
Supporting the construction of teacher’s practical knowledge through different interactive formats of oral reflection and written reflection

Raili Allas\(^a\), Åli Leijen\(^a\), Auli Toom\(^b\)

\(^a\) Institute of Education, University of Tartu, Estonia
\(^b\) Faculty of Behavioural Sciences, University of Helsinki, Finland

Abstract
The relevance of initial teacher education is a widely recognised concern. Researchers are striving to find innovative pedagogies that would better prepare student teachers for actual day-to-day teaching. In this study, a guided reflection procedure is presented that aimed to support student teachers in learning practical knowledge and linking this with research-generated knowledge. 21 student teachers at an Estonian university participated in the guided reflection procedure. Their lessons were video recorded, two meaningful events (one empowering and one challenging) selected, and oral (alone or with a peer or supervisor) and written reflections carried out. Differences between students’ practical knowledge as presented in 1) oral and written reflections and; 2) in three oral reflection conditions were investigated. Results indicated that the procedure supports the learning of different types of practical knowledge. Moreover, the practical knowledge gained could be more easily transferred to other situations when the oral reflection was carried out with a peer or supervisor.

Keywords: guided reflection procedure, teachers’ practical knowledge, initial teacher education, student teachers, school practicum

Introduction
Many researchers have highlighted the concern that teacher education does not prepare teachers well enough to relate the theories taught in teacher education institutes to practical situations in the classroom (e.g. Altan & Sağlamel, 2015; Caspersen & Raanen, 2010; Grossman, Hammerness & McDonald, 2009; Kansanen et al., 2000; Korthagen, 2001; Korthagen, Loughran & Russell, 2006; Lohmander, 2015; Meijer, 2010; Onnismaa, Tahkokallio, & Kalliala, 2015). As a result, beginning teachers often experience difficulties
when dealing with certain situations encountered in everyday teaching practice (e.g. Grossman et al., 2009; Meijer, 2010) and feel inadequate to deal with the challenges of their profession. Beginning teachers often therefore experience a significant amount of stress and burnout related to their work (e.g. Eisenschmidt, Oder, & Reiska, 2013; Hong, 2012; Löfström & Eisenschmidt, 2009; Poom-Valickis, 2007; Tynjälä & Heikkinen, 2011). Feeling burnt-out may even begin during initial teacher education (Fives, Hamman & Olivarez, 2007). In this article, the term initial teacher education (also known as pre-service teacher education) refers to the basic higher education required to become a teacher. Owing to this overwhelming emotional load and without adequate support, a considerable number of beginning teachers leave the profession during their first years at work (Council conclusions…., 2009; Fantilli & McDougall, 2009; TALIS 2009, 2013). In response to these challenges, great emphasis is placed by educational researchers on initial teacher education programmes and innovative pedagogies to bridge the gap between theory and practice via supporting the construction of different types of knowledge (Grossman, 2007; Meijer, 2010) and linking these together that is relevant for the practical work of teaching. Moreover, additional research is needed to find out which conditions are best suited to the construction of different types of knowledge and how to best support the construction of such knowledge already during initial teacher education to better prepare beginning teachers for their future work.

**Theoretical framework**

*Teacher’s practical knowledge*

In recent decades researches have become more interested in the knowledge and beliefs that form the basis of teaching. In order to emphasise teaching as a profession, researchers during the 1980s started to focus on the knowledge specific to the practice of teaching (e.g. Grossman et al., 2009; Loughran, 2010). Researchers’ interest then shifted from immediately observed behaviour and skills to teachers’ cognition and knowledge (Grossman et al., 2009; Meijer, Verloop & Beijaard, 1999), an aspect that teachers themselves had difficulty in articulating (Brown, Collins & Duguid, 1989; Shulman, 1987). Especially significant was Shulman’s (1987) conception of *pedagogical content knowledge*, which he distinguished as being important specialized knowledge related to teaching a subject in addition to knowledge of that subject matter or general pedagogical knowledge. Such specialized knowledge is often referred to as a teacher’s practical knowledge (Meijer, 2010).
Teacher’s practical knowledge refers to the knowledge experienced teachers have about their own teaching (Leinhardt, 1990). Teacher’s practical knowledge has been constructed based on the knowledge acquired from different sources – especially practical experiences – to meet the practical demands of a variety of teaching situations. Through constantly analysing and deliberating upon one’s own actions, experienced teachers have developed complex knowledge systems that enable them to react quickly in everyday situations (Fenstermacher, 1994; Meijer, 2010). Teacher’s practical knowledge is the knowledge that guides everyday teaching activities (Shulman, 1986) and enables experienced teachers to act effectively in the constantly changing environment of the classroom (Meijer et al., 1999; Wilson, Shulman & Richert, 1987). Therefore, teachers’ practical knowledge enables one to understand what teachers know and how they use such knowledge to manage the complexity of their work (Meijer et al., 1999). Consequently, teachers’ practical knowledge should form the core of teacher education programmes (Shulman, 1987).

Teacher’s practical knowledge is by its very nature tacit knowledge that they themselves are not used to putting into words (Brown et al., 1989; Shulman, 1987). Despite its implicit origin, teachers’ knowledge is expressed by their behaviour (Meijer, 2010) and more easily observable to others via discussions in which teachers explain and give reasons for their actions and decisions (Grimmet & MacKinnon, 1992). Therefore, teacher’s practical knowledge can be characterized by the types of knowledge they present in reflections on their teaching activities. By analysing student teachers’ reflections on their practical teaching experiences, Mena, García and Tillema (2012) and Mena, García, Clarke and Barkatsas (2015) identified four types of knowledge communicated in the reflections: recalls; appraisals; rules; artefacts. Knowledge types were distinguished based on the potentiality to use such knowledge in different future situations. Mena et al. (2012, 2015) defined recalls and appraisals as a type of knowledge closely connected to a specific experience, and rules and artefacts as knowledge that can be transferred to different contexts. More precisely, recalls are considered as exact reproductions of practical experiences (Mena et al, 2015), e.g. “I organised the classroom in two groups” (Mena et al., 2015, p. 5). Appraisals express the value judgements on the situations, explaining the success or failures in their teaching (Mena et al., 2012, 2015), e.g. “Children finally remained silent in the auditorium” (Mena et al., 2012, p. 11). Rules are understood as methodological strategies or abstract statements that derive from practice and may guide future teaching (Mena et al., 2012, 2015), e.g. “We should manage pupils” (Mena et al., 2015, p. 5). Artefacts are referred to as instruments, physical supports or
tools that teachers create to guide their teaching based on their rules and practical principles (Mena et al., 2012; 2015), e.g. “I will hang a poster on the classroom board with the four agreed-upon behavioural norms” (Mena et al., 2015, p. 5).

Regarding knowledge, Fenstermacher (1994; see also Toom, 2012) emphasised the importance of justification and distinguished between two types: practical justification, e.g. I preferred to agree with his wish, because I wasn’t so familiar with the kids and I felt that I did not know how to establish myself with him, and theoretical justification, e.g. for kids that age it is important to know what to expect, therefore, I could have repeated already at breakfast that when we finish breakfast, we will move to the morning circle. Fenstermacher (1994) distinguished the types of justification according to their level of generalisation. More specifically, theoretical justification is based on research-generated knowledge and it does not depend on any specific context, whereas practical justification is connected to concrete situations and it helps to explain what took place in this situation (Fenstermacher, 1994; Toom, 2006; 2012).

By reviewing the literature, Leijen et al. (2015) developed six types of teachers’ practical knowledge: recall, appraisal, rule or practical principle, artefact, practical reasoning and theoretical reasoning. The authors emphasise that all six types of knowledge are important to understand teaching. Similarly to Mena et al. (2012, 2015) and Fenstermacher (1994), Leijen et al. (2015) also differentiated types of knowledge according to the extent they could be transferred to different situations and contexts. Narrative knowledge (recalls and appraisals) is the most context-centred and helps to understand specific experiences; inferential knowledge (rules or practical principles and artefact) guides teachers’ activities and supports teachers in making changes to their practices; reasoned knowledge (practical and theoretical reasoning) is the most generalizable, helping teachers to construct theories of action based on personal practical experience to guide their future decisions and actions (Leijen et al., 2015). Therefore, beginning teachers should be supported in extracting more inferential and reasoned knowledge from their practical experiences in order to construct their own practical knowledge (Fenstermacher, 1994; Leijen et al., 2015; Mena et al., 2012, 2015; Toom, 2012).

**Reflection as a means to facilitate the construction of teacher’s practical knowledge**

It is generally understood that beginning teachers should be supported in constructing their own practical knowledge during initial teacher education as part of their overall

professional development (e.g. Altan & Sağlamel, 2015; Ruohotie-Lyhty, 2011; Schepens, Aelterman & van Keer, 2007). Beginning teachers need to be supported in constructing their own knowing-in-action (Schön, 1983) or code of practice (Mena, García & Tillema, 2011), by extracting “patterns” and strategies from their practical activities and constructing their own theory of action based on that knowledge. This knowing-in-action (Schön, 1983) or code of practice (Mena et al., 2011) is the knowledge that is communicated in practice and that guides teacher’s decisions and actions, but is often tacit (cf. Toom, 2006). Therefore, such abstraction can contribute towards finding potentially effective strategies, rules or principles for practice (Shulman, 1987). By constructing their own practical knowledge, beginning teachers learn not only how to use their knowledge to guide their actions and decisions (Bronkhorst, Meijer, Koster & Vermunt, 2011), but also how to adjust their knowledge according to actual teaching situations (Hammerness, Darling-Hammond & Bransford, 2005). Therefore, it is important to understand the knowledge that guides teachers’ actions (Schön, 1983) and how such knowledge relates to research-generated knowledge (e.g. Kansanen et al., 2000; Meijer, 2010). Moreover, specific methods are required to support beginning teachers in constructing their own practical knowledge.

Reflection assignments are often employed in initial teacher education to support beginning teachers’ to learn from their own practice and link such knowledge to research-generated knowledge (Korthagen, 2001, 2004; Korthagen & Vasalos, 2005; Korthagen & Wubbels, 1991, 2000; Laboskey, 2010). In general, reflection is defined as a cognitive process carried out individually or with the help of others to extract knowledge from experiences (Benammar, 2004; Dewey, 1933; Hébert, 2015; Korthagen, 2001, 2004; Mezirow, 1991; Schön, 1983) and consequently support profound learning (Moon, 2004). Although reflection is a focal method to support teachers’ learning and development, by itself reflection does not ensure the construction of new knowledge and or understanding (Shulman & Shulman, 2004). Teachers, especially beginning teachers, need help to construct knowledge in reflection process (Beijaard, Meijer, Morine-Dershimer & Tillema, 2005; Hammerness et al., 2005; Shulman & Shulman, 2004). Moreover, Schön (1983) found that teachers engage in two types of reflection – reflection-in-action and reflection-on-action – in which experience and reflection are related differently. Reflection-in-action refers to a reflection that takes place while teaching when “doing and thinking are complementary” (p. 280), whereas in reflection-on-action the reflection follows the teaching experience. In particular, support is needed to enhance reflections that take place during teaching (reflection-in-action) and that enables to
use the knowing-in-action flexibly to address the different situations encountered in everyday teaching (Schön, 1983). Several authors have emphasised that reflection should take place in interaction with others (e.g. Benammar, 2004; Dewey, 1933; Leijen, Valtna, Leijen & Pedaste, 2012; Procee, 2006). Interaction enables individuals to share their own experiences and learn from those of others, which helps beginning teachers (re)interpret and develop their own perspectives further. Moreover, in this paper the supportive role in the reflection process of supervisors and peers is emphasised (e.g. Danielowich, 2014; Lamb & Lane, 2012; Leijen et al., 2012; Meijer, Zanting & Verloop, 2002; van Ginkel, Oolbekkink, Meijer, & Verloop, 2015; Nielsen, 2015; Zanting, Verloop & Vermunt, 2001).

The role of peers in reflection is generally associated with a supportive environment and critical feedback (Danielowich, 2014; Fund, 2010; Lamb & Lane, 2012). The sense of equality that results from reflecting with someone at the same stage and of the status, provides a safe and comfortable setting to share ideas, discuss alternative viewpoints and collaborate on the construction of new ideas about one’s own teaching (Danielowich, 2014; Lamb & Lane, 2012). Research has suggested that peer feedback can raise the overall quality of students’ reflection (Fund, 2010; Leijen et al., 2012). A student’s supervisor however is generally expected to be the most important source of information (Meijer et al., 2002). As with peers, supervisors are seen to provide emotional support and encouragement, but beginning teachers are often particularly interested to learn tips and rules-of-thumb from their supervisors, and get their advice, suggestions and evaluation. In addition, supervisors are expected to stimulate beginning teachers’ learning and make their as experienced teachers’ tacit knowledge explicit by sharing what underlies teachers’ observable actions (Meijer et al., 2002; Zanting et al., 2001). In either case, including another person in the reflection process can contribute to the conscious construction of knowledge of all involved.

It has also been found that certain methods are potentially more effective for constructing teacher’s practical knowledge. The use of guiding questions (Korthagen & Vasalos, 2005; Sööt & Leijen, 2012; Wetzel, De Arment, & Reed, 2015; see Kori, Pedaste, Leijen, Mäeots, 2014) and stimulated recall interviews (Meijer et al., 2002) have been shown to improve reflection from being a mere description of practice to being a more critical evaluation and re-framing of one’s understandings. Similarly, guided reflection procedures, in which a stimulated recall interview and guiding questions are divided into different stages over a longer period of time, has shown to support beginning teachers in developing a profound and diverse understanding of their own thoughts and actions (Husu, Toom &

Patrikainen, 2008; Toom, Husu & Patrikainen, 2015). Consequently there are many ways to support reflection as a means of learning during initial teacher education, but they have until now not been intentionally implemented to support teachers’ practical knowledge construction. Therefore a guided reflection procedure – including several support methods – was developed based on previous research to enhance the construction of beginning teachers’ practical knowledge (Leijen et al., 2014) and to study any relationships between the implemented support methods and the types of practical knowledge communicated in the reflections.

The aim of the study was to examine how the developed guided reflection procedure (see Leijen et al., 2014) supports student teachers in constructing practical knowledge. More specifically, we addressed the following research questions: (1) How did the type of reflections (oral reflection and written reflection) differ in terms of the practical knowledge student teachers communicated? – but does this type of aim already assume that there should be differences?; (2) How did the three oral reflection conditions (reflecting alone, reflecting with a peer or reflecting with a school supervisor) differ in terms of the practical knowledge student teachers communicated in their oral and written reflections?

**Methods**

**Context: Estonian teacher education**

In Estonia teacher education is regulated at national level, with the requirements for teacher education established in the “Framework requirements for teacher education” (2013). According to national requirements, teachers are educated at a higher education level at university. All teacher education curricula include general education and psychology studies, subject and methodology studies, and teaching practice (for more information see Jakku-Sihvonen, Tissari, Ots, & Uusiautti, 2012; Niikko & Ugaste, 2012). Class teachers follow a five-year bachelor’s and master’s level integrated curriculum (300 European credit point, from here on ECTS) and kindergarten teachers follow a three-year bachelor’s level curriculum (240 ECTS). In class teachers’ and kindergarten teachers’ education subject and methodology studies have been simultaneously accompanied by general education and psychology studies, and teaching practice has been carried out throughout the studies. Subject teachers however are educated in a 3+2 system, i.e. bachelor’s studies in one subject area are followed by a two-year teacher education programme at master’s level. Their education has

been more theory-driven with an emphasis on subject and methodology studies, but less time dedicated to general pedagogical studies.

**Participants**

The sample was selected based on the sampling principles criterion of Patton (1990). Student teachers who were carrying out their teaching practice during the period of the current study (Spring, 2013) were selected from one institute at an Estonian university. In total, 21 student teachers participated in the study (all female; aged 21-49 years; average age 25). The demography of the participants represented well the student teachers’ population in Estonia. The participants were following three different teacher education curricula: eight student teachers followed the subject teacher in basic education curriculum; six students followed the class teacher curriculum; seven students followed the kindergarten teacher curriculum. For student teachers following the class teacher or subject teacher curriculum, the guided reflection procedure was a compulsory practice assignment. For student teachers following the kindergarten teacher curriculum, the guided reflection procedure was introduced as a voluntary practice assignment alongside with all the compulsory ones.

During the study all participants carried out their regular teaching practicum, but they differed in terms of their previous teaching experience. Student teachers following the subject teacher curriculum carried out their first teaching assignments during their first short-term teaching practice. Student teachers following the two other curricula had more teaching experience; they were carrying out their final teaching practice (kindergarten teacher curriculum students) or one of their main teaching practices with an age group (class teacher curriculum students). All the student teachers were asked to sign an informed consent to confirm that they allow using their practice assignment materials for research purposes. To ensure participants’ confidentiality in the study, each student teacher was given a code (S1 to S21).

**Data collection**

Data was collected during spring 2013 using the guided reflection procedure (Leijen et al., 2014; adapted from Husu et al., 2008; Toom, Husu, & Patrikainen, 2015) developed during an international European Union project. The guided reflection procedure used in the study is shown in Figure 1.
During the first phase, researcher filmed one lesson of each student teacher. Student teachers had complete liberty to choose which lesson they wanted to be videoed. Researcher however guided student teachers to keep in mind their personal aims for the teaching practice and the specific area of pedagogical skills they especially wanted to develop. In addition, researcher told to all participant that the lesson was not meant as a showcase, but rather as a source for their learning. Based on this guidance, each student chose a lesson taught by themself alone to be filmed. Before filming, researcher collected informed consents from the school and kindergarten directors and from all the parents of the children involved in the lesson in order to guarantee that the study was carried out ethically. At the end of this phase, the researcher gave each participant a video recording of their lesson.

During the second phase, the researcher guided student teachers to selected meaningful events that had occurred during the filmed lesson for reflection. The term meaningful event is used in this study to refer to an everyday situation that is chosen by the student teacher. The significance and meaning of this event derives from the analytical interpretation that could affect the student teacher’s thinking and actions (e.g. Angelides, 2001; Griffin, 2003; Toom, 2006; Tripp, 1993). Two days after filming, the researcher asked student teachers to view the recorded lesson and select two meaningful events for further reflection. One event had to be positive and empowering; student teachers had to find an aspect or event from the lesson that they were very satisfied with. The second event had to be...
“a challenge”; the student teachers were asked to identify an aspect of the lesson that they wished to address. Researcher collected the timecodes of every participants’ meaningful events and cut out the videoclips.

During the third phase, researcher asked the student teachers to orally reflect on their meaningful events one week after they had selected them. The student teachers carried out the oral reflections alone (n=8), with a peer (n=6) or with a supervisor (n=7) based on each student’s preference. All the oral reflections were audio recorded by the participants, even the oral reflections that student teachers carried out by themselves. Researcher asked participants to discuss the chose meaningful events during their oral reflection following the guiding questions (see Appendix 1). Researcher provided the questions for oral reflection phase, to encourage the student teachers to think about the chosen events from different perspectives. Researcher guided the student teachers to reflect on their own as well as their pupil’s activities. Additionally, researcher aimed to encourage the student teachers to reflect on the reasoning behind their actions. Researcher also asked student teachers to think about the causal relationships between their own and the pupils’ behaviour. Moreover, researcher guided the student teachers to relate these causal relationships to their theoretical knowledge. Finally, the researcher asked student teachers to formulate what they had learnt from the events to support their own knowledge construction. Researcher collected all participants’ audio recordings of their oral reflections via e-mail.

During the fourth phase, researcher asked the student teachers to carry out written reflections. This final phase took place one to two weeks after the oral reflection. During this phase researcher asked the student teachers to reflect on the meaningful events in an individual writing assignment following a second set of guiding questions (see Appendix 2). The written reflection phase focused on integrating the knowledge extracted from the meaningful events to their existing knowledge systems. Whilst researcher guided the student teachers to link each meaningful event with their theoretical knowledge, researcher also asked them to think about how the new knowledge gained via the reflection process related to their personal principles and aims. Researcher collected all participants’ written reflections via e-mail.

Data analysis

Data were collected during the oral and written reflection stages. The oral reflections were audio recorded and transcribed verbatim following the methodology of Oliver, Serovich

and Mason (2005). Mayring’s (2000) deductive qualitative content analysis procedure was employed for analysing the transcripts and written reflections, following a pre-defined coding scheme (based on Fenstermacher, 1994; Mena, Garcia, Clarke & Barkatsas, 2012; Toom, 2012) containing six categories: recall; appraisal; rule or practical principle; artefact; practical reasoning; theoretical reasoning. The coding scheme is shown in Table 1.

Table 1. Types of practical knowledge (based on Fenstermacher, 1994; Mena et al., 2015; Toom, 2012)

<table>
<thead>
<tr>
<th>Type of practical knowledge</th>
<th>Definition</th>
<th>Example from this study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recall</td>
<td>Direct reproduction of what has been experienced, i.e. images from the lesson as recalled from memory.</td>
<td>“I am explaining the tasks from the worksheet and I am showing where to find the necessary information” (S16)</td>
</tr>
<tr>
<td>Appraisal</td>
<td>Constitute evaluations or value judgments of the action being recalled.</td>
<td>“In general, everything is running smoothly” (S10)</td>
</tr>
<tr>
<td>Rule or practical principle</td>
<td>Methodological strategies student teachers extract from their experiences.</td>
<td>“Children learn through play and active involvement” (S20)</td>
</tr>
<tr>
<td>Artefact</td>
<td>Instruments and physical support teachers envisage from what they experienced.</td>
<td>“Next time, I would use shorter sentences” (S13)</td>
</tr>
<tr>
<td>Practical reasoning</td>
<td>Teachers’ practical arguments for their claims based on their experiences.</td>
<td>“Because I have participated in many group studies, then I know how important the instructions are for a successful group study” (S3)</td>
</tr>
<tr>
<td>Theoretical reasoning</td>
<td>Teachers’ theory-related arguments for their claims based on their experiences.</td>
<td>“Because I ask questions on different levels, then pupils were able to be quite active while answering the questions” (S1)</td>
</tr>
</tbody>
</table>

*Note: S = Student teacher*

In the current study, a unit of thought was defined as the smallest unit which carried an independent meaning (Berg, 2001). First, the units of thought in the written reflections were decided upon by the first and the second author of the current paper following the Eisner’s (2011) consensual validity method. All units of thought from the written reflections were discussed and coded by appointing one type of practical knowledge after these two authors had agreed upon a specific type of practical knowledge. To each unit only one type of
practical knowledge was appointed. To check for consistency, all the coded units were re-examined by the first author and if necessary discussed again with the second author to reach an agreement regarding the type of practical knowledge each unit represented. A total of 436 units were coded from the written reflections. The transcripts of oral reflections were then analysed in the same manner by the first author. A total of 621 units were coded from the oral reflections. All 1057 coded units were then re-examined by the first author to check for consistency within the types of practical knowledge. To assess the reliability of the coding, 107 units of thought (approximately 10%) from the written and oral reflections data in total were randomly selected and analysed by the second author following the coding scheme (see Table 1). The agreement between the coding decisions of the first and second researchers was 0.84 (Cohen’s kappa), indicating a high agreement between the researchers (Viera & Garrett, 2005).

Following the coding procedures, Pearson’s chi-square tests were used to ascertain whether there were differences between the types of practical knowledge student teachers communicated 1) in their oral and written reflections; 2) in the three different oral reflection groups. A Pearson’s chi-square test was used because the types of practical knowledge are not hierarchical. The types merely represent the different kinds of knowledge teachers need to understand, interpret and learn from their practical experiences.

Results

The types of created practical knowledge in student teachers’ oral and written reflections

Chi-square analysis showed that oral and written reflections were significantly different in terms of the practical knowledge types student teachers communicated as part of these reflection processes ($\chi^2=93.9$, $p<0.01$, df=5). The chi-square statistic exceeded the critical value for degrees of freedom ($\chi^2=16.8$) (Howell, 2006) and none of the expected frequencies was less than five.

Every type of practical knowledge presented in the oral and written reflections were significantly different (see Table 2). In their oral reflections, student teachers communicated more recalls (SR=3.4), appraisals (SR=3.5) and practical reasoning (SR=3.4) than in their written reflections. More precisely, the presentation of recalls such as “pupils are working along” (S10) or “I am standing and listening to pupils who present the result of their groups’ study” (S3), and practical reasoning such as “pupils stopped their work, because I asked them to stop” (S1) or “I go along with this happily, because the kids are so joyfully doing it” (S14),

were greater by half in the oral compared to written reflections. Similarly, student teachers communicated nearly twice as many appraisals such as “I felt good giving this lesson” (S5) and “It really disturbed me that one child’s name sounded all the time” (S15) in their oral reflections.

Table 2. Types of practical knowledge student teachers communicated in their oral and written reflections

<table>
<thead>
<tr>
<th>Types of practical knowledge</th>
<th>Rule or practical principle</th>
<th>Artefact</th>
<th>Practical reasoning</th>
<th>Theoretical reasoning</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>WR Frequency (%)</td>
<td>59 (14)</td>
<td>39 (9)</td>
<td>143 (33)</td>
<td>54 (12)</td>
<td>102 (23)</td>
</tr>
<tr>
<td>SR</td>
<td>-3.4</td>
<td>-3.5</td>
<td>5.1</td>
<td>4.1</td>
<td>-4.3</td>
</tr>
<tr>
<td>OR Frequency (%)</td>
<td>135 (22)</td>
<td>101 (16)</td>
<td>118 (19)</td>
<td>33 (5)</td>
<td>222 (36)</td>
</tr>
<tr>
<td>SR</td>
<td>3.4</td>
<td>3.5</td>
<td>-5.1</td>
<td>-4.1</td>
<td>4.3</td>
</tr>
<tr>
<td>Total Frequency (%)</td>
<td>194 (18)</td>
<td>140 (13)</td>
<td>261 (25)</td>
<td>87 (8)</td>
<td>324 (31)</td>
</tr>
</tbody>
</table>

*Key:* WR = written reflection  
OR = oral reflection  
SR = standardized residual

In their written reflections, student teachers communicated a higher number of examples of rules or practical principles (SR=5.1), artefacts (SR=4.1) and theoretical reasoning (SR=5.2). Specifically, student teachers reported theoretical reasoning such as “By doing this, I hope to get an answer to my question and if a pupil does not know how to go forward, then by helping him/her a bit he/she can continue, which means he/she stays in the zone of proximal development necessary for learning” (S14) over four times more frequently, and artefacts such as “another solution is to set the test sheets as a flabellum so that I can see the names and then I can give the test to a pupil next to whom I am standing” (S14) more than twice as frequently in their written than oral reflections. Additionally, the presentation of rules or practical principles such as “in the future I will know that there is always something that you are not prepared for” (S14) and “a teacher must act in the best interest of pupils” (S5) were greater by half in written compared to oral reflections. The results showed that the oral reflection assignment resulted in more descriptions of practice, value judgments and practical reasoning, and the written assignment questions seemed to trigger practical knowledge such as rules and artefacts and seemed to facilitate theoretical reasoning in relation to their practical experiences.
The types of practical knowledge created under different oral reflection conditions

Chi-square analysis was used to ascertain how the types of practical knowledge presented differed between the oral reflection conditions (alone, with a peer or with a supervisor). Moreover, the practical knowledge that the student teachers communicated in their reflections in general and specifically in their oral and written reflections was studied. First, the types of practical knowledge student teachers communicated in their oral and written reflections in general was compared with the type of oral reflection conditions. The results showed that the types of practical knowledge student teachers created in their oral and written reflections were significantly differently based on the oral reflection conditions ($\chi^2=21.0$, $p<0.05$, $df=10$). The chi-square statistic exceeded the critical value of the degrees of freedom ($\chi^2=18.3$) (Howell, 2006) and none of the expected frequencies was less than five.

A significant difference of the self reflection condition was related to the communication of appraisals (SR=2.1) and rules or practical principles (SR=3.1) (see Table 3); more precisely, student teachers who carried out the oral reflection alone in general presented more appraisals such as “this was really nice part of the lesson” (S4) and “kids are having fun” (S20) and less rules or practical principles such as “it is important that students feel free to say to teacher what they really think” (S7) and “I will try to find a trick for each student that will help to discipline or motivate him/her” (S19) in their oral and written reflections than student teachers who underwent other oral reflection conditions (with peer or with supervisor).

Table 3. Types of practical knowledge student teachers who underwent different oral reflection conditions communicated in their oral and written reflections

<table>
<thead>
<tr>
<th>Type of practical knowledge</th>
<th>Total</th>
<th>Frequency (%)</th>
<th>Recall</th>
<th>Appraisal</th>
<th>Rule or practical principle</th>
<th>Artefact</th>
<th>Practical reasoning</th>
<th>Theoretical reasoning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self reflection</td>
<td>465</td>
<td>(100)</td>
<td>194 (18)</td>
<td>140 (13)</td>
<td>261 (25)</td>
<td>87 (8)</td>
<td>324 (31)</td>
<td>51 (5)</td>
</tr>
<tr>
<td>Frequency (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SR</td>
<td></td>
<td></td>
<td>-0.5</td>
<td>2.1</td>
<td>-3.1</td>
<td>0.6</td>
<td>0.6</td>
<td>1.9</td>
</tr>
<tr>
<td>Peer reflection</td>
<td>321</td>
<td>(100)</td>
<td>56 (17)</td>
<td>44 (14)</td>
<td>95 (30)</td>
<td>22 (7)</td>
<td>94 (29)</td>
<td>10 (3)</td>
</tr>
<tr>
<td>Frequency (%)</td>
<td></td>
<td></td>
<td>-0.5</td>
<td>0.3</td>
<td>2.4</td>
<td>-1.1</td>
<td>-0.6</td>
<td>-1.7</td>
</tr>
<tr>
<td>SR</td>
<td></td>
<td></td>
<td>-0.5</td>
<td>0.3</td>
<td>2.4</td>
<td>-1.1</td>
<td>-0.6</td>
<td>-1.7</td>
</tr>
<tr>
<td>Supervisor reflection</td>
<td>271</td>
<td>(100)</td>
<td>56 (21)</td>
<td>23 (8)</td>
<td>73 (27)</td>
<td>24 (9)</td>
<td>83 (31)</td>
<td>12 (4)</td>
</tr>
<tr>
<td>Frequency (%)</td>
<td></td>
<td></td>
<td>1.1</td>
<td>-2.7</td>
<td>1.0</td>
<td>0.4</td>
<td>0.0</td>
<td>-0.4</td>
</tr>
<tr>
<td>SR</td>
<td></td>
<td></td>
<td>1.1</td>
<td>-2.7</td>
<td>1.0</td>
<td>0.4</td>
<td>0.0</td>
<td>-0.4</td>
</tr>
<tr>
<td>Total</td>
<td>1057</td>
<td>(100)</td>
<td>194 (18)</td>
<td>140 (13)</td>
<td>261 (25)</td>
<td>87 (8)</td>
<td>324 (31)</td>
<td>51 (5)</td>
</tr>
</tbody>
</table>

Key: SR = standardized residual

For the peer reflection condition there was a statistically significant difference for expressing rules and practical principles (SR=2.4); student teachers who carried out the oral reflection with a peer in general created in their oral and written reflections more rules or practical principles such as “you always have to prepare for the lessons thoroughly” (S6) and “it is important to attract kids attention when the interest seems to disappear” (S17) than student teachers who reflected alone or with a supervisor. A statistically significant difference was also found for the supervisor condition (SR=-2.7); specifically, those student teachers who carried out the oral reflection with a supervisor presented less appraisals such as “kids are quite restless” (S18) and “it was very disturbing” (S11) in their reflections than student teachers who reflected alone or with a peer. Altogether, these results showed that in general student teachers who carried out the oral reflection alone were more evaluative and descriptive in their reflections than the student teachers who carried out the oral reflection with a peer or a supervisor. The results indicate that when carrying out the oral reflection alone, it is somewhat more difficult to communicate in oral and written reflection knowledge that is generalizable to different situations.

Second, differences between the types of practical knowledge student teachers presented in their oral reflections was studied more specifically across the different types of reflection conditions. The differences in the types of practical knowledge student teachers presented in their oral reflections in relation to the type of oral reflection condition was compared. Chi-square test results showed that the types of practical knowledge student teachers communicated in their oral reflection were not significantly differently according to the type of oral reflection condition (p>0.05). This indicates that the oral reflection condition does not provide instant support to student teachers in their construction of practical knowledge, rather the role of support becomes evident in the later phase.

Finally, the differences between the types of practical knowledge student teachers presented in their written reflections was compared with the type of oral reflection conditions. Chi-square test results showed that the three groups (self reflection, peer reflection and supervisor reflection) were significantly differently with reference to the practical knowledge types created during the written reflections ($\chi^2=28.8$, $p<0.01$, $df=10$). The chi-square statistic exceeded the critical value of the degrees of freedom ($\chi^2=25.2$) (Howell, 2006) and none of the expected frequencies was less than five.

For the self reflection condition, statistically significant differences were found in expressing appraisals (SR=4.3) and rules or practical principles (SR=-2.4) in their written

reflections (see Table 4); the results revealed that student teachers who carried out the oral reflection alone presented more appraisals in their written reflections (SR=4.3) such as “*I think that it is positive*” (S7) and “*they like the idea of the game*” (S10) than student teachers who underwent peer (SR=-2.3) or supervisor (SR=-2.7) reflection conditions.

Table 4. Types of practical knowledge student teachers who underwent different oral reflection conditions communicated in their written reflections

<table>
<thead>
<tr>
<th>Type of practical knowledge</th>
<th>Frequency (%)</th>
<th>Rule or practical principle</th>
<th>Artefact</th>
<th>Practical reasoning</th>
<th>Theoretical reasoning</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self reflection</td>
<td>Frequency (%)</td>
<td>26 (12)</td>
<td>33 (15)</td>
<td>62 (28)</td>
<td>24 (11)</td>
<td>56 (25)</td>
</tr>
<tr>
<td>SR</td>
<td>-1.2</td>
<td>4.3</td>
<td>-2.4</td>
<td>-1.1</td>
<td>0.8</td>
<td>1.3</td>
</tr>
<tr>
<td>Peer reflection</td>
<td>Frequency (%)</td>
<td>17 (15)</td>
<td>4 (4)</td>
<td>42 (38)</td>
<td>13 (12)</td>
<td>29 (26)</td>
</tr>
<tr>
<td>SR</td>
<td>0.6</td>
<td>-2.3</td>
<td>1.2</td>
<td>-0.3</td>
<td>0.7</td>
<td>1.2</td>
</tr>
<tr>
<td>Supervisor reflection</td>
<td>Frequency (%)</td>
<td>16 (16)</td>
<td>2 (2)</td>
<td>39 (39)</td>
<td>17 (17)</td>
<td>17 (17)</td>
</tr>
<tr>
<td>SR</td>
<td>0.9</td>
<td>-2.7</td>
<td>1.6</td>
<td>1.6</td>
<td>-1.7</td>
<td>-0.3</td>
</tr>
<tr>
<td>Total</td>
<td>Frequency (%)</td>
<td>59 (14)</td>
<td>39 (9)</td>
<td>143 (33)</td>
<td>54 (12)</td>
<td>102 (23)</td>
</tr>
</tbody>
</table>

Key: SR = standardized residual

Self reflection condition student teachers communicated less rules or practical principles (SR=-2.4) such as “*definitely should begin more playfully*” (S21) and “*it is important that teacher says at the beginning that the work has to be presented to the class*” (S3) in their written reflections than student teachers who were supported in their oral reflections. The results indicate that the oral reflection condition was significantly related to the practical knowledge student teachers constructed based on their practical experiences during the written reflection phase. Moreover, peer and supervisor support in the reflection process seemed to help shift the focus of student teachers’ reflections from real world situations to conceptions about teaching in general.

**Discussion and conclusions**

The current study was derived from the shared observation of many educational researchers that initial teacher education programmes do not sufficiently prepare student teachers for their future work as teachers (e.g. Hammerness et al., 2005; Korthagen, 2001; Lieberman & Pointer Mace, 2009; Meijer, 2010). Therefore, in order to enhance the relevance and meaningfulness of initial teacher education and support more effective teacher training, a...

guided reflection procedure was developed (Leijen et al., 2014; adapted from Husu et al., 2008; Toom et al., 2015) and implemented during regular teaching practice at an Estonian university. The procedure aimed to support student teachers in constructing their own practical knowledge, an aspect that several authors (e.g. Hammerness et al., 2005; Meijer, 2010; Mena et al., 2012; Shulman, 1987) have pointed out as a key component in learning to think and act as a teacher. The first aim of the study was to examine how the developed guided reflection procedure supported student teachers in constructing their level of practical knowledge based on an analysis of their reflections.

The results indicated that the developed guided reflection procedure supported student teachers in constructing different types of practical knowledge based on their own experiences. More precisely, student teachers communicated in their oral and written reflections all six types of practical knowledge. The results are in accordance with Husu et al.’s (2008) findings that indicated that with proper guidance, student teachers are able to reflect on their experiences on different levels (e.g. related to the concrete situation in order to understand it better or on a more general level to understand the principles and reasoning behind this situation). Moreover, the results of this study suggest that the developed guided reflection procedure supports the construction of knowing-in-action (Schön, 1983) or a code of practice (Mena et al., 2011) that will form the base of student teachers’ own theory of action.

In order to find out the effect of different reflection conditions on the construction of teacher’s practical knowledge, two types of reflection stages were implemented in the developed guided reflection procedure. The oral reflection stage is aimed to encourage student teachers to find potentially effective strategies, rules or principles for practice (for more information see Shulman, 1987) and the written reflection stage to relate such practical knowledge to the educational theories taught in university programmes. The results of the current study showed that during oral reflections, context related knowledge, such as recalls, appraisals and practical reasoning, was mainly presented. These results indicate that in the proximate reflection, interpretations are relatively quick and emotional, focusing on understanding the situation and the emotions and the feelings that the teaching causes thoroughly (Husu et al., 2008). In contrast, during written reflections inferential knowledge (rules or principles and artefacts) and theoretical reasoning was more frequently communicated. The prior refers to the importance of prolonged reflection that allows developing understanding and interpretation based on the concrete situations (Husu et al.,

2008). These findings suggest that while the oral reflection stage allowed a detailed revisiting of real world incidents, the written reflection stage permitted students to reflect at a more abstract level and extract more generalized knowledge from the same incidents. These findings are in line with Husu et al.’s (2008) results indicating that with proper guidance student teachers are able to construct different knowledge via reflection process.

Three different oral reflection conditions were included in the guided reflection procedure to ascertain if there was any difference in their effectiveness to support the construction of teachers’ practical knowledge. One group carried out oral reflection activities by themselves, which is a common format for reflection in teacher education programmes; drawing on the work of Meijer et al. (2002) a second group carried out oral reflections with a supervisor; following Leijen et al. (2012) a third group carried out their oral reflections with a peer. The results of the current study showed that student teachers who carried out the oral reflection alone presented more context-related knowledge and less knowledge that could guide them in future teaching activities during both their oral and written reflections. In contrast, reflecting with somebody else helped student teachers to move their focus from the actual real world experiences to the rules and principles that underlay them. These results are in line with several previous studies highlighting the positive effect of supervisor (e.g. Meijer et al., 2002) and peer (e.g. Danielowich, 2014; Fund, 2010; Lamb & Lane, 2012; Leijen et al., 2012) input on the reflection process. More precisely, arising from the same professional position (including lack of experiences, knowledge and skills, uncertainties, fears) some aspects of learning to teach are more easier to be discussed and shared with peers. The emotional support and the absence of evaluative tendency permits to discuss about aspects of teaching that would not be brought up with supervisors (e.g. Danielowich, 2014; Lamb & Lane, 2012). On the other hand, supervisors are as a rule, expert in teaching that allows to make experienced teachers’ practical knowledge explicit to student teachers supporting the construction of their own theories of action (e.g. Meijer et al., 2002; Zanting et al., 2001). Therefore both peers and supervisors have their unique and important role in constructing teacher’s practical knowledge.

In an effort to provide more detailed information about the effect of the three oral reflection conditions on the construction of practical knowledge, a more in-depth analysis was carried out to compare the differences in knowledge types between the oral and written reflections. Although the type of oral reflection condition affected the type of support the student teachers received, no statistically significant differences were found in the types of

practical knowledge presented at the oral reflection stage; however, differences did become evident at the written reflection stage. Therefore the results of this study suggest that it may take time until collaboratively constructed knowledge attained during peer or supervisor discussions becomes internalized and can be used to create one’s own theory of action. These results indicate that reflection has to take place in interaction with others (e.g. Dewey, 1933; Moon, 2004) that enables individuals to share and learn from experiences and ideas from others’ perspective that will in turn lay the foundation for re(interpreting) and developing own perspectives further.

In conclusion, this study offers a new insight into the ways student teachers can be supported in their learning of practical knowledge. First, the results of this study present evidence that with proper guidance student teachers are able to reflect on their practical experiences and construct different types of knowledge. Second, by comparing different reflection conditions, suggestions might be made on how to best support student teachers in constructing their own theory of actions. The results indicated therefore that proximate oral reflection can be effectively used to construct an understanding of real world practical experiences, but prolonged written reflection is more effective in facilitating the construction of underlying rules and theories of practice. Similarly, the results provide grounds to expect the developed procedure to be especially helpful for student teachers to articulate generalized practical knowledge in cases where the oral reflection is carried out with a supervisor or a peer. The study emphasises the value of different types of support in reflection process in constructing teacher’s practical knowledge. To ensure teacher’s professional development reflection should take place in various conditions and in professional interaction with peers and experienced teachers already during initial teacher education. Therefore, this study offers several research-based suggestions on how to implement guided reflection procedures to better support student teachers’ learning of practical knowledge from their own teaching experiences.

**Limitations of the study**

When interpreting the results of this study, some limitations must be taken into account. This study was based on data collected from student teachers who carried out their regular teaching practice during the period of the current study (Spring, 2013). At that time, all the student teachers from the selected teacher education curricula were female. The participation of only female student teachers can be considered as a limitation of our study. However it is typical

for Estonian context, that the vast majority of student teachers are female, especially for the selected teacher education curricula. In addition, the study was conducted with a relatively small sample of student teachers from three different teacher education curricula. Further, no data was collected related to the student teachers’ initial level of reflection or the types of knowledge they had presented in their previous reflection. Finally, the student teachers were divided into oral reflection condition groups by self-selection that might make the initial equal level of different oral reflection groups disputable. Therefore, the results of this study should be interpreted with caution.

*Suggestions for future research*

Taking into account the limitation of this study, further research is required to confirm the supportive effect that the developed guided reflection procedure appear to have on student teachers’ construction of practical knowledge. Nevertheless, by exploring the types of practical knowledge student teachers communicated in different formats of reflection, our study is an important contribution to the future development of a pedagogy of reflection in teacher education. For more comprehensive understanding on how to use the developed guided reflection procedure to support the construction of teacher’s practical knowledge, further research is needed to explore the relation between the teacher education curricula and the types of practical knowledge student teachers communicate in their reflections. Similarly, further research is needed to explore how to support the construction of beginning teacher’s practical knowledge during their first years at work.

*Acknowledgements*

This study was carried out with the support of the Lifelong Learning Programme of the European Union (no. 526318-LLP-1-2012-1-EE-COMENIUS-CMP) and the Estonian Science Foundation, Grant number ETF9221.

**References**


Appendix 1. Guiding questions for the oral reflection

1. What is happening?
   1.1. What can you see/hear yourself doing?
   1.2. What can you see/hear the students doing?
   1.3. Is there a relationship between what you are doing and what the students are doing?

2. Why do you think this is happening?
   2.1. Which student behaviours are caused by your behaviour?
   2.2. Which behaviour of yours is caused by the students’ behaviour?
   2.3. What makes the incident a critical incident for you?

3. Relating the incident to theory.
   3.1. Which teacher role does the incident relate to?
   3.2. How does the literature support your causal explanation for section 2 (in the case of the empowering incident)?
   3.3. What suggestions does the literature offer for solving this problem (in the case of the challenging incident)

4. What have you learnt from this event so far? How will you make use of the things that you have learned from this event?
Appendix 2. Guiding questions for the written reflection

1. Relating the incident to theory.
   1.1. Which teacher role does the incident relate to?
   1.2. How does the literature support your causal explanation for section 2 (in the case of
        the empowering incident)?
   1.3. What suggestions does the literature offer for solving this problem (in the case of the
        challenging incident)?

2. What will be your future action?
   2.1. What will be your future action regarding this incident?
   2.2. What do you hope to achieve by this action?
   2.3. What personal principles underlie your choice of action?

3. How will you make use of the things you have learned from this event?