also important to focus on how teachers' adaptability can be supported in a sustainable manner and how teachers' learning experiences can be enhanced so that it provides long-lasting learning outcomes that are applicable to different situations and can be easily shared with other teachers and in different contexts (Grossman & McDonald, 2008; Lampert & Graziani, 2009; Stigler & Thompson, 2009).

Overall, the research focus of both the cognitive and situational perspectives to teachers' professional knowledge is very important (Stahnke, Schueler, & Roesken-Winter, 2016). Through a combined perspective, it is possible to develop reflective tools to enhance teacher learning that goes beyond technical skill and focuses on the educative reflective processes that allow teachers to build their own practical knowledge of teaching (Avalos, 2011; McDonald, Kazemi, & Kavanagh, 2013; Stigler & Thompson, 2009; Sun & van Es, 2015). In particular, more authentic and action-oriented tools and models for enhancing teachers' reflective awareness and metacognitive skills are needed (Bohle Carbonell, Könings, Segers, & van Merriënboer, 2016; Soslau, 2012; Wetzels, De Arment, & Reed, 2015). Thus, teachers may be inspired by their own experiences and ideas and develop more adaptive practical actions (Fives & Buehl, 2012; Moore-Russo & Wilsey, 2014; Wong et al., 2001).

1.3 The Finnish educational context of the study

The research was conducted in a Finnish primary school context. Finnish school system aims to provide all children equal opportunities to high-quality education, and the role of teachers in implementing high quality education has been identified as significant (Finnish National Agency for Education, 2017). Primary school teachers are educated in research-based—internationally appreciated—university programmes and qualified with a Masters of Education degree (Niemi, 2012; Tirri, 2014). Teachers work in municipal schools that are publicly funded and follow the guidelines of the Finnish National Core Curriculum for Basic Education (The Finnish Ministry of Education and Culture, 2004, 2014). The curricular guidelines are defined more specifically at the municipal and school levels, and teachers play an active role in this curriculum development. The primary school teachers are competent to teach all school subjects from the first to the sixth grade. Moreover, Finnish teachers are given a great deal of autonomy in deciding how to plan and conduct lessons in their classrooms and they are encouraged—at the school, municipal and national levels—to be innovative in their pedagogies and develop their professional expertise (Finnish National Agency for Education, 2017; Tirri, 2014; Toom & Husu, 2016).

Currently, the Finnish curriculum guidelines heavily emphasise the importance of broad-based skills, phenomenon-based teaching and digital learning environments (The Finnish Ministry of Education and Culture, 2014). In addition, according to the curriculum, teachers are expected to enhance their students' ability to take an active role in the learning process. These aims, as well as anticipated future challenges and rapid changes in society, impose new demands on teacher competence. Teacher education should provide teachers with more training on how to pay attention to these issues in planning, conducting and assessing their teaching (Saarinen et al., 2019). However, the development needs for teachers' basic, induction and further training have been identified (Teacher Education Development Programme, 2016) and practical means to tackle these challenges, in cooperation with teacher educators and other stakeholders, have been introduced under the leadership of the Teacher Education Forum. National development work is also evaluated and guided by the Finnish Education Evaluation Centre, which provides suggestions about the continuing development of teacher education (Niemi et al., 2018).

2 Theoretical framework

Teachers' thoughts and actions produce effective behaviour in real-life situations involving the concept of teacher competence (which is also known as teacher capacity) (Blömeke & Kaiser, 2017; Grant, 2008). Teacher competence is a component of a teacher's personality and consists of knowledge, dispositions and skills (Blömeke et al., 2015). Together these three factors underpin teaching practice and teachers' professional development. However, instead of seeing them as clearly separate from each other, Blömeke et al. (2015) concluded that "competence should be regarded as a process, a continuum with many steps in between" (p. 7). Teacher competence is a key factor in instructional events and necessarily consists of "interactions among teachers and students around content in environments" (Cohen, Raudenbusch, & Ball, 2003, p. 122). Furthermore, within the educational domain, teacher competence is always 'pedagogical' in that it takes its meaning from the aims and goals stated in the curriculum (Kansanen et al., 2000).

The components of teacher competence can be examined from the perspective of *generic competence*, which refers to teachers' intelligence or information processing abilities, or it can be connected with a certain context and understood as narrower subject expertise; that is, *domain-specific competence* (Blömeke et al., 2015). In addition, the components of teacher competence include both academic and non-academic attributes (Klassen, Durksen, Patterson, & Rowett, 2017) that are expressed through practical actions—especially through the ways in which teachers are able to deal with new situations and learn from them (Bohle Carbonell et al., 2014).

According to a short definition of teacher competence, the theoretical framework of this study uses the following components of teacher competence: knowledge, dispositions and skills. It also follows the focus of the empirical studies of the current doctoral thesis. The theoretical framework focuses on teachers' (1) practical knowledge of teaching and its intensive character, (2) dispositions that shape the way practical knowledge is used and (3) skills in adapting practical knowledge to teaching actions. In addition, the perspectives mentioned earlier are

connected by examining them from the standpoint of (4) teacher learning and professional development.

2.1 Practical knowledge of teaching and its intensive character

The practical knowledge of teachers is considered as an umbrella term, which is underpinned by numerous concepts and definitions including for example personal practical theories (Levin & He, 2008; Verloop et al., 2001). Dewey (1938) defined teacher knowledge as experiences that guide and support teaching actions. Schwab (1971) expanded the concept by considering the relationship between theoretical and practical knowledge and the multidimensional demands that practice makes on teacher knowledge. In the 1980's, Elbaz (1981) described practical knowledge as combining both practical and personal aspects, based on and shaped by several interactions in the school context. Clandinin (1985) further developed the notion of practical knowledge as being revealed through practical actions, based on personal and professional experiences, and striving for efficacy in achieving certain aims (see also Connelly & Clandinin, 1988; Connelly, Clandinin & He, 1997). Shulman (1986) approached practical knowledge by defining what teachers' pedagogical content knowledge includes and why it is needed for instructional decisions. In recent decades, the interest in teachers' practical knowledge has increased greatly. For example, Lampert (1990; 2001; 2010; 2012) has studied teachers' practical knowledge in relation to the problems of teaching and its relational characteristics, and Levin & He (2008) have focused on teachers' personal practical theories and, especially, the connections between the sources and content of practical knowledge (see also He & Levin, 2008; Levin, He, & Allen, 2013).

In line with previous studies, and especially with the definition of Verloop et al. (2001), this research defines teacher practical knowledge as knowledge structures and insights that are relevant to teachers' activities, and through which teachers build their contextual understandings. While practical knowledge originates from various sources and includes a wide variety of cognitions (e.g., well-balanced opinions, theoretical understandings, and innovations), it is also closely related to teacher beliefs and values, which represent a more affective aspect of teacher thinking (Mena et al., 2017; Stigler & Thompson, 2009; Tirri, 2008; Verloop et al., 2001).

2.1.1 Approaching teaching through core practices

Focusing on effective teaching approaches and their methods is particularly important for improving teaching (Forzani, 2014; Stigler & Thompson, 2009). The daily interactions between the teacher, the student and the content are based on the teacher's knowledge processing and actions decisions (Cohen et al., 2003; Hamre et al., 2013; Lampert, 2010; 2001). In other words, a practical knowledge base creates the conditions for teachers to use their teaching activities effectively by planning the lessons, interacting with students, and assessing the outcomes in relation to the established aims (Horowitz, Darling-Hammond, & Bransford, 2005; König, Blömeke, Klein, Suhl, & Busse, 2014).

Recent research has referred to this idea by using the concept of core practices, which enable teachers to use methods or techniques that can be efficiently employed to support students and their learning during the instructional process (Forzani, 2014; Grossman, Hammerness, & McDonald, 2009; McDonald et al., 2013). Core practices comprise “the enactment of knowledge, beliefs, and dispositions through strategies, routines, and moves that can be unpacked and learned by teachers” (Grossman & Pupik Dean, 2019, p. 158). Understanding the core practices requires teachers to be aware of the significance of contact (Korthagen, Attema-Noordewier, & Zwart, 2014), immediacy (Kelly, Rice, Wyatt, Ducking, & Denton, 2015), presence (Rodgers & Raider-Roth, 2006) and noticing (van Es & Sherin, 2002; Sherin, Jacobs, & Philipp, 2011). All these ideas emphasise momentary experiences, exchanges between teachers and students and how those exchanges provide various types of support for students, enhancing students' own active role, self-direction and learning through interaction (Babad, 2009; Forzani, 2014; Moore-Russo & Wilsey, 2014).

This study views core practices as concrete ways in which teachers consider their professional practices and pursue their progressive goals in teaching. For example, teachers may prefer certain ways of teaching if they emphasise particular aspects of the curriculum and respective teaching methods or, if teachers rely on high ideals about student learning, they might encourage students to develop as cultivated individuals (Fenstermacher & Soltis, 2004). In addition, teachers' personal expectations of students, such as their skill levels, affect teachers' selected practices (Timmermans et al., 2018). Similarly, Grossman, Hammerness, and McDonald (2009; see also Lampert, 2001) viewed core practices in terms of establishing a classroom culture and focusing on understanding student learning. Overall, core practices are closely connected with teachers' perceptions of students and classroom contexts in which everyday teaching occurrences will take place and facilitate learning experiences (Forzani, 2014; Stigler & Thompson, 2009). Teachers'

understanding of how students (are able to) understand the goals of teaching defines the starting point for instructional core actions (Forzani, 2014).

As the concept suggests, the core practices of teaching necessitate a sound grasp of the practical and relational demands of teaching (Bauml, 2009). Teachers need to understand how their actions can be performed for example within the limitations of time and other resources and identify opportunities to foster student learning or increase students' willingness to participate (Kennedy, 2006). In addition, as Kennedy (2006) and Lampert and Graziani (2009) have noted, core practices are easily transformed into routines and new work habits that help teachers to address potential actions with practical concerns. Increasing the understanding of core practices is especially important for student teachers whose teaching skills must be enhanced in order to meet the practical demands of their future work (Fenstermacher & Soltis, 2004; Forzani, 2014; Grossman & Pupik Dean, 2019).

2.1.2 The importance of core practices

Teachers' knowledge of core practices requires an awareness of the uncertain and unpredictable features of multifaceted teaching events (Ball & Forzani, 2009; Forzani, 2014; Kennedy, 2006). When choosing particular ways of teaching, teachers need to balance different requirements that involve several practical investments (e.g., teacher sensitivity and richness of instructional methods) in teacher-student interactions (Brante, 2009; Hancock, 2003). Teachers need to project and balance the intensity of these investments when they make decisions regarding tasks and acknowledge that individual actions can lead to a variety of outcomes (Good & Brophy, 2008). Thus, teachers' decisions in choosing their core teaching practices depend on how teachers understand complex, situational, intention-oriented and largely unpredictable teaching situations. Next, the four features of teaching demands will be described in more detail.

Teaching decisions often involve teachers to apply their knowledge of students (e.g., students' developmental levels and perceived learning abilities) and discipline-specific features, as well as the objectives of the curriculum and the school context (Gresalfi & Cobb, 2006; Janssen, Westbroek, & Doyle, 2015). These complex and overlapping demands require teachers to continually be in close contact with students and adjusting subject content in accordance with the requirements of the teaching context (Bransford, Derry, Berliner, Hammerness, & Beckett, 2005; Beltramo, 2017). Teachers have to make continuous observations of how students' knowledge, metacognitive skills and emotions are connected in order to best exploit situations for the benefit of the students (Gibson & Ross, 2016).

In order to define this complex organisation of teachers' practical knowledge more concretely, Shulman (1986) proposed seven categories for teachers' practical knowledge: content knowledge; pedagogical knowledge; pedagogical content knowledge; curriculum knowledge; knowledge of learners and their characteristics; knowledge of educational contexts; and knowledge of educational ends, purposes, and values. Thereafter, several researchers examined these knowledge categories in more detail and paid particular attention to pedagogical content knowledge (PCK) (e.g., Berry, Friedrichsen, & Loughran, 2015; Depaepe, Verschaffel, & Kelchtermans, 2013; Hill, Ball, & Schilling, 2008; Van Driel & Berry, 2017). Although the concept of PCK has also been criticised, its relevance and applicability to different contexts is considered to be important (Depaepe et al., 2013). Through PCK, teachers transform their subject matter knowledge into adaptive actions that support student learning (Hill et al., 2008). In teacher education contexts, it is also important to focus on the pedagogical approaches and tools that support the development of student teachers' PCK (Tirri & Ubani, 2013; Van Driel & Berry, 2017).

Even if teaching events are carefully planned and reasoned beforehand, this does not guarantee effective teaching (Fenstermacher & Soltis, 2004). Teaching is strongly situational, which places situational demands on teachers' ability to shift their practical knowledge for teaching actions (van Es & Sherin, 2002; König et al., 2014). As Fairbanks et al. (2010) state: "successful teachers must recognize that virtually every situation is different, must see multiple perspectives and imagine multiple possibilities, and must apply professional knowledge differentially" (p. 162). For this fundamental reason, it is important to focus on teachers' skill in observing essential situation-specific details (van Es & Sherin, 2002; Gibson & Ross, 2016; Ross & Gibson, 2010). However, mere observation of situational details during the interaction does not guarantee effective actions, since the observations need to be connected with existing knowledge structures and interpreted in a flexible manner (König et al., 2014; Ross & Gibson, 2010).

In an educational context, teachers' practical knowledge and situation-specific observations are necessarily organised and shaped by curricular aims and intentions for student learning (Stigler & Thompson, 2009). As Biesta (2012) argues, "any decisions about the content and form of education can only be made with reference to what it is one aims to achieve" (p. 38). Similarly, Kansanen et al. (2000) state that, in school contexts, study activities must be aligned with the curriculum. Teaching is a goal-oriented practice and teaching decisions must be based on an understanding of what teachers are going to achieve through selected approaches and methods, and how their actions support the ideal of student responsiveness (Lampert, 2010; Tirri, 2008).

Regarding the multilayered aims of teaching, teachers should be able to specify the aims that are regarded as meaningful in different phases of students' learning processes (Kennedy, 2006). In schools, prevailing curricular frameworks provide guidance for teachers' decisions and actions. In addition, teachers encounter a wide range of expectations from different stakeholders, such as parents or political decision makers. In the midst of pressure and support from many parties, teachers must constantly define and re-define their aims, plans and teaching practices. The objectives guiding the actions need to be aligned with both general curricular aims and students' interests and understandings (Forzani, 2014). Biesta (2012) suggests that teachers must establish the educational aims, which are related to qualifications (i.e., the knowledge and skills that must be learned), socialisation (i.e., how cultures and traditions are dealt with), and subjectification (i.e., how the students are seen as subjects of action and responsibility). This also involves teachers in processing the aims both at the general and individual level, but also in the short and long term (Stigler & Thompson, 2009).

Because teaching happens through continuous interaction between people, it also involves managing unpredictable events (Allen, Matthews, & Parsons, 2013; Duffy, Miller, Parsons, & Meloth, 2009). As Forzani (2014) notes, effective teaching is "a partially improvisational practice, contingent on the ideas and contributions that are offered in the classroom" (p. 359). In order to handle uncertainties in unpredictable settings, teachers often need to make quick but still meaningful decisions (Brante, 2009; Clark & Peterson, 1986; Kennedy, 2006). In the midst of rapidly advancing events, it is not necessarily meaningful to stop and consider oncoming events thoroughly because they constantly change and new events arise following the old ones. Instead, teachers may prefer teaching solutions that are simple, easy and involve a lower cognitive investment in their actions. For this reason, teaching routines and habitual ways of teaching can make teaching more predictable in constantly changing circumstances (Forzani, 2014; Kennedy, 2006; Lampert & Graziani, 2009). Although routines can limit teachers' ability to use core practices, they can also enhance teachers' use of their cognitive resources to make situation-specific observations and modify their accustomed teaching approaches (Lin, Schwartz, & Hatano, 2005; Schwartz, Bransford, & Sears, 2005). Therefore, the focus of core practices should be on the ways in which teachers can create their own understandings of core practices and fluidly translate them into actions (Ball & Forzani, 2009; Grossman et al., 2009).

2.2 Practical knowledge and teacher dispositions

Although teachers' practical knowledge can be considered as a key factor for producing effective teaching practices, it is not automatically used in practical actions. For example, teachers may refrain from applying certain knowledge if it does not fit their personal values (Verloop et al., 2001) or emotional states during the situation (Korthagen, 2017). Several studies have shown (e.g., Kansanen et al., 2000; Kennedy, 2008; Tirri, 2008; Wadlington & Wadlington, 2011; Uitto, Jokikokko & Estola, 2015) that teachers' capability in utilising practical knowledge for successful teaching is influenced by teachers' affective-motivational processing involving teachers' personal tendencies, values, emotions, principles and attitudes. Referring to this domain of teacher competence, the concept of disposition has reasserted itself in research on teacher education (Diez, 2007; Parrott, Da Ros-Voseles, & Eaton, 2013; Schussler, Stooksberry, & Bercaw, 2010; Wadlington & Wadlington, 2011). In the 1980s, teacher dispositions were considered to be 'habits of mind' and attributes that summarise "the trend of a teacher's actions in particular contexts" (Katz & Raths, 1985, p. 301). More recent interest in teacher dispositions has highlighted the connections between teacher dispositions, effective teaching and teacher education (Schussler et al., 2010). In particular, teacher education programmes across the United States have included dispositions in their standards and required teacher educators to pay close attention to them (NCATE, 2006; Parrott et al., 2013; Schussler et al., 2010). Later, teacher dispositions attracted more global interest and teacher dispositions are now studied and implemented in several teacher education programmes around the world (Welch & Areepattamamil, 2016).

2.2.1 Dispositions as tendencies to act

Although some researchers (e.g., Schussler, 2006) consider the concept of teacher dispositions to be ambiguous and imprecise, there is a consensus that dispositions bridge successful teaching (i.e. a realisation of the intended outcomes) and morally good teaching (i.e. worthwhile ends; Schussler et al., 2010). Dispositions are teachers' characteristic ways to connect their intentions with action decisions under particular circumstances. Dispositions are not unchangeable as they can be shaped and developed during teacher education and during teachers' professional careers (Stooksberry, Schussler, & Bercaw, 2009). Dispositions provide teachers with a meaningful foundation upon which practical knowledge can be built and further applied in teaching for different learners and subject contents (Parrott et al., 2013; Thompson, Ransdell, & Rousseau, 2005; Thornton, 2006; Wake & Bunn, 2016).

Figure 1 describes how dispositions shape teacher's ability to use situation-specific skills for effective teaching actions (Blömeke et al., 2015).

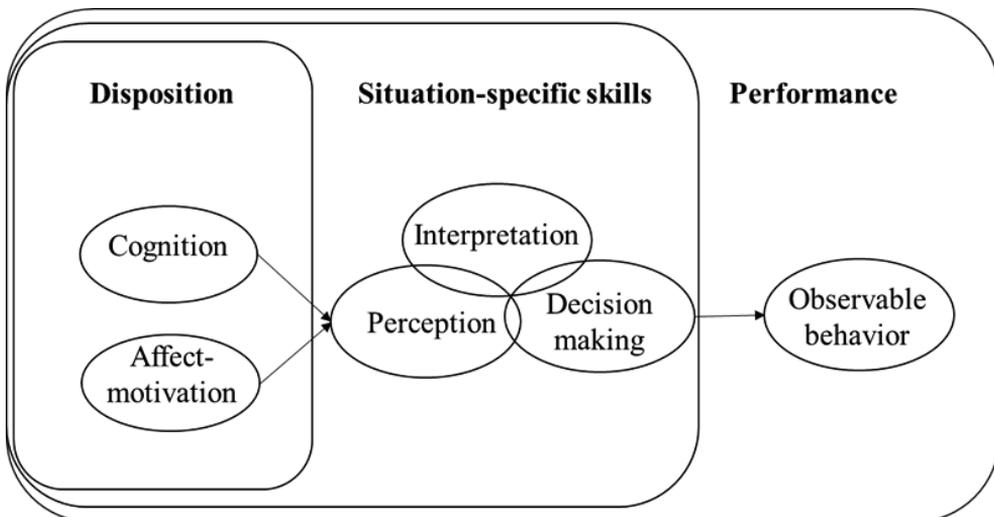


Figure 1. Dispositions as a basis for effective teaching and teacher competence (Blömeke et al. 2015).

As Blömeke et al. (2015) suggested, dispositions comprise both cognitive abilities and affective-motivational beliefs that shape teachers' situation-specific observations and interpretations to guide their teaching actions. Thus, in order to create practical knowledge for teaching, dispositions should integrate professional knowledge and experiences with teachers' personal characteristics. As Katz and Raths (1985) noted, when teachers' effectiveness is evaluated, the appraisals often consider their dispositions, not their skills: "Good teachers are often described in terms of their dispositions to be accepting, stimulating, encouraging, and so forth. Poor teachers are usually described in terms of such dispositions as impatience, remoteness, being rejecting, cold, and so forth" (p. 305). Similarly, Wake and Bunn (2016) mentioned that dispositions often refer to teacher characteristics such as "respect, flexibility, open-mindedness, persistence at task, risk-taking, curiosity, creative and innovative thinking, communication skills, and ability to listen to the voices of others" (p. 35). However, since teachers' personal traits cannot be directly interpreted as dispositions, the ways in which teachers manifest their characteristics (e.g., courage) in their actions can be classified as teacher dispositions (Katz & Raths, 1985).

Besides personal characteristics, teacher dispositions also involve moral viewpoints in connecting knowledge with actions (Fairbanks et al., 2010; Sockett, 2006). Teachers' pedagogical decision-making and practical actions are strongly

influenced by the values and norms that teachers' dispositions contain (Dottin, 2009; Tirri, 2008). For example, it is not enough that curricular aims align with general educational expectations; in addition, teachers' personal values and justifications should be in line with the aims of effective teaching (Elbaz, 1981). In addition to the moral viewpoints, teachers' emotional states during interactive teaching situations are embedded in their dispositions for actions (Korthagen, 2017). Furthermore, teachers' professional identities and the ways teachers see themselves as the experts of teaching shape their dispositions (Beijaard & Meijer, 2017; Beijaard, Verloop & Vermunt, 2000).

All of these presented factors together develop the relationship between dispositions and effective teaching. As Wake and Bunn (2016) stated, "Teachers who believe that they are capable of making a difference in their classrooms have a greater chance of positively affecting their students' performance" (p. 35).

2.2.2 Dispositions as means of knowledge and observation

Teacher dispositions shape and filter how teachers confront and interpret events, and how teachers manage themselves in instructional situations (Schussler et al., 2010). Because dispositions are closely associated with teachers' practical knowledge and how it is used in practice, they enhance actions, thoughts and feelings, and shape or reshape teachers' professional identities (Wong et al., 2001). It is also worth noting that teachers' personal beliefs may dominate to such an extent that they act like dispositions (Katz & Raths, 1985). Prospective beliefs tend to influence dispositions when teachers are framing their responses to instructional problems (Biesta, Priestley, & Robinson, 2015). Similarly, transient emotions that arise from the mismatch between teachers' intentions and situational demands can overrun their dispositions (Ainley, 2007; Schutz et al., 2007).

Dispositions are also closely related to situation-specific sensitivity: they guide teachers' observations and direct teachers' attention to particular issues and events. Thus, dispositions affect how teachers interpret their observations and guide their use of knowledge. Especially in poorly-structured situations, as Schussler et al. (2010) argue, teachers need "an inclination to put one's ability to use and the sensitivity to know when a situation calls for specific skills" (p. 351). In order to foster teachers' awareness of how situational and perceptual features shape teachers' dispositions, Stooksberry, Schussler, and Bercaw (2009; see also Schussler et al., 2010) have proposed a ICM framework of intellectual, cultural and moral domains of dispositions. When teachers are able to manifest all these dispositional domains, their actions are more likely to be effective (see Table 1).

Table 1. An ICM Disposition framework (Stooksberry et al., 2009; Schussler et al., 2010)

Domain	Relates to	Practical examples
Intellectual dispositions	<ul style="list-style-type: none"> • Instruction • Professional roles • Learning expectations • Beliefs about learning • Curriculum 	<p>What kind of expectations and beliefs do teachers have about student learning?</p> <p>How are decisions about curriculum and instruction made?</p>
Cultural dispositions	<ul style="list-style-type: none"> • Student identity • Instructional modifications • Teacher identity 	<p>How do teachers take into consideration students' gender or socioeconomic status and understand their cultural norms?</p> <p>How does cultural awareness influence teaching decisions?</p>
Moral dispositions	<ul style="list-style-type: none"> • Responsibility to others and care • Desirable ends • Values 	<p>How do teachers' personal values guide their responses to various teaching events? How do teachers help students to reach their individual learning potential?</p>

As Table 1 shows, to become aware and reflect upon the different components of dispositions enable teachers to envision effective teaching and find ways to adapt their teaching to meet students' needs (Stooksberry et al., 2009; Wadlington & Wadlington, 2011; Wake & Bunn, 2016). Dispositions connect several intentions and moral aspects to possible actions (Socket, 2006), deepen teachers' pedagogical and contextual understanding (Priyadharshini & Robinson-Pant, 2003), and produce thoughtfully adaptive approaches to future actions (Fairbanks et al., 2010). Despite these beneficial outcomes, dispositions are not straightforward ways to achieve effective teaching behaviours because teachers may have unfavourable dispositions or their dispositions might be underdeveloped (Popham, 2017). However, becoming more aware of their dispositions helps teachers to avoid their possible harmful effects.

2.3 The use of practical knowledge as an adaptive process

In order to implement effective teaching, teachers should have skills to adapt their practical knowledge with actions (König et al., 2014). In doing this, teachers need especially to understand how students' needs and influences are manifested within multifaceted classroom settings in an adaptive manner (Horowitz et al., 2005; Levin & He, 2008; Kennedy, 2008). Adaptive teaching skills also necessitate teachers' constant desire and ability to reflect upon classroom activities from different perspectives and in relation to the goals and demands of student learning (Wetzel et al., 2015). For these reasons, several researchers (e.g., Allen et al., 2013; Bohle Carbonell et al., 2014; Corno, 2008; Darling-Hammond & Bransford, 2005) have highlighted the need to clarify how adaptability might be supported in a real-life classroom context.

2.3.1 Building adaptive approaches by examining student learning

Teachers' skill in uniting practical knowledge with actions is linked to their adaptive ways of observing and interpreting essential features in their teaching and student learning (Bell & Kozłowski, 2008; Beltramo, 2017; Gibson & Ross, 2016; van Es & Sherin, 2002). In order to be adaptive, teachers have to take into account several issues and mirror and shape them according to the present situational needs and resources. For example, during teaching events, teachers should be able to balance the kind of pedagogical and instructional support that is useful for different students (Bransford, Brown, & Cocking, 2000; Tirri & Ubani, 2013). This goal can be contrasted with the ideas of *scaffolding* (Allen et al., 2013), *differentiation* (Corno, 2008), and *presence in teaching* (Rodgers & Raider-Roth, 2006) because they underline teachers' interactive capabilities as a necessary prerequisite for adaptive teaching. Moreover, adaptive teaching demands that teachers demonstrate:

... awareness, receptivity and connectedness to the mental, emotional and physical workings of both the individual and the group in the context of their learning environments and the ability to respond with a considered and compassionate best next step (Rodgers & Raider-Roth, 2006, p. 266).

Adaptive behaviour requires flexible cognitive processing in order to rationalise and restructure knowledge and prior experiences while teaching (Bohle Carbonell et al., 2014; Hammerness et al., 2005; Hayden, Rundell, & Smyntek-Gworek, 2013;

Moore-Russo & Wilsey, 2014). Vermunt and Verloop (1999) proposed six categories of cognitive processes to better analyse teachers’ adaptive teaching activity: relating or structuring, analysing, concretising or applying, memorising or rehearsing, critical processing, and selecting. Similarly, Anderson, Krathwohl et al. (2001, see also Krathwohl, 2002) have revised Bloom’s taxonomy of educational objectives (Bloom, Englehart, Furst, Hill, & Krathwohl, 1956) and defined six different cognitive processes that arise through reflective learning processes and enable teachers to use adaptive approaches (see Table 2).

Table 2. Cognitive processes as prerequisites for adaptive behaviour (Krathwohl, 2002, p. 215).

Cognitive process	Description	Example
Remembering	Retrieving relevant knowledge from long-term memory	Recognising, recalling
Understanding	Determining the meaning of instructional messages	Interpreting, exemplifying, classifying, summarising, inferring, comparing, explaining
Applying	Carrying out or using a procedure in a given situation	Executing, implementing
Analysing	Breaking material into its constituent parts and detecting how the parts relate to one another and to an overall structure or purpose	Differentiating, organising, attributing
Evaluating	Making judgments based on criteria and standards	Checking, critiquing
Creating	Putting elements together to form a novel, coherent whole or make an original product	Generating, planning, producing

As Table 2 shows, teachers’ adaptations are revealed through different cognitive processes, closely related to the teachers’ ability to acquire and interpret situation-specific essentials and to connect the information to practical actions (Biesta & Burbules, 2003; Clandinin, 1985; Elbaz, 1981; Wong et al., 2001). This connection process refers to the interaction between the knower and what is to be known, and how this changes (Biesta & Burbules, 2003). The different cognitive processes also illustrate the continuums from less complex to more complex and from concrete to abstract (i.e., see Table 2 from up to down; Krathwohl, 2002). The less complex

dimensions are considered to be prerequisites for more complex cognitive processes (Krathwohl, 2002); for example, in order to apply knowledge, a teacher needs to remember and understand things.

2.3.2 Adaptive expertise as a combination of routines and interactive insights

Adaptive expertise and routine expertise are often seen as opposites of each other (Hatano & Inagaki, 1986). However, several studies (e.g., Anthony, Hunter, & Hunter, 2015; Bransford et al., 2005; Lampert & Graziani, 2009; Schwartz et al., 2005) have shown that routines can also be important prerequisites for adaptive expertise. This is because teachers' skill in adapting their actions is closely related to balancing routine instructional practices with novel insights. Thus, routines, defined as well-trying experiences or knowledge representations, create a good starting point for adaptability in teaching situations. They require simpler cognitive processing than adaptive actions (Soslau, 2012; Stigler & Thompson, 2009) because "they have become automatic through practice" (Leinhardt & Greeno, 1986, p. 76) and thus give teachers the space and opportunity to perceive teaching from multiple perspectives (Kennedy, 2006; Schwartz et al., 2005). Routines also make teaching more predictable, assist in managing the diverse demands of teaching and allow teachers to base their actions on adaptive decisions (Forzani, 2014; Lampert, 2010).

However, relying frequently on routines may lead teachers to perceive events as simple, although they are seldom so in unpredictable teaching settings (Dewey, 1938). Similarly, if routine ways of acting have worked well previously and led to tolerable outcomes, teachers do not necessarily see the need for new forms of cognitive processing and the alteration of their teaching approaches. Therefore, from the viewpoint of adaptability, it is crucial for teachers to recognise the need to adjust routines and be able to modify their routines according to new and perceived demands (Bohle Carbonell et al., 2016). Changing teaching routines can be challenging (Lin et al., 2005), especially if routines are embedded in a certain (cultural) tradition of teaching (Stigler & Thompson, 2009).

Modifying routines toward adaptive approaches should not however be a goal in itself. Developing teaching adaptations should include theoretical justifications, showing that adaptation is useful for improving teaching performance and supporting the students' learning (Stigler & Thompson, 2009). Nevertheless, it is important to notice that such adaptive behaviour is a partly unconscious process that takes place on many different levels. Adaptability may occur in brief and rapid individual moments (e.g., implementing an old or new teaching method) or be related to broader educational approaches or thinking patterns that guide action in general

(Good & Brophy, 2008). If insights permeate routines and so bring new meaning to routines—of course, taking into account the established goals and individual needs of the students—teaching events can be considered to be adaptive.

2.4 Teacher learning and professional development through reflection

Teachers' continuing professional development is an important prerequisite for effective teaching and successful student learning (Feiman-Nemser, 2001). Teachers should continually connect their experiences and theoretical viewpoints, thus expanding their practical knowledge base and dispositions to support students' learning processes (Leijen et al., 2015; Stigler & Thompson, 2009). This requires teachers to be active agents who independently, but also in close collaboration with their social environments, try to understand situations in the interests of effective teaching (Fairbanks et al., 2010). For this reason, reflection is often seen as a useful component of teachers' professional development. Several researchers (e.g., Beauchamp, 2015; Blömeke et al., 2015; Harlin, 2017; Kansanen et al., 2000; Loughran, 2010) have suggested that teachers' learning often takes place through stimulating reflections and the connection of reflections with practical actions: a process that can be seen as a pedagogical thinking activity. Thus, teachers concretise their ideas and become aware of their knowledge and beliefs about teaching (Schön, 1983; 1987).

However, reflection on 'all kind of things' is not a key factor in learning. For this reason, it is neither guaranteed that, through reflection, teachers will spontaneously make effective use of their thoughts for practical actions (Beauchamp, 2015; Bransford et al., 2000) or that reflection will lead to teacher development (Zeichner & Yan Liu, 2010). Instead, the productive reflection process for learning should be rigorous; that is, not random thinking or directionless inventing (Rodgers, 2002). Similarly, Korthagen and Vasalos (2005) distinguish a structured reflection process from "what teachers are accustomed to doing" (p. 48). They present the ALACT model (named according the first letters of the phases; see Figure 2), which is widely used and reported in many publications (e.g., Korthagen, 1985; Korthagen, 2017; Korthagen & Kessels, 1999; Korthagen, Kessels, Koster, Lagerwerf, & Wubbels, 2001).

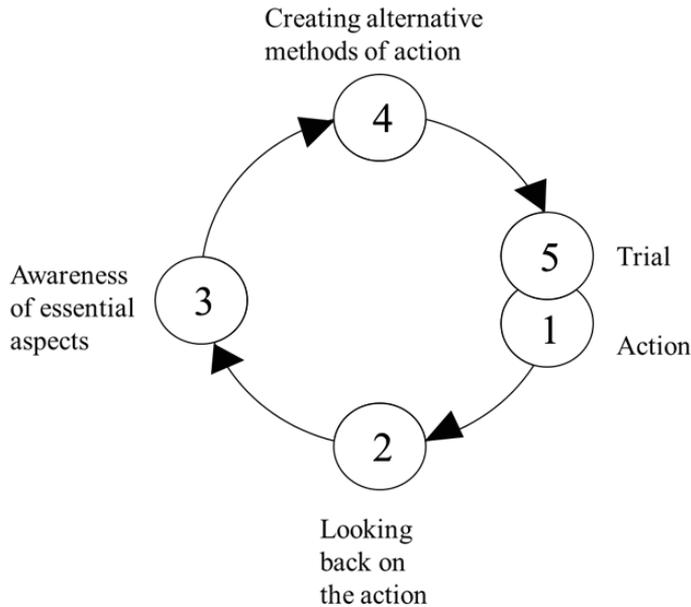


Figure 2. A structured process of reflection through the ALECT model (Korthagen et al., 2001, p. 44).

The five-phased ALECT model for reflection aims to support teachers' reflection processes. It directs teachers' reflections into a particular situation, guides teachers to become aware of the varied perspectives, suggests teachers to create alternative methods of action, and encourages teachers to try the alternative activities in practice (Korthagen et al., 2001). However, as Korthagen (2017) has outlined, it is important to note that reflections should not only focus on the rational aspects of teaching but also on the emotional and motivational aspects. The ALECT model acknowledges those necessary core qualities (such as care, sensitivity, commitment and flexibility) and encourages teachers to actualise and experiment new behaviours in varied situations (Korthagen, 2017; Korthagen & Vasalos, 2005; Korthagen et al., 2001). With the help of these phases, teachers can learn "to activate the process of core reflection during their teaching, and in this way to make contact with the core qualities which are of importance at that particular moment" (Korthagen & Vasalos, 2005, p. 68). When teachers ground their reflections on their experiences and intertwine personal theories with practice, they can create more relevant learning outcomes than traditional theory-based approaches (Korthagen, 2017).

Productive reflection deals with many types of knowledge and belief structures that affect what teachers discover in practical situations and how they interpret the observations (Moore-Russo & Wilsey, 2014; Kärkkö, Kyrö-Ämmälä & Turunen, 2016). During the process, as Levin and He (2008) note, a variety of experiences

creates beliefs, which are then implemented in teaching contexts. Many researchers (e.g., Clandinin, 1985; Elbaz, 1981; Schwab, 1971) have also found that conflicts between teachers' beliefs and practice reshape their practical knowledge, because knowledge structures are adapted in line with new understandings. In this way, teachers continually mould their practical knowledge through reflecting experiences, but existing knowledge structures will also affect their actions (Elbaz, 1981; Clandinin, 1985). For this reason, it is often suggested that practical knowledge cannot be found in textbooks or lectures since it is acquired in the course of teachers' daily work.

Several researchers (e.g., Chung & van Es, 2014; Forzani, 2014; Grossman & Pupik Dean, 2019; Moore-Russo & Wilsey, 2014) have also focused on developing various reflective representations, tools and pedagogies (e.g., narrative cases, modelling, rehearsals or video clips) to promote teacher reflection and to support teachers in identifying core teaching practices. Reflective inquiry can help teachers to assimilate experiences and habits through which teachers' dispositions can also be shaped. Maaranen & Sternberg (2017) suggest that: "[t]hrough supportive tools, student teachers are able to perceive and assess their experiences in order to understand the beliefs and assumptions underlying the experiences" (p. 701). However, it is important to recognise that, even though reflection may be systematic and structured, learning experience does not always result in the same learning outcomes for different learners. For example, the adoption of habits does not automatically evolve through experience, but requires conscious effort to break existing habits and routines (Gibson & Ross, 2016). Even if teachers have the same goals or follow the same guidelines, they may interpret things differently and implement them differently in their teaching (Fairbanks et al., 2010; Stigler & Thompson, 2009).

The construction of new practical knowledge through reflection is also largely influenced by social interactions, and the knowledge structures themselves are social in nature (Nonaka & Takeuchi, 1995; Wong et al., 2001). Nonaka & Takeuchi (1995) suggest that, instead of seeing teachers' practical knowledge as stable and explicit, it should be seen as a social and dynamic structure that is constantly transformed through social interaction. This phenomenon should not only be examined at a classroom level but equally, at the teachers' metacognition level. For example, a teacher who rarely sees how others teach will have a very limited understanding of different teaching methods or pedagogical approaches, as well as a weak ability to recognise his or her own behaviour (Bishop, 1976). Also, it is important to note that not all teaching experiences are good and effective from the perspective of professional learning, and not all bad learning experiences will necessarily result in poor practical knowledge either (Dewey, 1938).

Overall, this raises the question of what motivates teachers to reflect and build new knowledge structures for practical use (Wong et al., 2001). Fairbanks et al. (2010) highlight the importance of the belonging perspective: because a teacher builds new knowledge in close contact and interaction with different individuals and groups, the commitment of a teacher, and his or her sense of belonging in the environment, is central. The teachers' sense of belonging to 'something' is closely related to the teachers' dispositions, which have proved to be significant for supporting and affecting professional development (Hodkinson & Hodkinson 2005). Dispositions guide teachers to envisage future activities and reflective visions create learning experiences, which can make professional development possible (Dottin 2009; Gresalfi & Cobb 2006; Hodkinson & Hodkinson 2005; Schussler et al., 2010). In other words, if teachers do not dispose their practical knowledge for envisioning their teaching, their ability to learn adaptive approaches to teaching will be lower (Biesta et al., 2015).

3 The aims of the study

The aim of this doctoral thesis is to investigate teachers' reflections regarding their actions in attention-demanding classroom situations. The study aims to clarify how teachers' reflections take shape as patterns, and how the patterns work as rationales for teaching behaviour. Earlier studies have largely focused on the content and context of reflection and teachers' self-knowledge, without offering much explanation of the procedures or patterns by which the reflections are linked with teaching actions (Beauchamp, 2015). However, by examining the interconnected reflections on core practices, it is possible to better understand how teachers apply their knowledge in practice and, more specifically, how teachers go beyond technical skills to focus on the educative processes that allow them to build their own practical knowledge of teaching (McDonald et al., 2013; Stigler & Thompson, 2009; Toom, Husu, & Patrikainen, 2015). Reflective focus on core practices also enables teachers to deepen their understanding about effective teaching, and creates new learning experiences during interactions (Grossman et al., 2009; McDonald et al., 2013). These processes aim to support the work of student teachers, teacher educators, mentors, and others who are engaged in assisting the processes of learning to teach and enhancing teachers' effective teaching (Beauchamp, 2015; Forzani, 2014; Moore-Russo & Wilsey, 2014).

The general research aim is divided into two parts: the first examining what teacher reflection consists of and the second focusing on how reflective practices contribute to professional development. These aims are further examined through three studies (see Figure 3).

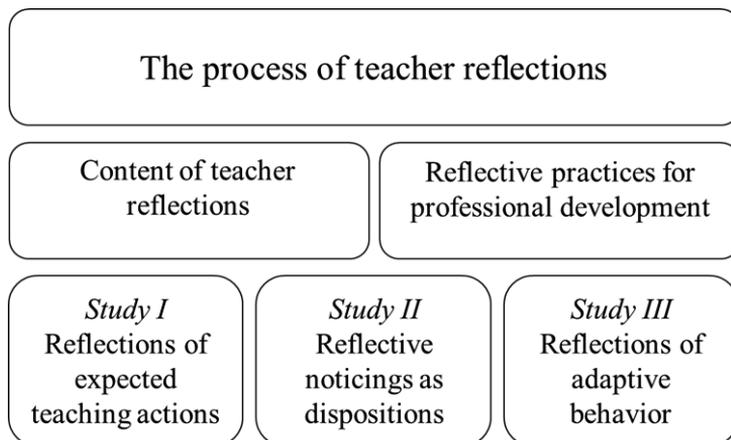


Figure 3. The general aims and sub-aims of the study.

First, the aim was to understand what teacher reflections consist of and how teacher reflections on effective teaching were integrated with multifaceted attention-demanding teaching events. The events consist of complex, situational and intention-oriented features of teaching that require teachers to make quick pedagogical and instructional decisions in order to support students’ learning (Admiraal, Korthagen & Wubbels, 2000). This reflective stance comprises teachers’ practical justifications for their actions and links teachers’ prior knowledge with interactive observations. Second, the study explored the ways in which reflective practices can facilitate teachers’ learning experiences and professional development. When teachers are encouraged to actively process their practical knowledge and interactive observations, they are more able to create new understandings and develop their adaptive expertise in teaching. This demands developing reflective tools and models to analyse teacher learning in practical professional contexts.

The two aims were explored through three empirical studies each comprising a different perspective on teacher reflections in attention-demanding classroom situations. The specific research tasks and research questions of the three studies are outlined in the following sections.

Study I examined teachers’ reflections on their expected teaching actions, and how their level of intensity differed. The research questions were as follows:

- Ia** What teaching methods did teachers employ in attention-demanding teaching situations?
- Ib** How did the intensity in teaching vary within different investments in teaching methods?

Study II examined teachers' reflective noticing of students and content, and how the observations were connected with teachers' dispositions to act. The research questions were as follows:

IIa What student and subject content observations do teachers expose in their teaching decisions?

IIb What do those observations reveal about teachers' teaching dispositions?

Study III examined teachers' adaptive behaviour and how it was guided by teachers' personal practical theories (PPTs). The research questions were as follows:

IIIa In what ways do teachers' PPTs enable them to notice and adapt their decision-making in dynamic teaching contexts?

IIIb What are the relationships between and meaning of changes in teachers' adaptive practices and PPTs?

Taken together, the studies aimed to clarify the processes of teacher reflection, which are seen as relevant for better understanding and improving effective teaching in teacher education and professional work learning afterwards.

4 Methods and procedures

Several prerequisites are necessary for scientific inquiry. As Creswell (2003) notes: “Philosophical ideas must be combined with broad approaches to research (strategies) and implemented with specific procedures (methods)” (p. 4). This chapter 4 examines the ontological and epistemological premises that guided the design and conduct of the research process, presents the practical methodological solutions, and discusses how the reliability of the research was assessed during the process.

4.1 The ontological and epistemological premises for the study

A research process is always based on a researcher’s ontological interrelated assumptions about what constitutes knowledge (ontological understanding), the nature of knowledge (epistemological understanding), and how knowledge can be captured (methodological understanding). As already noted in section 1.1, the study is guided by pragmatic principles, highlighting the orientation toward real-world practice, problem-centricity, and the consequences of actions (Creswell, 2003). Siljander (2014) suggested three conditions for a pragmatic understanding of teaching. First, the research aim should not be seen as separate from a researcher or a research subject; second, knowledge should be seen as a knowing of a research subject, not as a description of an object; and third, the validity of the knowledge must be evaluated in relation to its practical purpose and function. Regarding the truthfulness of knowledge claims, it is important to consider how the knowledge is manifested in actions and how practically functional the knowledge claims are (Biesta & Burbules, 2003; Wong et al., 2001).

Regarding teachers’ pedagogical thinking and reflection, it is meaningful to study teaching actions in close connection with the multidimensional context of teaching, since the actions and reflections are able to reveal socially constructed events (Lyons, 2010). While a teacher's activity embodies practical knowledge and thinking processes, reliable interpretations cannot be drawn only through observing

this activity (Rubin & Rubin, 2005). It is important to highlight the voice and perspectives of the research subjects, which in turn generates certain requirements for the methods of data gathering. It is important that the chosen method takes into account the views of the research subjects in ways that allow them to see their views as socially constructed and constantly changing and evolving. This study employed the ALACT model (presented in more detail in section 2.4; Korthagen et al., 2001) in order to build up a structured process of reflection that would also meet the epistemological requirements for consistent data gathering. The phases of ALACT model encourage teachers to systematically reflect upon what occurs and to connect their thoughts and actions with specific teaching situations (Kortahgen & Vasalos, 2005; Korthagen et al., 2001). In line with these notions, teachers' words are interpreted as a reflexive mix of thinking and action, representing teachers' personal practical theories (Clandinin, 1985; Mena & Tillema, 2006; Rodgers, 2002).

As everyday experiences form the basis of knowledge production (Siljander, 2014), some researchers (Grossman, 2005; Kansanen et al., 2000) recommend using practical situations (e.g., videoed lessons, simulations or case ideas) as starting points for investigating teachers' thinking processes. Practicalities link thinking to particular contexts and help teachers to concretise their thoughts. However, using practical situations also has limitations (see more in section 4.8) because complex and intricate teaching events do not easily allow teachers to act according to their aims, instead causing spontaneous thoughts, actions and emotions (Ball & Forzani 2009; Bishop, 1976; Schutz et al., 2007; Uitto et al., 2015). In addition, complex and overlapping teaching situations make it difficult to identify individual events from the whole range of events (Rubin & Rubin, 2005; Silverman, 2000).

4.2 Qualitative inquiry in a multiple case study design

This qualitative study used a multiple case study design for all three studies (Creswell, 2003; Hancock & Algozzi, 2017; Stake, 1998; Yin, 2009). The number of cases and the case selection were considered to be crucial elements of the case study design because a proper selection of cases represents a researcher's understanding of the phenomena and offers appropriate insights into the phenomena (Lewis, 2003; Kvale, 1996; Stake, 1998). The selected cases were subjected to intensive analysis and description, thus enabling a focus on individual teachers and their reflections (Hancock & Algozzi, 2017). All the studies also shared the features of an exploratory case study design since they aimed to define and develop certain essential components in consecutive studies (Yin, 2009).

The individual cases were unique and context-specific and, through them, it was possible to acquire an in-depth understanding of the individual teachers' thoughts and actions (Hancock & Algozzine, 2017; Lewis, 2003; Stake, 1998; Yin, 2009). This also meant that the participants and researcher necessarily interacted during the research process, and their mixed values and knowledge of the context were a necessary element of the process (Creswell, 2003). Therefore, a qualitative multiple case study represents "both the process of learning about the case and the product of our learning" (Stake, 1998, p. 87). For this reason, it is not possible, or even useful, to claim that the results of case studies can be generalised. Instead, a case study should be seen as representing the phenomena through the chosen cases (Stake, 1998). The knowledge of a particular case or cases helps readers to connect them with their prior experiences and in this way create personal meanings for the cases (Moore-Russo & Wilsey, 2014; Stake & Trumbull, 1982).

4.3 Methodological decisions regarding the thematic interviews

This study used two sets of data, which were collected from teachers by the interview method. More specifically, the thematic interview (or focused interview) method with semi-structured questions was used (Hirsjärvi & Hurme, 2011). In addition, the thematic interview frameworks used reflective tools (i.e., narrative scenarios for dataset I and video clips for dataset II) to encourage the teachers to speak about the given themes (Törrönen, 2002). The instruments for interviews were based on the theoretical perspectives and the research aims, and they helped the participants to reflect upon their knowledge and beliefs in relation to given events, but also on a more general level (Törrönen, 2002).

Thematic interviews flexibly allowed the researcher to maintain proximity with participants and easily identify their thoughts and experiences (Hirsjärvi & Hurme, 2011). Through thematic interviews, participants were able to put their thoughts into words as they wished, explain the motives behind their answers and expand upon their initial answers. In practice, a thematic interview as a data collecting method provided an opportunity to collect information from all interviewees on the same themes. The researcher used a theory-guided approach to develop the themes and questions for the interviews. Depending on teachers' answers, the researcher asked more focused or detailed additional questions (Rubin & Rubin, 2005). In addition, in order to make constructive interaction between the researcher and participants possible, the participants were able to influence the conduct of interviews; that is,

they could raise the issues they wanted to raise and add new themes for discussion if they wished.

4.3.1 Thematic interviews regarding narratives of teaching scenarios

When collecting dataset I, the narrative scenarios were used as reflective tools to prompt the teachers to think about the themes. The narrative scenarios (also referred to as vignettes) were short, fictional descriptions of particular situations that were presented to the teachers verbally during the interview sessions (Arthur & Nazroo, 2003). Hence, the interviewees were asked to imagine and draw upon their experience in relation to the case presented in the narrative scenario (Bloor & Wood, 2006). Narrative scenarios were useful for introducing the same key elements with consistency across all the interviews; in all the interviews, the same themes were presented and the teachers' reactions could thus be compared (Arthur & Nazroo, 2003).

The use of narrative scenarios in the thematic interviewing enabled teachers to freely connect their thinking with certain contexts and cases, and to verbalise their thinking and knowledge in relation to certain themes (Jenkins, Bloor, Fischer, Berney, & Neale, 2010; Arthur & Nazroo, 2003). While in everyday classroom situations teachers often need to make quick interpretations, narrative scenarios allowed (and also challenged) teachers to take their time and make more thorough, detailed and thoughtful interpretations of the scenario (Jenkins et al., 2010). Arthur and Nazroo (2003) stated that narrative scenarios “bring a degree of specificity to the discussion which can be very valuable, for example helping to highlight the boundaries or contingencies of people’s beliefs and actions” (p. 129). Narrative scenarios also allow the interviewees to distance themselves from the described situations and to reflect upon them more objectively (Barter & Renold, 1999). Thus, narrative scenarios acted as stimuli and allowed the researcher to obtain access to the teachers’ thinking processes, to understand how the teachers interpreted various teaching situations, and to identify what practical knowledge they used to support their interpretations (Bloor & Wood, 2006; Jenkins et al., 2010).

However, before using the narrative scenario as a research instrument, it was of paramount importance to consider the purpose of the narrative scenarios in the study. Jenkins et al. (2010) emphasise that, instead of seeking accurate information about the teachers’ activities through narrative scenarios, the purpose should be to gather teachers’ interpretations and perceptions reflecting their actions. The plausibility of narrative scenarios is also of central importance: in order to provide credible

answers, the teachers must experience the narrative scenarios as credible (Jenkins et al., 2010).

4.3.2 Video stimulated recall interviews

The video stimulated recall interview method (i.e. STR method) was used to collect dataset II. It aimed to refresh the interviewees' memories regarding a particular situation and to help the interviewees to verbalise their interactive thoughts in relation to the event (Bloom, 1953; Lyle, 2003; Rosaen, Lundeberg, Cooper, Fritzen, & Terpstra, 2008). The interviewees were shown authentic videos of their own activities and were encouraged to reflect upon their experiences during the videoed situation; for example, what they observed and how they were thinking during the interaction (Lyle, 2003; Rosaen et al., 2008; Vesterinen, Toom, & Patrikainen, 2010). Previous studies have shown that the STR method is well-suited to this type of study, which aims to investigate teachers' interactive pedagogical thinking processes (Clark & Peterson, 1981, 1986; Harlin, 2017). Similarly, Vesterinen et al. (2010) stress that STR interviews are especially suitable and useful when the aim is "to describe and understand the phenomenon being researched in a specific context and to take the subjectivity of the researcher and the informant into account" (p. 185). However, the possibility existed that the interviewees would not report their true interactive thoughts during the event, but would reflect upon and then rationalise their thinking (Hatton & Smith, 1995; Patrikainen & Toom, 2004; Vesterinen et al., 2010).

In practice, Patrikainen & Toom (2004) described the data gathering within video stimulated recall interview as proceeding as follows. First, the researcher video records the taught lesson. Next, the video clips for the interview are chosen. There are three options for choosing the video clips: the interviewee watches the video data independently and selects the points to be discussed in the interview, or the researcher analyses the video data independently and selects the points to be discussed in the interview, or the interviewee and the researcher watch the video data together during the interview and both are able to stop the video at the point they want to discuss. Finally, after choosing the video clips for the interview, the video clips are watched and the interviewees are asked to reflect upon their thoughts during the videoed event.

The video stimulated recall interview method also has some constraints that must be taken into account. Building mutual trust between the teacher and students in the classroom is important: they need to know the purpose of the videoing and who the target is; otherwise, it is possible that they might find the videoing unpleasant or their behaviour in the video might be unnatural (Vesterinen et al., 2010). Correctly

scheduling the videoing and interviewing is also crucial. The interview should be conducted as soon as possible: at least within two days of the videoing (Bloom, 1953). This makes it possible for teachers to recall the events as clearly and reliably as possible. Receiving permission to video all the students imposes its own limitations on how the videoing is conducted in practice. For example, some students might forget to bring the signed permission form with them and cannot be videoed even though they attend the lesson in the classroom. Problems may also arise due to the technical use of video camera (e.g., the camera angles or recorded soundscape—Vesterinen et al., 2010).

4.4 Data collection procedures for two data-gathering contexts

The studies were conducted in the context of common primary schools in Finland and all the participants were qualified primary school teachers (further information about the Finnish educational context of the study is given in section 1.3). In order to achieve the aims of the study, two separate sets of data were collected (datasets I and II). Mathematics lessons were chosen as the context for the both data-gatherings, since much of the previous research on teachers' reflection, noticing, and instructional strategies has been made in the context of teaching mathematics (e.g., Ball, Thames, & Phelps, 2008; Depaepe et al., 2013; Korthagen et al., 2001; Lampert, 2001; Sherin et al. 2011; Stahnke et al., 2016). The studies of mathematics teaching have shown that the subject content allows and demands teachers to flexibly use their content knowledge and pedagogical content knowledge, and to adapt mathematical content knowledge with practical situational requirements (Hill & Lubienski, 2007; Sherin & Han, 2004; Stahnke et al., 2016). However, it is important to note that, although the context of the both data-gatherings has been in mathematic lessons, the research aims to contribute to a broader discussion both on teaching in general and in different school subjects.

Before collecting datasets I and II, permission to conduct the research in the schools was received from the school authority and the school principals (as explained more thoroughly in section 4.7). The researcher also visited the schools to introduce the general aims of the study and its design to the teachers. During both data gathering processes, the researcher carefully and continuously considered whether or not there were sufficient participants to meet the aims of the study. Table 3 presents details of the participants and the contexts of data gathering.

Table 3. Participants and their working contexts

Class level	Number of schools	Number of teachers	Male/ female	Teachers' ages	Students' grades
Dataset I	2	10	3/7	26–55	From 1st to 6th grade
Dataset II	4	17	4/13	25–62	From 1st to 6th grade

For dataset I (Studies I and II), 10 qualified primary school teachers from Southern Finland participated. They worked in two different municipal primary schools. The school principals suggested teachers who might be interested in participating in the study. Thus, five teachers from each school agreed to take part in the study. Of the 10 teachers, three were men and seven were women. The participants' ages ranged from 26 to 55 years old. All the teachers were teaching students aged 7–12 in primary school settings (from the first to the sixth grade).

For dataset II (Study III), 17 qualified primary school teachers from Southern Finland participated. Initially, the principals of five municipal primary schools were asked about the possibility of conducting the study in their schools and all the principals who were approached agreed to support the study. Next, all the primary school teachers in those schools (N = 63 teachers) received an email from the researcher asking about their interest in participating in the study and having one of their mathematics lessons video recorded. 17 teachers from four different municipal primary schools agreed to participate in this process. Of the 17 teachers, four were men and 13 were women. The participants' ages ranged from 25 to 62 years old. The teachers taught students aged 7–12 (from the first to the sixth grade) and their work experience varied from 3 to 37 years, with the average length of work experience being 17 years.

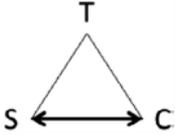
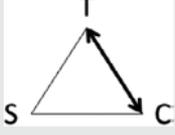
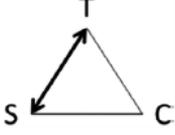
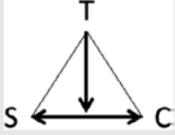
Before conducting the interviews, the teachers were introduced to the general aims of the studies, the study design and the practical steps of the data acquisition. The teachers were told that the researcher was interested in all kinds of reflections about the events. It was also highlighted that there were no right or wrong answers and there was no intention to evaluate any teacher or rate the teacher's reflections or actions. Additionally, before collecting dataset II, the teachers were informed that the purpose of the video was only to stimulate their recall during the interviews and there was no intention to evaluate teachers' actions or students' behaviour through the video data (Lyle, 2003; Rosaen et al., 2008). All of the interviews were conducted

at the teachers' workplaces, and they were conducted in Finnish. The researcher conducted both data gathering processes by herself.

4.4.1 Dataset I: Interviews with narrative scenarios

The teacher interviews for dataset I (Studies I and II) were based on four short narrative scenarios from a mathematics lesson, each of which depicted an attention-demanding event in the teaching process. The narrative scenarios aimed to connect the participants' reflections with the scenario events and illustrate practical teaching situations. The researcher prepared the narrative scenarios, guided by the instructional core elements of teacher, students and subject content in a teaching context (Ball & Forzani, 2009; Cohen et al., 2003; Kansanen, 2003). Through the narrative scenarios, four types of attention-demanding events were presented to the teachers: 1) an event relating to the student's learning process; 2) an event relating to the teacher's teaching process, 3) an event relating to the relationship between the student and the teacher, and 4) an event relating to the relationship between the teacher and the student's studying activities. Table 4 illustrates the types of attention-demanding situations, the teaching relationships and their respective narratives.

Table 4. The four narratives used in teacher interviews when collecting dataset I

Narrative scenario	Type of attention-demanding situation	The teaching relationship	The concrete narrative recounted in the interviews
1	An event relating to the student's studying process		Students' motivation to study differs. Some of the students are working hard and some of them are remaining passive.
2	An event relating to the teacher's teaching process		A teacher is teaching a new task on the board. Some of the students do not understand the point of the lesson.
3	An event relating to the relationship between the student and the teacher		A teacher approaches a student in order to supervise the student's work. The student becomes distracted and does not want to communicate with the teacher.
4	An event relating to the relationship between the teacher and the student's learning activities		A teacher is asking a question to the whole class. The teacher is pleased when a shy and low-performing student is willing to answer. The student's answer to the question is incorrect.

At the beginning of interview, the teacher was asked to think about the attention-demanding situation described in the narrative. After listening to the narrative, each teacher was asked to answer four types of main questions about (1) the teacher's thoughts regarding the situation, (2) the teacher's reaction to the situation (i.e., how quickly he or she responded to the situation), (3) alternative teaching methods that could be used to respond to the situation and (4) the teachers' explanations of his or her actions. Follow-up questions were asked in order to clarify and probe more deeply into the understanding of the teachers' thoughts and explanations (Rubin & Rubin, 2005).

4.4.2 Dataset 2: video-stimulated interviews

Dataset II (Study III) was collected by video stimulated interviews with 17 teachers. The data gathering with the STR interview method involved three steps. First, one

mathematics lesson (of about 45 minutes' duration) was video-recorded for each teacher. Second, the video data were analysed deductively by the researcher on the same day as the videoed lesson. Third, on the day following the video recordings, the teacher interviews were conducted with the video material at the teachers' workplace. During the video stimulated recall interviews, teachers watched one video episode at a time. After watching the video episode, semi-structured questions were asked in order to encourage teachers to reflect upon their thoughts during the situation. The semi-structured questions related to the recorded episode and covered teachers' general thoughts about the episode, teachers' observations of the students and the content during the actions, and teachers' reasons for choosing the actions.

4.5 Data analysis

The separate phases of content analyses were used as a theoretical framework to guide the data analysis processes (Miles, Huberman, & Saldaña, 2014). In general, content analysis proceeds through six phases (Figure 4):

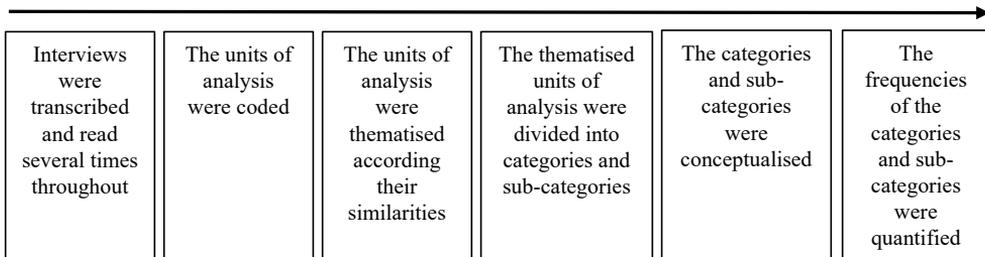


Figure 4. An overview of the phases of content analysis.

First, in order to obtain an overall picture of teacher's answers, the interview data were transcribed and read several times, carefully, throughout. Second, all the quotes relating to the aims of the studies were identified and coded as units of analysis. Third, the units of analysis were thematised according to their similarities and differences. Fourth, after thematising the units of analysis, they were divided into different categories and sub-categories. Fifth, the categories and sub-categories were conceptualised. Sixth, to acquire a deeper understanding of the essential qualities and structure of the phenomena, the analytical processes were continued in order to quantify the endorsed categories and patterns in the data (Miles et al., 2014).

Although qualitative research approaches do not typically use numbers when forming interpretations (Hancock & Algozzi, 2017), in this study the quantification of the units of analysis was seen as an essential part of the analysing process (Creswell, 2003; Hammersley, 1992). This also aligns with the pragmatist approach

to research, which suggests using a combination of qualitative and quantitative methods (Creswell, 2003). According to Miles and Huberman (1994), the quantification of the units of analysis (i.e., the category or sub-category appears x times) is a prerequisite for identifying converging themes and regularities. The quantifications were done in relation to individual teachers (i.e., how many times a teacher mentioned a certain unit of analysis), in relation to teachers’ episodes (i.e., how many times a teacher mentioned a certain unit of analysis in one episode) and in relation to all teachers’ interviews (i.e., how many times a certain unit of analysis was mentioned in the whole dataset). In addition to the frequencies, the quantification of the units of analysis was also presented as percentages.

4.5.1 Study I: combining inductive and deductive approaches

For Study I, the content analysis was conducted by combining inductive and deductive coding (Miles et al., 2014). Figure 5 illustrates specifically how the analysing process proceeded in Study I.

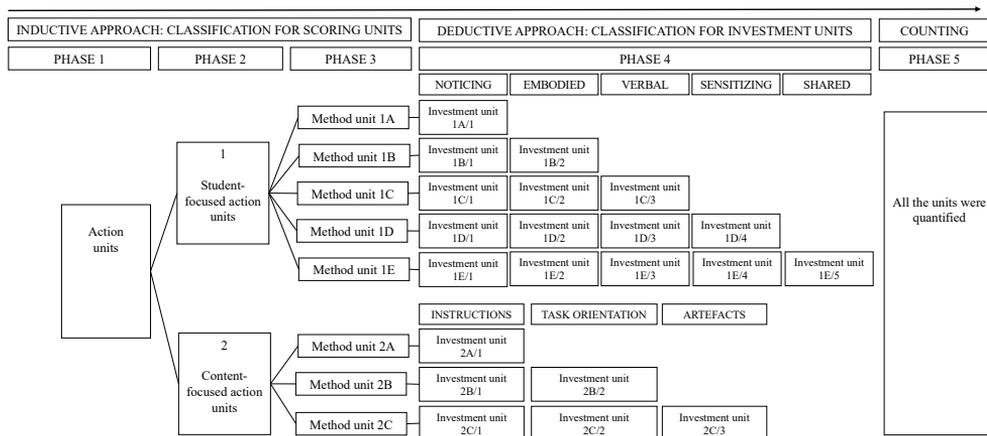


Figure 5. A visualisation of the analysis process for Study I.

Phases 1–3 followed an inductive coding process. In the first phase, the units of analysis were identified and all of the teaching actions from the interviews were coded as action units. Each action unit consisted of the teachers’ descriptions of their expected teaching actions. In the second phase, the action units were classified into student-oriented or content-oriented behaviours. In the third phase, the classified action units were categorised as method units according to the similarities embedded in the described actions. The student-oriented category included five methods, while the content-oriented category contained three methods.

The fourth phase followed a deductive coding process. All of the action units were divided into smaller action investments based on practical theories of teaching and different teaching styles. The student-focused action units were divided into five different investments: (1) noticing investments (Korthagen et al., 2014), (2) embodied investments (Korthagen et al., 2014), (3) verbal investments (Gorham, 1988), (4) sensitising investments (Hamre et al., 2013; Korthagen et al., 2014) and (5) shared investments (Korthagen et al., 2014). The content-focused action units were divided into three different investments based on Scott, Vitale and Masten’s (1998) identification of instructional adaptations through (6) investments in instructions, (7) investments in task orientation and (8) investments in artefacts. Lastly, the frequency of all the units occurring in the transcriptions was counted.

4.5.2 Study II: using thematic analysis

Content analysis with an inductive approach (Miles et al., 2014) and guidelines for thematic analysis (Braun & Clarke, 2006; Santos & Eisenhardt, 2011) were used for Study II. Figure 6 shows the data analysis process:

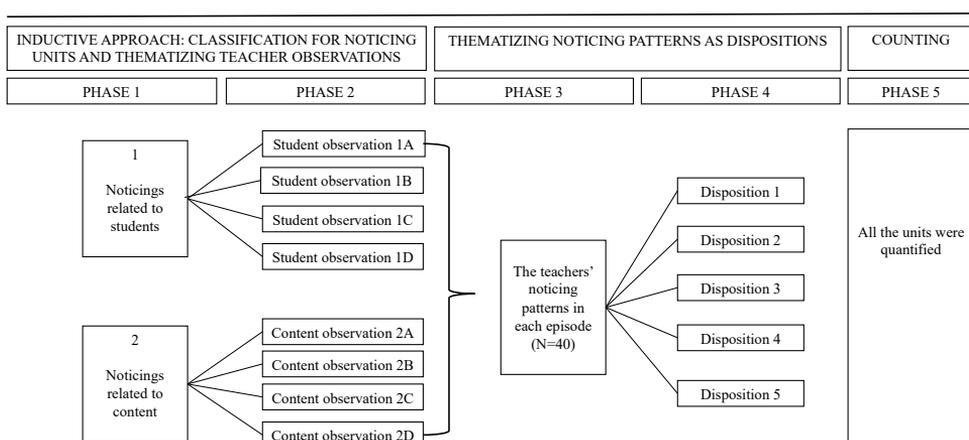


Figure 6. A visualisation of the analysis process for Study II.

In the first phase, the teacher’s reflective noticings relating to students and content were extracted from the data and identified as analytical units (henceforth referred to as ‘student/content observations’). Following the descriptive coding (phase 2), the student and content observations were thematised according to their similarities. For example, ‘student action’ consisted of teachers’ remarks about students’ behaviour as well as teachers’ ways of relating their own actions to those patterns (Clarke & Braun, 2013). Both the student observations and the content observations consisted of four distinctive themes, which were conceptualised as categories.

The third phase clarified how the teachers related student and content observations to each other. The teachers' student and content observations in each episode (N = 40) were examined in order to find patterns of observations (henceforth referred to as 'noticing patterns') that guided the teachers' thoughts and teaching actions (Clarke & Braun, 2013). The noticing patterns included from three to sixteen observations. An analysis of the features of sequence, similarity and frequency (Hatch, 2002) across the noticing patterns allowed the dispositions to be deduced from the observations (Braun & Clarke, 2006). The sequence in noticing patterns indicated a particular order in the teachers' thoughts and intended actions, while noticing pattern similarities referred to parallel student and content observations, and noticing pattern frequency showed how often a feature emerged (Hatch, 2002). Through a comparison of these features, five dispositional structures for teaching actions were detected. Lastly, to gain a better understanding of the structure of the phenomena, all the units were quantified (Miles et al., 2014).

4.5.3 Study III: interaction analysis and inductive approach

The third study included two data analysis processes. First, the video data were analysed using the interaction analysis method (Jordan & Henderson, 1995; Shedletsky, 2009). Second, interview data were analysed using content analysis with inductive coding (Miles et al., 2014). Figure 7 shows how the data analysing process proceeded.

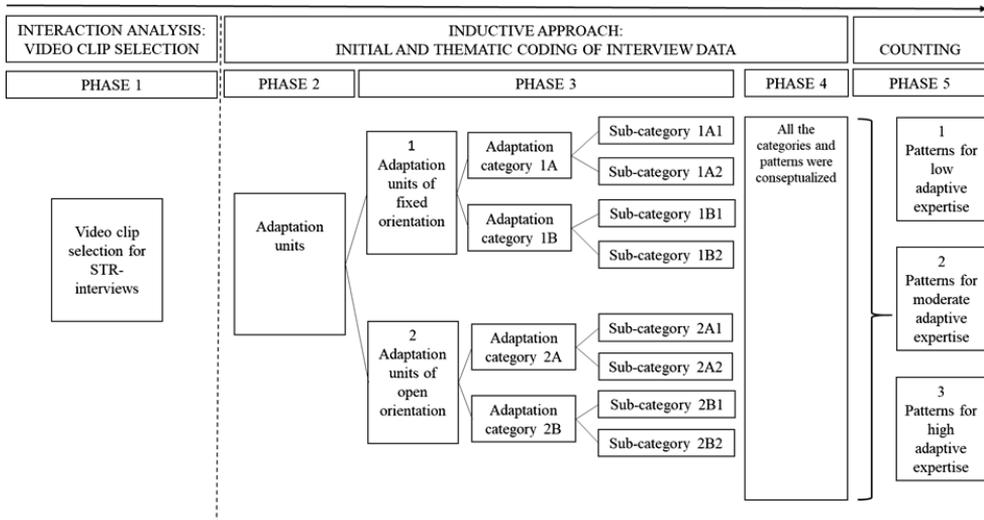


Figure 7. A visualisation of the analysis process for Study III.

In the first phase, teaching episodes in which a teacher faced an instructional problem and used a strategy to deal with the situation (Bohle Carbonell et al., 2016) were identified from the video data. These episodes were considered to be attention-demanding events (Admiraal et al., 2000) that required teachers to adapt their observable teaching actions. In order to select the attention-demanding episodes from the video data, adaptation codes proposed by Allen et al. (2013) were applied. Thus, three criteria were used to select episodes for the interview: (1) the situation was not expected, but the teacher still led the actions; (2) during the situation, the teacher needed to modify or change his or her reactions or behaviours; and (3) the teacher was not behaving purely according to his or her stereotypical teaching habits (e.g., repeating words like ‘good’ or ‘well done’ was not considered to be encouraging and quickly scanning the classroom was not considered to be observing). All the episodes that met the criteria were shown to the teachers during the interviews.

Phases 2–5 related to analysing the interview data. In phase 2, all the reflective rationales for the teachers' actions were identified as units of analysis and referred to as adaptation units. One adaptation unit consisted of a teacher's representation of his or her rationale for choosing the interaction in the video episode (i.e., the rationale concerning how a teacher adapted his or her knowledge to act in a specific manner). In phase 3, the adaptation units were classified into categories that illustrated the point at which the teachers acquired the knowledge to make their adaptation (i.e., the categories for a fixed or open orientation to teaching). This was followed by thematising the adaptation categories and their sub-categories.

Four major adaptation categories were found, each with two sub-categories. In phase 4, all the content categories and their sub-categories were conceptualised. In phase 5, the frequency at which the adaptation units occurred with individual teachers was examined and the teachers were profiled according to the extent to which they emphasised a fixed or open orientation in their adaptations. These frequency-based categorisations illustrated the teachers' different levels of adaptive expertise.

4.6 Summary of the methods

In order to provide an overall picture of the methodological decisions made within this study an overview of the studies can be seen in Table 5.

Table 5. An overview of the analyses

Study	Research aim	Participants	Method	Analysis methods	Units of analysis
Study I	To investigate teachers' expected teaching actions and how the intensity in actions varied	10 primary school teachers	Theme interview with four narrative scenarios	Qualitative content analysis with an inductive and a deductive approaches Quantification of qualitative coding	Representation of expected teaching behaviour
Study II	To clarify teachers' student and subject content observations and what do those observations revealed about teachers' teaching dispositions	10 primary school teachers	Theme interview with four narrative scenarios	Qualitative content analysis with an inductive approach and thematic analysis	Reflective observation shaping the action decision
Study III	To understand how teachers adapted their personal practical theories in practical teaching situations	17 primary school teachers	Video stimulated recall - interview	<u>Video material:</u> interaction analysis based on the theoretical criteria <u>Interview data:</u> qualitative content analysis with inductive approach	Attention demanding situation Reflective rationale for choosing the practical action

4.7 Ethical considerations

The criteria for the evaluation of qualitative research and ethical guidelines were given great consideration (Kvale, 1996; Silverman, 2000; Seale, 1999). The study has especially taken into account that the interview research method raises particular ethical issues that need to be carefully borne in mind throughout the study: informed consent, confidentiality and the consequences of the interviews (Kvale, 1996). These concerns also align with the Finnish Advisory Board on Research Integrity's (2009) suggestions about voluntariness, anonymity, confidentiality and informing participants.

Permission to conduct the study proceeded as follows. Initially, the institutional approval to conduct the study and collect the data with the chosen methods was requested from the municipality administration. Subsequently, the principals were contacted and asked about the possibility of conducting the study in their schools. With regard to dataset 1, the principals suggested teachers who were qualified primary school teachers and might be interested in participating in the study. With regard to dataset 2, all the qualified primary school teachers in the chosen schools received an e-mail from the researcher asking about their interest in participating in the study.

As the ethical guidelines for qualitative research suggest, all the participants in this study participated voluntarily and were informed about the relevant issues relating to the study's design (Cohen, Manion, & Morrison, 2001; Hirsjärvi & Hurme, 2011; Silverman, 2000). The teachers received an e-mail that introduced the aims of the study, the data-gathering methods, the research's practical execution, and how the data would be used and protected. Additionally, with regard to dataset 2, the researcher emphasised that the video recording phase of data collection would not demand anything unusual of the teachers: only that the lesson context should be a mathematics lesson and the lesson should be conducted in one classroom to make videoing possible. However, because the teachers might feel uncomfortable with the video recordings of themselves, the researcher also visited the schools to provide the teachers with more information about the study aims and the study design.

Because the data collection (dataset 2) included video recordings in classrooms, informed consent to videotape the students was also obtained from their parents (Mason, 2002). The consent form was similar to that used to obtain consent from the teachers. The students for whom consent was not given, who were unable to return the signed consent form, or who were not willing to be videotaped, were not videotaped at all. These cases were treated as unique: depending on the situation and the possibilities, the solutions were considered very carefully from an ethical standpoint. The researcher ensured that the data collection was carried out without

harming any student or his or her studying or learning (Cohen et al., 2001). Additionally, before collecting the video material in the classrooms, the students were informed about the study (taking their ages into account).

The issues of confidentiality and respect were also carefully considered (Seale, 1999). During the interviews, it was important that the teachers felt that their expertise was appreciated and the interview was conducted in an appropriate manner (Cohen et al., 2001). The interviewer acted sensitively and explained that the purpose was not to evaluate the teachers' activities in any way, but to understand the teachers' underpinning thinking. In addition, in order to protect the anonymity of the participants, any identifiers in the data transcriptions were replaced by pseudonyms. In addition, because the data included recordings, data storage and protection was a critical concern involving who had the access to the data, and when and how the data would be destroyed (Silverman, 2000).

Not only the data management, but also the results of study and their implications, necessarily had an ethical dimension. These reflections are presented in the next section when discussing the trustworthiness of the study.

4.8 Trustworthiness

The trustworthiness of qualitative findings refers to slightly different issues than those of quantitative research. For example, general ideas about reliability and generalisability, which are central to quantitative research, only play a minor role in validating the accuracy of qualitative research (Creswell, 2003). It might even be assumed that the credibility of qualitative results does not matter, because the qualitative findings are so diverse and difficult to check (Silverman, 2000). Despite the challenges associated with assessing the trustworthiness of qualitative research, in this study with pragmatist approach it was considered extremely worthwhile to evaluate the trustworthiness in relation to its practical purpose and function (Siljander, 2014). Creswell (2003) suggests eight primary strategies, one or more of which should be used in a single study: triangulation; member checking; rich, detailed description; clarification of the researcher's bias and negative or discrepant information; prolonged time in the field; peer debriefing; and an external auditor. Hancock and Algozzine (2017) agree that as many of the verification strategies as possible should be implemented when confirming case study findings.

In this research, when collecting both datasets, prolonged time in the field was considered to be important. This means that the researcher acquired a deep understanding of the phenomenon and developed familiarity with the teachers and school culture (Creswell, 2003). In line with Shenton's (2004) suggestion, the researcher visited the schools before starting the data acquisition and talked freely

with the teachers and the principals. The researcher's educational background and experiences as a teacher supported the familiarity with the phenomenon and context.

Researcher's self-reflection also supports the validity of the data analysis process. During the analysis processes of both datasets, the researcher continually reflected on her own activities by writing memos regarding her reflections and sharing her thoughts with other researchers. This enabled the researcher to become aware of her existing biases (Creswell, 2003). In addition, the context in which the study was conducted was carefully considered when designing, implementing and evaluating the research (Lewis & Ritchie, 2003). The researcher's self-reflection contrasts with external peer debriefing, which aims to enhance the accuracy of the interpretations (Creswell, 2003). Colleagues, peers and academics challenged the thinking of the researcher; for example, the researcher's prior beliefs or schematic ways of forming interpretations (Shenton, 2004). Preliminary versions of all the studies were also presented at national and international conferences, enabling the researcher to receive feedback and suggestions for finalising the research articles. Thus, the researcher sought to become aware of challenges relating to her thinking processes involved in the data analysis.

An official audit by an external auditor was not conducted, but the researcher regularly presented the progress of the analytical process to another researcher. Another researcher regularly assessed the clarity, comprehensibility and acceptability of the findings and interpretations. This is in line with Shenton (2004) suggestion: "the vision of the investigator may be widened as others bring to bear their experiences and perceptions" (p. 67). Through these discussions, the interpretations of data were also systematically compared to the raw data.

Within Study III, member checks (or respondent validation) were considered to be important for confirming a study's credibility and validating the results (Lincoln & Guba, 1985). This means "[t]aking one's findings back to the subjects being studied. Where these people verify one's findings, it is argued, one can be more confident of their validity" (Silverman, 2000, p. 233). Following this approach, the research results were presented to the teachers and they were asked to comment on the results at both the general and individual levels.

With the help of these verification strategies, it was possible to create an understanding of the quality of the research. Table 6 focuses on key observations that arose from the studies as a result of the verification strategies used. More specifically, the quality criteria of the credibility, transferability, dependability, and confirmability of the findings are reflected upon (Lincoln & Guba, 1985; Miles & Huberman, 1994).

Table 6. Reflections upon the credibility, transferability, dependability, and confirmability of the findings

Quality criterion	Main idea	Used verification strategies	Key observations
Credibility	How the results reflect the experiences of the participants	<ul style="list-style-type: none"> • Prolonged time in the field • Frequent debriefing sessions • Member checking • Random sampling 	<ul style="list-style-type: none"> • Participant selections supported credibility; the teachers were qualified teachers with experience in teaching. • The methodological choice to interview the teachers may have limited their reflections. • The plausibility and meaningfulness of the instruments used (i.e. narrative scenarios and video clips) may have affected the teachers' reflections. • The participating teachers (Study III) did not suggest any changes to the results.
Transferability	<p>To what extent the results can be generalised</p> <p>How the results can be applied in other situations</p>	<ul style="list-style-type: none"> • The researcher's continuous self-reflection • Careful definition of the context 	<ul style="list-style-type: none"> • Although the context for the research was considered as relevant, the results are specific only to these particular situations and contexts. • The selected cases in narrative scenarios and video clips might have limited the teacher reflections. • Situational factors during the interviews and video-recordings could have influenced teachers' responses. • The interviewer developed as an interviewer.
Dependability	How the analysis methods can be applied to different cases	<ul style="list-style-type: none"> • Another researcher assessed the logic of the research process • Examining referential adequacy 	<ul style="list-style-type: none"> • When conducting data analysing processes, clear similarities were found and the data became saturated. • The researcher's own practical experiences as a teacher and theoretical understanding of teaching may

		<ul style="list-style-type: none"> • Detailed methodological description • Use of reflective commentaries 	have affected how the interpretations were made.
Confirmability	<p>How clearly the interpretations and the results are derived from the data</p> <p>How much the data analysis method used might have distorted the result</p>	<ul style="list-style-type: none"> • Regular documentation of the research process • Frequent debriefing sessions 	<ul style="list-style-type: none"> • The credibility, transferability, and dependability of the results were all achieved sufficiently.

Reflections upon credibility. From a credibility standpoint, it was evaluated how genuinely teachers expressed their thoughts in the context in which the research was conducted and how congruent the results were with reality (Merriam, 1998). The participant selection, the methodological choice to interview teachers, the instruments used in the interviews, and member checking, were considered to be key considerations when evaluating credibility. The credibility of the results is enhanced when participants are carefully selected. It is important to choose interviewees who will provide useful information (Rubin & Rubin, 2005). In this study, the participating teachers were all qualified teachers who had at least two years of experience in teaching. They were very familiar with the themes discussed in the interviews, they expressed a variety of perspectives and they showed a versatile understanding of teaching.

However, the methodological choice to interview teachers, and thus study knowledge and thinking through speech, may have affected the credibility of the results. The teachers may have conveyed an ideal picture of teaching because, during the interviews, they had time to reflect and they were allowed to correct and change their responses. For example, in Studies I and II, because of the narrative scenarios, the teachers might have described their expected actions and dispositions in a particularly idealistic tone. In addition, due to the interactive nature of the interview situation, it is possible that the teachers gave stereotypical answers or answered in

the way that they assumed the researcher desired (Rubin & Rubin, 2005). It is also possible that while reflection often involves verbal processing, the ability of a teacher to describe his or her own activity was limited. As Clandinin (1985) states: “[t]alking about what they do is not a necessary part of their practice” (p. 92). This indicates that the teachers’ expression does not necessarily manifest through speech due to the possible difficulty of verbalising practical information. On the other hand, although it would be natural for teachers to tell about their thoughts, they can also act differently in practice than what they state in words. For these reasons, it is also uncertain to what extent the teachers’ actual work corresponds to what teachers genuinely think and how they really wish to work.

The plausibility and meaningfulness of the instruments used (narrative scenarios and video stimulations) in the interviews is also crucial for the credibility of the results. When constructing the narrative scenarios (dataset I) it was of paramount importance that they sounded credible to teachers and were easy to imagine as part of a practical situation (Jenkins et al., 2010). Similarly, teachers must clearly understand why the video clips, which were shown to the teachers in the interviews, were chosen. If a teacher started to consider, for example, the reasons for choosing the video clip (e.g., was the video clip selected because he or she did something atypical or because he or she missed something), the answers might not credibly reflect the teacher's true thoughts during the situation. For this reason, both instruments used in interviews were tested with other teachers beforehand.

Despite the above-mentioned limitations, the researcher formed the impression that the responses of the teachers constituted mainly credible answers. Jenkins et al. (2010) have stated that interviewees’ responses to narrative scenarios ‘may well carry some predicative power in respect of how they would behave if they were to be subsequently presented with a similar, “real-life” event’ (p.192). Similarly, Patrikainen and Toom (2004) have noted that video stimulations often allow the teachers’ reflections to be rather credible—even though there is no certainty about whether the reflections occurred during or after the situation.

Credibility was also supported by the informal discussions with teachers after the interviews. In addition, when collecting dataset II, the final interview questions focused on the teachers' reflections during the data acquisition process. The teachers were asked to evaluate how they felt when they were being videoed, watching the videos of themselves and reflecting upon their own actions. Every teacher thought that the process was natural and easy, but also useful for enhancing their learning. For example, teachers T4/dII and T10/dII said:

I wondered beforehand what it might feel like to watch myself in the video, but I don't think that I was disturbed when you videoed me. I did not even remember that you were in the classroom for the video recording. I don't think it had any effect on my behaviour. (T4/dII)

I didn't remember you at all—except once, when I felt that I would have liked to chat with you about a case, but I decided not to talk in the middle of the lesson. (T10/dII)

Some of the teachers had wondered in advance (before the video-stimulated interviews) whether they would remember the situations afterwards. However, the teachers were surprised that the video made it easy to return their thoughts back to these situations. For example, T10/dII reflected: “The situations came to mind quite easily. Although I thought beforehand that I would not remember anything about my own lesson from yesterday, when I watched the video I remembered the cases very well” (T10/dII).

Credibility was also supported by the teachers own opinions (Study III). When the interpretations of the data were presented to the teachers, they found them credible and did not propose any changes.

Reflections upon transferability. In terms of transferability, the main question was whether the results of the study could be generalised and to what extent, and whether similar research contexts might produce similar results. Some researchers think that qualitative research should not be intended to be generalisable. Qualitative research is always contextual and, therefore the generalisation of the results is difficult and unnecessary (Hirsjärvi & Hurme, 2011). On the other hand, some researchers (Lewis & Ritchie, 2003) assert that the results of qualitative research can be generalised if the research framework is clearly taken into account. The key issue is whether all the contextual factors influencing the inquiry are carefully described (Lincoln & Guba, 1985).

This study was contextualised in mathematics lessons in primary schools, which is a relevant context for obtaining new perspectives and deepening the understanding of teachers' pedagogical thinking processes for effective teaching (Korthagen, 2001). Attempts were also made to standardise the interviews. The clarity of the interview questions was maintained as far as possible in order to ensure that each interviewee would interpret the context of the question in the same way. However, it is possible that the narrative scenarios used in the interviews (dataset I) could have limited the teachers' thinking; that is, they may not have adequately described the multidimensional nature of the teaching situation. It is also possible that the narrative scenarios and video clips problematised situations that the teachers do not usually

stop to think about; in this case, the teachers' reflections did not directly reflect how they thought in practical situations, but rather their more general thoughts about teaching. It is also possible that the same teachers would respond differently to the same questions because their current experiences, their alertness and earlier events would affect the answers. In addition, teachers' actions may have been affected by the video recording (dataset II), which might distort their reflections. The researcher also felt that she developed as an interviewer during the data acquisition process and, thus, her approach to interviewing the teachers could have slightly changed in the course of the interviews (Mason, 2002).

Reflections upon dependability. From the point of view of dependability, it is important to evaluate how the methods used can be applied to different cases in a sustainable manner (Shenton, 2004). From this perspective, it was clear that similarities emerged in the interview data during both data analysis processes. The same themes were found repeatedly and a saturation point was eventually reached (Glaser & Strauss, 1967). Hence, it was assumed that similar coding classifications might be found in other, similar, research environments. However, although teachers' answers were generally clear, there is always the possibility that the concepts and language used influenced the interpretations; for example, the teacher might have meant something differently from what the interviewer understood (Hirsjärvi & Hurme, 2011).

It is also clear that the dependability of the results was influenced by the researcher's own assumptions and theoretical knowledge of the phenomena. The researcher's own perceptions of the practice of teaching and how teachers process information may have affected the implementation of research: the researchers' perceptions inevitably interact with the perceptions of the teacher being studied and also reflect the reality that the researcher sees and understands (Clandin, 1985). This may have influenced the ways in which the researcher categorised and thematised the data. It is therefore natural that another researcher, with a different theoretical understanding, would see the data in a slightly different way, choose different concepts and thus obtain different results, even if the data itself was similar. However, despite the possible ambiguity, the researcher has endeavoured to analyse the data as systematically, objectively and accurately as possible.

Reflections about confirmability. The concept of confirmability describes how objectively the researcher has approached the observation and interpretation of the data, and how much the data analysis method might have distorted the results or the understanding of the phenomenon. In this study, confirmability was established because the credibility, transferability and dependability of the results were all achieved sufficiently (Guba & Lincoln, 1989). However, in qualitative research, objectivity is difficult to achieve: that is, it may always be somewhat inadequate

because the chains of the experiences, the researcher's experiences and the interviewee's experiences cannot remain unchanged by the research process (Perttula, 1995). Similarly, in this study, the results reliably confirmed how the teachers' reflections proceeded (i.e., regarding how things should go), but the study did not permit an assessment of the extent to which the teacher's thinking was realised in practice or how useful this knowledge was in practical situations. However, careful documentation of the underpinning principles affecting the research was used to increase the confirmability. In this way, it was possible to confirm that the findings reflected "the experiences and ideas of the informants, rather than the characteristics and preferences of the researcher" (Shenton, 2004, p. 72).

Viewing from the pragmatist perspective of the study, the steps taken for trustworthiness of the research can be seen as valid. According to pragmatist approach, the study emphasises practical meaning of the results, and the results are integrated into views of effective teaching and teacher education (Biesta & Burbules, 2003). The results can be applied to the development of the practical knowledge, teacher dispositions, and adaptive skills in teaching and teacher education.

5 Overview of the empirical studies

Understanding teacher reflection is the key to explaining how practical knowledge is used and, furthermore, how the adaptive use of practical knowledge can be supported through reflection. Study I approached this phenomenon from the point of view of what kind of expectations teachers have for their own activities and how these expectations reflect the effort and intensity of their activities. In Study II, the aim was to examine teachers' dispositions through reflective noticing. Study III focused on specifying the teachers' knowledge structures and interactive observations from an adaptive perspective. This chapter 5 briefly summarises the main results of the studies.

5.1 Study I

Männikkö, I. & Husu, J. (2018). Uncovering Expected Teaching Actions in Attention Demanding Teaching Situations. *Teacher Development*, 22 (5), 651–667.

Teachers possess a wealth of essential practical knowledge that guides their teaching decisions. However, quickly-changing events during lessons do not necessarily allow teachers to act according to the practical knowledge they consider to be ideal. In order to understand why teachers act the way they do, it is necessary to understand what kind of expected actions they carry out. In addition, the teachers' expected actions were examined from the viewpoint of their varying intensity; that is, what kind of different investments they included. The varying intensities in teaching actions may be one reason why teachers feel that they are not able to act in the way they would prefer. Through this increasing understanding, it is possible to recognise what it means to use 'ideal', effective teaching approaches and methods.

The results constituted a detailed exploration of two approaches that teachers considered to be effective in promoting student learning: an *interactional teaching approach* (i.e., expected actions focused on the relationship between the teacher and student) and an *instructional teaching approach* (i.e., expected actions focused on the relationship between the teacher and the subject content). Both approaches also

included certain core functions (i.e., teaching methods), which enabled the approaches to be identified. The interactional approach was demonstrated by five different methods: observing, being present, activating, encouraging and discussing. As the core functions indicate, the teachers considered it important for students' needs to be identified from the perspective of pedagogical interaction. The interactional approach works as a tool whereby the teachers aim to promote students' wellbeing and positive self-image. In particular, the teachers recognised that the students' individual needs could be taken into account with the help of an interactional approach. The instructional approach consisted of three methods: advising, explaining and concretising. Through these methods, the teachers used their students' learning goals and needs as premises for their instructional approaches. The responses indicated teachers' readiness to promote students' active learning through didactical solutions. The teachers were also aware of the ways in which different instructional methods made it possible to customise teaching for various groups of students (e.g., individual teaching, small-group teaching or whole-class teaching).

In order to better understand the core functions of the teaching methods, they were examined further from the perspective of what investments they required and what those investments reveal about the action intensity. The results showed that the methods consisted of one or more simultaneous investments. Depending of the number of investments within the method, the level of intensity was determined. In both approaches, teachers' investments in expected teaching methods were interpreted along a continuum from low to high intensity. An increasing number of different investments led to a higher intensity in the teacher's methods of action. In other words, both the interactional teaching approach and the instructional teaching approach included low and high intensity activities.

Study I suggests that teachers' reflections on practical cases can activate teachers' experiences and help teachers to develop a deeper understanding of teaching methods. In addition, teachers' awareness of the intensity of teaching actions explains the teaching demands and how teaching actions could be organised more appropriately according to their resources.

5.2 Study II

Männikkö, I. & Husu, J. Exploring Teachers' Relational Dispositions through Reflective Noticing. *International Journal of Educational Research* (under review).

Previous studies have shown that teacher decisions for practical actions are influenced not only by practical knowledge but also by dispositions. Disposition can be defined as teachers' personal tendencies to notice and interpret the events in a certain manner. In this study, teachers' reflections were examined from the perspective of teacher dispositions. Because examining teacher dispositions is not straightforward (i.e., asking direct questions does not necessarily elicit reliable answers), the decision was made to approach dispositions through teachers' reflective noticing. Earlier studies have shown that dispositions are connected with teacher observations and interpretations. The dispositions guide teachers to make certain observations of events; however, the observations also activate and develop dispositions. Thus, by focusing on teachers' observations and the patterns they create, the types of dispositions that guide teachers' action decisions can be defined.

The results indicated that the teachers were willing to pay careful attention to students and their needs for learning and emotional support. For subject content, the teachers' observations focused on the content's aims and demands, the required teaching methods, and the resulting learning outcomes. Five teaching dispositions were detected, each one uniquely characterised by a delicate interplay between student and content observations. When using caring dispositions, teachers perceived students' needs for emotional support in learning tasks and focused mainly on student support observations. The focus of appreciative dispositions was on recognising student differences in order to meet their individual learning aims. When using them, teachers emphasised observations of student qualities and student actions. Executive dispositions concerned the use of classroom arrangements as pedagogical tools. Teachers with adaptive dispositions mainly worked by developing a range of teaching practices and using those practices meaningfully, while particular subject content was attuned to the students' learning needs. Instructional dispositions emphasised observations of content methods. These dispositions guide teachers to choose the most appropriate teaching methods for the content being taught.

The findings revealed delicate interplays between the core features of teachers' dispositions. Paying attention to the content and function of teachers' observations can provide a deeper understanding of how teachers' practical knowledge and situation-specific skills are connected with teachers' dispositions. Additionally, the results of this study generated three suggestions for developing teaching and teacher learning

programmes. Student teachers need to be supported in building connections between their observations of their students and teaching, to become aware of their customary patterns of noticing, and to develop their self-reflection skills and perceptual abilities for teaching events. Through these phases, teachers' are able develop their dispositions in order to enhance their adaptive teaching approaches.

5.3 Study III

Männikkö, I. & Husu, J. (2019). Examining teachers' adaptive expertise through personal practical theories. *Teaching and Teacher Education*, 77, 126–137.

Several studies have examined how teachers adaptively reflect their practical knowledge to decide their practical actions. This is especially important because teachers' ability to make adaptive action decisions and behave in an adaptive manner is crucial for supporting students' learning processes. Being adaptive requires teachers to be sensitive to situations and to make connections with situational observations as a component of their personal practical theories. As the research literature shows, teachers' perceptions and interpretations of classroom events are closely connected with teachers' adaptive decisions. Teachers' adaptability can also be considered from the routine perspective. The more adaptable the teachers are, the more openly and creatively they apply their existing routines.

The results showed that the teachers' adaptive expertise was characterised by a varying emphasis on a fixed versus an open teaching orientation, and their level of adaptability differed. Both orientations are rooted in the teachers' PPTs and represent different practical guidelines for teaching and for utilising their practical knowledge and teaching experiences. Adaptations based on a fixed orientation consist of structured and pre-existing knowledge items and are divided into recognitions and anticipations. Adaptations based on an open teaching orientation are processed through situational cues by combining pre-existing knowledge with interactive observations and they include deliberations and insights. The teachers' use of the two types of orientations revealed their varying levels of adaptability. The more the teachers demonstrated adaptations with an open orientation, the higher their levels of adaptive expertise became. However, a greater tendency to rely on adaptations with a fixed orientation indicated lower levels of adaptive expertise.

In order to gain a better understanding of how teachers' adaptive expertise develops, we need to pay attention not only to 'what' is reflected in an adaptive manner, but also to 'how' it is reflected. In addition, it is important to develop adaptive expertise from the perspective of when and where teachers need to be adaptive. The results suggest that teachers should flexibly practice reflection and the

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observation of complex teaching events. In addition, greater attention should be paid to the teachers' self-awareness of their teaching routines.

6 Discussion

The aim of this study was to examine the content of teachers' reflections and reflective practices for professional development. Throughout the reflections, teachers' practical knowledge guided teachers' responses and how the instructional decisions were adapted (Allen et al., 2013; Hayden et al., 2013; Levin & He, 2008; Maaranen & Stenberg, 2017). Teacher dispositions further shaped the knowledge and skills used in practical settings and contributed to the ways in which teachers achieved their aims (Parrott et al., 2013; Schussler et al., 2010). In this chapter 6, the results of the study are discussed from two perspectives: first, what the results reveal of teachers' views of effective teaching and, second, how the results help us to better understand and support teachers' professional development.

6.1 Balancing interaction with the core dimensions of teacher reflections

The first research task aimed to identify the core components of teacher reflections. In line with other studies (e.g., König et al., 2014; Lampert, 2010; Pianta, Stuhlman & Hamre, 2002; Stahnke et al., 2016; Stieha & Raider-Roth, 2012), the results showed that teaching decisions are influenced by several overlapping core dimensions, which teachers simultaneously take into account and balance during their teaching. In addition, the results confirmed that the interaction between the core dimensions of teacher reflections necessary comprised teachers' personal value judgements (Tirri, 2008). The findings from the three studies also confirmed that teacher reflections for effective teaching involve constant presence in instructional situations (Rodgers & Raider-Roth, 2006) and the ability to manage unpredictable and uncertain issues (Forzani, 2014). Furthermore, teachers' ability to handle cognitive and situated perspectives within their reflections (Stahnke et al., 2016) relates to their adaptive expertise (Bohle Carbonell et al., 2016; König et al., 2014). This idea of the core dimensions of teacher reflections also aligns with Moore-Russo and Wilsey's (2014) suggestion to treat teacher reflection as "a multidimensional

construct” (p. 85). Next, the five core teaching dimensions and their interrelationships are discussed (Table 7).

Table 7. The core dimensions of teacher reflections

The core dimensions of teacher reflections		
student orientation	↔	content orientation
individual focus	↔	collective focus
formal knowledge	↔	personal views
prior expectations	↔	interactive observations
details	↔	entities

Student orientation – content orientation. Within this core dimension, teachers combined their pedagogical expertise with their subject content expertise for effective teaching (Hill et al., 2008). Throughout their expected actions, dispositions and adaptations, the teachers channelled their perceptions of student and subject content features and balanced their knowledge and observations of those two poles (Bauml, 2009; Cohen et al., 2003; Lampert & Graziani, 2009; Verloop et al., 2001). Study I showed that teachers’ interactional approaches focused on working with students as well as with their instructional approaches and subject content features. While the teacher dispositions in Study II further clarified student and content issues, Study III explained in greater detail the ways in which different levels of adaptation included both student and subject content features.

It is important to note that, while the results explicitly separate student and content orientations from each other, they are not seen as opposites or mutually exclusive. Instead, they actively relate to each other. This result aligns with several studies (Bransford et al., 2000; Fairbanks et al., 2010; Lampert, 2001; Lampert & Graziani, 2009; Stahnke et al., 2016) that suggest the necessity for teachers to reflect upon students’ individual needs, together with the subject content and didactic requirements associated with them. By reflecting upon these dimensions, teachers develop varied understandings of students and ways to support their learning processes. For example, Study II showed that the teachers’ emphasis on subject content also presumed student-centricity since teachers’ pedagogical notions were channelled to support the students’ ability to learn the content in feasible ways (Stahnke et al., 2016). Similarly, Study III identified links between students’ ideas

and the teachers' instructional responses, which were seen as essential resources for teachers' decision-making (Bransford et al., 2000; Forzani, 2014).

This result also strongly resonates with the idea of adaptive teaching, which specifies that a person who is familiar with the pedagogical and instructional aspects of teaching can support students' learning of topics they could not grasp independently (Allen et al., 2013). Likewise, as Study I showed, teachers' subject-matter understanding was central to their ability to set individual goals for students and to adjust learning tasks in line with student capabilities (Ma, 1999). The more teachers acknowledged the content issues in relation to students' needs, the more adaptively they were able to help the students and provide individual support for their learning (Forzani, 2014).

Individual focus – collective focus. In line with other studies (Kennedy, 2006; König, Blömeke, Paine, Schmidt, & Hsieh, 2011; Pianta et al., 2002; Voss, Kunter & Baumert, 2011), this study showed how teachers must simultaneously deal with many pedagogical challenges that affect the students they teach: thus, student perspectives are unavoidable. Even if teachers strive to provide equal opportunities for all students, in practice they must decide who they are going to teach first and on what terms the activity is planned and carried out. Balancing different students' needs requires constant decision-making from a teacher and shifts decision-making toward teachers' personal tendencies and values (Tirri, 2008). Study I especially showed how the teachers' actions often involve deciding whose learning should be prioritised and, regarding that aim, how teaching actions should be organised. Teachers often used a variety of approaches to ensure effective teaching, from the individual guidance of particular students or group of students to teaching the whole class. These decisions might be connected with teachers' personal values and dispositions because they guided teaching actions relating to students' needs (Stooksberry et al., 2009). For example, if teachers decided to direct their teaching at a large group of students, this large-scale, un-individualised decision might deter some students from completing the task due their lack of knowledge and skills. Even if these decisions are the sum of many factors, they can be seen as unavoidable value judgements in teaching (Tirri, 2008).

Regarding the individual–collective dimension in authentic classroom situations, it is also possible that student selections (e.g., whose learning should be prioritised first) largely take place through routine activities and involve rapid situational interpretations (e.g., who asks for help, who does not seem to understand the task etc.). Study III showed that, during teaching interaction, the teachers reflected less often on who to teach. Hence, such situations do not require teachers to challenge their thoughts about the students to whom the teaching should be directed and, therefore, student selections easily become part of teaching routines (Brante, 2009;

Kennedy, 2006). The intensive nature of a teaching event (i.e., several overlapping moments and teaching demands) may also lessen reflection upon who the activity should be directed toward. This raises concerns about diffident students who do not demand attention to their needs: the teachers may overlook them.

Formal knowledge – personal views. The findings showed that the teachers reflected upon both their formal knowledge of teaching and their personal views of teaching, referring to the cognitive and affective dimensions of teacher thinking (Mena et al., 2017). In line with this idea, Verloop et al.'s (2001) study distinguished formal knowledge of teaching from a teacher's personal knowledge. While the former includes the generally accepted features of teaching, the latter comprises aspects of a teacher's personal history and personality (Verloop et al., 2001). Furthermore, these dimensions related to the personal and professional aspects of teacher identity development through reflection (Beauchamp, 2015; Beijaard & Meijer, 2017; Körkkö et al., 2016).

In this research, the relationship between formal knowledge and personal views was emphasised, especially in Study III in which the teachers' actions were partly shaped by their formal recognitions and deliberations and partly by their subjective anticipations and insights, since both dimensions developed teachers' adaptability. Regarding the scale of adaptive expertise, moderate adaptability was especially affected by the teachers' personal experiences and ideas, whereas high and low forms of adaptive expertise comprised a greater degree of formal knowledge. As Barnett & Koslowski (2002) have suggested, the social context of teachers' work possibly shapes the extent to which teachers' formal knowledge and personal views are activated in their professional adaptive expertise. Despite the differences between the two dimensions, they are closely connected with each other and they both develop through practical teaching experience (Beijaard & Meijer, 2017). For example, teachers may have concluded that a certain (research-based, proven) approach does not work for them in a certain context and this, in turn, requires them to question their own intentions and abilities. Alternatively, it is also possible that an increase of knowledge can help teachers to see their previous personal experiences in new and more workable ways.

Prior expectations – interactive observations. Clark & Peterson (1986) have noted a temporal dimension (i.e., when the teacher acquired an idea) within teachers' thought processes. All the three studies (Studies I-III) revealed that the teachers had several prevailing expectations about how the events might or should unfold and, in particular, how students' characteristics and behaviour might influence teaching situations. At the same time, the teachers constantly observed the unfolding moments, gained new insights, and integrated their expectations with observations. In this way, prior expectations and interactive observations influenced each other

and created new situation-specific interpretations that, in turn, were transformed into teaching decisions (Babad, 2009; Ball & Forzani, 2009; Fives & Buehl, 2012).

The idea of a temporal dimensions within teachers' thinking involves a balance between the poles of flexibility and stability, as well between teaching routines and adaptive expertise: the teachers need to be innovative 'in the moment' in response to unexpected situational demands (Lampert & Graziani, 2009). The two different means of rationalising and justifying the taken actions arise from different ways of connecting expectations with new and unexpected observations. As the results from Study III showed, teachers with low levels of adaptability tended to rely on their prior knowledge and experience, while their more adaptive colleagues integrated their prior knowledge and beliefs with the interactive features of the teaching more frequently, thus creating new bases for their teaching decisions.

Details – entities. The results indicated that the teachers interpreted certain situations through very detailed analysis (e.g., when a particular student struggled to complete his or her task), while some situations could be assessed at a general level (e.g., when students seemed to be tired of studying). These factors demonstrate how the teachers must, at all times and based on their observation, balance their generalisations with more detailed perspectives. This result can be compared to Leinhardt and Greeno's (1986) work, in which they explored the teachers' need to assess different levels of generality within their knowledge base and skills. This might well depend on the teachers' dispositions to notice and interpret complex events. While the teachers were inclined to pay attention to several important details in classroom contexts, they were also able to encompass larger entities in their understanding and anticipation of the flow of events.

Overall, as presented, effective teaching implies a continuous and multi-dimensional interaction between many core issues through which teachers become aware of their reflections (Schön, 1983, 1987). By combining different cognitive and situational perspectives in their knowledge, teachers are able to create a more comprehensive understanding based on their reflections (Stahnke et al., 2016). As the results showed, by combining different core dimensions, teachers can carry out purposeful reflection that goes beyond simple descriptions to compare various multifaceted aspects of teaching with their prior knowledge and experiences. This process of understanding also necessarily involves teachers' use of their adaptive expertise (Moore-Russo & Wilsey, 2014).

Managing these complex instructional activities requires teachers to develop their metacognitive awareness and reasoning ability (Kennedy, 2006; Parsons & Vaughn, 2013; Seidel & Stürmer, 2014). As Lampert & Graziani (2009) have noted, effective 'in the moment' teaching does not emerge spontaneously but requires conscious training. However, these findings do not merely support teachers in

becoming more capable of analysing their teaching; they enable them to become more skilled at teaching itself (Forzani, 2014). This multidimensional understanding is also important for teacher education programmes because it necessitates paying close attention to how teachers' knowledge is organised and developed through interactive situations (Entwistle, 2009).

6.2 Methodological issues: how the two datasets benefit teacher reflection

This research also aimed to explore how different reflective practices contributed to teachers' professional development. As previously presented in section 4.3, the two datasets employed different reflective methods with the objective of encouraging and distinguishing the teachers' thinking. The narrative scenarios (dataset I) considered teachers' actions and the reasons for those actions. The video stimulations (dataset II) were designed to support the teachers' recall of their actions and their reflections during the events. In line with the study aims, both the narrative scenarios and the video stimulations were considered to be helpful for teachers in activating their knowledge and the reasons for their actions, but also in serving "as an indicator for the quality of teacher knowledge" (Seidel & Stürmer, 2014, p. 740).

The results revealed that both methods directed teachers' attention to particular teaching events and made teachers aware of their essential features (Korthagen & Vasalos, 2005; Moore-Russo & Wilsey, 2014). Both methods also encouraged teachers' self-reflection, which was considered to be essential for developing adaptive expertise (Bransford et al., 2000; McDonald et al., 2014). However, although both methods sought to elicit similar teacher observations, they also triggered teachers' reflection upon different perspectives related to the events. The effects of the methods are presented in Table 8.

Table 8. The differences in teachers' reflections elicited by the data acquisition methods

Teacher reflections	Narrative scenarios	Video-stimulations
Nature of reflection	Speculative interpretations	Declarative statements
Reflection focus	Teaching behavior in general	Teachers' own behavior
Reflection direction	Opening for future events	Re-experiencing the particular event
Reflection versatility	Context-specificity	Situation-specificity
Reflection approach	Support for students	Support for student learning

The teachers' answers in the narrative scenario interviews were more speculative and less personal than in the video-stimulation-based interviews. Narrative scenarios activated the teachers' interpretative abilities by encouraging them to compare several different key issues when choosing the teaching approaches (Jenkins et al., 2010; Moore-Russo & Wilsey, 2014). By contrast, in response to the video stimulations, the remarks made by the teachers were more declarative and more straightforwardly concerned with justifying why they chose certain actions. Instead of reflecting upon alternative ways of behaving, the teachers focused on justifying their own action decisions. It is therefore possible that practical arguments were more difficult to reflect upon (or distinguish from dataset I) in the narrative scenario interviews. Because the practical arguments of the teachers were often situational, and the real teaching context was lacking in the narrative scenarios, the teachers could not justify their actions as they did in the video-stimulation interviews, which were necessarily related to real contexts. For example, in the narrative scenarios interviews, teachers were unable to link their reflections to particular circumstances, such as the students' age, background or the learning objectives.

The narrative scenarios enabled teachers to use their previous experience as a guide for future actions, while the video stimulations mainly focused on recalling and re-experiencing specific situations. Narrative scenarios encouraged teachers to reflect upon their previous teaching experience in general (for example, experience gained during teacher education programmes, through in-service training or working in the classroom) and to envision several practical possibilities for future teaching situations. When using video stimulations, the teachers referred to their knowledge processing during certain situations and were able to re-experience their decisions during the teaching event (Hamilton, 2012). Thus, instead of utilising their practical

knowledge as a tool for envisioning possible future actions, the teachers' reflections focused heavily on describing what had happened during the situation—especially the teachers' own behaviour and the factors that had influenced it (Haw & Hadfield, 2011; Vesterinen et al., 2010).

Thus, within both datasets, it was apparent that the teachers reflected upon prior circumstances but, while the narrative scenarios guided teachers to use the prior experiences as expected event scans and means for future reflection, the video stimulations guided teachers to re-experience the events and explain the interactive (and post-active) reasons for their actions. These ideas are compatible with concepts of reflection-in-action, reflection-on-action (Schön, 1983, 1987) and reflection-for-action (Olteanu, 2016). While video stimulations highlighted reflection, which took place during and after the action, narrative scenarios highlighted reflection-for-action, arising before the action but mirroring earlier experiences in order to deliberate future actions (Moore-Russo & Wilsey, 2014).

For these reasons, when using both methods, it is important to be aware of the temporal direction of reflection and whether reflection represented recall or anticipatory thinking (Beauchamp, 2015). When using video stimulation, the teachers did not necessarily consider future actions or how their reflections could be used in future actions, but they easily focused on past events and earlier experiences. For this reason, it would be useful to enhance teachers to consider how the events on videos and their reflections can be useful for future situations. By contrast, when using narrative scenarios, it may be necessary to shift teachers' focus on their expected actions to a consideration of previous experiences and knowledge items: Have I had previous experience of such an activity? Have I used this method before? How did it support student learning?

The use of narrative scenarios and video stimulations also provided opportunities for the teachers to focus on what is important to notice within the dynamic nature of classroom interactions (Moore-Russo & Wilsey, 2014). Despite the method used in the interviews, the teachers possessed a wide range of knowledge and beliefs that supported their reflections and they raised diverse viewpoints relating to their teaching practice (Harlin, 2017). However, some differences in reflective versatility also occurred. While narrative scenarios linked the teachers' reflections to certain contexts and expected context-specified aspects, video stimulations guided teachers toward more situation-specific reflection. In addition, in the narrative scenario interviews, the reflections were not directly associated with a particular person, but more generally with different types of students in similar contexts. In the video stimulation interviews, teachers' reflections were clearly personalised for certain students involved in the event (Meijer, Zanting, & Verloop, 2002).

This shows that the lack of genuine events in interviews based on narrative scenarios did not limit the number or substantive versatility of the teachers' reflections, but the teachers imagined a context that framed their reflection. However, what should be noted in relation to reflection versatility is that both methods might have encouraged teachers to reflect in more depth than they usually would in authentic situations. For example, the teachers might have considered that the events presented in narrative scenarios or video clips do not require special attention or are routine in practice; thus, they may simply invent a response to the researcher's questions (Jenkins et al., 2010).

The methods used also affected the teachers' responses regarding their intention to provide support for students' studying and learning. In the narrative scenario interviews, the importance of providing emotional support for students became one of the key themes. Teachers often mentioned that they endeavoured to encourage students and explained how they must support the students' self-esteem and self-image. By contrast, in the video-stimulation-based interviews, the teachers justified their work with less concern for encouraging students as persons than for their learning processes. It is possible that this discrepancy arises from the very different requirements of the (imaginary) narrative and (actual) video-stimulated situations. The teachers might have felt that encouraging the students and providing incentives is extremely important in narrative scenarios, but in intense genuine situations (video-stimulations) they might have had less opportunity and time to be emotionally supportive of students, or emotional support and guidance might have been an unconscious routine activity. It is also possible that, in the case of video-stimulations, the teachers identified several overlapping requirements in the teaching situation. Narrative scenarios, by contrast, provided an opportunity to focus in more detail on certain core factors in teaching. Furthermore, it is also possible that, during the interactive situation, the encouragement and support of the students was more closely intertwined with factors relating to the learning aims and content being taught. Teachers may have become accustomed to justifying practical work solutions primarily according to didactical and instructional perspectives (Schwab, 1971).

In summary, narrative scenarios gave the teachers the freedom to consider various actions related to the core factors of teaching (i.e. students, content) and to reflect upon their practical experience while anticipating future actions. They were not particularly critical of themselves, but were more likely to envision different possibilities for supporting the students as individuals. By contrast, video stimulations of the teachers' own authentic activities guided the teachers to focus their attention on themselves, evaluate their own activities and reflect upon their own decisions. In these cases, the teachers' reflections were more personal and explanatory.

These findings can be used in teacher education to support student teachers' reflection processes and thus create useful learning experiences and enhance professional development in meaningful ways. It is essential for teacher educators to acknowledge the kind of reflection the various methods elicit and how a method is thus suited to the particular learning objectives of courses.

7 Conclusions

The purpose of this study was to explore what teacher reflections consist of and how they can support effective teaching practices and enhance teacher learning and professional development. While the results discussed in chapter 6 are summarised according to the particular studies and should not be generalised, there still remain some more general aspects that can be interpreted across the particular phenomena and cases. This chapter 7 discusses how the results of this study can be utilised in pre- and in-service teacher education and which research topics should be examined in more depth in the future.

7.1 The implications for teaching and teacher education

The results imply that teachers benefit from continuing opportunities, in the form of reflective inquiry, to systematically analyse their teaching and students' learning. These reflections promote teachers' sensitivity to situations and support interactive reasoning skills, which are integral to the continuous adaptation and development of their teaching (e.g., Chung & van Es, 2014; Forzani, 2014; McDonald et al., 2014; Moore-Russo & Wilsey, 2014; Tirri & Ubani, 2013). In addition, in order to enhance teachers' professional development, the professional and the personal aspects of teaching must be intertwined (Korthagen, 2017). The teachers' increasing understanding of their own behaviour contributes to the development of their dispositions (Mena et al., 2017) and furthers the growth of their professional identities (Beauchamp, 2015; K rkk  et al., 2016). Thus, as Korthagen (2017) stated, teacher learning "takes place in the connection between theory, practice and person" (p. 399).

Supporting this connection through teachers' reflections is necessary during teacher education, but also in later professional development (Beauchamp, 2015; Maaranen & Stenberg, 2017; K nig et al., 2014). Because each teaching situation is unique and demands interactive pedagogical decisions about how to act (Forzani, 2014; Tirri, 2008), it is important to develop teacher education pedagogies that

anchor teacher reflections in teaching practices and help teachers to break intricate teaching events into smaller components (Ball & Forzani, 2009; Beauchamp, 2015; Grossman & Pupik Dean, 2019; McDonald et al., 2014; Spalding et al., 2011). Systematic and productive reflection on core practices requires supervision and rehearsal in the interests of developing functional habits for adaptive teaching (Biesta & Burbules, 2003; Moore-Russo & Wilsey, 2014; Rodgers, 2002).

This study suggests a case-based reflection method through which teachers' reflections upon adaptive teaching practices can be challenged and supported in teacher training programmes: for example during practicum sessions or pedagogical seminars. The method aims to present experiences that help teachers to focus on the ways in which they use their essential pedagogical and instructional knowledge items alongside their awareness of complex teaching demands. This idea is in line with Grossman and Pupik Dean's (2019) and McDonald et al.'s (2014) suggestions about teacher education pedagogies, which emphasise the importance of operating with concrete core practices in teaching. Similarly, Ball and Forzani (2009) suggest that teacher educators should use tasks and activities that emphasise actual teaching skills and shift the focus from what teachers know toward how teachers might use their knowledge as a basis for practical actions.

A structured case-based reflection method involves giving teachers a stimulus (e.g., narrative scenario or video clip) that directs their reflections to certain teaching situation. Teachers are then encouraged to reflect upon the case from three perspectives, which the results of the study showed necessary for adaptive teaching: (1) what kind of observations and interpretations the case elicits, (2) what kind of goals and intentions relate to the case and (3) what alternative means of pedagogical interaction could be used when acting in similar situations. When teachers become aware of these perspectives and are able to connect the perspectives together, their adaptive expertise can develop. Figure 8 shows how the method proceeds.

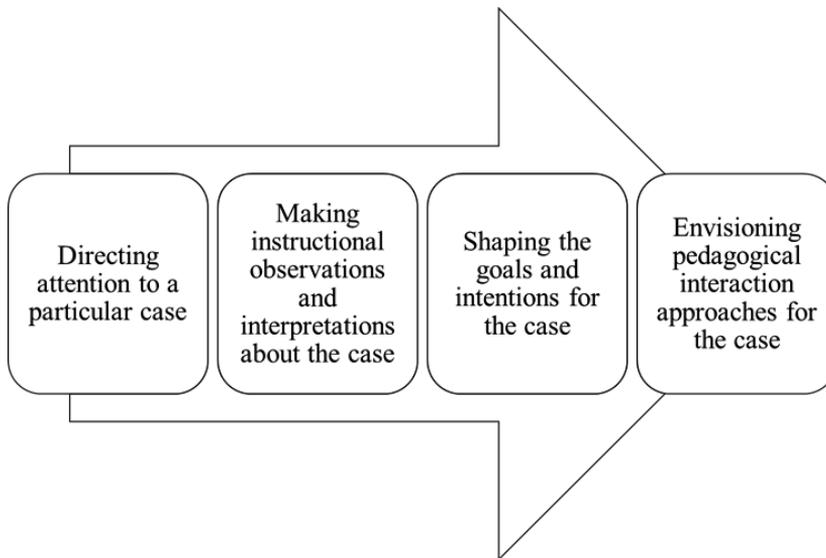


Figure 8. A case-based reflection method to develop adaptive expertise.

Initially, teachers are encouraged to become familiar with the case and imagine themselves as teachers in a similar situation. The case can be presented as a narrative scenario or via a video clip: the important factor is that the method used should describe an attention-demanding situation that stimulates teachers' reflection (Spalding et al., 2011). The cases may be imagined or real, and they can arise from teachers' own experiences or from the experiences of others (e.g., colleagues or teacher educators). Furthermore, the cases can be presented to teachers in gradual stages. This could give teachers—especially student teachers during teacher education—opportunities to practice progressive reflection (c.f., Forzani, 2014). For example, teachers may first be encouraged to focus on narrative scenarios, then on videoed classroom cases of other teachers and, finally, on videos of their own teaching. This enables teachers to gradually deepen their context-related understanding of the core practices and expand their active role as teachers. The usefulness of cases to enhance adaptive expertise becomes particularly apparent when teachers are encouraged to systematically reflect upon three perspectives that are necessary for adaptive practices.

First, teachers' observations and interpretations of the instructional events can be seen as reflective tools through which teachers begin to envision possible actions (Chung & van Es, 2014). When teachers are encouraged to carefully observe what is happening within the presented case and interpret these observations, they can learn to actively combine their practical knowledge, beliefs and experiences with their intentions for teaching actions (Lampert & Graziani, 2009). This is also closely related to their dispositions to be present for their students and their needs. By paying

attention to the ways in which teachers tend to observe and interpret events, teachers can learn to unpack and reorganise their assumptions, which influence their action decisions (Schussler et al., 2010). In turn, teachers' increasing awareness of their dispositions enhances their self-efficacy by providing experiences of being committed to particular situations and contexts (Parrot et al., 2013).

Second, teachers should practice adjusting their case-based observations and interpretations in line with their student-related and learning-related intentions (Bransford et al., 2000). Teachers often spend a great deal of time planning teaching situations, but do not evaluate in detail how their actions might promote students' learning, or how their methods might take into account students' individual needs (Stigler & Thompson, 2009). This does not imply that teachers should define their goals only for particular purposes and needs but that, in certain situations, they should constantly reshape what their existing objectives mean in relation to their in-the-moment observations and interpretations. In this way, the awareness of the specific learning goals provides constant guidance for observing and interpreting student learning (Chung & van Es, 2014). Similarly, Beauchamp (2015) has emphasised that the intentionality teachers bring to their practice by working toward future goals is a significant element of their professional development. Thus, teachers should focus more on the factors that make their teaching methods effective in relation to the goals to be achieved and, on the other hand, consider the factors that may prevent the achievement of the goals.

Third, teachers should envision alternative ways to interact with students within the situation. While it is important for teachers to actively interpret the events and to recognise and reassess the goals of the events, it is essential that teacher training is designed to prepare teachers to become skilled in interaction with students and support the students' learning processes through pedagogical interaction approaches (Forzani, 2014). Interaction itself is manifested in many dimensions that enable teachers to deal sensitively with students, create a positive classroom atmosphere and develop suitable conditions for the student's learning process. However, since learning goals can be achieved through many means, it is important to understand that, rather than seeing a pedagogical approach or method as categorically good or bad, it is more useful to recognise why the chosen approach may be, to a varying extent, effective or ineffective. It is also important to focus (again) on teachers' aims in using a particular teaching approach, and how the teachers' reasons for choosing the approach are in line with the interactive interpretations. This strategy expands our view of teaching because teachers can achieve equally good learning outcomes with different approaches.

Structured case-based reflection upon these three perspectives emphasises many functional relationships between teachers' thinking and actions and may help

teachers to confront the classroom actions more adaptively (Moore-Russo & Wilsey, 2014; Spalding et al., 2011). These perspectives acknowledge that teaching cannot be adaptive if it lacks situational sensitivity, considerations of teaching objectives, or a focus on pedagogical interaction. This is in line with Biesta's (2012) assertion: whatever teachers choose to do in classrooms, their action decisions always reflect how teachers see the events and what aims they want to promote. Reflection, supported by structured foci on practical cases, influences both the functional (teacher performance) and attitudinal (attitudes and values) development of teachers' adaptive expertise (Evans, 2008). In addition, through structured case-based reflections, the focus of the reflections can be expanded from the description and evaluation of teaching methods and activities to a more solid capability of teachers' to interpret events and understand what students know and feel (Ball & Forzani, 2009).

Although this study has pointed out that professional development is mainly based on the teachers' own active roles, a culture of sharing knowledge (i.e., cooperation between colleagues and other experts) is also considered very useful in supporting teacher learning through reflection (Bransford et al., 2000; Horn, 2005; Leijen et al., 2015). Beauchamp (2015) stated that "individual reflection is best supported in a trusting relationship with another" (p. 130). When teachers are able to share their ideas with other teachers—for example, within the school community or through the use of online knowledge-sharing activities—they become more aware of their own thinking (Hou, Sung, & Chang, 2009). By considering the views of others, teachers can perceive and acquire new perspectives on the development of their own practice and strengthen their mutual engagement with other teachers. It would also be useful to intensify cooperation between teachers and teacher educators to mutually generate greater research-based practical knowledge through reflective inquiries (Spalding et al., 2011; Stigler & Thompson, 2009; Wadlington & Wadlington, 2011).

Consequently, as Spalding et al. (2011) stated, "learning to teach is a continuum that only begins with a teacher education program and extends throughout one's career" (p. 5; see also Feiman-Nemser, 2001). Similarly, Chung & van Es (2014) emphasised the importance of learning to analyse teaching already from teacher education: it may help beginning teachers to adopt "an inquiry stance toward practice and develop a disposition of teaching as inquiry that will empower them to continue to learn in and from their own practice over time" (p. 132). Practical knowledge of teaching is not therefore straightforwardly transferrable or teachable from teacher educators to (student) teachers, but rather teachers should be seen as originators of their own practical knowledge (Ball & Forzani, 2009). Their active role as professional learners, produces practical knowledge relevant to practical teaching

(Elbaz, 1981; Körkkö et al., 2016) and, as this study suggests, their active role can be supported through the case-based reflection method.

This support might be especially beneficial when introducing educational innovations, such as co-teaching, phenomenon-based teaching or the application of digital technology, into teaching practice: teachers must experience innovations as useful and be willing to integrate them with their existing knowledge. If teachers feel that the innovation does not work sufficiently well in practice, or is in conflict with their practical knowledge or teaching aims, it may not support effective teaching (Verloop et al., 2001). With the help of the structured case-based reflection method, teachers can challenge their assumptions and develop new perspectives on the use of innovations. Therefore, it cannot be assumed that teachers lack essential knowledge: rather, they may lack the means or opportunities to shape their prevailing knowledge and transform it, based on situation-specific observations, into instructional practices (Chung & van Es, 2014).

7.2 Future research

In the future, research regarding teachers' pedagogical reflection and practical knowledge should take into account the factors that encourage or prevent the use of desirable adaptive teaching approaches. In particular, by examining more deeply and longitudinally teachers' adaptive thinking processes, it is possible to gain a better understanding of the practical and dispositional blocks that may prevent teachers from acting adaptively and achieving the desired learning outcomes (Blömeke et al., 2015; Buehl & Beck 2015; Levin & He, 2008; Stahnke et al., 2016). For example, it is possible that teachers might be unable to use the available resources in a multidimensional teaching situation (e.g., because of an impatient or restless student), the teacher might perceive the workload to be disproportionate to the potential benefits, or the teachers' emotions (e.g., his or her fear of failure) might limit the use of teaching methods (Kennedy, 2006). When these factors are examined, the examination can lead to a realisation of teachers' positive dispositions and hence, through reinforcement of the teacher's professional performance, to more effective teaching (Diez, 2007; Maaranen & Stenberg, 2017).

In addition, as the study showed, the methods of narrative scenarios and video stimulations are useful for enhancing teacher learning, but they are also methodological tools for examining teachers' thinking. It is hoped that this study stimulates interest in continuing the examination of these two different methods. Although this study discussed about several potential perspectives related to their use and benefits, more research is needed. Teacher educators need reliable and easily accessible methods that open up possibilities for understanding teachers' reflection

processes and supporting their development of practical decision-making. In order to gain access to the practical knowledge of a teacher, a method necessarily requires the teacher to reflect upon his or her own particular knowledge structures, especially the dialectical relationship between theory and practice (Clandinin, 1985). In addition, it would be interesting to further develop narrative scenarios (e.g., as digital animations) in order to create a deeper and more contextualised framework for teacher reflection (Moore-Russo & Wilsey, 2014).

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