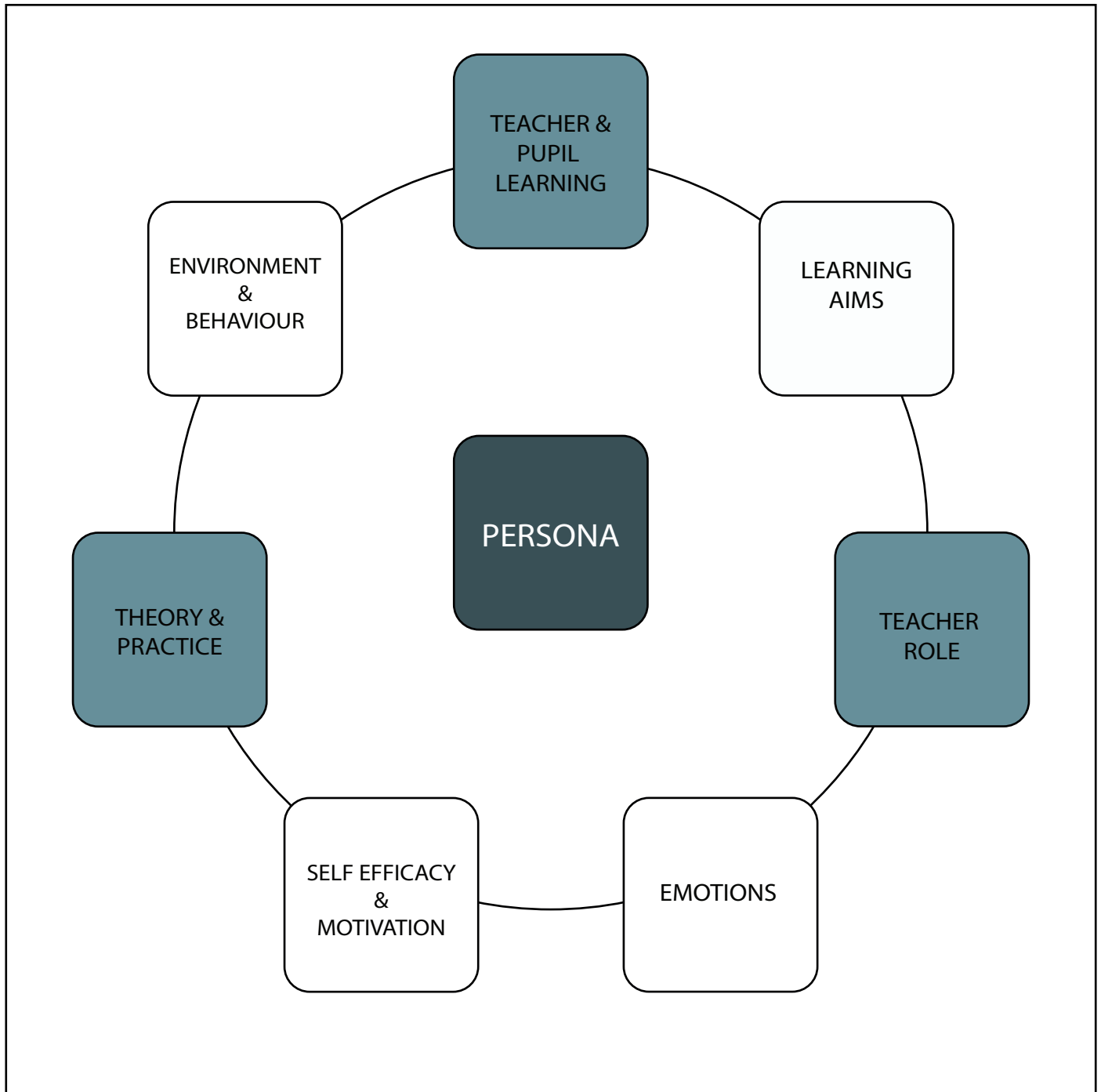


Beneath the Surface: Developing Video-Based Reflective Practice in the Primary School Teacher Education Programme



Minna Körkkö

Acta Universitatis Lapponiensis 275

MINNA KÖRKKÖ

**Beneath the Surface:
Developing Video-Based Reflective Practice
in the Primary School Teacher Education Programme**

Academic dissertation
to be publicly defended with the permission
of the Faculty of Education at the University of
Lapland in lecture hall 2 (LS2) on 18 September 2020 at 12 noon



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Abstract

Körkkö Minna

Beneath the Surface:

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The aim of this study was to investigate the ways in which the video application VEO (video enhanced observation) could be used as part of reflective practice in the primary school teacher education programme at the University of Lapland. In particular, I wanted to explore the suitability of using VEO as a tool for learning reflection skills and for guiding that learning as well as how VEO could become a practical and useful tool to promote the development of reflection skills. These aims were pursued through a cyclical developmental process, whereby the mobile-based video application VEO was adapted to the context of primary school teacher education. The study consists of three sub-studies, all of which included separate research questions and employed a qualitative case study approach. Thirty-five student teachers and 14 supervisors participated in the study. The results present the holistic model of learning and guiding reflection, which originated from the three sub-studies and the research process and informed the organisation of reflective practice in the primary school teacher education programme.

The aim of the first sub-study was to explore how student teachers' reflection changed over time during the teacher education programme and what characteristics of the practicum periods promoted the development of these student teachers' practical theories. The data were collected by analysing the pedagogical portfolios of 13 student teachers. This sub-study formed the basis of the two remaining sub-studies in the dissertation. In the second sub-study, I investigated how the student teachers used the VEO app for their professional development during one practicum period, the applicability of the VEO app for supervision and the student teachers' and supervisors' thoughts about the use of the VEO app as part of future reflective practice. The data consisted of individual or focus group interviews with 11 student teachers and nine supervisors, video diaries from three student teachers and a piece

of reflective writing from one student teacher. In the third sub-study, I explored how meaning-oriented reflection could be enhanced through video by using the video-enhanced reflection procedure during one practicum period. The data consisted of individual or focus group interviews with eight student teachers and nine supervisors and supervisory discussions with seven student teachers and four supervisors. The data from the sub-studies were analysed using qualitative thematic analysis methods, with Sub-studies II and III also employing phenomenographic analysis methods.

The results of the study showed that the process of developing and applying VEO to the context of the primary school teacher education programme was complex and time-consuming. Reflection through VEO benefited the student teachers in their ability to reflect on their teaching, both on their own and with their peer students. In the first VEO trial, technical limitations regarding the app restricted opportunities to learn from videos and the use of videos in the supervisory process, resulting in the need to combine individual and collaborative video-based reflection and provide the student teachers with a strong external guide to support their video analysis. The video-enhanced reflection procedure applied during the second VEO trial helped the student teachers in applying a more analytical viewpoint to their teaching. However, the procedure did not encourage a critical stance. Institutionally, video-based reflection clashed with the existing culture of reflective practice, which was seen in the ways in which some student teachers and supervisors resisted the use of the VEO app during the first VEO trial. Negative attitudes were affected by a lack of prior experience with video technologies and the disciplinary changes that video usage implied for the aims of supervision and the roles of the supervisor and student teachers. Video usage required student-centeredness, which challenged the supervisors to consider their own role from a new angle.

The study results have both practical and theoretical implications for primary school teacher education. There is a need to pay closer attention to the ways of promoting student teachers' critical reflection skills through video. The results call for a strengthening of the theoretical basis and a clarification of the aims of supervision as well as for increasing the possibilities for supervisors' in-service education. The holistic model of learning and guiding reflection developed in this study widens the theoretical basis of teacher education and can work as a practical reflection guide for student teachers and supervisors. To make reflection through VEO a permanent part of reflective practice in teacher education, it is essential to build a learning environment in which video-based reflection is regarded as an important learning tool among a range of approaches and where video is included in the various study courses and contexts. The means of video application has to be in line with theoretical underpinnings as well as with the context of the primary school teacher education programme, which supports the achievement of the individual learning aims of student teachers, the aims of each practicum period and the ultimate aim

of developing reflective teachers. It is against this backdrop that we can realistically bear testimony to research-based teacher education that promotes the integration of theory, practice and research in student teachers' professional development process.

Keywords: primary school teacher education, reflective practice, reflection, video-based reflection, professional development, video application

Tiivistelmä

Körkkö Minna

Pinnan alle: videoperustaisen reflektiivisen käytännön kehittäminen
luokanopettajakoulutuksessa

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Tutkimukseni tarkoituksena oli selvittää, miten VEO-videosovellusta (video enhanced observation) voidaan käyttää osana luokanopettajakoulutuksen reflektiivistä käytäntöä. Tutkin videosovelluksen sopivuutta reflektiotaitojen oppimisessa ja oppimisen ohjaamisessa sekä sitä, miten sovellus muuntuu käytännölliseksi ja hyödylliseksi reflektiotaitojen kehittymisen tukemisen välineeksi. Näiden tavoitteiden saavuttamiseksi mobiilipohjainen VEO-videosovellus sovitettiin luokanopettajakoulutuksen kontekstiin syklimäisen kehitysprosessin aikana. Tutkimukseni koostuu kolmesta osatutkimuksesta, joilla kaikilla on omat tutkimuskysymyksensä. Hyödynsin tutkimuksessani laadullista tapaustutkimusta. 35 luokanopettajaopiskelijaa ja 14 ohjaajaa osallistuivat tutkimukseen. Tulokset esittelevät holistisen reflektion oppimisen ja ohjauksen mallin, joka muotoutui osatutkimusten ja tutkimusprosessin seurauksena. Mallia voidaan hyödyntää luokanopettajakoulutuksen reflektiivisissä käytännöissä.

Ensimmäisessä osatutkimuksessa selvitin, miten luokanopettajaopiskelijoiden reflektio kehittyy opettajakoulutuksen aikana ja, mitkä ohjattujen opetusharjoitteluiden piirteet edesauttavat opiskelijan ammatillista kehittymistä. Aineistona käytin 13 opiskelijan pedagogisia portfolioita. Ensimmäinen osatutkimus, joka kuului tutkimuksen kontekstiin, muodosti perustan kahdelle muulle osatutkimukselle. Toisessa osatutkimuksessa selvitin, miten luokanopettajaopiskelijat käyttivät VEO-videosovellusta ammatillisessa kehittämisessään yhden harjoittelujakson aikana, miten sovellus toimi harjoittelun ohjauksessa sekä opiskelijoiden ja ohjaajien näkemyksiä sovelluksen käytöstä osana reflektiivistä käytäntöä. Aineisto muodostui 12 luokanopettajaopiskelijan ja yhdeksän ohjaajan ryhmä/yksilöhaastattelusta, kolmen luokanopettajaopiskelijan videopäiväkirjoista ja yhden opiskelijan kirjoitelmasta. Kolmannessa osatutkimuksessa selvitin, miten merkitysorientoitunutta reflektiota voidaan edistää videon avulla hyödyntämällä videointiin perustuvaa reflektiomallia. Aineistona käytin kymmenen luokanopettajaopiskelijan ja yhdeksän ohjaajan ryhmä/

yksilöhaastatteluja sekä seitsemän opiskelijan ja neljän ohjaajan ohjauskeskusteluja. Hyödynsin tutkimusaineiston analyysissä laadullisia temaattisen analyysin menetelmiä, toisessa ja kolmannessa osatutkimuksessa lisäksi fenomenografisia menetelmiä.

Tutkimustulosten mukaan prosessi, jossa VEO-videosovelluksen käyttöä kehitetään ja sovelletaan luokanopettajakoulutuksen kontekstiin, on monitahoinen ja aikaa vievä. Reflektointi videosovelluksen avulla edisti opiskelijoiden kykyä reflektoida omaa opetustaan yksin ja yhdessä vertaisopiskelijoiden kanssa. Ensimmäisessä VEO-kokeilussa videosovelluksen tekniset rajoitukset vaikeuttivat videoista oppimista ja videoiden käyttöä harjoittelun ohjauksessa. Tämä synnytti tarpeen yhdistää yksilöllinen ja yhteisöllinen videoperustainen reflektio ja lisätä opiskelijoiden reflektion ulkoista ohjausta. Toisessa VEO-kokeilussa hyödynnetty videopohjainen reflektiomalli auttoi opiskelijoiden analyttisempää lähestymistapaa opetukseen mutta ei tukenut kriittisen näkökulman kehittymistä. Opettajankoulutusinstituution näkökulmasta videoperustainen reflektio törmäsi vallitseviin toimintatapoihin mikä näkyi joidenkin opiskelijoiden ja ohjaajien ilmaisemana vastustuksena videon käyttöä kohtaan ensimmäisen VEO-kokeilun aikana. Negatiivista asennetta selitti osaltaan vähäinen aikaisempi kokemus videoteknologioiden käytöstä sekä muutokset, joita videon hyödyntäminen aiheutti ohjauksen tavoitteille ja opiskelijoiden ja ohjaajien rooleille. Video edellytti opiskelijalähtöisyyttä mikä haastoi ohjaajat tarkastelemaan omaa rooliaan uudesta näkökulmasta.

Tutkimuksen tuloksilla on sekä käytäntöä että teoriaa ohjaavia seurauksia. Tulokset osoittavat, että jatkossa on tarpeen kiinnittää enemmän huomiota opiskelijoiden kriittisten reflektiotaiteiden tukemiseen videon avulla. Ohjauksen teoreettista perustaa tulee vahvistaa ja ohjauksen tavoitteita selkeyttää. Harjoittelun ohjaajien ammatillisen kehittymisen mahdollisuuksia tulee parantaa. Tutkimuksen tuloksena kehitetty holistinen reflektion oppimisen ja ohjauksen malli laajentaa opettajakoulutuksen teoreettista perustaa ja voi toimia yhtenä ohjaavana reflektiotyökaluna opiskelijoille ja ohjaajille. VEO-sovellukseen perustuvan reflektion vakiinnuttaminen luokanopettajakoulutukseen edellyttää oppimisympäristöä, missä videoperustaista reflektiota arvostetaan oppimisen välineenä muiden lähestymistapojen rinnalla. Videon käyttö tulee sisällyttää laajasti opettajakoulutuksen opintoihin. Videon soveltamisen tapojen tulee olla linjassa opettajakoulutuksen teoreettisten lähtökohtien ja koulutuksen kontekstin kanssa. Tämä edesauttaa opiskelijoiden yksilöllisten oppimistavoitteiden ja harjoittelujaksojen tavoitteiden saavuttamista sekä perimmäistä tavoitetta reflektioon kykenevien opettajien kouluttamisesta. Näin voimme puhua aidosti tutkimusperustaisesta opettajakoulutuksesta, joka tukee teorian, käytännön ja tutkimuksen integroitumista opiskelijoiden ammatillisen kehittymisen prosessissa.

Asiasanat: luokanopettajakoulutus, reflektiivinen käytäntö, reflektio, videoperustainen reflektio, ammatillinen kehittyminen, videosovellus

Authors' contribution

I took on the main responsibility for collecting and analysing the data and writing up Sub-studies I–III. Kyrö-Ämmälä and Turunen contributed to the analysis and interpretation of the results of Sub-study I and the writing process of the article related to this sub-study. Morales Rios and Kyrö-Ämmälä contributed to the analysis and interpretation of the results of Sub-study II and the writing process of the article related to this sub-study. I wrote the third article independently, and a colleague provided me with advice on producing the figure for the article. Finally, two other colleagues read and commented on the manuscript relating to Article III.

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*You can reach up higher than anyone else does
but where to get wings for the dreams
you can begin your journey with empty hands
and come back with thousand leaves
But what if you just build up from those small pieces
and make a wall
even though sometimes you might hesitate, today I can't
you would believe that someday you will achieve it all*

This dissertation has been part of my life for the last four years. This has been a wonderful journey, during which I have developed my knowledge and skills as a researcher, supervisor and teacher. Above all, I have grown as a remarkable human being and learnt to know myself better. It is indeed an honour to work with the things that you love the most.

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Rovaniemi, January 2020

Minna Körkkö

List of Articles

This thesis is based on three articles, which are hereafter referred to as Sub-studies I to III:

Sub-study I

Körkkö, M., Kyrö-Ämmälä, O., & Turunen, T. (2016). Professional development through reflection in teacher education. *Teaching and Teacher Education*, 55, 198–206.

Sub-study II

Körkkö, M., Morales Rios, S., & Kyrö-Ämmälä, O. (2019). Using a video as a tool for reflective practice. *Educational Research*, 61(1), 22–37.

Sub-study III

Körkkö, M. (2019). Towards meaningful reflection and a holistic approach: Creating a reflection framework in teacher education. *Scandinavian Journal of Educational Research*. Advance online publication. doi:10.1080/00313831.2019.1676306

Article I is available on ScienceDirect, <http://dx.doi.org/10.1016/j.tate.2016.01.014>

Article II is the author's accepted manuscript of an article published as the version of record in *Educational Research* © 2019, Informa UK Limited, trading as Taylor & Francis Group, <http://www.tandfonline.com>

Article III is the author's original manuscript of an article submitted to *Scandinavian Journal of Educational Research* in 2019, Informa UK Limited, trading as Taylor & Francis Group, <http://www.tandfonline.com>

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1 INTRODUCTION

This dissertation was undertaken as part of an international research project called VEO Europa (2015–2017), whose aim was to improve the quality of teaching and learning through the use of the video application VEO (video enhanced observation) to improve initial teacher training and continuous professional development. The University of Lapland was one of the project's strategic partners. My study focuses on video-based reflective practice, especially student teachers' reflection and professional development and the ways of promoting these aspects through video during teacher education. The impetus behind the study originated from the praxis and practical developmental requirement of the primary school teacher education programme. Thus, the starting point of the study was pragmatic in nature. Moreover, I pursued social constructivist ideas during the research process by respecting the participants' views and leaving space for multiple interpretations while analysing the study results.

The theoretical background of my study consists of the educational literature on teacher professional development and reflection (see, e.g. Beijaard, Meijer, & Verloop, 2004; Levin & He, 2008; Schön, 1983). Professional development is usually defined as the constant development of professional knowledge and skills throughout one's career; it includes both natural learning experiences and planned activities that together affect individual teachers, the environment in which they work and the quality of education in their classrooms (Day, 1999). In the process of professional development, teachers form their professional identity and, through that, increase awareness of their personal and professional selves (Berliner, 2001; Stenberg, 2011a). Teacher professional development is affected by changing working environments, innovations in the field of education and the needs of schools, the school system and society (Darling-Hammond, 2005; Fraser, Kennedy, Reid, & Mckinney, 2007). Moreover, professional learning is determined by teachers' motivation, personal commitment and perceptions (Darling-Hammond, 2005).

In this study, student teacher professional development is approached from the point of view of reflection, i.e. development resulting from reflection, instantiated through changes in reflection, which can have implications for teaching practice (Meijer, Zanting, & Verloop, 2002; Zeichner & Liston, 1987). On the subject of reflection, I focus on video-based reflection and the corresponding research. I lean on the work of Korthagen and his colleagues (Korthagen, 2001, 2004; Korthagen, Kessels, Koster, Lagerwerf, & Wubbels, 2001; Korthagen & Vasalos, 2005) concerning the holistic approach to teacher learning. Moreover, experiential

learning theory (Kolb, 1984), constructivist and social constructivist learning theories (Dewey, 1933, 1997; Palincsar, 1998; Vygotsky, 1978), sociocultural learning theory (Vygotsky, 1978), collaborative learning theory (Dillenbourg, 1999) and a situated perspective on cognition and learning (Lave & Wenger, 1999) are all essential background theories in my study.

Since Schön (1983) published his book *The Reflective Practitioners*, the development of reflection skills has been an important aim of many teacher education programmes. Reflection, i.e. the analysis of one's thoughts and experiences, is considered a key element of teacher professional development because, through reflection, teachers can integrate educational theory into their teaching practice (Dewey, 1933; Schön, 1983). Reflection enables teachers to evaluate their experiences and conceptualise them. Through reflection, they can become aware of their inner feelings and assumptions, ultimately achieving a more analytical viewpoint in relation to their teaching (Kolb, 1984). The aim of developing reflective practitioners has been pursued through different approaches to teacher education, such as the research-based approach, which has been a guiding approach in Finland since the 1980s. Finnish teacher education aims to educate pedagogically thinking teachers who are able to adopt a critical viewpoint to their practice (Toom et al., 2010). Pedagogical thinking focuses on the teaching event; it is a synonym for reflective thinking and is the antithesis of routine thinking (Kansanen, 1995).

Paying attention to teachers' reflection skills has become increasingly important in the current period, which is marked by the evolution in teachers' role and the corresponding expectations (European Union, 2014). Teachers' work has changed, and today, teachers are supposed to be active participants in schools, e.g. by taking part in curriculum planning (Priestley, Edwards, Priestley, & Miller, 2012). Because of demographic changes and evolving school instructional policies, pupil heterogeneity has increased, and teachers now face a wide range of learning differences in their classrooms; therefore, teachers' work requires reflection, and research skills and teacher education programmes should aim to develop this ability (Commission of the European Communities, 2007). The Finnish national curriculum for basic education (Finnish National Board of Education, 2014) highlights the development of pupils' self-assessment skills in school. To be able to assess pupils' learning, teachers must first be able to assess their own learning. A teacher education developmental programme launched in 2016 included transversal competence, creative expertise and the ability to develop professionally during the teaching career as essential characteristics of future teachers (Husu & Toom, 2016; Ministry of Education and Culture, 2016).

Theoretically, the topic centres on different perspectives and ideas of what is regarded as important in reflection and learning (Dewey, 1933; Jay & Johnson, 2002; Kolb, 1984; Korthagen, 2004; Schön, 1983). However, different definitions of reflection have compounded the difficulty of teaching the phenomenon, usually

seen as a context-bound process that includes different phases. This starts with a definition of the problem, then looks at the problem from different vantage points and ends by choosing a way of action (Dewey, 1933; Schön, 1983). Dewey (1933) defined reflection as 'active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it, and the further conclusions to which it ends' (p. 6). Many researchers have abandoned Dewey's strict definition and, instead, have defined reflection as including all kinds of reflection, not only those consisting of judgments (Kember et al., 1999). The reflection process is not linear; thinking moves between different phases (Lee, 2005).

Reflection can occur at different hierarchical levels. The lowest level is descriptive (Hatton & Smith, 1995), technical (Van Manen, 1977) or routine reflection (Zeichner & Liston, 1987), which means describing one's thoughts and actions. The person does not question the assumptions behind the action or the relevance of the results. The next thinking level can be called comparative (Jay & Johnson, 2002), contextual (Taggart, 1996) or analytical reflection (Ward & McCotter, 2004). Here, the person looks critically at the assumptions behind their actions, ponders situations from multiple viewpoints and considers contextual restrictions. The highest level is critical reflection, where the person critically analyses his or her thoughts and actions from different viewpoints, including a consideration of cultural, social and ethical factors (Brookfield, 1995; Van Manen, 1977). Critical reflection can result in changes in action when the person co-constructs his or her experiences in light of new experiences (Zeichner & Liston, 1987). Reflection can be *self-reflection*, carried out individually, or *collaborative reflection*, carried out with other people (Gelfuso & Dennis, 2014). Reflection can focus on one's own actions, thoughts or learning, competences, beliefs, strengths, environment or any other issue concerning oneself or others (Korthagen, 2004, 2017).

This study is based on the idea that everyone acquires the ability to think from birth and that this ability can be learnt and developed through practice (cf. Dewey, 1933; Jay & Johnson, 2002; Schön, 1983). Researchers seem to agree on the notion that the development of teacher reflection skills must be guided in order to promote quality of reflection and, thus, the development of practice (Gelfuso & Dennis, 2014; Jay & Johnson, 2002). Many reflective activities, such as portfolio writing, have been used to support the development of student teachers' reflection skills (Mansvelder-Longayroux, Beijaard, & Verloop, 2007; Oosterbaan, van der Schaaf, Baartman, & Stokking, 2010). Previous studies have indicated that higher levels of reflection can be achieved through support structures, such as theoretical frameworks and teacher inquiry (Chitpin, 2006; Dawson, 2006; Toom, Husu, & Patrikainen, 2015). Supervisors and peer students play a critical role in fostering reflection through questions and comments that challenge student teachers to broaden their thinking (Danielowich, 2014; Stockero, Rupnow, & Pascoe, 2017).

However, despite continuous guided reflection activities during teacher education programmes, student teachers' reflection skills tend not to reach the highest critical level, whereby student teachers are able to question their teaching practices. Their reflection skills remain primarily descriptive at the end of their studies (McFadden, Ellis, Anwar, & Roehrig, 2014; McGarr & McCormack, 2014). As such, other reflection tools, such as video, have been developed to support the development of critical reflection. Video has been used in teacher education since the 1960s, and along with technological advances, the use of video and video research has increased in recent decades (Moore, 1988). Besides video, the use of video analysis tools (VATs) for analysing practice has also increased (Ellis, McFadden, Anwar, & Roehrig, 2015; Rich & Hannafin, 2009; Stockero et al., 2017). Previous studies have also reported that video is beneficial for reflecting on teaching and can be a powerful tool in teacher professional development. This is because video improves the ability to evaluate teaching and contributes to changes made to teaching (Bryan & Recesso, 2006; Snoeyink, 2010; Wang & Hartley, 2003).

Previous studies have tended to focus on the benefits of video for teacher reflection and learning. The problems identified are usually technical in nature, but they also include student teachers' tendency to pay attention to their appearance and negative feelings, which can emerge from watching a video (Pailliotet, 1995; Shepherd & Hannafin, 2008; Snoeyink, 2010). The educational literature lacks a wider discussion of barriers to the use of video in teacher education. This discussion is also wanting in terms of knowledge of what it means to bring video into the teacher education context and apply it to the learning of reflection skills as well as to guide that learning. There are several existing studies on the content and level of student teachers' reflection and the guiding of reflection (see, e.g. Jay & Johnson, 2002; McFadden et al., 2014; Sewall, 2009; Toom et al., 2015). However, there is a need for further research on the use of VATs in teacher education, especially mobile applications, which are easily transportable and can be used flexibly via smartphones and iPads.

My study contributes to the existing research literature by investigating how the video application VEO can be used as part of reflective practice in the primary school teacher education programme at the University of Lapland. I am interested in how VEO can be used in the learning of reflection skills and in guiding that learning. Moreover, I want to explore how VEO can become a practical tool to promote the development of reflection skills during teacher education studies. So far, research on the matter has mainly focused on the context of subject teaching, such as mathematics, science and literacy (Arya, Christ, & Chiu, 2014; Borko, Jacobs, Eiteljorg, & Pittman, 2008; Bryan & Recesso, 2006). My study adds to the field by examining the context of primary school teacher education, where student teachers teach many school subjects to children in grades 1–6. Thus, the perspective regarding video recording is not limited to single subjects and their specificities; the view is significantly broader.

The study consists of three sub-studies and three related peer-reviewed scientific articles. The first sub-study investigated how the student teachers' reflection changed over time during the teacher education programme and what characteristics of the practicum periods promoted the development of these student teachers' practical theories. This sub-study formed the basis for the second and third sub-studies. The second sub-study explored how the student teachers used the VEO app for their professional development during one practicum period, the applicability of the VEO app for supervision and the student teachers' and supervisors' thoughts about the use of the VEO app as part of future reflective practice. The third sub-study found that meaning-oriented reflection could be enhanced with the help of video through the video-enhanced reflection procedure used during one practicum period. Based on the research process, I illustrate, as an outcome of my increased understanding, the holistic model of learning and guiding reflection at the end of the dissertation.

The study applied the case study approach to investigate reflective practices within the primary school teacher education programme (Yin, 2018). The use of an innovative mobile technology, VEO, was also investigated, developed and adapted to the context. VEO is a rather new application, and therefore, research on it is still scarce. My study offers an insight into the developmental work of VATs as part of reflective practice in teacher education over time. There are some descriptions of practical applications of VATs in teacher learning (Bryan & Recesso, 2006; Ellis et al., 2015; Shepherd & Hannafin, 2008), but research on mobile applications remains scarce.

The structure of the study is as follows: After the introduction, I present the theoretical background of the study in two subsequent chapters. Thereafter, I illustrate the research context, followed by the research questions and research design. In Chapter 7, I discuss the three sub-studies, focusing on their key results as well as an evaluation of them. After presenting the sub-studies, I illustrate the holistic model of learning and guiding reflection. The final chapter includes a discussion of the study's main results as well as concluding remarks.

2 REFLECTION

2.1 Defining reflection and learning

While the concept of reflection has been widely discussed in the teacher educational literature, a clear definition remains wanting (Jay & Johnson, 2002; Schön, 1983). The concept was first introduced by Dewey (1933), who defined it as a systematic way of thinking about practice in order to improve it. According to Dewey, reflective thinking involves careful consideration and a thought or opinion resulting from that consideration. This is a strict definition, as it excludes all thinking that is not based on judgment. Dewey described the process of reflection as involving the interpretation of a situation, the realisation of a problem and the testing of an explanation. Based on Dewey's model, Schön (1983) introduced three levels of reflection. The first level, *setting a problem*, has to do with determining and describing a phenomenon. The next level, *framing the experiment*, consists of thinking about the matter of reflection from different perspectives. The highest level of reflection means that a person has viewed the matter under reflection in several ways and decides on a course of action.

Schön (1987) expanded Dewey's work by distinguishing three forms of reflection: reflection-on action, reflection-in-action and reflection-for-action. Reflection on-action takes place after an action. Reflection-in-action is reflection during an action itself. Reflection-for-action takes place before action and includes planning. All of these forms are present in teaching when teachers prepare for a lesson and analyse their actions during and after the lesson. Later, influenced by the ideas of Dewey (1933) and Schön (1983), Kolb (1984) developed experiential learning theory. One commonality among the three descriptions of the reflective process is that reflection involves the conceptualisation of action that results in new action.

Following the early works of Dewey, Schön and Kolb, many researchers have defined reflection and constructed reflection frameworks. Over the last decades, the definition of reflection has changed and broadened from Dewey's definition as careful consideration of any form of thinking, including non-reflective action (Mezirow, 1991) and habitual action (Kember et al., 1999). Reflection has been analysed in the context of problem-solving (Bigge & Shermis, 1999), teachers' capacity to think creatively, imaginatively and critically about classroom practice (Norton, 1994), rational thinking and taking responsibility for one's educational choices (Ross, 1989). Definitions of reflection usually share the same basic principle: Reflection is situated in practice and develops through a cyclical and progressive process in which a teacher looks back on an action, analyses it and plans new action

(Korthagen & Vasalos, 2005). Another element of the process of reflection is to seek multiple perspectives in trying to solve the problems at hand (Hatton & Smith, 1995). Researchers have also highlighted the social dimension of reflection, which was introduced by Dewey (1933): Reflection can be carried out both individually and collaboratively, and the social aspect significantly promotes thinking.

Many researchers have described the hierarchical qualities of reflection (Jay & Johnson, 2002; Hatton & Smith, 1995; Van Manen, 1977; Ward & McCotter, 2004). Higher reflection goes beyond description and includes analysing, comparing and criticising as well as a consideration of multiple perspectives of teaching and learning. According to Jay and Johnson's (2002) typology, which is based on Schön's (1983) thinking, reflection comprises three stages. At the descriptive stage, teachers formulate a problem and determine what will become the focus of their reflection. At the comparative stage, teachers reframe their topic of reflection in light of alternative views, other peoples' perspectives and research. At the critical stage, teachers evaluate different alternatives and integrate new information into their previous knowledge. As a result of critical reflection, teachers establish a new perspective about their teaching.

Researchers have also focused on dimensions of reflection to show what aspects teachers reflect on (Harrington, Quinn-Leering, & Hodson, 1996; Korthagen & Vasalos, 2005; Luttenberg & Bergen, 2008). Reflection can focus on both narrow and broad areas of the teaching profession (Luttenberg & Bergen, 2008). Broad reflection is both internally and externally oriented, which means that reflection focuses on other people and their actions, in addition to one's own (Korthagen & Vasalos, 2005). It pays attention to personal, cognitive or moral dimensions; teachers express their own thoughts and hopes and are concerned about the impact of their actions (Harrington et al., 1996). It also considers social, cultural and political conditions, that is, wider social policies and values. Furthermore, it includes the caring aspect (Noddings, 2012).

In this study, I define reflection as a cognitive process whereby teachers focus on their own actions and experiences of practice, the context in which they act and others within that context. Reflection can be self-reflection, or it can be carried out with peer students or supervisors. The assumption is that reflection somehow changes teachers' way of thinking and can also affect actions. Reflection can occur on many levels and focus on different dimensions. The educational literature does not provide a clear definition of the difference between the breadth and levels of reflection. While it is not always necessary to make distinctions, this may help in analysing reflection in greater detail, as in Sub-study I. In any event, analytical and critical reflection represent thinking that is broader in nature than the narrower descriptive reflection (cf. Jay & Johnson, 2002).

Based on my definition, reflective practice includes all kinds of thinking and examination, not only that which is critical in nature, as defined by Zeichner and

Liston (1996). Reflective practice includes reflective teaching, which is defined as teaching based on reflection for-action, in-action and on-action (Schön, 1987). Moreover, reflective practice includes reflective activities that aim to support and foster reflection (Zeichner & Liston, 1987). Previous studies on reflective practice state that reflection is something that can be developed over time. In teacher education programmes, the aim is to educate reflective practitioners who are able to analyse their teaching from different perspectives, question their underlying assumptions, connect practice to their personal knowledge and make decisions based on an examination of their teaching (Schön, 1983; Toom et al., 2010). The aim is for student teachers to move closer to a more critical stage of reflection over time. To achieve this aim, different ways of promoting reflection have been introduced (Gelfuso & Dennis, 2014).

Following the ideas of Korthagen (2017), I look at teacher learning from a holistic approach: Learning is multidimensional, which means that it can be rational and non-rational and can include motivation and emotions (see also Blömeke, Gustafsson, & Shavelson, 2015). Korthagen (2001, 2004) introduced *the ALACT model of reflection*, which describes the reflection process, starting from action. In this model, teachers take a step back and look back at their action, observing and gaining awareness of the important and most essential aspects of that experience. Finally, they draw conclusions and create alternative methods of action, followed by a new trial. Becoming aware of essential aspects means that the teacher understands the meaning of a situation (Mansvelder-Longayroux et al., 2007). Moreover, teacher learning is multilevel, which means that reflection starts from individual experience, pondered in relation to the environment, competencies, beliefs, identity, mission and core qualities, such as individual strengths and weaknesses. These aspects form the layers of *the onion model of reflection* (Korthagen, 2004), which highlights that to find deeper meaning in a situation, teachers need to reflect on the inner layers, those of identity and core qualities. I have a preference for these models because they broadly consider such factors, which can affect teaching. When reflecting on their teaching, teachers cannot explain and understand everything through their own actions. In teacher education, student teachers are strongly guided to look at their own actions, even though the reasons behind possible obstacles may be e.g. in the learning environment.

2.2 Promoting reflection in teacher education

Reflection is considered an essential tool for developing practical knowledge or practical theories, i.e. interconnected, personal and context-based knowledge, beliefs and practices concerning the teaching profession, during teacher education (Levin & He, 2008). Through reflection, student teachers observe and evaluate their

experiences and thoughts in order to increase awareness of their feelings, beliefs and assumptions. In this way, reflection enables the integration of educational theory and teaching practice (Korthagen et al., 2001). Thus, reflection can be understood as a key element in promoting student teachers' self-knowledge and professional development (Stenberg, 2011b; Zeichner & Liston, 1987).

In teacher education programmes, student teachers' self- and collaborative reflection are promoted through different artefacts, such as portfolio writing, other reflective writings and self-assessments (Chitpin, 2006; Mansvelder-Longayroux et al., 2007; Stenberg, Rajala, & Hilppo, 2016). Student teachers use portfolios to reflect on themselves and document their experiences and learning. Portfolios seem to be effective in changing teaching practice and constructing teachers' practical knowledge and professional identities: Through portfolios, student teachers are able to follow changes that occur over time in their teaching, solve pedagogical problems and develop their teaching based on the contents of the portfolios (Chitpin, 2006; Levin & He, 2008; Stenberg et al., 2016).

Guided practicum periods play an integral role in the development of student teachers' reflection skills and professional development (Lee, 2005; Orland-Barak & Klein, 2005; Pence & Macgillivray, 2008; Stenberg et al., 2016). Reflection is promoted through supervisory discussions in which student teachers analyse their own actions and receive feedback on their teaching (Korthagen & Vasalos, 2005; Meijer, Korthagen, & Vasalos, 2009; Orland-Barak & Klein, 2005). In these discussions, which can happen in scheduled and facilitated situations or spontaneously, supervisors can use modelling as a way of demonstrating reflection to student teachers by thinking aloud about their pedagogic choices and asking questions about the student teachers' teaching and the reasons for their decisions (Timperley, 2001). Student teachers also receive feedback from their peers and pupils. Feedback helps them understand new aspects about themselves; thus, observation and evaluation are tools for deepening thinking and professional growth (Pence & Macgillivray, 2008; Turnbull, 2005).

In the literature, the concept of mentor teacher is used to describe teachers who assist student teachers during their practicum period or beginning teachers during their first year in the profession (Devos, 2010; Zanting, Verloop, Vermunt, & Van Driel, 1998). It is not possible to define a single concept of mentoring because all teachers construct their own interpretations, which result in different ways of supervising (Franke & Dahlgren, 1996). Moreover, context shapes mentoring and the way in which teachers define their role (Feiman-Nemser & Parker, 1993). In this study, the concept of mentoring is replaced with that of supervision and mentor teacher with that of supervisor.

Supervision can include different contents and intentions that depict supervisors' pedagogical thinking. The advice and guidelines that supervisors share with student teachers are shaped by theoretical knowledge, their teaching experience and their

own personal practical theories (Kansanen et al., 2000). The curriculum of the teacher education programme and its aims also affect the supervision process. Franke and Dahlgren (1996) found that there are traditional and reflective approaches to supervision. In the traditional approach, the emphasis is on student teachers' teaching performance. Supervisory discussions focus on actual teaching episodes, and supervisors' knowledge is taken for granted and reproduced by student teachers. The reflective approach emphasises student teachers' learning and aims to foster their reflection. As such, it supports the development of professional knowledge and competence. Discussions between student teachers and supervisors address general principles and go beyond teaching episodes.

Supervisors seem to emphasise teaching behaviour and stress superficial issues at the expense of reflection on teaching and learning from experience (Ben-Peretz & Rumney, 1991; Feiman-Nemser & Parker, 1993). Mentor teachers have sometimes been criticised for concentrating too much on supporting student teachers instead of evaluating and challenging them (Ben-Peretz & Rumney, 1991). Finnish researchers have recorded similar findings. For instance, Ojanen (1990) and Krokfors (1997) found that the main part of supervision consisted of advice on student teachers' teaching skills, behaviour and practice. Conversely, some parts of mentoring focused on connecting theory and practice and constructing student teachers' practical theories. Jyrhämä (2002) classified supervisors' supervisory intentions according to several dimensions: providing a model; encouraging self-confidence (professional self-esteem); learning interaction skills (atmosphere, communication); developing teaching skills (pedagogical content knowledge); developing metacognitive skills (reflection skills) and adopting an ethical way to act (responsibility). When compared with the three levels of pedagogical thinking (Kansanen, 1993), supervisory intentions mostly focused on the action level. However, supervisors' intentions differed according to the practicum period and the group of supervisors. Sometimes, supervision was strongly normative and focused on action; sometimes, it included theorising the action, evaluating it and constructing student teachers' practical knowledge; other times, supervision focused on evaluating the grounds of student teachers' personal practical theories and pondering ethical questions and wider social aspects. Jyrhämä (2002) highlighted that different supervisory intentions cannot be set in hierarchical order because they serve different supervisory situations and needs and interact with each other. Moreover, when thinking about supervisory aims, student teachers' developmental stage should be considered. It is important that supervisors are aware of their supervisory intentions and the background of these intentions. Following Jyrhämä, Komulainen (2010) reported that the student teachers in his study received very little guidance focusing specifically on their personality.

In agreement with Jyrhämä (2002), I also believe that it is essential to discuss the approaches and aims of supervision in teacher education, state out loud implicit intentions to make them more explicit and regularly check that supervision is in

line with the teacher education curriculum and its aims. Awareness of supervisory intentions and their theoretical and methodological underpinnings helps supervisors in their work and promotes their competencies in guiding student teachers' professional development (Ojanen, 2006; Silkelä, 2004). Student teachers ought to be encouraged to find their professional self-confidence and personal teaching style because teacher personality is one of the integral aspects of their work (Korthagen, 2017; Pickle, 1985). To highlight the role of personal development in supervision, it may be useful to integrate this theme more strongly into the theoretical basis of teacher education and teacher professional development, similar to what has been done in this dissertation.

I concur with Tomlinson (1995) and Zanting et al. (1998) that supervision, despite its various forms, should focus on student teachers learning from their experiences through an analysis of their teaching. Student teachers need to take responsibility for their learning. This kind of supervision follows principles of experiential and social constructivist learning, which forms the main theoretical background of supervision in Finnish teacher education. It is important that different supervisory activities are adjusted to student teachers' stage of professional development. Supervision has to consider a wide range of issues that might determine student teachers' thinking and behaviour. Korthagen and Vasalos (2005) stated that a good supervisor is capable of moving between different levels of the onion model, in accordance with student teachers' needs. However, supervisors sometimes encounter difficulty in setting boundaries between supervision and therapy. They might think that going deeper into issues related to professional identity, emotions and motives goes beyond the professional domain. Even though there is no clear boundary between professional issues and the personal biographical domain, supervisors can choose to focus only on the professional domain. At the core of reflection, the idea is to dig into one's inner potential and strengths and, through that, trigger positive feelings that are impossible to reach through an exclusive focus on the outer levels of the onion model.

2.3 Previous studies on teacher reflection

Previous studies on teacher reflection have focused on the content and level of reflection, the ways of promoting reflection and the role of supervisors, peer students and knowledgeable others in enhancing reflection. According to these studies, student teachers face difficulties in terms of learning critical reflection skills and, therefore, need specific guidance and support to be able to reflect at deeper levels. Student teachers' reflection is affected by many factors, and low levels of reflection are more probable when reflection occurs in isolation, without support structures, such as theoretical frameworks or other people. I shall now present some previous studies on the matter.

Chitpin (2006) examined the effectiveness of journal keeping as a means of developing the reflective practice of 28 student teachers who used the Popperian knowledge-building framework during a course which included classroom teaching and observation. The student teachers wrote journal entries throughout the course and were given an introduction to the Popperian theory of reflection as well as instructions concerning reflective journal writing. The results showed that the student teachers identified multiple aspects of teaching in their journals, e.g. curricula, classroom management and assessment. They found the Popperian model practical because it focused on the essentials of the problem to be solved, the theorised solution and the outcome deriving from applying the tentative theory. The Popper cycles drew attention to further problems to be solved. The author concluded that the Popperian knowledge-building framework can help student teachers gain a better understanding of their teaching, as it enables them to reflect on, document and improve their teaching.

Mansvelder-Longayroux et al. (2007) investigated the nature of student teachers' reflection in their portfolios. The participants were 25 student teachers of language or science in a one-year teacher education course. The student teachers attended classes at the university while carrying out their practicum period in a school or working as paid teachers. During the academic year, they produced two portfolios in which they reflected on their learning experiences. They conducted portfolio exercises, followed a portfolio manual and received guidance from their university supervisor during the process of producing the first portfolio. The authors identified six types of learning activities from the portfolios: recollection, evaluation, analysis, critical processing, diagnosis and reflection. The learning activities differed in the type of learning at which they were aimed: either improvement of action in teaching practice or understanding the underlying processes. Moreover, the authors identified patterns in the learning activities in the portfolios. An analysis of their portfolios revealed that the student teachers tended to focus on their own practice, how to improve it and what they had learnt. They did not use their portfolios to gain a better understanding of the situations and developments that had occurred; according to the authors, this is where the student teachers would require more supervision and guidance. For example, their 'why' questions were related to issues about which they felt personally involved, which, according to the authors, suggests that meaning-oriented reflection depends on the subject matter to which it relates.

Arrastia, Rawls, Brinkerhoff and Roehrig (2014) investigated the levels of reflection, the use of future-oriented reflection and changes in the reflective writing of 90 elementary student teachers enrolled in two sections of an early field experience university course. One of the groups received guided observation during the course, and the data consisted of essays and journals. The essays were writings about great teachers and great teaching written at the beginning and end of the practicum period. The journal entries were written during the practical experiences

and focused on three topics: instructional variety, classroom management and motivation. According to their results, while the level of reflection in the writings of 35% of the student teachers increased in complexity over the span of a semester, only 10% of them demonstrated the deepest level of reflection in their writing. Future-oriented reflection was present in six percent of the assignments, with most of the instances describing what the student teachers planned to do in their future classrooms. The student teachers in the guided observation group demonstrated significantly more dialogic reflections than those in the unguided group. However, the reflection of those in the guided group was not significantly more future-oriented or transformative. The authors concluded that in order to promote the development of deeper reflection, more attention should be paid to ways of challenging student teachers to question their practice and that they should have more possibilities for self-reflection. The authors highlighted the need for scaffolding certain skills that are important for reflection, such as writing skills and identifying problems in theory and practice.

Toom et al. (2015) reported encouraging results regarding student teachers' reflection skills through guided reflection. They examined the structure and patterns of six student teachers' reflection during the final practicum period. The data were collected using the procedure of guided reflection, which included videotaping a lesson, a stimulated recall interview, reflective discussion with a supervisor and writing a reflective portfolio. The data consisted of portfolio texts. The authors found that the student teachers showed diverse reflection skills in terms of being able to reflect beyond practical issues of teaching, articulating multiple concerns and elaborating on them. They were able to describe and evaluate the practical side of teaching, including their prior knowledge of it, as well as learn from both practice and their prior knowledge. They were also able to reach the stage of broader and more critical reflection, and they encouraged the teacher educators to develop their own tools for understanding and structuring reflection in portfolios.

However, the presence of knowledgeable others does not always lead to productive discussions. For instance, Gelfuso and Dennis (2014) conducted a formative experiment study and used Dewey's ideas about judgment, analysis/synthesis and balance to explore reflection as a communal process which results in 'warranted assertabilities' about teaching and learning. Thirteen student teachers participated in the Elementary Teacher Residency Program and spent extensive periods in the field, supported by integrated course work and opportunities for supported reflection. The data consisted of the student teachers' reflective conversations, which were video recorded and transcribed. The findings showed that the presence of knowledgeable others helped the student teachers focus the conversations on teaching and learning. However, reflection was merely descriptive and, thus, did not align with Dewey's (1933) conception. The authors, therefore, called for additional inquiry into facilitating the process of reflection.

3 VIDEO-BASED REFLECTION

3.1 The use of video in teacher reflection and professional development

Besides written reflection tools, videos have been used since the 1960s to promote teachers' reflective practice. Video seems to be a powerful tool for learning because it offers an authentic view of the classroom and because teaching situations can be watched multiple times; videos can be paused and watched from different perspectives, both individually or collaboratively (Atjonen, 1998; Santagata & Guarino, 2011; Sherin, 2004; Tripp & Rich, 2012a). One of the earliest ways of using video in teacher learning was micro-teaching, where teachers teach a short lesson to their peers, which is recorded. Thereafter, the teachers watch the recording, identify strengths and developmental needs and reteach the lesson (cf. Tripp & Rich, 2012a). During the first decades, the aim of videoing was to identify specific behaviours and develop practice accordingly. Today, however, the aim is to broadly analyse all aspects of the classroom, capture the teacher's thinking in action, consider the effects of one's teaching on pupil learning and adapt teaching on the basis of evidence (Gröschner, Schindler, Holzberger, Alles, & Seidel, 2018; Rich & Hannafin, 2008; Shepherd & Hannafin, 2008; Stockero et al., 2017). Stimulated recall, whereby a lesson tape is replayed to stimulate commentary on the teacher's thought processes, has been widely used in various forms (Calandra, Brantley-Dias, Lee, & Fox, 2009; Calderhead, 1981; Rich & Hannafin, 2008).

In addition to these technical advantages, new ways of using videos have been developed. The use of VATs has also been on the rise (Rich & Hannafin, 2009; Sherin & van Es, 2005; Stockero et al., 2017). These tools enable viewing, analysing, commenting and sharing of videos, thus promoting the further exploration of videos. Moreover, the use of mobile devices has brought new possibilities to the use of video because these devices are completely mobile. The VEO app is one of these new mobile applications.

3.2 Previous studies on video-based reflection in teacher education

Existing studies of video-based reflection embody the same theoretical underpinnings as previous studies of reflection and video-based reflection. Moreover, some studies present specific theoretical insights as the basis of their method, such as the teacher as

the expert (Sherin & van Es, 2005), situated learning theory (Borko et al., 2008) and sociocultural learning theory (Arya et al., 2014). According to the literature, video viewing has two main objectives that help teachers learn to teach and improve their practice. The first objective, which is more common, is building knowledge on how to reflect and interpret classroom practices and embark on a discussion of teaching and learning (Borko et al., 2008; Brophy, 2004; Coffey, 2014; Santagata & Guarino, 2011). The second objective, which has been of interest to some researchers, is to construct what to do in the classroom, i.e. to present and learn from best practices (Marsh, Mitchell, & Adamczyk, 2009; Seago, 2004). Both objectives can also be combined, which is recommended by several authors (Borko et al., 2008; Dooly & Masats, 2011).

Even though these studies vary in their approaches, methods and processes, they all conclude that video helps teachers reflect on their teaching, either in terms of developing their ability to evaluate teaching and changing the focus and depth of reflection (see, e.g. Bryan & Recesso, 2006; Gröschner et al., 2018; Shepherd & Hannafin, 2008; Stockero et al., 2017) or in leading to changes in teaching and developing classroom practice (see, e.g. Sherin & van Es, 2005; Snoeyink, 2010; Tripp & Rich, 2012a). Video can be viewed many times and watched from different angles, thereby offering an insight into the richness of the classroom culture, which cannot otherwise be gained (Brophy, 2004; Rich & Hannafin, 2008; Snoeyink, 2010). Both written and oral reflection seem to have advantages (Borko et al., 2008; Shepherd & Hannafin, 2008). Video can foster the integration of theory and practice so that teachers can develop their theoretical knowledge on the basis of videoed instances and then apply this knowledge to interpret classroom practice (Borko et al., 2008; Bryan & Recesso, 2006; Gröschner et al., 2018). This is possible because video enables reflection-in-action (Schön, 1987). Through video, teachers can identify contradictions between their image of teaching and actual teaching practices (Bryan & Recesso, 2006; Rich & Hannafin, 2008).

Only few studies have compared teachers' experiences of watching videos of themselves to their experiences of watching videos of others. Reflecting on videos of one's own and others' teaching seems to positively affect teachers' ability to reflect on teaching. Observing and reflecting on videos of one's own teaching can further activate prior knowledge and experience, which can increase emotional and motivational involvement (e.g. Borko et al., 2008; Tripp & Rich, 2012a). There is evidence to suggest that reflecting on one's own teaching activates and motivates more than reflection on the teaching of others (Seidel, Stürmer, Blomberg, Kobarg, & Schwindt, 2011). However, this is not always the case (Kleinknecht & Schneider, 2013). Sometimes, reflection on one's own videos can spark more negative emotions, and therefore, it might be easier to critique the teaching of others (Seidel et al., 2011).

Previous studies have also investigated effective teaching behaviours resulting from the use of video. Video-based reflection can improve one's ability to apply

different teaching materials and methods (Christ, Arya, & Chiu 2014), engage pupils (Shepherd & Hannafin, 2008) and more comprehensively consider pupils' needs (Sherin & van Es, 2005). Changes in teachers' thinking may occur after reflecting only a few times (Sherin & van Es, 2005; Snoeyink, 2010), and reflecting for longer periods can strengthen this ability (Shepherd & Hannafin, 2008; Stockero et al., 2017). However, only a few studies have investigated how video affects the process of teacher change (see, e.g. Tripp & Rich, 2012a). Based on previous studies, the ideal number of reflections leading to changes in teachers' thinking is unknown. Arguably, the positive effects are strengthened when the number of reflections and the reflection intensity increase.

In most previous studies, teacher reflection on video has been guided through reflection questions, rubrics or other frameworks as well as a coach/supervisor or peers (see, e.g. Arya et al., 2014; Bopardikar et al., 2019; Bryan & Recesso, 2006; Harford & MacRuairc, 2008; Rich & Hannafin, 2008; Santagata & Angelici, 2010; Shepherd & Hannafin, 2008). According to these studies, it is essential to guide video-based reflection because, without guidance, teachers and student teachers may find it difficult to focus their reflection, especially if they reflect individually, which can result in superficial thinking. Reflective questions and discussions with others provide teachers and student teachers with another perspective of their own learning and help them examine and criticise their teaching. Watching the teaching of others renders new insight and can lead to productive discussions on practice.

So far, researchers have recognised that even though video enables one to see the classroom environment from different perspectives, it can exclude essential aspects of the learning environment. Video points only to one place at a time, and depending on the placement of the camera, pupils' facial expressions and pupil interaction may not be captured in the video, thus limiting student teachers' possibilities of assessing their classroom practices and pupil learning (Brophy, 2004; Bryan & Recesso, 2006; Shepherd & Hannafin, 2008). There may also be technical problems, which may further hinder the limited vision. Therefore, it is necessary to complete video recordings with other types of evidence, such as pupil work samples, lesson plans and other contextual information, to get a better understanding of what is going on in the classroom (Shepherd & Hannafin, 2008; Sherin, 2004). Contextual information can also help decrease cognitive overload caused by video viewing (Goldman, Pea, Barron, & Derry, 2007).

Bryan and Recesso (2006) reported users' skills and willingness as barriers to the use of a web-based VATs and concluded that it is essential to provide users with practical training in video technologies. Teachers' unwillingness to share their videos with others was also reported by Borko and her colleagues (2008), Zhang, Lundeberg, Koehler and Eberhardt (2011) and Shepherd and Hannafin (2008). Teachers and student teachers may be fearful that someone will judge the teaching shown in the video (Abell, Bryan, & Anderson, 1998; Bryan & Recesso, 2006;

Snoeyink, 2010). According to the authors (Abell et al., 1998; Bryan & Recesso, 2006; Snoeyink, 2010), convenience and accessibility increase users' willingness to use these technologies. They also highlighted the role of a supportive and trusting communal environment where teachers are encouraged to show videos of their teaching to others. Fadde and Sullivan (2013) recommended starting the use of video observation early in teacher education in order to increase acceptance of video-based reflection.

Researchers have found that teachers and student teachers are not automatically cognisant of the integral aspects of teaching and learning in videos, as they tend to concentrate on superficial issues, such as their appearance and behaviour (Snoeyink, 2010; van den Bogert, van Bruggen, Kostons, & Jochems, 2014). These struggles with selective attention are connected to the level of professional development and result from a lack of knowledge of both the teaching profession and the specific subject, i.e. subject-specific knowledge (Blomberg, Sturmer, & Seidel, 2011; Sherin & van Es, 2005). Therefore, presumably, over time, the ability to observe will improve during teacher development. Moreover, even though watching videos of one's own teaching can encourage and motivate, teachers and student teachers can find it difficult to criticise their own or their peers' teaching, which may hinder deeper discussions regarding their developmental needs (Ellis et al., 2015). These findings highlight the role of strong external guidance in video-based reflection.

Most previous studies seem to concentrate on the advantages of video-based reflection and lack a wider discussion of the possible obstacles. As Wang and Hartley (2003) have pointed out, the effectiveness of video is often assumed and not studied in detail. Even though some solutions are suggested, the existing research lacks a broader discussion of possible obstacles concerning video-based reflection from the point of view of teaching, learning and supervision in teacher education programmes. In this study, I shall address these topics by also focusing on obstacles in the use of video.

4 THE CONTEXT OF FINNISH TEACHER EDUCATION

4.1 Different teacher education programmes

Teacher education can be organised in a variety of forms based on different ideas in different countries. Zeichner (1983) distinguished between teacher education programmes that highlight either technical and practical skills or personal growth and an inquiring stance. In the former, a student teacher's role is passive and receptive, and degree requirements are static. In the latter, a student teacher is active and aware. Emphasis on skills is related to the *performance-based* or *competence-based approach* to teacher education, which started to emerge in the mid-20th century at a time when the positivist paradigm dominated the sciences; this approach described a good teacher in terms of competencies (Korthagen, 2001). To this day, there are many teaching models describing ways of planning, executing and evaluating lessons (see, e.g. Joyce & Weil, 1980). The competence-based model was strongly criticised as overly narrow and technical because it could not sufficiently describe the complexity of teaching in practice (Barnett, 1994). A contrasting view, known as *humanistic-based teacher education*, started to gain currency during the 1970s when a more cognitive and constructivist view of learning started to emerge (Zeichner, 1983). This approach shifted the focus from teacher competencies to teacher thinking and learning from experience (Combs, 1974; Kolb, 1984; Schön, 1983).

For a long time, research on teacher learning focused on change in cognition (Hoekstra, 2007). The so-called *theory-into-practice approach* concerned the assumption that teacher behaviour is guided by teacher thinking and that theories acquired by teachers can be transferred to practice (Carlson, 1999). The assumption was that a change in cognition resulted in changes in behaviour and teaching practices. This approach has dominated the field of teacher education for years, even though research findings have shown its failure in changing teachers' behaviour (Cochran-Smith & Zeichner, 2005). The theory–practice divide is still one of the most essential problems of pre- and in-service teacher education (Korthagen, 2001). Teachers may find it difficult to apply theoretical knowledge to their teaching practice and they do not always regard scientific knowledge as meaningful for their work (Bailey & Van Harken, 2014; Boardman, Argüelles, Vaughn, Hughes, & Klingner, 2005). Difficulties with reflection tasks seem to be a common problem in those teacher education programmes in which teaching is based on knowledge transmission, i.e. where student teachers do not participate in reflective activities before practical experiences in school (see e.g., Korucu Kis & Kartal, 2019;

Yesilbursa, 2011). Research findings indicate that the earlier the reflective practice is introduced in the programme, the better, as student teachers will have enough time to get involved in the reflection process and learn to reflect (cf. Roberts, 2008). In recent years, more practice-oriented teacher education programmes have emerged, and the focus has shifted to workplace learning (Avalos, 2011). However, connecting practical experiences to theory has been challenging, with ongoing debates between these different approaches.

Moreover, teacher education programmes can be approached from the viewpoint of organisational structures (Kansanen, 2006). An approach can be inductive, stemming from individual problem-solving, or deductive, based on wider structures. Educational activity can be based on intuitive or rational thinking. Intuitive thinking leads to more student-centred activities, rational thinking to socially agreed principles (Krokfors et al., 2009). A programme in which perspective is inductive and educational phenomena are approached in an intuitive way can be called *experiential* and *personal*; programmes following deductive principles and highlighting a student teacher's personal experiential knowledge can be called *school-based teacher education* (Krokfors et al., 2009). In school-based teacher education programmes, which are popular, e.g. in the United Kingdom, national curricula and school tradition guide professional growth, and student teachers are of minor importance (Jyrhämä et al., 2008). Such programmes resemble the apprenticeship model whereby experienced teachers work as mentors to student teachers (Maandag, Deinum, Hofman, & Buitink, 2007).

Because of constructivist and social constructivist concepts of learning, which define learning as a process of knowledge construction, there are *problem-based* or *case-specific programmes*, which embody a rational perspective, and student teachers approach teachers' work inductively. In this approach, the issues of learning are highlighted, and the teaching–studying–learning process is of minor importance (Jyrhämä et al., 2008).

The *research-based approach*, which is the leading approach in Finnish teacher education, differs from the problem-based approach, as it is deductively planned and rationally justified (Krokfors et al., 2011). These programmes consist of theoretical, methodological and practical studies, which are closely integrated, and the development of student teachers' pedagogical thinking and argumentation skills is key (Jyrhämä et al., 2008). The research-based approach aims to encourage student teachers and practicing teachers to become reflective practitioners through the adoption of an inquiring stance to their work (Reis-Jorge, 2005). An inquiring stance means that student teachers are able to critically reflect on their teaching, utilise research in their teaching and develop their work based on reflection (Reis-Jorge, 2005; Toom et al., 2010). The research-based approach has gained wide acceptance within the teacher education community over the last few decades, and practitioners are increasingly involved in research as part of teacher training and

professional development (Reis-Jorge, 2005). There is also more research about teacher education being conducted by teacher educators themselves than at any other time (Cochran-Smith, 2005).

Generally, different theoretical perspectives are applied to different teacher education programmes. Nowadays, the most common approaches include Kolb's (1984) experiential learning theory, constructivist, social constructivist and sociocultural learning (Palincsar, 1998; Vygotsky, 1978) and collaborative (Dillenbourg, 1999) and situated (Lave & Wenger, 1999) learning. According to experiential learning theory, learning is based on concrete experience, which is reflected on in the reflection cycle. Reflection-on-action is followed by conceptualisation and abstract thinking, resulting in further action. Kolb's (1984) experiential learning theory is based on the ideas of Lewin (1977), Dewey (1933, 1997) and Piaget (1970), who highlighted that learning is based on experience and that it is the process by which a person creates knowledge and interacts with the environment. In the learning process, observation, cognition and emotions are part of action.

Dewey (1933, 1997) can be regarded as the philosophical founder of constructivism and social constructivism. In constructivist learning, learning is about knowledge construction, which is always based on previous knowledge and requires the activity of the learner. Social constructivist and sociocultural aspects complete this idea by highlighting the role of social interaction, culture, cultural artefacts and language in learning (Vygotsky, 1978). Moreover, collaborative learning theory highlights the role of social interaction in learning (Dillenbourg, 1999). In terms of the other perspectives, situated learning theory posits that learning and knowing are constructed through participating in the practices of a particular community. Thus, knowing and acting are inseparable; as they are situated in particular contexts, learning contexts should resemble those contexts where learning is applied (Lave & Wenger, 1999). This idea approximates those of Dewey (1933, 1997), who highlighted a closer connection between thinking and action, i.e. between theory and practice.

All these abovementioned theories are closely interrelated in terms of integrating approaches to experience, perception, cognition and behaviour. They all share the idea of learning as an individual and collaborative process based on experience, which results in new thinking and action. Research-based teacher education in Finland is based on these perspectives. Student teachers are seen as active agents who develop their reflection skills during teacher education studies; they do this through assignments, discussion with other student teachers and supervisors and by taking part in practicum periods (Toom et al., 2010).

4.2 The development of research-based teacher education in Finland

Finnish research-based teacher education can be traced to the 1960s when Koskenniemi (1968), a well-known Finnish teacher educator, talked about the didactically thinking teacher. The term was used in reference to teachers' action during teaching practice. Research on didactic thinking took place at a time when there was an interest in upgrading the degree of primary teacher education and highlighting teaching as a profession (Committee Report, 1969). The path towards the research-based approach began when Finnish teacher education was moved from seminars to the university setting in 1974 and a master's degree programme was added to the primary school teacher diploma in 1979 (Jyrhämä et al., 2008; Lauriala, 2013). Because of this progress, Finnish teacher education became an academic, high status education, and the number and quality of theoretical, educational and methodological courses increased (Toom et al., 2010). It is during this time that the idea of the academic teacher as a researcher or developer of his or her own work emerged in Finnish educational science (Kohonen, 1993).

In Finnish teacher education, the research-based approach means that the study programme is structured according to a systematic analysis of education. All teaching is based on the latest research, which means that teachers teach what they study; student teachers learn academic skills, such as writing, argumentation and decision-making while solving pedagogical problems; they learn research skills and practice research through assignments and activities (Lauriala, 2013; Toom et al., 2010). The writing of bachelor's and master's theses develops skills, such as analytical and critical thinking, that can be transferred to new situations outside education (Niemi et al., 2012).

Research-based education is connected to the quality of teacher education, and especially in Europe, there is a desire to develop teacher education in this area and raise the competence and status of teachers. However, according to Puustinen, Sääntti and Salminen (2015), emphasis on the role of research can lead to a situation in which the research-based approach becomes an intrinsic value, whereby the connection between teacher education and practical work in school is in danger of being weakened. The authors stated that more research is needed on the role of the research-based approach in the teacher education context and how individual teachers can take advantage of this approach.

4.3 The model of teacher education at the University of Lapland

At the University of Lapland, the model of teacher education (Figure 1) is based on an interpretive approach whereby student teachers are seen as reflective practitioners and researchers and teachers' identity formation and professional development as essential parts of teacher education (Kaasila & Lauriala, 2010; Kyrö-Ämmälä, 2012, 2019; Lauriala, 1997a, 1997b, 2013). The aim of the primary school teacher education programme is to educate pedagogical and didactical experts, who are able to work creatively and flexibly in changing situations and environments, in co-operation both within their own profession and as part of an interprofessional team. Student teachers receive support and guidance while constructing their teacher identities and conducting research on teaching (Autti, 2017). The theoretical background of the teacher education programme rests on ideas about educating reflective practitioners (Dewey, 1933; Schön, 1983, 1987) as well as the theory of experiential learning (Kolb, 1984). Social interaction is firmly highlighted, and therefore, ideas of collaborative, social constructivist and social cultural learning, as well as of situated cognition, are included in teacher education studies (Brown, Collins, & Duguid, 1989; Dillenbourg, 1999; Palincsar, 1998; Vygotsky, 1978). This means that student teachers are seen as active participants who construct their knowledge individually and in interaction with others based on their personal background, theoretical teacher education studies and practical experiences during the teacher education programme. Supervisors and peer students facilitate student teachers' learning through feedback and common discussions. Supervisors do not offer student teachers ready-made solutions; they encourage them to find their personal way of teaching.

How does a student teacher become a reflective practitioner?

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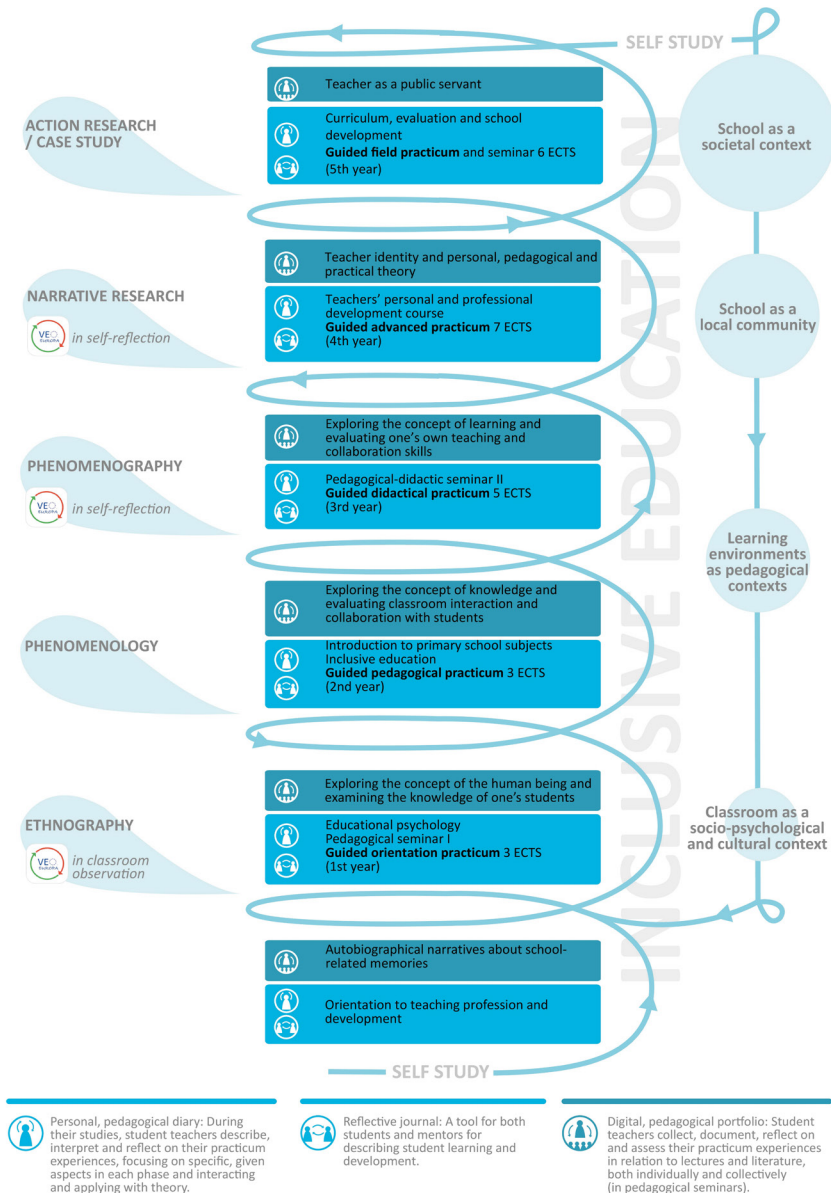


Figure 1. Model of teacher education at the University of Lapland (unpublished)

As illustrated in Figure 1, in the model, pedagogical studies, professional experiences (practicum periods) and the learning of research methods are combined into a spiral that goes through the whole programme (Lauriala, 2013). To promote the integration of research and practice, each practicum period involves learning about and practicing research approaches in authentic contexts, i.e. in real school settings. The aim is to enhance reflection by guiding student teachers to analyse and assess their own actions during their portfolio and seminar work (Lauriala, 2013). They collect data and analyse their own teaching, children's learning and classroom activities, with their foci changing from one practicum to another (Kyrö-Ämmälä, 2012; Lauriala, 2013).

Student teachers start their studies by recalling their school time and writing autobiographical narratives about their memories. They use different reflective tools, which is guided. The aim is that, over time, their reflection skills will develop, instantiated through increasing levels of analytical and critical thinking. During each practicum period, student teachers first write personal diaries of their private notions and experiences. From these notes, they compile their reflective journals, which are used in supervisory discussions with a supervising class teacher. This is how reflection-in-action occurs (Schön, 1987). Reflection-on-action (Schön, 1987) takes place in pedagogical seminars, after practicum periods, when student teachers share their experiences with a university lecturer and peer students. Based on their reflective journals, they write their pedagogical portfolios, in which they also set their development goals for the future. Portfolio writing represents reflection-on-action and reflection-for-action (Schön, 1987). The video application VEO is used in three different practicum periods so that the focus of observation, the VEO target and the mode of the student teachers' reflection vary between periods.

The model includes five different practicum periods: *The Orientation Practicum*, *Pedagogical Practicum*, *Didactical Practicum*, *Advanced Practicum* and *Field Practicum*, all of which, except the field practicum, are carried out in the Teacher Training School at the University of Lapland. Data for this study were collected from the Advanced Practicum, which is usually attended during the fourth year of study in the autumn or spring term. It lasts five weeks and aims to develop student teachers' ability to take overall responsibility for their pupils and classrooms and to adopt different pedagogical perspectives. Teachers' personal and professional development form the theoretical background alongside a narrative methodological approach. Student teachers carry out teaching alone and with peer students. In this practicum period, school is seen as a societal context. For their pedagogical portfolios, the student teachers reflect on their professional identity and growth, such as their skills and knowledge, strengths and needs, their own paths as teachers and future aims. The video app is used for self-reflection, especially for examining issues relating to the student teachers' professional development and personal learning aims. The

student teachers discuss their videos with peer students and share these videos with their supervisors, with whom they have supervisory discussions.

During the Orientation Practicum, the student teachers are guided by their class teachers in the Teacher Training School. During the Pedagogical, Didactical and Advanced Practicums, the guidance is divided between supervising class teachers and university supervisors. In the Field Practicum, the supervisor is the class teacher of that particular school. Supervision is determined by the teacher education curriculum, especially the aims of each practicum period. Moreover, the supervisors' former experiences, theoretical knowledge, perceptions of teaching, values and other underlying factors affect the way in which they interact with the student teachers and what kind of guidance they provide (Buitink, 2009; Elbaz, 1981). Guidance always includes a normative aspect, the supervisors' personal views on good and desirable teaching and decisions on how to pursue this (Jyrhämä, 2002). Supervising class teachers from the Teacher Training School follow and observe the student teachers' lessons during the practicum periods. Feedback sessions are organised daily. In the Pedagogical and Didactical Practicums, university supervisors are the teachers and lecturers of subject didactics, who guide the student teachers in their own subject field. They attend the student teachers' lessons so as to observe their teaching. Feedback discussions usually follow every observed lesson. Until the autumn of 2016, teachers and lecturers of subject didactics also guided student teachers in the Advanced Practicum by observing all teaching, not only teaching relating to their own subject. Since the autumn of 2016, VEO has been used in self- and peer reflection as well as in the supervision of the Advanced Practicum.

4.4 The video application VEO

From September 2015 to September 2017, the primary school teacher education programme at the University of Lapland ran alongside an international research project called VEO Europa. Newcastle University led the project, which aimed to improve the quality of teaching and learning through the use of an innovative technological approach to support initial teacher training and continuing professional development. VEO is a video application that uses iPad capabilities to enhance the personalised professional development of teachers through video observation practice (VEO Group). It allows users to time-stamp live video of lessons with tags relating to the activity in the classroom. After recording, videos can be watched and reviewed by using tags instead of having to watch the entire video. Tags can be rated as positive, negative or with a question mark. Recorded videos are uploaded to the VEO portal where they can be shared, reflected on, commented on and discussed in collaboration with others.

Every research member carried out case studies in their own institution. At the University of Lapland, the ultimate aim of the VEO Europa project was to apply the VEO app to the context of the primary school teacher education programme. Based on a wide educational literature, we expected that video would work as a good reflection guide for student teachers and that it could be used for peer reflection and supervision during practicum periods. We wanted to test the app with the student teachers and their supervisors from the Faculty of Education, get feedback from them and, based on that feedback, further develop the use of the app. We chose the Advanced Practicum to act as an experiment practicum period because it focused on teacher professional development and, thus, seemed suitable for the research purpose. The first VEO trial occurred in the autumn of 2016 and the second in the spring of 2017. I collected my data during these two trials. The results of the trials are reported in Sub-studies II and III.

5 RESEARCH QUESTIONS

This dissertation consists of three research articles published in international peer-reviewed journals as well as a summary. The research questions of this dissertation are based on the articles, having evolved during the research process. As a broad picture, the study focuses on student teachers' reflection and professional development. Reflection is understood as a precondition for professional development. As a specific focus, the study concerns video-based reflection in the context of primary school teacher education. The main goal of the study is to answer the following research question and sub-questions:

1. How can the video application VEO be used as part of reflective practice in the primary school teacher education programme?

1.1. How can the video application VEO be used as a tool for the learning of reflection skills and for guiding that learning?

1.2 How can the video application VEO become a practical tool for promoting the development of reflection skills?

Each article has its own research questions, which are introduced both in the articles and research design in this summary. The sub-studies included in the dissertation are based on student teachers' ($n = 35$) written portfolio reflections and their perceptions and experiences of the use of the VEO app as well supervisors' ($n = 14$) perceptions and experiences of the use of the VEO app as part of their reflective practice.

The aim of Sub-study I was to explore the development of student teachers' practical theories through changes in their reflection during the entire teacher education programme. Sub-study I motivated me to continue my investigation into student teachers' professional development and reflection and the various ways of promoting them. The aim of Sub-study II was to explore how the VEO app could be used as part of reflective practice in the primary school teacher education programme. The study focused on the first VEO trial where the VEO app was used for the student teachers' individual reflection and professional development and supervision during the Advanced Practicum.

Sub-study II further motivated me to examine the nature of the student teachers' video-based reflection, the use of the VEO app in peer reflection and the supervisors'

role in promoting reflection. The second VEO trial was carried out by using the video-enhanced reflection procedure. The aim of Sub-study III was to explore how student teachers' meaning-oriented reflection could be enhanced through video. In this sub-study, the focus was more on the benefits of the VEO app for the student teachers' individual and collaborative reflection than on professional development. The reflection framework, considered the holistic approach to teacher learning, was developed as a result of this study.

In the related articles, reflection refers to both self- and collaborative reflection. In Sub-study I, while the portfolios were the products of the student teachers' self-reflection, they were developed through and influenced by discussions with peer students and supervisors. In Sub-studies II and III, the student teachers reflected both individually and collaboratively with their peer students and supervisors during the practicum period. Besides me, as a researcher, several student teachers or supervisors participated in the focus group interviews. In Sub-study II, self-reflection was instantiated through reflective writing and video diaries, and in Sub-studies II and III, supervisory discussions included aspects of self- and collaborative reflection because of the presence of peer students and supervisors.

All in all, the aim of this study is practical, stemming from the need to develop reflective practice. Each of the three sub-studies contributes to the research task of this study. Sub-study I begins my journey of investigating reflection. In this dissertation, Sub-study I is part of the context. I widen the topic to video-based reflection, which I address in the two other sub-studies.

6 RESEARCH DESIGN

I applied a qualitative research design during the research process. Following definitions of qualitative research (Creswell, 2013; Denzin & Lincoln, 2005), my study is based on a specific theoretical frameworks and focuses on people and the social phenomena experienced by these people. I collected the data in a natural setting where the participants experienced the issue under study. I personally collected all the data using multiple methods. For the interviews, I used open-ended questions and gave the participants the opportunity to voice their perceptions and experiences. The reports of each sub-study include my interpretations and the voices of the participants. During the data analysis, I used both theoretical (deductive) and inductive (data-driven) approaches. The research design was emergent, which was necessary in specifying the focus of the research and changing the interview questions between the two VEO trials. The ultimate aim of the study was to understand the phenomenon of video-based reflective practice, not only to describe and explain the results of the VEO trials, e.g. perceptions and experiences or the nature of the student teachers' reflection. My aim was to reach a holistic picture of the issue under study by reporting multiple perspectives and factors that may interact with each other in complex ways. While conducting the study, I positioned myself as a researcher, aware that my background would affect my interpretations. I discuss my position at the beginning of this chapter and further ponder it at the end of the dissertation.

This study consists of three sub-studies, all of which have been reported in peer-reviewed international scientific journals. Table 1 summarises the research design of the study.

Table 1. Summary of the research design

Aims and research questions	Research methods, data collection methods and research data	Data analysis methods	Publications	Contribution
<p>Sub-study I: Development of student teachers' practical theories through changes in their reflection during the entire teacher education programme</p> <p>How does student teachers' reflection change after each practicum session?</p> <p>What characteristics in practicum sessions promote the development of student teachers' practical theories?</p>	<p>Pedagogical portfolios of student teachers ($n = 13$)</p>	<p>Qualitative thematic analysis</p>	<p>Refereed international scientific journal: Körkkö, M., Kyrö-Ämmälä, O., & Turunen, T. (2016). Professional development through reflection in teacher education. <i>Teaching and Teacher Education</i>, 55, 198–206.</p>	<p>Describing an ongoing practical theory-building process and illustrating factors that contribute to this process</p>
<p>Sub-study II: A video app as a promoter of student teachers' reflective practice in the primary school teacher education programme</p> <p>How did student teachers use the app in their professional development?</p> <p>How did the app work in the supervision of student teachers' practice?</p> <p>How can the app be used in the future as part of reflective practice?</p>	<p><i>Case study approach</i></p> <ol style="list-style-type: none"> 1. Focus group/ individual interviews (student teacher, $n = 11$; supervisor, $n = 9$) 2. Reflective writing (student teacher, $n = 1$) 3. Video diaries (student teacher, $n = 3$) 	<p>Qualitative thematic analysis and phenomenographic analysis</p>	<p>Refereed international scientific journal: Körkkö, M., Morales Rios, S., Kyrö-Ämmälä, O. (2019). Using a video as a tool for reflective practice. <i>Educational Research</i>, 61(1), 22–37.</p>	<p>Understanding the perceptions and experiences of student teachers and their supervisors regarding the usefulness of the VEO app in the student teachers' professional development and the supervision of their practice</p>
<p>Sub-study III: Enhancing meaning-oriented reflection with the help of video</p> <p>What kinds of perceptions do student teachers and supervisors have regarding the video-enhanced reflection procedure and its usefulness in self- and peer reflection and supervision?</p> <p>What are the main contents of identity-related reflection in supervisory discussions?</p> <p>What is a supervisor's role in enhancing reflection related to forming student teachers' professional identity?</p> <p>What are the key characteristics of a reflection framework?</p>	<p><i>Case study approach</i></p> <ol style="list-style-type: none"> 1. Focus group/ individual interviews (student teacher, $n = 8$; supervisor, $n = 9$) 2. Supervising discussions (student teacher, $n = 7$; supervisor, $n = 4$) 	<p>Qualitative thematic analysis and phenomenographic analysis</p>	<p>Refereed international scientific journal: Körkkö, M. (2019). Towards meaningful reflection and a holistic approach: Creating a reflection framework in teacher education. <i>Scandinavian Journal of Educational Research</i> (published online 17 October 2019)</p>	<p>Presenting a reflection framework that considers a holistic approach to teacher learning</p>

6.1 Description of the research process

My background is in general education. This study took its first steps in the spring of 2013 when I started my master's thesis in education in the Faculty of Education at the University of Lapland. The topic of my thesis was the role of practicum periods and school memories in student teachers' professional development. I collected my data through student teachers' pedagogical portfolios, which I analysed for the study. After publishing my thesis, I began writing an international article based on the thesis. In my article, I developed my thinking about practical theories and reflection and investigated student teachers' portfolios more closely. I realised that the topic needed further research, so I began planning my doctoral studies. The first article forms the first sub-study and acts as an orientation to my doctoral dissertation.

The other two articles of my dissertation deal with the VEO app. These two sub-studies were conducted as part of an Erasmus + funded project, VEO Europa, which ran from September 2015 to September 2017. The first VEO trial in the autumn of 2016 was the first time the app was used in the practicum period. The second time followed in the spring of 2017. I collected my data during these two trials.

Both of the VEO trials and the related research were conducted during the Advanced Practicum, which, at the time of research, was the final practicum period for the student teachers. The use of the VEO app was mandatory for the student teachers, but participation in my research was voluntary. Because of the different times of study, the student teachers differed between the three sub-studies. The supervisors were partly the same because some of them guided the student teachers both in the autumn of 2016 and the spring of 2017. My responsibility in this practicum was to introduce the student teachers and supervisors to the app and demonstrate how it works. Moreover, I discussed with the participants ethical issues concerning video-recording and other essential aspects. Following each trial, I analysed the raw data and shared the preliminary results with my faculty colleagues. I suggested changes to the use of the app and participated in co-planning and modifying its implementation. The student teachers started using the app at the beginning of their practicum period, so they had no previous experience with it.

During the research process, I worked as a researcher in the Faculty of Education, University of Lapland. I did not guide the student teachers in the capacity of a supervisor. Both of my supervisors worked as researchers in the VEO Europa project. At the end of the research process, in the spring of 2018, I completed the teachers' pedagogical studies, and through that, I gained a qualification that enabled me to supervise student teachers during the practicum periods. While writing this dissertation, I began working as a teacher educator and supervisor in the Advanced Practicum and participated in further development work and the implementation of video-based reflection in the faculty.

6.2 Philosophical assumptions

Research always relies on philosophical assumptions that affect the way in which it is carried out. These assumptions determine the research questions, the data collection and the analysis and interpretation of the results (Denzin & Lincoln, 2005). Moreover, the researcher holds beliefs about ontology (the nature of reality), epistemology (what counts as knowledge and how knowledge claims are justified), axiology (the role of values) and methodology (the process and language of research) (Creswell, 2013). In qualitative research, the researcher accepts the existence of multiple realities and aims to reveal them by using various research methods. Epistemologically, it is assumed that knowledge can be obtained through individuals, and therefore, the researcher conducts the study in the participants' places of work. Axiologically, the researcher recognises the value-laden nature of the study and reports it, including his or her own values and positions in a study. Finally, from a methodological point of view, qualitative research follows the inductive approach, which is open to experiments and changes during the research process. Data analysis usually occurs mainly from the bottom up, from the data towards wider categories and themes, which are contrasted with theoretical perspectives.

These philosophical assumptions are placed into interpretive frameworks in qualitative research. This study especially relied on frameworks based on social constructivism and pragmatism to guide the research design.

Social constructivism. Social constructivism is a philosophical assumption that draws on the work of Dewey (1859–1952), also known as the developer of pragmatism, and the work of Vygotsky (1896–1934). Like the constructivist approach (Dewey, 1933, 1997; Piaget, 1970), social constructivism posits that learning occurs as a construction process and assumes that knowledge is constructed through social interaction. Groups construct knowledge for one another, collaboratively creating a small culture of shared artefacts with shared meanings: As a member of a culture, one is learning all the time about how to be part of that culture (Vygotsky, 1978). According to Vygotsky (1997), learning first occurs through interaction between people; thereafter, individuals internalise this learning. Social constructivism (see Creswell, 2013; Denzin & Lincoln, 2005) accepts the existence of multiple realities, constructed through lived experiences and interactions with others. Reality is co-constructed between the researcher and the researched, and individual values are negotiated among individuals. The data analysis follows inductive approaches that enable flexibility and modifications during the research process.

In this study, social constructivism informed the research design, from setting the research questions to analysing the results and drawing conclusions. The philosophy is visible in the interaction between the researcher and the participants. I relied on the participants' views of the situation and was in close contact with them. My aim in the interviews was to build an encouraging environment in which the participants

felt free to express their ideas. The nature of the group discussions enabled the sharing of ideas and the negotiation of subjective meanings. Besides people, I focused on the context in which the participants performed and how it might have affected the interaction between myself (the researcher) and the participants and among the participants. Along the research process, I realised how powerful the primary school teacher education programme was as a context, where historical and cultural norms affected the way in which the video application was received, accepted and applied. During the process of analysing and reporting the findings, I factored in the influences of the context on the participants' expressions and, thus, on the results and my interpretations. My analysis of the results mainly followed inductive principles, thus leaving space for flexibility. The overall research questions of the study changed during the process. While conducting the research, I was aware of my own background and reflected on the possible influences of this background on the study.

Pragmatism. As a philosophical school, pragmatism was born around the Metaphysical Club, which gathered at Harvard University in the years 1871–1874. Pragmatism was founded by Charles S. Peirce (1839–1914), but its basic principles gained public attention through the work of William James (1842–1910) and John Dewey (1859–1952) (Niiniluoto, 2002). Pragmatism (Denzin & Lincoln, 2005; Kivinen & Ristelä, 2001; Niiniluoto, 2002) focuses on the outcomes of research or the consequences of inquiry. It is concerned with applications and solutions to problems. Reality is what is useful and practical, and it is achieved through multiple research tools that reflect both deductive and inductive evidence. Values are considered important because knowledge reflects both researchers' and participants' views.

Similar to social constructivism, pragmatism influenced the design of this study. The ultimate aim of the study was pragmatic: to test and develop the video application VEO as a practical and useful tool as part of reflective practice in the primary school teacher education programme. I return to this pragmatic aim in the process of reporting and discussing the findings of this study. Like a pragmatic researcher, I chose the research methods that, in my opinion, were most suitable for achieving the study aim. During the research process, I was aware of the presence of social, historical and other contexts. However, contrary to traditional pragmatism, I only collected qualitative data. Thus, no quantitative data were collected.

6.3 Case study approach

I applied the case study approach because it seemed best suited for the purposes of this study. Yin (2018) pointed to a two-fold definition of the case study as a research method: A case study is empirical research that focuses on a contemporary phenomenon in its real-world context, especially when the boundaries between the

phenomenon and context are not clear. The researcher asks how and why questions about a set of events over which he or she has little or no control. A case study can be conducted from various theoretical perspectives that guide the design, data collection and analysis, and both quantitative and qualitative methods can be used when conducting case studies (see also Cohen et al., 2011). Figure 2 summarises the case study approach of this study.

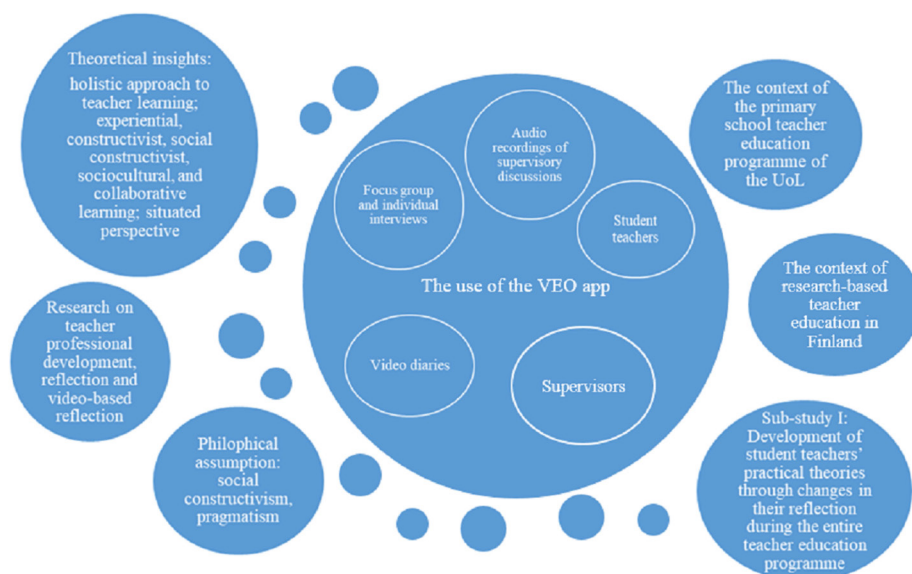


Figure 2. Case study approach of the study

Figure 2 shows that research-based teacher education in Finland and the primary school teacher education programme of the University of Lapland form the study's context. Moreover, Sub-study I is part of the context because it revealed the student teachers' difficulties in learning reflection skills and, therefore, raised a pragmatic need to delve deeper into this problem and develop new ways of promoting the learning of critical reflection skills. Once I began my research journey, I wanted to know more about why and how student teachers learn to reflect. I also wanted to explore how the development of student teachers' reflection skills could be comprehensively enhanced during basic education and how the video application VEO could help with this. I familiarised myself with the previous research on teacher professional development, reflection and video-based reflection. Based on the previous research, I proposed that video could be an effective tool for reflection and professional development. My attitude towards video-based reflection was positive, and I was optimistic about the study results. My study was informed by

the philosophical assumptions of social constructivism and pragmatism, theoretical insights from the holistic approach to teacher learning, experiential, constructivist, social constructivist, sociocultural and collaborative learning and the situated approach to cognition. A number of other factors also affected and interacted with the case under study, such as the age, background and personal characteristics of the participants. The empty circles in the figure present these various factors. As is usual in a qualitative case study, I did not aim to identify cause–effect relationships between different issues, but I did recognise their sequential and coincidental nature (cf. Stake, 2005).

I adopted an interpretative case study approach, which considers the existence of multiple truths, depending on who is interpreting (Yin, 2018). I chose to apply the embedded single-case study approach because it was relatively easy to define one phenomenon, or a case, and the corresponding sub-units (Yin, 2018). In this study, the actual case was the use of the video application VEO in the primary school teacher education programme. During the research process, the VEO app was tested and developed as a tool for student teachers' reflection and the supervision of their practice, and it was applied to the context of the primary school teacher education programme, the University of Lapland. The development, testing and application occurred through two VEO trials, which formed the sub-units of the case study. I pondered suitable data collection methods that would enable me to answer the research questions and achieve the research aims. I ended up with qualitative methods, which I also used in the data analysis. My study can also be defined as an instrumental case study (Stake, 2005) because it concerns a specific bounded issue. The results of the study are being used to increase understanding of video-based reflective practice in teacher education; thus, the study also has a more general purpose.

The process proceeded through iterative phases. The planning of the implementation of the video-based reflection began with a common discussion with supervisors from the Faculty of Education and the Teacher Training School, the University of Lapland. The student teachers and supervisors who participated in the research contributed to the developmental process by sharing their perceptions and experiences in the two sub-studies. The second VEO trial (Sub-study III) was developed based on the results of the first (Sub-study II). After every trial, the main findings of the results were discussed with the supervisors, who used the video application in their supervision. As a result of the case studies, I received information which increased my understanding of the phenomenon and was useful for the further planning of the use of the app (cf. Cohen et al., 2011). Following the two trials, I used the research results to modify the implementation of the video-based reflection in the Advanced Practicum, which was done together with two colleagues from the VEO Europa research project.

6.4 Participants of the sub-studies

This section presents the participants of the study (Table 2).

Table 2. The sub-studies and their participants

Study	Participants
Sub-study I	Student teachers ($n = 13$)
Sub-study II	Student teachers ($n = 12$), supervisors ($n = 9$)
Sub-study III	Student teachers ($n = 10$), supervisors ($n = 9$)

The participants of this study were student teachers from the primary school teacher education programme and supervisors who were lecturers and teachers from the Faculty of Education, the University of Lapland. The supervisors represented both general and subject didactics. Some of them had a background as a primary school teacher, a subject teacher or as a researcher.

For the first sub-study, I examined the portfolios of the student teachers ($n = 13$) to explore the development of their practical theories through changes in their reflection during the course of the teacher education programme in the autumn of 2013. I contacted those student teachers who had carried out their final practicum period during the academic year 2012–2013, seeking permission to use their portfolios for research purposes. Thirteen student teachers responded, granting me permission. A university lecturer who was responsible for the teacher education studies at the university sent me the portfolios of these student teachers through email.

In the second sub-study, I used focus group or individual interviews to investigate how the student teachers ($n = 12$) and their supervisors ($n = 9$) used the VEO app as part of their reflective practice during the Advanced Practicum in the autumn of 2016. After the first VEO trial, I became interested in the different ways of supporting the student teachers' individual and collaborative reflection through video-enhanced reflection procedures and reflection frameworks. In the third sub-study, I concentrated on meaning-oriented reflection, a kind of reflection that aims to capture the most essential aspects in experience. I collected the data through focus group or individual interviews and audio recordings of supervisory discussions from the student teachers ($n = 10$) and supervisors ($n = 9$) who followed the video-enhanced reflection procedure during one practicum period.

6.5 Data collection and analysis

From the beginning of the study, the approach was qualitative, which enabled an examination of the student teachers' and supervisors' perceptions and experiences. The different aims of the sub-studies influenced the methodological choices. The study used first-hand data, which means that I collected and analysed the data myself. During the research process, I shared the results with my co-authors and other researchers in my faculty, including the supervisor participants. Other people participated through discussions in the analysis of my results, and together, we developed the ways of organising reflective practice in our teacher education programme. A summary of the data collection and analysis methods in the three sub-studies is presented in Table 3.

Table 3. Data collection and analysis methods

Study	Subjects	Research situations	Role of the researcher	Data collection	Sources	Data analysis methods
Sub-study I	Student teachers (n = 13)	Each student teacher produced a pedagogical portfolio, which was read by the researcher	The researcher analysed the contents of the pedagogical portfolios	The researcher received portfolios through email and printed them for further analysis	Copies of the student teachers' pedagogical portfolios	Qualitative thematic analysis method
Sub-study II	Student teachers (n = 12) Supervisors (n = 9)	10 student teachers and all supervisors participated in focus group interviews; one student teacher was interviewed individually; one student teacher wrote a piece of reflective writing; 3 student teachers produced video diaries with the VEO app	The researcher acted as interviewer	Focus group and individual interviews were recorded by the researcher; the researcher received a piece of reflective writing via email and video diaries through the VEO portal	Transcriptions of focus group and individual interviews and video diaries; a piece of reflective writing from a student teacher	Qualitative thematic analysis method; phenomenographic analysis method
Sub-study III	Student teachers (n = 10) Supervisors (n = 9)	7 student teachers and 7 supervisors participated in a focus group interview. One student teacher and 2 supervisors were interviewed individually; 7 student teachers and 4 supervisors gave permission for the audio recording of their supervisory discussion	The researcher acted as interviewer	Focus group and individual interviews were recorded by the researcher; supervisors recorded their supervisory discussions and sent audios to the researcher via email	Transcriptions of focus group and individual interviews and audio recordings	Qualitative thematic analysis method; phenomenographic analysis method

In the first sub-study, I read the student teachers' pedagogical portfolios as a data collection method. The portfolios revealed the development of the student teachers' reflection over time from the beginning of the education programme until the end (see, e.g. Mansvelder-Longayroux et al., 2007). The length of the portfolios differed according to the student teacher. In my analysis process, I followed the steps of data-driven thematic analysis¹ (cf. Graneheim & Lundman, 2004; Mayring, 2014). One of my units of analysis consisted of several sentences that were somewhat related to the contents of the student teachers' practical theories and practicum experiences (cf. Chi, 1997). First, I read through the whole body of the textual data and then identified data-based codes. The second phase of the analysis process was to summarise the codes into themes. By analysing the data qualitatively, I was able to draw conclusions of changes occurring in the student teachers' reflections over time (e.g. Creswell, 2013).

In the second sub-study, I chose to collect the data through focus group interviews, which can be defined as a form of group discussion that addresses a particular topic or topics. The group includes target people who have gathered to share their perceptions, feelings, attitudes and ideas about a selected topic, and the moderator guides the discussion by asking prepared questions (Vaughn, Schumm, & Sinagub, 1996). I considered focus group interviews as a suitable method because I wanted to explore the student teachers' and supervisors' perceptions and experiences of the use of the VEO app in the practicum period. There were several advantages to using this method (Vaughn et al., 1996): Group discussions saved the participants' time and enabled interaction and direct contact between the researcher and the participating student teachers and supervisors and between the participants. The atmosphere in the discussions was open, which seemed to increase the participants' willingness to express their opinions and perceptions. Moreover, through focus group interviews, the participants were able to share their views and develop them further, and my role was to guide the discussions (see, e.g. Sim, 1998). Every interviewee participated in a single interview. There were three focus group interviews with the student teachers and three with the supervisors. One student teacher was interviewed individually because of time-management problems. One student teacher wrote a piece of reflective writing of her experiences. The student teachers were interviewed in the Teacher Training School, the University of Lapland, during the last two days of their practicum period and the supervisors in the Faculty of Education after the practicum period.

The focus group interviews lasted 30–60 minutes and the individual interview 30 minutes. The number of people in the focus group interviews varied between three and five. The interviews were of a semi-structured thematic nature, which means

¹ In the three articles, I use the term *content analysis*. However, as a result of my increased understanding during the process, I have changed the terminology and use the term *thematic analysis* in this summary.

that they included certain themes for discussion, such as the use of the VEO app for self- and peer reflection and the process of supervision. The interview questions were very similar for the student teachers and supervisors. For the supervisors, the questions concentrated more on supervision and the development of the use of the VEO app as a tool for supervision. My aim was to pose prompting questions and, through that, encourage a discussion that did not include right or wrong answers.

Moreover, to study the student teachers' reflections during the practicum period, I asked them to produce video diaries through the VEO app. This task was optional, and one student teacher produced two diaries, while two of them one diary each.

I analysed the data by using the qualitative data-driven thematic analysis method and the phenomenographic analysis method (Graneheim & Lundman, 2004; Mayring, 2014; Perttula, 1996). I used several sentences as units of analysis (Chi, 1997). The analysis progressed iteratively through the following phases: 1) setting the research questions to the data; 2) creating themes based on the research questions; 3) coding phrases into different themes; 4) paraphrasing the coded phrases into the third person; 5) rephrasing phrases into the passive voice; 6) looking for connections between the phrases and naming the relationships; 7) creating categories under the themes based on the relationships between the phrases and 8) summarising each theme with the help of categories. The analysis process followed the phases of thematic analysis; however, along with coding, I applied the principles of phenomenographic analysis, evident in the paraphrasing and rephrasing of phrases. Through this, I was able to get an overview of the participants' perceptions and experiences at both the individual and general levels.

In the third sub-study, my aim was to focus more closely on the contents and levels of the student teachers' reflections. Therefore, I collected data through focus group interviews and audio recordings of supervisory discussions. Seven student teachers and seven supervisors participated in the focus group interviews, which lasted between 30 and 90 minutes. There were three focus group interviews with the student teachers and two with the supervisors. The number of people in the focus group interviews varied between three and five. For reasons of time management, I held one-on-one interviews with one student teacher and two supervisors. These interviews lasted between 20 and 45 minutes. Similar to the previous trial, the interviews were of the semi-structured thematic kind and were carried out in the Teacher Training School for the student teachers and in the Faculty of Education for the supervisors. Sub-study II revealed that the student teachers used the VEO app mostly for their self-reflection and that self-reflection formed one basis of their professional development. Therefore, I chose to focus more on self- and peer reflection in the third sub-study and made small changes to the terminology of my interview questions so that I no longer spoke about professional development.

Seven student teachers and four supervisors gave permission to audio record their supervisory discussions. I was not present for these discussions, but the supervisors

recorded the discussions and sent the audio files to me through email. I received four audio recordings for analysis. Among 10 student teachers, eight participated in the interview, five participated in both the interviews and audio recordings, and two participated only in the audio recording. All nine supervisors participated in the interview, four of whom also participated in the audio recording.

Similar to Sub-study II, I analysed the interviews through the qualitative data-driven thematic analysis method and the phenomenographic analysis method to explore the participants' perceptions and experiences (Cohen et al., 2011; Graneheim & Lundman, 2004; Perttula, 1996). Using several sentences as the unit of analysis (Chie, 1997), the analysis progressed from setting the research questions to thematising, coding, paraphrasing, looking for connections and categorising the data, finally ending by summarising the main themes. From the supervisory discussions, I wanted to study the contents of the discussions, paying special attention to reflections focusing on identity. Therefore, the analysis of the supervisors' discussions included three stages: combining data- and theory-driven thematic analysis methods and the layers of the onion model introduced by Korthagen and his colleagues (Korthagen, 2004, 2017; Korthagen & Vasalos, 2005). Again, I used several sentences as the unit of analysis (Chie, 1997). First, the data were analysed by data-driven thematic analysis; thus, I read the transcripts and coded the data freely in 19 different themes. Thereafter, I coded the data again by using the onion model and five of its stages: *environment*, *behaviour*, *competencies*, *identity* and *mission*. In the third phase, I focused on and coded identity-related reflection. This coding produced specific categories. Through the analysis process, I obtained a picture of all the supervisory discussions, particularly the identity-related aspect. I used the content of the identity-related reflections to build a reflection framework for teacher education.

7 SUMMARIES AND EVALUATIONS OF THE SUB-STUDIES

7.1 Sub-study I: Development of student teachers' practical theories through changes in their reflection during the entire teacher education programme

Körkkö, M., Kyrö-Ämmälä, O., & Turunen, T. (2016). Professional development through reflection in teacher education. *Teaching and Teacher Education*, 55, 198–206.

The purpose of Sub-study I was to explore the development of student teachers' practical theories through changes in their reflection during the entire teacher education programme. I analysed the portfolio writings of student teachers, with the aim of examining their practicum-related reflections and how they developed during the teacher education programme. My study contributed to the existing literature (see, e.g. Chong & Low, 2009; Hao, 2016; Lamote & Engels, 2010; Meierdirk, 2017; Pence & Macgillivray, 2008; Turnbull, 2005; Ulusoy, 2016) by investigating those characteristics in the practicum periods that promoted the development of student teachers' practical theories during the five-year teacher education programme.

The results of Sub-study I showed that the student teachers' practical theories developed throughout the education programme. The student teachers' self-reflections were narrow and superficial at first, but they gradually deepened and broadened during the studies. Their reflections expanded from themselves to the pupils, the classrooms and eventually the school community and society. The student teachers' ability to reflect the meaning of theoretical knowledge in practicum situations developed. Individual and collaborative reflection, feedback from supervisors and peer students and specific issues concerning each practicum period promoted the development of practical theories. Practicum assignments and guiding questions concerning each practicum period focused the student teachers' reflections on certain issues. However, despite some indication of deepening, the student teachers' reflections remained mainly descriptive and did not reach the stage of critical reflection. In their portfolios, the student teachers mainly described their behaviour and classroom activities during the practicum periods. Their ability to take account of pupils' viewpoints and ponder aspects of their practical theories developed during the second practicum period, but evidence of true comparative reflection was rare (cf. Brookfield, 1995; Jay & Johnson, 2002). They did not make use of the theoretical literature to support their observations or explanations from

practice. Moreover, they did not reach an adequate level of metalevel thinking: They did not question their own thinking and teaching, the wider school settings or the grounds for their practical theories (cf. Kansanen, 1993). Reflections on wider social, cultural and ethical issues of schooling were scarce.

The results of Sub-study I challenge the development of reflective activities and supervision in teacher education. Different practicum periods focusing on different theoretical and methodological aspects guide student teachers' thinking, and assignments help student teachers' reflection, which results in the acquisition of broader perspectives and perceptions. However, despite this guidance, portfolio writing may support merely descriptive reflection at the expense of analytical thinking. This is so partly because portfolios are graded study assignments that are read by supervising teachers (cf. Imhof & Picard, 2009; Ward & McCotter, 2004). Student teachers may not want to judge their supervisors because of a fear of repercussions. I concur with Jay and Johnson (2002) and Ulusoy (2016), who highlight the importance of teaching student teachers the different levels of reflective thinking. I argue that during teacher education studies, student teachers need to experience reflection at different levels. When student teachers do practical assignments concerning levels of reflection in seminars, the acquired skills can become part of their pedagogical thinking and can be transferred to their actions in practicum periods. It is important that supervisors are aware of the different levels of reflection and focus their guidance on enabling student teachers to develop critical reflection skills. Moreover, this sub-study identified the need to strengthen the role of research in teacher education studies and make research methodologies more explicit for student teachers. Furthermore, the links among theory, practice and research should arguably be more visible.

One of the limitations of this study is that it was based on a small sample of student teachers who were willing study participants. Moreover, it would have been useful to also study the student teachers' reflection-in-action, i.e. how they reflected while teaching, to get a more comprehensive picture of their self-reflection. This would have required different research methods, such as interviews and analysing the student teachers' reflective journals.

The main contribution of Sub-study I is that it exemplifies a model for teacher education. It also illustrates how student teachers' practical theories developed in each practicum period, what progression could be seen in their reflection over time and what characteristics in the practicum periods promoted change. The study showed a need to ponder the quality of reflective practice more consciously and apply new ways of enhancing student teachers' reflection skills. Sub-study I opened up my journey into research on reflection. In the next phase, I wanted to study ways of supporting student teachers' reflection through the video application VEO. Moreover, I became interested in the role of supervisors in enhancing reflection.

7.2 Sub-study II: A video app as a promoter of student teachers' reflective practice in the primary school teacher education programme

Körkkö, M., Morales Rios, S., & Kyrö-Ämmälä, O. (2019). Using a video app as a tool for reflective practice. *Educational Research*, 61(1), 22–37.

Sub-study II was the first study to experiment with the video application VEO at the University of Lapland. The study focused on the perceptions and experiences of student teachers and their supervisors, who used the app during one practicum period. The ultimate aim was to explore the usefulness of the app as a tool for the student teachers' professional development and for the supervision of their practice. This information was necessary to develop and apply video-based reflection in the teacher education programme. I gathered the empirical data from the student teachers and their supervisors through focus group or individual interviews, a piece of reflective writing and video diaries.

Prior to the first VEO trial, I acquainted myself with the previous research on video-based reflection in the context of teacher education. I realised that there was a great deal of research on the use of video, digital video and video analysis tools in teacher learning but that there were no studies on the use of mobile apps in teacher education (see, e.g. Blomberg, Sherin, Renkl, Glogger, & Seidel, 2014; Danielowich, 2014; Santagata & Angelici, 2010; Shanahan & Tochelli, 2014). Based on this literature, I had a presumption that the use of the VEO app might somehow benefit the student teachers' reflection and professional development and that the use of video might also confront some of the obstacles.

To summarise, the findings revealed that the student teachers found the VEO app useful in their self-reflection, as the videos helped them look at themselves from a different angle and take note of issues from their teaching that they had not noted before. For some of the student teachers, watching videos of their own teaching increased their self-efficacy and self-satisfaction. However, the influence of the app on the student teachers' professional development was limited by several factors, including a lack of guidance for individual and collaborative reflection. Moreover, the findings showed that the student teachers and supervisors regarded the use of the video app (as a supervisory tool) as challenging in some ways, particularly because video clips taken out of context could not capture the atmosphere, environment and culture in the classroom. In this study, video excerpts were used as the sole basis for lesson observations carried out by the supervisor.

The findings of Sub-study II revealed some of the same issues uncovered in earlier research regarding the use of video: difficulty observing pupils, screen and voice quality concerns and student teachers' reluctance to watch videos of their own teaching (Borko et al., 2008; Brophy, 2004; Shepherd & Hannafin, 2008). The main contribution of this study is that it revealed other potentially limiting

factors that have not been widely discussed in earlier research, which need to be considered when video-based reflection is applied in teacher education. These factors include the exclusion of significant elements of the classroom environment and culture. Moreover, the findings showed that the process of bringing a new self-reflection tool to teacher education was not easy because the student teachers and most supervisors were comfortable with the in-person lesson supervision. Video can change the aim of supervision as well as the supervisor and student teacher roles. In lesson observations, the focus is on assessing the student teachers' actions, and video highlights the processes by which their self-reflection is facilitated. This brings a more reflective approach to supervision, questioning and commenting to consider the efficacy of teaching practices beyond classroom episodes (Franke & Dahlgren, 1996). As Cyrille and Sébastien (2015) noted, the use of video enables changes to the hierarchical positions between the supervisor and student teacher. Video affects traditional ways of supervising student teachers' practice, which challenges teacher educators who need to adapt their existing perceptions of themselves as teachers (White, 2014). In this process, supervisors' professional development should be supported (Korthagen, 2001).

Researchers have highlighted that the use of video-based reflection has to be informed by its aims (Borko et al., 2008; Santagata & Guarino, 2011). The ultimate aim of implementing the VEO app in the teacher education programme was to enhance the development of student teachers' critical reflection skills. The results showed that the implementation did not support the achievement of this aim in the best possible way. Therefore, based on the findings of Sub-study II, I was able to derive some practical implications for applying and using the VEO app in the teacher education programme in the future. The findings showed that the student teachers and supervisors needed time to become familiar with the app as well as technical training in the use of the app. The study revealed that video excerpts, in themselves, did not provide a sufficient basis for lesson observation. After the first trial, it was evident that the role of the supervisor in video-based reflection needed to be discussed and focused and that individual and collaborative reflection had to be guided more strongly and connected to the process of supervision.

The findings of Sub-study II were based on self-reports from student teachers and their supervisors. I was able to obtain valuable information through the interviews, even though I recognise the limitations of interviewing. The participants may have interpreted the interview questions differently and may have answered not to the questions asked but to different ones. My interpretations may have included mistakes (Cohen et al., 2011). To minimise the chance of misinterpretation and increase the trustworthiness of the study, I sent the summary of interviews to the supervisors for their comments on my interpretations (Graneheim & Lundman, 2004). I did not send the summary to the student teachers because some of them had already

graduated from the university at the time of the analysis. I received no feedback from the supervisors regarding my interpretations.

Afterwards, I realised that I should have explicitly defined the concept of professional development to the student teachers to ensure conceptual clarity to everyone. Moreover, while analysing the data, I realised that I should have asked more questions about the connections between video-based reflection and the student teachers' learning. This would have enabled me to ascertain what the student teachers actually learnt from reflecting on the videos and whether they were able to apply their learning to teaching. Moreover, the number of participants was relatively small because participation in the research was voluntary. There was active participation from the supervisors, but it would have been beneficial to have had more student teachers in order to get a better overview of their perceptions and experiences.

Sub-study II further motivated me to focus more closely on the nature of reflection among student teachers in order to provide evidence of how video affects their thinking and reveal the processes leading to change in their thinking and practice. Moreover, I wanted to study the role of supervisors and peers in facilitating student teachers' reflection.

7.3 Sub-study III: Enhancing meaning-oriented reflection with the help of video

Körkkö, M. (2019). Towards meaningful reflection and a holistic approach: Creating a reflection framework in teacher education. *Scandinavian Journal of Educational Research* (published online 17 October 2019).

The aim of Sub-study III was to explore how student teachers' meaning-oriented reflection could be enhanced with the help of video. By meaning-oriented reflection, I mean reflection that seeks to understand the meaning of a situation under reflection. Teachers tend to focus on immediate practice during hectic situations, moving to new action without stopping to think about what actually occurred and why. However, learning from experience and developing practice require understanding what is behind actual situations (Korthagen, 2004; Mansvelder-Longayroux et al., 2007).

In Sub-study III, I focused on the use of a video-enhanced reflection procedure during one practicum period and the student teachers' and their supervisors' perceptions and experiences of this procedure. I was also interested in the content of the reflection in the supervisory discussions and the role of supervisors in enhancing student teachers' reflection in terms of professional identity formation. Based on the findings, I constructed a reflection framework that considers the holistic approach to teacher learning. For Sub-study III, I gathered the empirical

data through focus group or individual interviews and audio recordings of supervisory discussions.

The results of the second sub-study influenced the purpose and methods of the third sub-study. Moreover, the motives for Sub-study III developed from the fact that most theoretical frameworks on reflection seemed to highlight technical matters, such as behaviour, subject matter and teaching objectives or the cognitive dimension of learning (e.g. Kolb, 1984; Liakopoulou, 2012). I noticed that video studies usually focused on teachers' cognitive processes instead of non-cognitive processes and that few studies had investigated non-cognitive processes, such as emotions and motivation, in the context of video-based reflection (see, e.g. Kleinknecht & Schneider, 2013; Seidel et al., 2011).

Through the literature review, I encountered the ideas of Korthagen (2004, 2017) concerning the holistic approach to teacher learning and his models for guiding reflection. According to Korthagen (2004), to understand the underlying processes and reach meaning-oriented reflection, a teacher needs to reflect on inner levels: emotions, motivation and his or her identity. Therefore, the holistic approach needs to be considered when reflective activities occur. As a result of the review, my understanding of the role of identity increased, and therefore, I especially wanted to study student teachers' identity-related reflections. Once I had analysed my data, I decided to construct a reflection framework as a guide for supervisors and student teachers. This framework was based on the holistic approach to teacher learning and an integration of different theoretical perspectives.

The implementation of this study was based on the results of Sub-study II, which revealed the need to combine individual video-based self-reflection more strongly to supervision and further relate different modes of reflection to the process of supervision. Based on the findings and especially the feedback from the supervisors, I aimed to build some kind of reflection procedure for the second VEO trial. In this process, the student teachers were to design their own tag sets, record lessons using them, reflect on their teaching and select instances for discussion with their supervisors and fellow students to guide their learning. In this way, the student teachers would have an active role in their own reflection process, increase the amount of contextual knowledge in the supervisory discussion and overcome some of the limitations of video use (cf. Borko et al., 2008; Kleinknecht & Schneider, 2013). I acquainted myself with examples of similar reflective activities from previous studies (Arya et al., 2014; Bryan & Recesso, 2006; Liakopoulou, 2012; Tripp & Rich, 2012b), paying special attention to ways of guiding video-based reflection. While reading, I came across the action-oriented teacher knowledge project (ACCTEA), where teacher educators had developed a video-based procedure of guided reflection (Husu, Toom, & Patrikainen, 2008; Leijen et al., 2015; Tiilikainen, Heikonen, Toom, & Husu, 2016). I found this procedure helpful, and I used it as a basis for the VEO-based reflection procedure, which was then applied in the Advanced

Practicum in the spring of 2017. The procedure included the following five stages: (1) creation of an individual tag set based on personal learning aims; (2) authentic lesson observation and feedback discussion (optional); (3) selection of a lesson for recording and watching the video; (4) a supervisory discussion and (5) written reflection.

In the second trial, the role of the supervisor was discussed and focused on facilitating the student teachers' self-reflection. The main stress was on the student teachers' individual reflection process, and videos were used as one part of the supervision. Before the practicum period began, I tried to highlight the possibilities of the VEO app, introduced it and engaged in discussion with the student teachers and supervisors. Similar to the previous trial, the student teachers had no prior experience of using the app, and they started using it at the beginning of their practicum period.

The analysis of the focus group and individual interviews revealed that the second VEO trial was more successful than the first. Arguably, the main reason was that we had created a coherent model for supervision, of which videos were one aspect. The supervisors and the student teachers were mainly satisfied with the reflection procedure they used during the practicum period and throughout the process of supervision. Those supervisors who had participated in the previous trial stated that transferring more responsibility to the student teachers regarding their learning process was a good improvement. The student teachers found the VEO app to be a useful tool for their individual and peer reflection. Video offered the student teachers a fresh viewpoint on their practice. Most of them found that the university supervisor had helped them in their reflection process. Some supervisors had used a strong theoretical approach in their guidance. The most difficult part of the reflection procedure was the creation of personal tag sets.

The analysis of the content of the supervisory discussions revealed a primary focus on issues relating to the environment, which means interactions between the student teachers, the environments they worked in and the people with whom they worked. Identity was found in one-quarter of the coded references. The results can be partly explained by the reflection procedure, which both highlighted the classroom situations and was the focus of the reflection. The results indicate that the video-based reflection procedure can enhance the reflection process regarding the complex aspects of teacher development. In looking more closely at identity-related reflection, I found that the discussions focused on the topics of student teacher learning, teachers' role, learning aims, theory and practice, pupil learning and teacher personality. In these discussions, the supervisors linked practice and theory by proposing clarifications of questions and comments. Thus, the supervisors adapted the principles of the reflective approach to guide the student teachers' learning process (cf. Franke & Dahlgren, 1996). The discussions included aspects of comparative reflection, whereby the student teachers pondered their teaching

from the viewpoint of their pupils or linked theoretical insights to their practice (cf. Brookfield, 1995; Jay & Johnson, 2002). Even though the student teachers looked at their teaching from different viewpoints, they did not criticise their actions or relate their teaching to social, cultural or ethical aspects of schooling. The supervisors' guidance did not consider these issues. Thus, while the supervisors guided the student teachers' reflective thinking, especially in relation to objects, this was not pronounced at the metalevel (Kansanen, 1993). The second VEO trial faced similar obstacles to the use of video, as in the first trial. Some student teachers were reluctant to watch videos of their own teaching, especially at the beginning of their practicum period. However, there were positive changes to the perceptions of many student teachers when they became cognisant of the benefits of recording.

The topic that aroused a great deal of discussion among the researcher and supervisors was the role of the supervisor in enhancing student teachers' self-reflection. The supervisors pondered their role in relation to the supervising class teachers' role. Some supervisors expressed that they did not know their role or that the role was vague. These supervisors expressed a need for theoretical tools for their supervision. Every supervisor seemed to have his or her own way of guiding student teachers. Some were aware of the theoretical basis of their supervision, but some had not formed an explicit theoretical grounding for their work as a supervisor. Jyrhämä (2002) and Komulainen (2010) also identified the challenges of the scattered theoretical background of teacher education. This made me think about ways of unifying supervision and providing theoretical support for supervisors. For this purpose, the reflection framework was developed based on the results of this study so as to act as a theoretical tool for reflection and as a practical guide for the supervision of student teachers. This framework was grounded in identity-related reflection. It addressed both the content and level of reflection, guiding reflection to the topic of the student teachers' identities and indicating specific considerations that could facilitate deeper reflection. The reflection framework was based on the ideas of Korthagen and his colleagues (e.g. Korthagen, 2017; Korthagen et al., 2001; Korthagen & Vasalos, 2005) concerning the holistic approach to teacher learning. Moreover, it lay on experiential learning theory (Kolb, 1984), social constructivist and sociocultural learning theories (Palincsar, 1998) and experiences of situated learning (Lave & Wenger, 1999).

Following the second trial, the video-enhanced reflection procedure was changed according to the feedback from the student teachers so that the creation of personal tag sets was moved to the third week of the practicum period. In the subsequent Advanced Practicum in the autumn of 2017, the student teachers used the ready-made tag set as they recorded videos during the first teaching period. For the second teaching period, they watched videos of their teaching, used this to ponder their learning aims and created their personal tag set together with their university supervisor.

Similar to Sub-study II, this study was based on self-reports from student teachers and their supervisors. To test my interpretation, I sent the summary of the analysis to the supervisors (Graneheim & Lundman, 2004), and once again, I received no comments. Again, the number of participants was relatively low, and it would have been good to involve more student teachers in the research. In the third sub-study, I broadened the data to supervisory discussions, which gave me a closer look at the student teachers' reflection. I could have used the student teachers' pedagogical portfolios as material as well to see how they talked about videoing and whether video-based reflection had any impact on their level of reflection.

Following the second trial, I began investigating my reflection framework more closely. I used the framework when I served as a supervisor on the Advanced Practicum in the autumn of 2018. I also discussed the findings of both VEO trials with my colleagues, and through common discussion, I realised that video-based reflection deals significantly with questions of self-awareness and self-efficacy, which powerfully affect everyone's learning. The student teachers differed in their reflection skills and their abilities to reflect on videos, which is connected to their perceptions of themselves. As a result of this pondering, I started to think about ways of incorporating the concepts of self-efficacy, self-concept and self-confidence, and the theories related to these concepts, into teacher education and its theoretical basis.

8 HOLISTIC MODEL OF LEARNING AND GUIDING REFLECTION

In this chapter, I describe and discuss the holistic model of learning and guiding reflection originating from the three sub-studies and the research process spanning these sub-studies. During the process, my understanding of the phenomenon under study increased. The model summarises what I have learnt regarding reflection: how student teachers learn to reflect, how the development of reflection skills can be guided through video application and what theoretical background contributes to an even greater understanding of the phenomenon. Thus, the model arose from the theoretical and empirical findings, and by informing the practice, it forms one part of this dissertation's results.

The model resembles the reflection framework created in Sub-study III, which is presented in the related article. However, based on further analysis of the results and my own experience as a teacher educator, I came to the conclusion that this original framework could not sufficiently guide student teachers' learning of reflection skills, and therefore, I needed to develop it further. The student teachers seemed to understand the basic elements of the model. However, the praxis revealed the need to widen the theoretical background of the framework by incorporating social cognitive theory and the concepts of self-efficacy, motivation, self-concept and self-confidence. I also wanted to avoid the mistake of making the framework overly restrictive; thus, I wanted to enable flexibility (cf. Korucu Kis & Kartal, 2019). The model is presented in Figure 3.

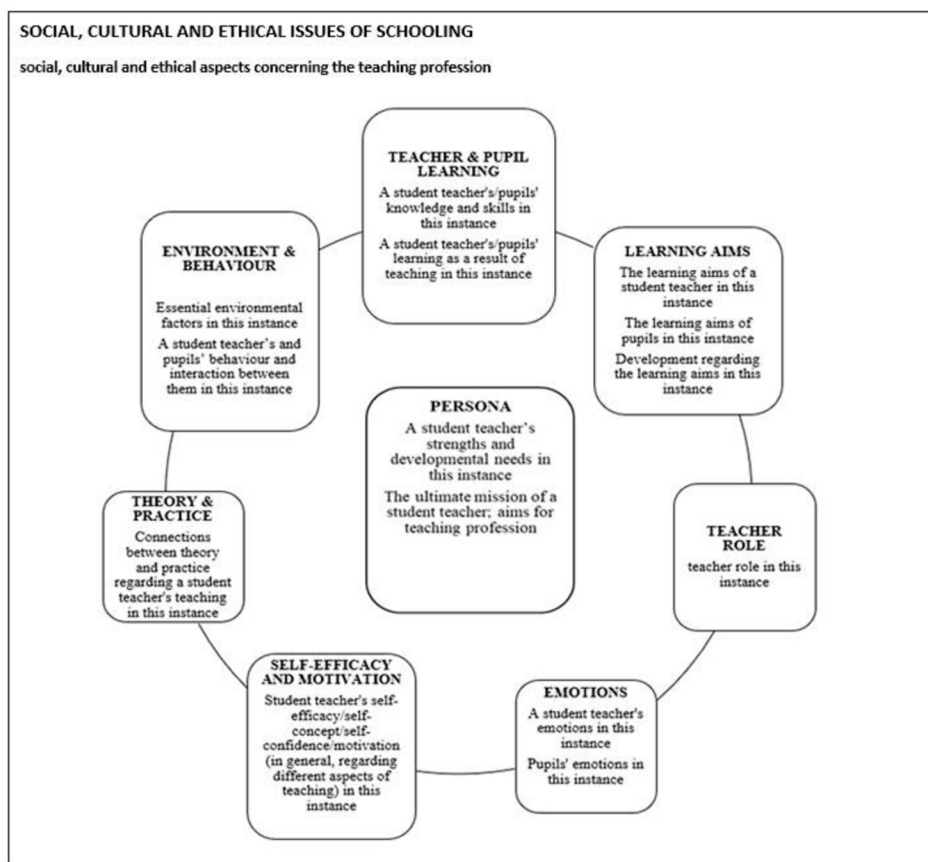


Figure 3. Holistic model of learning and guiding reflection

As Figure 3 presents, the model consists of eight parts, with a persona in the middle. The parts are connected to personal development and, through that, to teachers' professional development. I do not find it relevant to make distinctions between personal and professional identities because they are closely intertwined, and distinguishing them is unnecessary when the aim is to promote teacher learning. All parts of the model interact with each other.

The model can serve as a practical and theoretical guide for both student teachers and university supervisors. Student teachers can use it as a guide for their individual or peer reflection during the course of the practicum period. The model can be used to help them reflect on their teaching or write their pedagogical portfolios after the practicum periods. It can also be used in every practicum period in university supervision. Supervisors can benefit from the model in seeking to elaborate discussions and encourage productive reflection that integrates learners and learning, instruction, assessment and subject-matter knowledge (Davis, 2006). The

model does not depend on the existence of video or the application of video-based reflection, but it can be connected to it. The model enables reflection on many levels: It is possible to focus on reflection on actual actions as well as to theorise the action and ponder wider topics, such as ethical and cultural aspects (cf. Kansanen, 1993).

The model is based on the holistic approach to teacher learning (Korthagen, 2004, 2017): Learning is often seen as unconscious because part of teacher behaviour is determined by unconscious factors; teacher learning is multidimensional, which means that learning comprises cognitive, motivational and emotional aspects related to the social context. Moreover, learning is multilevel, as it occurs and is affected by different layers of the onion model: the environment, behaviour, competencies, beliefs, identity, persona and mission. Teacher learning takes place at the juncture between theory, practice and the person.

Other theoretical foundations of the model can be found in experiential learning theory (Kolb, 1984), social constructivist and social cultural learning theories (Dewey, 1997; Palincsar, 1998; Vygotsky, 1978) and situated learning theory (Brown et al., 1989; Lave & Wenger, 1999). All reflection is based on student teachers' practical experiences, which form the basis of future experiences. Learning from experience requires action from student teachers. Learning does not occur in isolation; it occurs in the context of teacher education, the teacher education community and the wider social and cultural contexts. Supervisors and peer students facilitate student teachers' learning through discussion. During teacher education studies and in interaction with the social environment, student teachers learn skills and knowledge and develop pedagogical thinking, all of which are essential in teachers' work. This is how student teachers become members of the teaching community.

Besides the abovementioned theories, based on my research results, I want to complete the model with social learning or social cognitive theory (Bandura, 1977) because it arguably fits well with the idea of the holistic approach to teacher learning. Moreover, this theory emphasises the role of social interaction in learning. It especially highlights that people learn by observing others. According to Bandura, behaviour is determined by personal, behavioural and environmental influences. Personal factors refer to *self-efficacy*, i.e. beliefs about one's ability to complete a behaviour. Behavioural factors refer to one's prior experiences and success with tasks. Success with a task can affirm one's self-efficacy beliefs regarding similar tasks in the future. Environmental influences are those aspects in the environment that promote an individual's ability to complete a behaviour. Self-efficacy is closely related to the concepts of motivation, self-concept, self-confidence and emotions, all of which are essential parts of the persona. They are cognitive personal conditions which are affected by many environmental factors. They cannot be explained through a single theory because they result in many kinds of processes and are connected to their context. For instance, from a psychological point of view, motivation can be triggered by an internal or external stimulus, one's own will and purpose or basic

biological needs (Beck, 2000; Fontana, 1995). Exploring different meanings of those concepts and their mutual relations is beyond the scope of this study, so here, I shall simply state that they interact with each other and affect the learning process. Therefore, they are essential concepts in the context of teacher education.

Student teachers can have different ideas of their abilities regarding different subjects or tasks, which are shaped by their motivation, emotions and conceptions of themselves. The learning environment can both positively and negatively affect student teachers' self-efficacy beliefs. In the best-case scenario, supervision and feedback from peer students increase student teachers' motivation and positively affect their self-efficacy. This is especially important in cases in which student teachers have an inaccurate perception of their self-efficacy (Bandura, 1997). Thus, encouragement and a warm environment have the potential to strengthen student teachers' self-confidence and contribute to the development of their self-awareness.

Following the ideas of the holistic approach, the persona forms the heart of the model. Inside the persona are one's personal characteristics and qualities that can be regarded as strengths and developmental needs. Moreover, the persona includes one's mission, i.e. what student teachers aim for in the teaching profession. The environment in the model means those factors that are essential in a student teacher's lessons and that affect teaching and learning. Behaviour refers to the behaviour of student teachers and pupils and the interactions between them. The model includes both teacher and pupil learning because it is usually useful to distinguish these two and consider them separately and to then assess them in relation to each other. The same distinction is made regarding learning aims. The teacher's role guides student teachers to think about their actions during lessons and the different ways of implementing teaching. Because part of teacher learning is unconscious and relates to emotions and motivation, the model encourages student teachers to recall their emotions in specific moments. Regarding the emotional side, the model draws attention to student teachers' self-efficacy, motivation, self-concept and self-confidence and the relation of these aspects to the student teachers' self-efficacy beliefs. The aim of the model is for student teachers to find connections between their practical experiences and educational theories. The model refers to specific teaching instances under focus. This is because reflection and learning always happen in certain contexts (Dewey, 1933; Schön, 1983). Outside the circle, there are social, cultural and ethical issues of schooling that are beyond the context and affect everything that happens in learning situations.

I recognise that the implementation of the model presented here may imply challenges and may require discussion with users and specific guidelines regarding how the model can be used. In order to use the model, student teachers and supervisors need to be aware of the purpose and kind of reflection being sought. It is also important that reflective activities align with the aims of certain practicum periods.

9 DISCUSSION AND CONCLUDING REMARKS

9.1 Summary and discussion of the research results

The general objective of this study was to investigate student teachers' reflection and professional development, their learning of reflection skills and the ways of guiding their learning of these skills through the video application VEO in the primary school teacher education programme. Through the research process, I created the holistic model of learning and guiding reflection, which was based on previous studies on teacher reflection, video-based reflection and teacher professional development as well as on learning theories and three sub-studies (see Chapter 8). At the beginning of the research process, I set the following research question and sub-questions, which guided the study:

1. How can the video application VEO be used as part of reflective practice in the primary school teacher education programme?

1.1 How can the video application VEO be used as a tool for the learning of reflection skills and for guiding that learning?

1.2 How can the video application VEO become a practical and useful tool in promoting the development of reflection skills?

The main outcome of this dissertation has been the different ways of using the video application VEO as a tool for reflective practice in the primary school teacher education programme. In particular, this dissertation

- presents the process of applying and developing video-based reflective practice in the primary school teacher education programme (Sub-studies II and III).
- produces information on the nature of student teachers' reflection and the development of reflection in different phases of the teacher education programme (Sub-studies I and III).
- sheds light on student teachers' and supervisors' perceptions and experiences of the use of the video application VEO in self- and peer reflection and supervision and how student teachers' self-reflection can be promoted through the use of the video application and simultaneous discussions with peers and supervisors (Sub-studies II and III).

- indicates the advantages of and possible obstacles to the process of implementing video application in teacher education and how to manage them (Sub-studies II and III).
- reveals supervisors' orientations and attitudes, reflection skills and demands for their professional development (Sub-studies I–III).
- broadens the theoretical background of teacher education through the holistic model of learning and guiding reflection, which also informs the practical usage of the video application (Sub-study III).

While previous research has addressed some of the abovementioned issues, some of the results reported in this dissertation have not been reported elsewhere or widely discussed. These include the process of applying and developing the use of a mobile-based video application in the primary school teacher education programme through iterative phases and an identification of the multiple advantages and obstacles, specifically those relating to the use of the video application VEO in teacher education. By presenting advantages and challenges, the study discusses appropriate ways of using the app. Moreover, the results present ways in which the theoretical background of teacher education can be enriched through the holistic approach to teacher learning and social cognitive learning theory and how these can be connected to video-based reflective practice. I shall now analyse the findings according to the research questions.

How can the video application VEO be used as a tool for the learning of reflection skills and for guiding that learning?

The findings of this study showed that the video application VEO is beneficial to student teachers in both their self- and peer reflection, thus resonating with many previous studies on the matter (Shanahan & Tochelli, 2014; Sherin & van Es, 2005; Tripp & Rich, 2012b). However, the use of the app is shaped by technical, institutional and disciplinary challenges that need to be considered when the app is used as a reflection tool (see also K rkk  et al., 2019). I consider these challenges as advantages because they serve as springboards for development and force teacher educators to review their reflective practice.

The results showed that, technically, the VEO app does include characteristics that both promote and limit individual and collaborative reflection. Sub-study II showed that the videos recorded by the app excluded significant elements of the classroom environment and culture, which hindered the possibilities for the student teachers' professional development. It was difficult for the supervisors to understand the classroom practice simply by watching the video clips. After the first trial, it was evident that videos recorded by VEO were not suitable for use 'as windows to the classrooms'. These results made me think about how to better guide individual reflection on videos and increase the amount of peer reflection as

well as how to integrate video-based reflection more strongly into the process of supervision.

There are many benefits from using VEO, including that it is a mobile-based app and, thus, can be easily moved and transported anywhere. Also beneficial is that the user can tag events and moments while recording. After completing the recording, it is easy to upload the video to the portal with a single click. Videos do not have to be transferred from a video camera to a computer. Many video analysis tools developed so far are not mobile-based, however, compared to VEO, they include many characteristics that better enhance the possibilities for reflection. For instance, the Video Analysis Support Tool (VAST) (Sherin & van Es, 2005), the Video Analysis Tool (VAT) (Bryan & Recesso, 2006; Shepherd & Hannafin, 2008, 2009) and MediaNotes (Tripp & Rich, 2012a) enable student teachers to edit and tag videos of their teaching, depending on the purpose of learning. Moreover, student teachers can write reflective comments on video segments based on certain guiding questions and share videos with other student teachers and supervisors, who can watch and tag the same video segments. The shortfalls of the VEO app include that it does not enable video editing or the selection of segments for further analysis. Student teachers have to add notes to tags before uploading the videos to the online portal, where they cannot add further notes. Student teachers can tag their videos afterwards in the portal, but they cannot add comments to specific video segments. Moreover, the portal does not include an external reflection guide or reflective questions that would further deepen the student teachers' reflection. These issues also limit supervisors' ability to focus on specific learning instances from the videos.

Because of these technical limitations, it is necessary to provide student teachers with a strong external reflection guide to support their video analysis. The video application can be a beneficial tool for supervision when individual video-based reflection is connected to collaborative video-based reflection with peer students and supervisors (cf. Bryan & Recesso, 2006; Shanahan & Tochelli, 2014; Tripp & Rich, 2012a). The findings of this study indicate that different reflection procedures can be effective in promoting comparative, theory-level thinking; however, promoting a critical stance is more demanding, highlighting the characteristics of reflection procedures and supervisors' competence in guiding reflection. The findings confirm the results of previous studies that the mere use of a video does not guarantee a discussion that includes questions and suggestions that challenge student teachers to widen their thinking and develop their work (Ellis et al., 2015; Husu et al., 2008). Teacher learning is affected by many contextual factors, such as collegial support and the time used for learning, as well as personal factors, such as individual characteristics, knowledge, accomplishments and a desire to learn (Clarke & Hollingsworth, 2002; Van den Berg et al., 2015). Contextual factors can more easily be changed. Therefore, it is important to pay attention to the characteristics of guiding questions, reflection frameworks or other reflection guides and whether

they are adequate in promoting the learning of critical reflection skills. Student teachers can benefit from using the holistic model of learning and guiding reflection developed in this study or similar frameworks that guide their attention to both cognitive and non-cognitive aspects of teachers' work, including interaction with the environment and themselves as teachers.

Institutionally, the results showed that bringing a new self-reflection tool to teacher education was challenging for many reasons. Some participants resisted the use of the VEO app. The resistance seemed to have been strongest amongst those supervisors who had long-term experience in supervising student teachers using more traditional ways. One reason for the resistance might have been that the student teachers and supervisors were using the VEO app for the first time and had no prior experience using video technologies. It seems that the student teachers and supervisors would have needed more time to familiarise themselves with the app and become acquainted with the idea of using it as part of reflective practice. The findings showed that it would be necessary to start using the VEO app in the early phases of the teacher education programme. Resistance itself was not a surprising result, as other researchers have identified the same negative attitude towards video technology (Borko et al., 2008; Shepherd & Hannafin, 2008). What was somewhat surprising for me was the way in which video-based reflection clashed with the existing culture of reflective practice in teacher education and the strong division of the participants into supporters and non-supporters of the new reflection tool.

Introducing the VEO app to the teacher education programme was challenging, especially because of the disciplinary changes it elicited in terms of the aims of supervision and the roles of the supervisor and student teacher. The VEO app highlighted the ways in which the student teachers' process of self-reflection was facilitated, requiring the student teachers to take an active role in their learning, and brought a more reflective approach to supervision. Developing new methods of supervision challenged the supervisors' attitudes towards supervision. This shift from assessor of practice to facilitator of reflection seemed to be significant for some supervisors.

The findings of the study revealed that the supervisors varied in their ability to base their guidance on the research literature and relevant theories. The guidance encouraged the student teachers to reflect on the comparative and analytical level but not on the critical level. Both beginners and supervisors with much experience may struggle with these questions. Supervisors come from different backgrounds and do not receive formal training to become teacher educators and supervisors (cf. Korthagen, 2001). It is often erroneously assumed that qualified teachers will automatically be competent teacher educators (Williams & Ritter, 2010). Despite the availability of formal in-service education, especially university supervisors use the skills and knowledge that are based on their education and former experiences

and develop their own ways of supervising. There are variations in supervisory competence and lack of consistent training (see, e.g. Jyrhämä, 2002; Komulainen, 2010). Consequently, supervisors can follow different principles, which may vary considerably. If the theoretical background and aims are not discussed, supervision will lack common ground and become unsystematic. An internalised guiding philosophy supports supervisors in their work and awareness of the basics of supervision and promotes quality supervision (Ojanen, 2006). Shared contents and aims in supervision also guarantee that supervision is of high quality and that student teachers are treated equally (Jyrhämä, 2002; Komulainen, 2010). Therefore, it is fundamental that we regularly discuss supervision and state explicitly what our work is based on, what our aims are and how we are able to achieve those aims. Supervisors' behaviour is critical, especially when we know that student teachers can easily reflect the behaviour of their supervisors during supervisory discussions (cf. Arya et al., 2014). Creating the holistic model of learning and guiding reflection was one attempt at strengthening the theoretical basis of supervision and offering supervisors a framework that they could use.

It is important that supervisors' possibilities for training and professional development are supported through mentoring and collegial co-operation. Even though there is no mentoring system for teacher educators in Finnish higher education institutions, there are other options for professional development. In the interest of simplicity, the mentoring could include welcoming colleagues to observe teaching and holding discussions on ways of teaching and supervising. Video analysis tools would be practical in mentoring and other forms of continuous professional development because they enable the sharing of and commenting on videos and, therefore, support the aims of building a community of practice (Borko et al., 2008). Creating such a system would require developing a professional community where all members consider themselves to be learners and are willing to help others and act as mentors (Feiman-Nemser, 2003; Tammets, Pata, & Eisenschmidt, 2019). Creating such communities of practice was also one of the aims behind the development of the VEO app.

How can the video application VEO become a practical and useful tool in promoting the development of reflection skills?

The two VEO trials revealed how the VEO app could promote the learning of student teachers' reflection skills and the guiding of that learning. The trials showed that video-based reflection was a complete novelty to the student teachers and supervisors. The purpose of the trials was to test the VEO app and further develop its use to make it more practical. In the long run, the ultimate is to make video-based reflection through VEO a permanent and natural part of reflective practice in the primary school teacher education programme of the University of Lapland. In pragmatic terms, the aim is that the use of the VEO app results in positive outcomes,

that is, increased diversity of reflective activities and improved reflection skills among student teachers and supervisors.

The VEO app is already part of the teacher education curriculum of the University of Lapland. We are in the right place, but the process is ongoing, and many issues still need to be ironed out before the written curriculum truly becomes a lived one. I think that the most important thing is to build a learning environment in which video-based reflection is regarded as a precious learning tool among a range of approaches and where video is included in the various study courses and contexts. Here, I refer to Dewey's (1997) thoughts on the role of educators in organising the learning context in a way that produces educative experiences that are always based on learners' previous experiences, which cumulate over time.

Based on the study results, building a learning environment that encourages the use of the VEO app as a tool for reflective practice requires that both supervisors and student teachers are carefully introduced to the basic idea of video-based reflection, what it is, why and how it is used and the roles of supervisors and student teachers. This is how all users get the same basic information of the topic, thereby decreasing and correcting possible misconceptions. It is also important to hear users' thoughts and answer their questions. The results suggest that because of a long history and tradition, supervisors are used to the observation-based model of supervision, and therefore, new ways of applying supervision may generate resistance. The aim of this study was not to abandon former supervision models but to investigate how the introduction of a video application to teacher education could help consider the effectiveness of established practices, diversify these practices and awaken thinking from different angles for the betterment of student teachers' learning. The video application offered a new viewpoint on supervision for all supervisors. At the beginning of the research process, some supervisors seemed to be quite tired of their current way of doing their work and wanted a new approach. Therefore, I believe that despite the struggles, the changes elicited through the introduction of the video application have been positive. Based on my experiences, it seems particularly important to effect the attitudes of supervisors because their perceptions of video-based reflection impact the way in which they talk about video to student teachers. Thus, supervisors need to be convinced that video, like the portfolio, is a useful format for reflecting and discussing teaching (Imhof & Picard, 2009).

Depending on the user's previous experience with video technology, gaining familiarity with a video application can take time, and therefore, it is better to start using the app at the beginning of the teacher education studies. This is essential not only for developing technical skills but also because early familiarisation may mitigate technological resistance. Moreover, the more video is used as a basis for reflection, the better the ability to reflect on it (Fadde & Sullivan, 2013; Seidel et al., 2011). During the research process, and as a result of multiple experiences, the use

of the video application VEO has already widened to two other practicum periods in the primary school teacher education programme at the University of Lapland (see Figure 4).

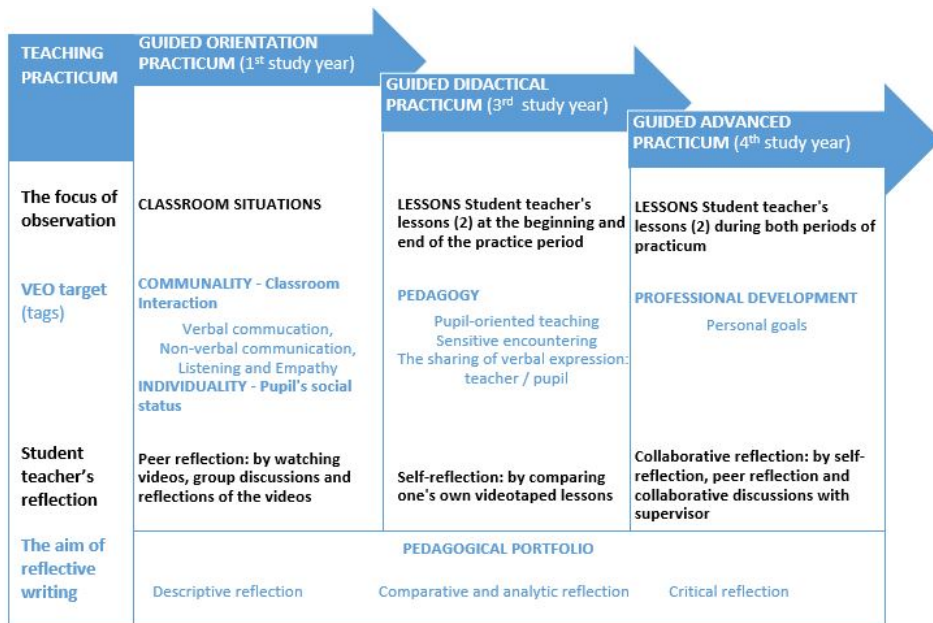


Figure 4. The reflective process in teacher education elicited by VEO (Körkkö et al., 2019)

As Figure 4 illustrates, student teachers start using the app at the beginning of their studies. The focus of observation and VEO targets change from one practicum period to another. Moreover, forms of reflection change and the level of reflection deepens when the student teachers advance in their studies. In this model, the way of applying video is integrated with theoretical underpinnings and the context of the primary school teacher education programme, which supports the achievement of the student teachers' individual learning aims, the aims of each practicum period and the ultimate aim of developing reflective teachers. This represents a truly research-based teacher education that promotes the integration of theory, practice and research in student teachers' professional development process (Borko et al., 2008; Krokfors et al., 2011; Toom et al., 2010).

I believe that over time, the threshold for using video will become lower, and attitudes towards using video for reflection will become more positive when student teachers and supervisors get practice, familiarise themselves with the video app and begin to see the benefits of video-based reflection (see, e.g. Atjonen, 1998). At the moment, the VEO app is being used only during practicum periods. To promote familiarisation with video and strengthen the role of video-based reflection in the

teacher education curriculum, it might be beneficial to widen the use of video-based reflection to other teacher education studies, such as multidisciplinary study programmes in basic education. Integrating video-based reflection with learning to teach different school subjects would help student teachers widen their pedagogical thinking and gain essential learning experience with the VEO app, which would promote further learning (cf. Dewey, 1997). Dewey (1997) highlighted that learners' individual needs should be considered in all cases. Taking account of every learner's personal background during practicum periods would be difficult, but for other teacher education studies, it might be easier to achieve.

The results of this study encourage a continuation of video-based reflection in the teacher education programme. It is important to bear in mind that a new reflection tool will not be accepted and implemented before users realise its benefits and usefulness (cf. Santagata & Guarino, 2011). The use of video is not valuable in itself; its value is instantiated in its consequences. The issue can be viewed from the perspective of value constructivism, an idea expressed by Niiniluoto (2008), which states that values are created in human interaction and belong to the world, which is socially constructed. Artefacts, such as video applications, are not naturally value-laden in themselves; humans give them value after pondering their functions. This is how natural artefacts become cultural artefacts. From this point of view, the VEO app can also become valued through its use.

9.2 Evaluation of the study

The present study advances our understanding of video-based reflective practice in the primary school teacher education programme. The research process raised a wide discussion in the primary school teacher education programme at the University of Lapland in terms of the approaches to and the aims and theoretical background of supervision. To my knowledge, the discussion has been very welcoming because before the video application VEO was introduced to the faculty, there was no common understanding of how student teachers should be guided. Every supervisor seemed to have their own style of guiding student teachers.

To evaluate the trustworthiness of the research and its findings, I now delve into the concepts of *credibility*, *dependability* and *transferability*, which have been used in the context of qualitative research. Credibility addresses the question of how well the study has focused on the issues under study. Dependability considers the degree to which the data have changed over time, and transferability refers to the extent to which the results can be transferred to other settings or groups (see, e.g. Lincoln & Guba, 1997). Moreover, I use three tests that have been applied to judge the quality of the research design, which are especially suitable for case study design: *construct validity*, *external validity* and *reliability*. Construct validity means defining specific

concepts and identifying operational measures that match these concepts; external validity refers to the generalisation of the study's findings; reliability demonstrates the repeatability of the study, i.e. whether future investigators will arrive at the same findings and conclusions (Yin, 2018).

This study applied four kinds of triangulation: theoretical, methodological, data and researcher, which strengthened its credibility and construct validity (Denzin, 1978). The study is based on earlier writings of reflective practice, educational theories and a large number of previous studies, all of which increased my understanding of the phenomenon under study. All three sub-studies were qualitative in nature. This was because I found the qualitative approach to be the only way to get close to the participants and construct an understanding of the issue under study (cf. Creswell, 2013). Moreover, the number of student teachers and supervisors in each Advanced Practicum was quite small, so it was not possible to get a large number of participants. I could have used statistical measures for many purposes, such as to test how video-based reflection affected student teachers' perceptions of their reflection skills. However, this would have required a different kind of research design. Moreover, I did not want to assign extra assignments to the student teachers, which determined my choice of methods.

I collected different kinds of qualitative data and used multiple sources of evidence: portfolio writings, interviews, video diaries and supervisory discussions, through which I was able to investigate different issues according to the aims of each sub-study. One limitation was that, with the exception for the supervisory discussions, the data can be regarded as self-reporting, which implies a danger of misinterpretation (Kember, 1997). Conducting the research in the context of teacher education and as part of teacher education studies may have affected what the participants reported during the process. I believe that the atmosphere in the focus group and individual interviews with the student teachers and supervisors was positive, open and reflective. In the group discussions, every participant had a chance to say something and raise concerns. Therefore, the data were not distorted by threatening or unpleasant moods or an over-emphasis on a single participant (cf. Vaughn et al., 1996). Finally, I did not test the interview questions before using them. However, I had discussed my research with colleagues and the supervisors who guided my dissertation, which helped me formulate relevant interview questions that addressed the intended focus. After the first interviews, I was able to modify my questions for future interviews.

I analysed all the material using the qualitative thematic analysis method. In Sub-studies II and III, I also applied principles of phenomenographic analysis to get a better picture of the data (see, e.g. Graneheim & Lundman, 2004; Mayring, 2014). To enhance the credibility and reliability of the study, I kept a research diary and aimed to describe the research process and the process of data collection and analysis in great detail. This ensured that the procedures were made explicit so that readers

could follow my thinking. Moreover, to confirm my interpretations, I produced representative quotations from the transcribed text.

For all the sub-studies, I analysed the raw data myself. However, my co-authors and other faculty members contributed to the analysis process through discussions and shared insights. I believe that co-operation with others increased my understanding of the data and helped me distance myself from my findings and interpret and look at them from a new perspective. This contributed positively to the accuracy of the results and reporting and, therefore, the reliability of the study.

All three sub-studies have been published or are in press in peer-reviewed research journals. Therefore, they have undergone a rigorous review process before acceptance and publication. Third-party reviews have confirmed the findings of the sub-studies as relevant and of high quality. Moreover, I have received feedback on my study from teachers and supervisors in the Faculty of Education, other doctoral candidates, conference audiences and other researchers whom I met during the process. This communication with others has given me new insights, impacting the overall quality of the study.

The data collected in the different phases of the research process were quite similar. The data changed somewhat between the two VEO trials because, during the process, my understanding of the phenomenon increased, and therefore, I wanted to use different methods to acquire a wider data set.

This study was conducted with a small number of participants in a specific context. One of the limitations of the case study approach is that the results cannot be generalised. This limitation was mitigated through two sub-studies on the same issue (cf. Gray, 2004). The findings of this study resonate with those of many previous studies, which indicates good external validity, and therefore, I believe that the results can be partly generalised to other teacher education programmes and that similar results could be achieved in different settings. However, transferability and reliability were not the aim of this study. Instead, other researchers and practitioners can learn from this study while thinking about future research options or developing new ways of promoting reflective practice in the social sciences.

As I have conducted case study research, I see the relevance of evaluating myself against the desired skills and values of a case study investigator presented by Yin (2018). These include the abilities to ask good questions, be a good 'listener', remain adaptive, have a firm grasp of the issues being studied and conduct research ethically. The researcher should be able to pose and ask questions during the entire research process. I have asked new questions while planning the study, collecting and analysing the data, and writing articles and, finally, this summary. These questions have led me to focus more on certain aspects of the phenomenon, further deepening the study.

The researcher should be a good 'listener' so that he or she could receive information through multiple modalities, such as emotions, the mood and other

contextual factors. As my research is closely connected to a certain context, I have paid special attention to contextual factors during the study. The ability to remain adaptive means that the researcher is ready to change research plans or design a completely new study if needed. While my study remained the same, my research plan grew more focused through the formulation of research questions, which is typical in qualitative research.

Moreover, the researcher has to keep the purpose of the case study in mind to be able to interpret the data. I tried to conduct my study by keeping the purpose in my mind at all times. Finally, the researcher has to follow ethical guidelines when conducting research, including being open to contrary evidence and aware of preconceptions. I followed the necessary ethical principles and reflected on my preconceptions during the study. I also learnt that the phenomenon of video-based reflective practice is much more complex than I had expected, leading me to modify my way of thinking.

9.3 Ethical considerations

In this study, there were ethical issues in relation to the student teachers and supervisors who participated in the research, the staff members of the Faculty of Education, the University of Lapland, who were involved in the discussions and planning the implementation of the video-based reflection in the practicum periods, and the staff and pupils of the Teacher Training School at the time the study was conducted. My own role as a researcher, staff member and teacher educator also raises ethical considerations. While undertaking my work, I followed the guidelines for the responsible conduct of research and for handling alleged violations of conduct, introduced by the Finnish Advisory Board on Research Integrity (2012), as well as guidelines recommended by other researchers (see Creswell, 2013; Lincoln, 2009).

Prior to conducting the sub-studies, the participants were informed orally about the study and its purpose and the activities that would take place during the research process. Research permission was sought for every sub-study from both the participants and the Faculty of Education. For Sub-studies II and III, permission was also sought from the Teacher Training School, the University of Lapland, because these studies were conducted during the Advanced Practicum. The principles of *autonomy*, *privacy* and *confidentiality* were respected by obtaining consent from every participant (Finnish Advisory Board on Research Integrity, 2012). The forms included descriptions of the study purpose, data collection methods, the use, reporting and publishing of the research material, confirmation of the anonymity of the participants in every phase of the research and assurance that the participants could withdraw from the study at any time. For further queries, my contact information was provided. In Sub-study I, the student teachers provided

their consent by writing an email. In the second and third sub-studies, they filled out a written consent form. To guarantee the privacy of the participants, I saved the consent forms in a locked cabinet, which was not available to outsiders. I saved the research material in my personal computer, which was inaccessible to others.

The student teachers were told that the use of the VEO app was a mandatory part of their practicum period and that participation in the VEO-related research was optional. Following the ethical principle of *avoiding harm* (Creswell, 2013; Finnish Advisory Board on Research Integrity, 2012), I tried to make participation in the research as easy as possible. Therefore, I visited the Teacher Training School to interview the student teachers and interviewed the supervisors at their place of work. While conducting the interviews, I highlighted to the participants that the study would benefit the development of video-based reflective activities in the teacher education programme and that, therefore, their involvement in the research was important. While conducting the interviews, I was aware of the power imbalance in the hierarchical relationship between myself and the participants. However, I did not observe negative effects during the interviews. I believe that a warm and relaxed atmosphere diminished the role of power relations in the discussions.

During the data analysis, I remained open to all kinds of findings, including those that contradicted my own preconceptions. I have reported the findings in, e.g. conference presentations, peer-reviewed scientific journal articles and other writings. In reporting the results, I have followed research ethics by aiming to communicate in understandable language. I have respected the work done by others and refer to their work throughout the sub-studies and this summary. As is typical in qualitative research, the results of this study illustrate multiple perspectives. Each sub-study and its corresponding article include quotations from all the participants. The participants' privacy has been protected in the results through anonymisation. I have published my results in the articles, which include funding information and a declaration that there were no conflicts of interest while conducting the research. Because of copyright considerations, I have not been able to share these papers publicly, but I have done so privately. The sub-studies do not duplicate my findings, as each forms its own unique study.

One ethical question of this study concerns the recording and exploitation of videos and their storage in the VEO portal. Concerning recording, the study followed the current practices of the Teacher Training School. Besides other duties, this school is focused on research and teaching experiments. When pupils begin their school path at the school, their parents give permission for their child to participate in research carried out in school. Therefore, when the VEO app was trialed, permission for recording from the pupils or their parents was not needed. The pupils were not a target group of this study, and videos of student teachers' teaching were not used as research material. There were some exceptions to recording certain pupils. In such cases, the pupils were not recorded.

The student teachers were reminded of professional confidentiality and informed about ethical considerations concerning the use of videos. It was discussed that student teachers were allowed to use the videos only for the purposes of their practicum period. Moreover, it was discussed that some pupils might become disturbed by recording and that it was important to always be sensitive towards pupils. I encouraged the student teachers to talk openly to the pupils about recording and to answer any questions.

Every student teacher and supervisor had a personal VEO account and access to the VEO portal through a username and password. After recording, the observer saved the video and uploaded it to an online portal. The student teachers were only able to watch their own videos. Nobody else was able to watch the student teachers' personal videos. Videos in the portal were automatically saved in Amazon Cloud. The information in the portal was given to the participants when providing information on VEO and seeking their consent. After each trial, I permanently deleted the VEO accounts of each student teacher.

During the research process, I not only worked as a researcher but also as a staff member and, at the end of the process, as a teacher educator and supervisor. My own experience was that being part of the staff was highly advantageous. As I mentioned in Chapter 9.2, discussions and co-writing with my colleagues have contributed to my understanding and, therefore, positively affected the research process. I know the research context and have been able to develop my own work by applying research results gathered in different phases of the process. This has increased my motivation and inspiration regarding the study. The interaction with my colleagues, many of whom also participated in the study as informants, has been open and honest, and it has formed a good starting point for collegial trust. Even though I consider familiarity a strength, I recognise that it may also have affected interaction somewhat negatively by preventing informants from divulging some issues in interviews because of perceptions that they could not express all of their ideas.

9.4 Implications and future research

This study has both practical and theoretical implications. Practically, the study suggests ways in which the video application VEO can be used as a tool for reflective practice, especially in learning reflection skills and guiding that learning. It also shows how video-based reflection should not be applied, what kinds of obstacles might be implied and solutions on how to manage them. The greatest implication of the study is that it has shed light on the ways in which student teachers are guided in their practicum periods and the aims and theoretical basis of supervision. Bringing a new reflection tool, a video application, to our teacher education programme has challenged the thinking of those supervisors who have been following a model based

on supervisor feedback. Using a video application, such as VEO, requires a learner-centred approach, with student teachers first analysing their videos (see also K rkk  et al., 2019). Thus, a video application is well suited for the purpose of promoting the reflection activity of student teachers. The role of the supervisor remains important, but this role has to be different when video viewing is applied. Student teachers have to take responsibility for their learning and analyse their teaching from a new perspective. Supervisors who are used to applying more traditional approaches have to rethink their role when video is used as part of the supervision process.

In future, it would be relevant to study more closely individual beliefs and attitudes towards using video for reflection: What kinds of beliefs do student teachers and supervisors have about the use of video in general? Why are some student teachers and supervisors excited about the use of video and others not? This information would be beneficial because individual beliefs impact how new learning tools are implemented (cf. Janssen, Kreijns, Bastiaens, Stijnen, & Vermeulen, 2013). It is important to have supervisors' opinions because they are key to implementing new reflection tools in the teacher education programme. If supervisors do not support a new tool, it cannot be presumed that student teachers would consider that tool meaningful for their learning.

Supervision can have different goals, all of which are important and can be addressed in different phases of the teacher education programme and according to student teachers' personal phase of development (cf. Jyrh m , 2002). However, in all supervision, the main focus should be on promoting the learning of critical reflection skills. Supervision cannot be based only on analysing student teachers' actions. Therefore, based on the results of this study and previous studies on video-based reflection (Arya et al., 2014; Tripp & Rich, 2012a, 2012b), I highly recommend continuing the use of VEO. This does not mean that previous reflection tools or ways of supervision have to be abandoned. As different tools have both advantages and disadvantages, they can be used simultaneously. This is now the case in our teacher education programme. The challenge is to find a combination of reflective activities that support learning – activities that take on a critical stance. Supervisors and student teachers would benefit from using reflection frameworks and models that guide reflection. The holistic model of learning and guiding reflection developed in this study can work as such a model. However, this model has not been empirically tested, and future research needs to be cognisant of this. Additional research could aid in modifying the model and creating new reflection frameworks.

Based on the experiences from this study, I think that using a video application in peer reflection is something that needs to be developed and studied more in the future. In particular, it would be important to explore what kind of peer reflection forms are most successful in the context of video-based reflection. Reflection is already being discussed with student teachers during their teacher education studies. However, besides providing external guidance, it is useful to further highlight the

levels of reflection and indicate to student teachers what kind of feedback is helpful for professional development. This is important because video offers a new approach to giving feedback.

Theoretically, this study widens the background of teacher education by adding a holistic approach to teacher learning (Korthagen, 2004, 2017) in research on teacher reflection, especially video-based reflection. To my knowledge, many reflection frameworks developed so far (Kolb, 1984; Liakopoulou, 2012; Schön, 1983) are highly theoretical and, therefore, mainly ignore the emotional and motivational sides of teaching. Previous research has not connected video studies of teacher learning to the holistic approach. In relation to the holistic approach, the theoretical background of the teacher education programme is enriched with social cognitive views of learning, which consider the role of self-efficacy, motivation, self-concept and self-confidence in learning (Bandura, 1977, 1997). These issues may remain hidden in supervisory discussions, and therefore, it is important to recognise their existence and the positive or negative ways in which they may affect student teachers' learning (cf. Komulainen, 2010; Pickle, 1985). Theoretical insights are included in the holistic model of learning and guiding reflection developed here. The model emerged from theory and empirical findings and serves as a guide for reflective practice.

Research on video-based reflection in teacher education is increasing, and we are discovering more and more about how to effectively use video for teacher learning. Wang and Hartley (2003) stated that connections between video and reflection and video and professional development need to be studied in greater detail. This study provides information about student teachers' learning through video; however, many questions remain unanswered. It would be important to conduct further studies on, e.g. how different elements of video applications affect teacher professional development. This could help us understand how the various benefits of video applications can be applied. Learning from video is affected by many contextual issues, such as how reflective practice is organised. The results can vary depending on the presence or lack of external guidance and the type of setting (individual or group reflection) (Kleinknecht & Schneider, 2013). Therefore, conducting more research with varied conditions would increase our understanding of the phenomenon. In my own work context, I would like to study the use of the VEO app over the course of the whole teacher education programme in order to see how student teachers learn to use the app, how their attitudes develop and how they benefit from using the app in their reflection and professional development. Besides other study assignments, student teachers' portfolios would be a valuable source of study to ascertain whether video-based reflection has any impact on their reflection over time. I want to guide student teachers to take more advantage of the educational literature in their portfolios. Moreover, teacher educators' professional development has gained little scientific interest, and therefore, it needs to be addressed more carefully in the future (Dinkelman, 2011; Williams & Ritter, 2010).

9.5 Conclusion

The research and development work around video-based reflection has set in motion useful processes in the primary school teacher education programme of the University of Lapland, the most important of which is that we have started to discuss our different ways of doing our work. Research on supervision has enabled the faculty staff to ponder the ultimate aims of guiding student teachers in their path to the teaching profession. Through this, there is more common ground around supervision. As a consequence of changing the way in which supervision is organised, i.e. through the VEO app in one practicum period, changes have also been made to supervision in other practicum periods. The VEO app has become a permanent part of the teacher education curriculum. Reflection is highlighted more powerfully in teacher education studies, and student teachers are taught the levels of reflection.

Research and development around video-based reflective practice will continue in the research context. At the same time, communal discussions of supervision will continue, and supervisors' professional competencies will be strengthened by training and developing theoretically justified models that supervisors can utilise. With the development of reflective activities, it will be possible to better support the interaction between theory, practice and research.

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