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Student teachers' patterns of reflection in the context of teaching practice

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This study clarifies the basic structure of student teachers' reflective thinking. It presents a constructivist account of teacher knowledge through a detailed analysis of various patterns of reflection in student teacher portfolios. We aim to gain a greater understanding of the process and outcomes of portfolio writing in the context of teaching practice. By closely analysing portfolio texts, we defined six main starting points for reflective episodes and several patterns under each of them. Also, the patterns of reflective episodes were analysed according to their deductive and inductive dimensions, together with their static and dynamic features. According to our results, it is possible that student teachers can reflect beyond solely practical issues on teaching, articulate multiple concerns about practice and elaborate them in an integrative manner as well as learn both from theory and from practice as a result of reflection for their future profession.

Keywords: student teachers; reflective practice; teaching practice; teacher education

Introduction

In teacher education, there is a clear expectation that during their studies student teachers will engage in practices that enable reflection both as a process and as an outcome. On the surface, the politics and rationale of teacher reflection have long been alluring, but their integration into studies of teacher education often exposes their limitations. The same critical issues also relate to the use of various methods and pedagogies to enhance reflection in teacher education. According to Delandshere and Arens (2003), portfolios and written tasks in teacher education tend to appear to be 'some sort of empirical data collection venture[s] to build on key words from the standards but missing the broader theoretical perspective[s] indispensable to make sense of [their] data' (72). Related to this concern, Marcos, García-Rodríguez, and Tillema (2013) concluded that still there is a lack of agreement about how to conduct empirically and theoretically supported reflection in teacher education.

No doubt, many student teachers and teacher educators express puzzlement when faced with the tasks of reflective writing and their interpretation (Spalding and Wilson 2002; Pellicone and Raison 2009). The challenge of researchers is to develop and test appropriate methodological tools that can appropriately support and guide student teachers' pedagogical reflection. We also need to develop a more

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detailed analysis of written reflection in order to better understand teachers' professional development during teacher education and beyond (e.g. Marcos, Sanchez, and Tillema 2011; Cimer 2012; Kaasila and Lauriala 2012; Mortari 2012; Swinkels, Koopman, and Beijaard 2013).

This study focuses on the structure and patterns of student teachers' reflection. It illustrates a constructivist account of teacher's practical knowledge through a detailed demonstration of patterns of reflection in portfolios and the inferences drawn from them in the context of teaching practice. It allows us to see what creates changes in teachers' knowledge and to focus on the reflective processes through which such changes take place. The aim is to gain a greater understanding of the process and outcomes of student teacher reflection by examining:

(1) What are the various patterns of reflection in student teachers' written pedagogical reflection?
(2) How does written reflection contribute to student teachers' learning and practical knowledge construction?

Teachers' reflective judgement in learning to teach

In the previous research, significant critiques of the imprecise use of the concept of teacher reflection and questions about its effectiveness have come from several directions (e.g. Eraut 1995; Reiman 1999; Evans 2002; Klenovski 2002; Marcos, Sanchez, and Tillema 2009; Watts and Lawson 2009; Belvis et al. 2013). Researchers report that teacher reflection tends to be seen as an ideal solution to the problems teachers face when it comes to reviewing their teaching. It is often assumed that teacher reflection actually *does* something or that, *being* reflective has some sort of transformative power regarding a prior 'unreflective' teacher condition. This is because the concept of reflection is often used vaguely (Parker 1997). As Lynch (2000) argues, the concept and practice of reflection is interpreted in various and even contradictory ways. According to him,

> [i]n some social theories it [reflection] is an essential human capacity, in others it is a system property, and in still others it is a critical, or self-critical, act. Reflexivity, or being reflective, is often claimed as a methodological virtue and source of superior insight … or awareness. (26)

As a response to the multifaceted nature of reflection, researchers have theorised the temporal qualities and phases (e.g. Schön 1983; Eraut 1995; van Manen 1995), focuses of functioning (e.g. Korthagen 2004) and qualities related to rigour of reflection (e.g. Dewey 1933; Rodgers 2002). They have even created multiple categorisations for the forms of reflection in order to analyse their variety from mere habitual towards the transformative qualities of reflection (e.g. Boud and Walker 1991; Kember et al. 1999; Wallace and Louden 2000; Korthagen 2001; Husu, Toom, and Patrikainen 2008). In spite of or perhaps because of these difficulties, reflective thinking is still understood as an essential skill for identifying, analysing and solving the complex problems that characterise teachers' classroom work. Dewey (1933) defined reflection as the '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 tends' (9). Thus, reflection is a complex and rigorous enterprise that takes time and effort to do well. It often begins with a state of doubt

and moves through the act of searching for some sort of evidence that will 'resolve, clarify, or otherwise address the doubt' (Spalding and Wilson 2002, 1394).

According to Dewey, two concepts – *sequence* and *consequence* – are of vital importance. This is because thought is reflective only 'if it is [somehow] logically sequenced and includes a [some kind of] consideration of the consequences of a decision [or action]' (Valli 1997, 68). These qualities of reflection come especially to the fore when reflection takes place in written format through artifactual tools like portfolios, essays or various journal tasks in comparison to social tools (Richert 1990; Loughran and Corrigan 1995). Thus, reflective thought looks back on the assumptions and beliefs, and simultaneously, it looks forward to the implications or consequences of a reported action. It is an exercise in sustaining multiple elements and emotions in teaching. Being reflective means 'expanding rather than narrowing the psychic, social and cultural fields of analysis' (Luttrell 2000, 516). Hence, reflection is mainly a question of fully recognising the often ambivalent relations within the situations being studied.

Teachers make meaning of their experiences through reflection, and the constructed meanings depend on their understandings about themselves as persons and as teachers, events they encounter and the contexts in which their experiences occur. Thus, it must be understood as involving properties of persons (attitudes, dispositions, habits of mind and character traits) and all sorts of contextual factors involved in teaching (Garrison 1999). Teachers' practical knowledge takes shape and develops in such contexts. In these situations, teachers recognise that they cannot solve their problems by formal knowledge alone and involve consideration of their own beliefs in relation to the events being analysed. This kind of reflection implies a reconstruction of experiences of how teachers explicate their actions and assumptions. Uncovering those explanations is essential to understanding teachers' pedagogical knowledge and its construction (e.g. Baxter Magolda 2004; Conle et al. 2006; Tigelaar et al. 2006, Tillema and Smith 2007, Mortari 2012).

Guiding student teacher reflection within the context of teaching practice

As presented, reflection is believed to be a genuine way of fostering change in teachers' professional actions. However, the problem is how teachers actually extract meaning from their teaching experiences. Reflecting on experience alone and in a vacuum may be difficult (Thies-Sprinthall 1984; Zeichner 1996; Reiman 1999), and it often needs to be guided in order to fulfil its learning potential (Boud, Keogh, and Walker 1985; Dewey 1933). By guidance in this study, we mean the complementary phases of teacher reflection to challenge and support student teachers in an effective way in order to learn through their teaching experiences. We emphasise the guidance of student teachers' reflection according to their learning needs as they engage in their new teaching roles.

Acting in this way requires the help of a particular method: careful consideration of teaching practice by means of structured reflective tasks, which are intended to lead to better understanding of teaching and its underlying issues (Johns 1996; Fish and Coles 1998; Bakker et al. 2011). Student teachers can be helped to be more competent by assisting them in understanding their work and its contradictions: the gap between what they hope to achieve and their actual practice. It is hoped that this procedure of guided reflection acts as a catalyst for student teachers to challenge

their 'habitual practice' and 'implicit norms', and to consider what they have learnt through their reflective portfolio tasks (Lieberman 1989; Orland-Barak and Yinon 2007).

Theoretical support for portfolios as well as for other written tasks as reflective tools is strong (Wolf, Lichtenstein, and Stevenson 1997). Portfolios provide a structure for teachers to document their teaching and articulate their professional knowledge of how and why they teach the way they do (Zeichner and Liston 1987; Loughran and Corrigan 1995; Borko et al. 1997). Portfolios provide evidence for critical examination of teaching and learning experiences and they can make teachers' pedagogical knowledge more public and visible (Shulman 1998). They can contribute to teachers' professional development by making explicit tacit knowledge (Toom 2006, 2012), and consequently, increase teachers' professional autonomy. As Shulman (1998, 24) states, 'what is declared worth documenting, worth reflecting on … is even a theoretical act'. Therefore, the theory of teaching gives meaning to portfolio entries.

Methods

Data collection and participants

The study presented here is a part of our wider research project, where we have developed a model 'the procedure of guided reflection' to guide student teacher reflection during their teaching practice (Husu, Patrikainen, and Toom 2007; Husu, Toom, and Patrikainen 2008). The procedure is based on the theoretical ideas of reflection, especially on the Deweyean perspective (Rodgers 2002), including personal intentions, interaction and time as its central elements. The procedure consists of video-recorded lessons, stimulated recall interviews, reflective discussions and portfolio writing (see Figure 1).

The data were collected from eight student teachers during their final teaching practice period. All the student teachers (six females, two males) participating voluntarily in this research are typical teacher education students at the end of their studies: their mean age is 25 years, major subject is education, they are finishing their primary teacher studies and they have some working experience as substitute teachers. The distribution of men (25%) and women (75%) represented the whole primary school teacher student population at the teacher education institute sufficiently; men were slightly overrepresented in the relatively small sample. During the five-week teaching practice (8 ECTS), student teachers are responsible for almost all the teaching in their classes, approximately 20 h per week. The general aims of this final practicum as part of the academic Master-level teacher education (300 ECTS) at a large research intensive university in Finland are to achieve competencies in the teaching profession: to acquire an overall impression of a teacher's daily work; to plan, organise and evaluate the whole instructional process, and to analyse this process and the teacher's thinking and action from a theoretical perspective. Classroom teachers and university lecturers supervise the practice period and give feedback to student teachers.

We collected the data by using the procedure of guided reflection (Figure 1). After being video-recorded in an optional lesson and having a stimulated recall interview, student teachers selected a critical incident exemplifying their own intentions for further examination during reflective discussion and in portfolio. At the reflective discussion, student teachers considered the incident from different perspectives and
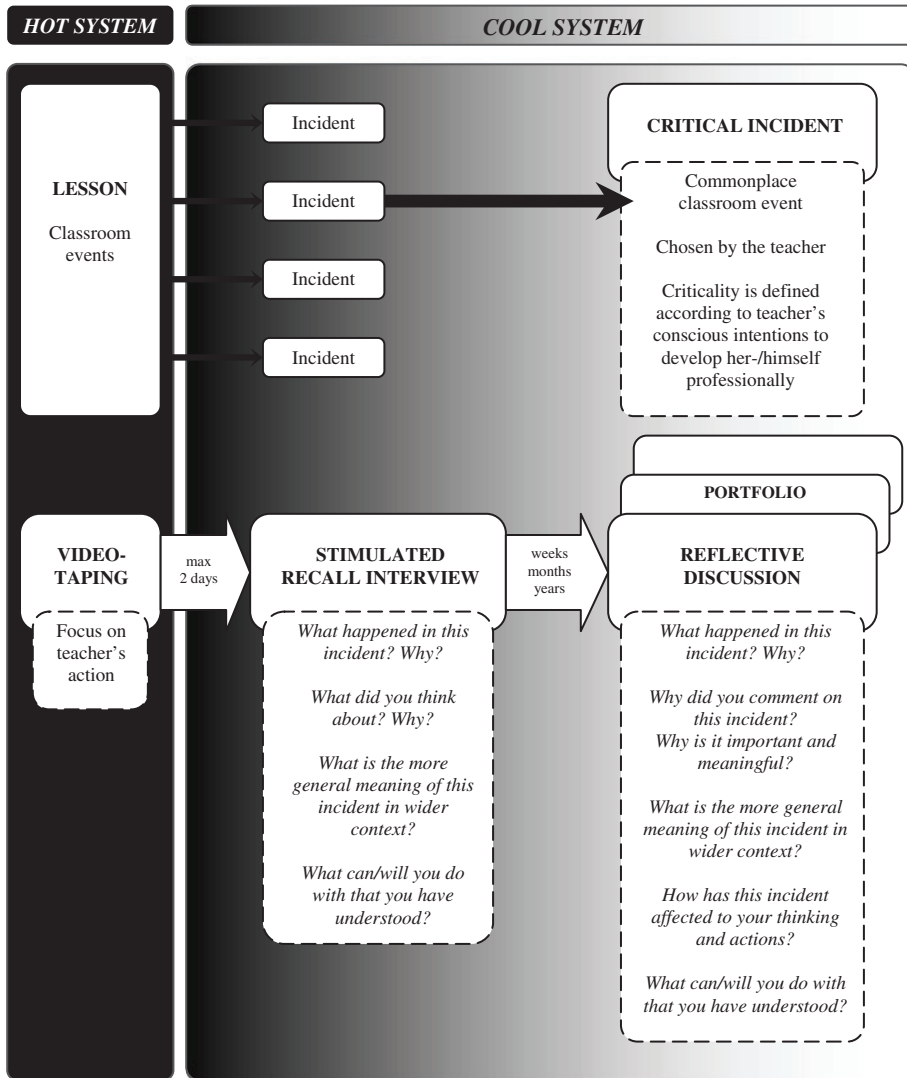
Figure 1.   The procedure of guided reflection (Husu, Patrikainen, and Toom 2007; Husu, Toom, and Patrikainen 2008).

in a wider context with the help of the researcher. After this, the students wrote a reflective portfolio in which they reflected on their teaching experiences. They were advised to consider their aims and goals of the practicum teaching, and how they achieved them in the light of theoretical ideas. They were especially asked to reflect on the critical incident from the video-recorded lesson in wider context (Tripp 1993; Francis 1997). This portfolio texts form the data analysed and reported in this article.

Data analysis
The data analysis is premised both on a theory-based coding scheme concerning the forms of reflection and on data-based classification. The theoretical coding scheme

is based on the works of Boud and Walker (1991), Wallace and Louden (2000), Korthagen (2001), and Kember et al. (1999). In our data analysis, we defined six forms of reflection: (1) introspection, (2) association, (3) integration, (4) validation, (5) appropriation and (6) transformation (Husu, Toom, and Patrikainen 2008).

In the analysis, the portfolio texts were taken for their capacity to reveal student teachers' pedagogical knowledge and 'to *represent* their thinking' (Freeman 1996, 734). What teachers know could be seen in the language they use in their portfolios. According to these ideas and the interactive positioning of reflective statements meaning that the words used in any utterance are part of larger contexts (Husu 2005) and in an ongoing dialogue with the other parts of the text, we considered all the text in portfolios to be some sort of reflection.

After we had read the portfolios carefully, we divided the portfolio text into *reflective meaning units* and identified these units with one of the six *forms of reflection* (see Figure 2). The end of the unit was defined by a change in the form of reflection. The transitions between the forms were not clear-cut in nature; rather, the categories employed were elusive and included connections to previous reflections. By taking this notion into consideration, the identification was made according to the major form of the reflection in each unit. Reflective meaning units ranged in length from short sentences to longer pieces of nearly 200 words. Altogether there were 296 reflective units determined.

In order to examine the internal course of the reflection in the second step of the analysis, we divided the portfolio texts again according to the content of reflection, and then identified the *reflective patterns* (see Figure 2). Each reflective pattern followed the course of the portfolio and the reflective meaning units identified during the first phase of the analysis. The length of the pattern was determined according to the content of the reflection: In one pattern, the reflection focused on the particular content, for example, on the personal aims of the teaching practicum or on the relationship between teachers and pupils. Altogether, the portfolio texts contained 70 reflective patterns. On average, one reflective pattern consisted of four reflective units and included several forms of reflection.

Thirdly, the reflective patterns were collected and classified into six categories according to their starting points (see Table 1). The reason for categorising the reflective patterns according to their starting point was that it was then possible to analyse their course and quality on a more general level. After this classification, the reflective patterns were further classified into subcategories according to the student teachers' ways of knowing what was possible to perceive in them. These different
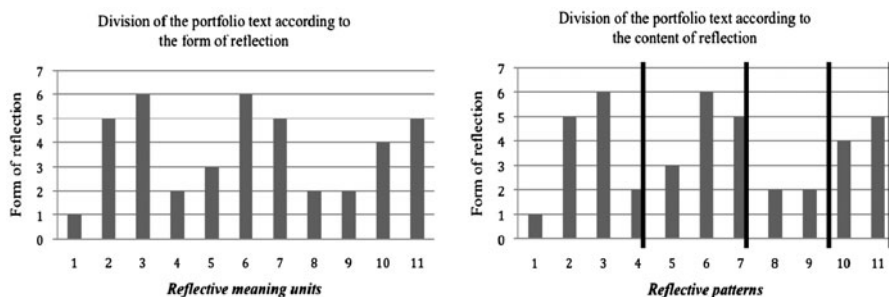

Figure 2.   The phases of data analysis illustrated with a data example (Student 4).

Table 1. Classification of the reflective episodes according to their starting point and their internal structure.

Description of the reflective episodes	Number of episodes out of total 70
1. Introspection	32
→ 1.1 Association → appropriation → transformation	12
1.2 Validation → appropriation →transformation	8
1.3 Validation	5
1.4 Association	5
1.5 Association →integration	2
2. Association	11
→ 2.1 Validation → appropriation → transformation	7
2.2 Introspection	4
3. Integration	7
→ 3.1 Introspection → transformation	4
3.2 Introspection → appropriation	3
4. Validation	6
→ 4.1 Introspection	3
4.2 Introspection → association → integration → transformation	3
5. Appropriation	10
→ 5.1 Transformation	5
5.2 Introspection → association	3
5.3 Validation	2
6. Transformation	4
→ 6.1 Association	2
6.2 Appropriation	2

types of knowing consisted of the same forms of reflection, although their particular order within a reflection pattern might vary.

In this detailed analysis, we discovered that the reflective patterns had general characteristics regardless of their starting points or contents: the basis for the reflection seemed to be inductive (i.e. characterised by reasoning from particular facts to general principles) or deductive (i.e. characterised by reasoning from general principles to particulars) by nature. Related to that, the implications or consequences of a reported reflective description could be interpreted as static or dynamic. The reflective patterns were declaratory or progressing by nature. Finally, the reflective patterns were interpreted according to these two related dimensions (see Figure 3).

To assure the validity and reliability of this research, the two researchers did all the analyses. During the analysis, they constantly compared each other's tentative impressions and after discussions they reached to a common interpretation of the reflective statements. During the analysis, the notion about the elusive transition between the forms of reflection and their connections to surrounding units became evident and this had an effect on the interpretations. Especially in the beginning of the analysis, the researchers were in disagreement over interpretations and conceptual labelling. After the discussions and mutual agreements on interpretations and labelling, the consensus was reached and the content analysis was done systematically throughout the data. In the final analysis phase, the third researcher conducted the analyses independently and both analysed the content of reflection and identified

Table 2.   An example of 'Elaboration of practice'.

Original portfolio text	Reflective unit *identified with the form of reflection (1–6)*	Reflective pattern *defined according to the content of reflection*
When I heard that I would carry out my final practice period in a sixth grade class, I felt distressed: I had to study a lot of things and master broad contents in teaching	(1) Introspection	Elaboration of practice
I also wondered how I would be able to manage the class if the pupils were already thinking about their next school year in upper grades of comprehensive school	(1) Introspection	
I wondered how the pupils would accept us as student teachers, because they have their last year with their usual teacher. Soon, the next autumn, they will face big changes. How would they feel about strange adults in their classroom?	(1) Introspection	
When I met the teacher and my student teacher colleague for the first time, I heard that the class was extremely nice and peaceful. The class had had student teachers before and the pupils had already asked whether some student teachers would still be coming to their class. This information calmed me down and I was able to wait for the practice period without nervousness	(1) Introspection	
On Monday I went to the school in a state of some excitement. Everything was new and strange. The school was unfamiliar to me, and so were the teacher, the class, and even my student teacher colleague. We had met only once before	(1) Introspection	
I had carried out the previous practice periods in a familiar school with my friend. The school and its surroundings were also familiar because of my previous studies there. Now everything was new. (Student 8, 1–6)	(2) Association	

the reflective patterns. Consensus between the researchers of these both perspectives was reached for the whole data. The analyses done first by two researchers and then by the third, followed the idea of investigator triangulation in order to assure the quality and reliability of the analysis procedures (Denzin 1970, 2010).

Table 3.   An example of 'Elaboration of prior knowledge'.

Original portfolio text	Reflective unit *identified with the form of reflection (1–6)*	Reflective pattern *defined according to the content of reflection*
My aim was to break out of the plans made beforehand and to be able to change my own action according to the situation	(5) Appropriation	*Elaboration of prior knowledge*
Especially at the beginning of the teaching practice I felt I was sticking too much to the lesson plans. Of course it was influenced by the fact that I had to follow a certain timetable with my pair so that we did not have to change our future plans	(1) Introspection	
Limited time for teaching practice in general compelled us to adhere to the lesson plan. This was because we had to go through certain contents before the exams during the last week	(1) introspection	
At the end of the teaching practice I was able to break away from the timetables better than earlier. During several lessons the time ran out and I decided to continue with the same topic in the next lesson	(2) association	
Of course this shows that it is difficult for me to estimate the proper time I should allocate for different activities. (Student 8, 11–15)	(5) appropriation	

Results

Patterns of reflection in student teachers' written reflection

The internal patterns of student teachers' reflection are presented in this section. Altogether six main starting points for reflective patterns were defined with several subcategories under each of them.

Introspection as a starting point

Introspection as a starting point means that reflection involves looking inwards and reconsidering one's thoughts and feelings about some issue in teaching. The stance emphasises the personal meaning of situations. Five different patterns of reflection were defined under this category. *Firstly* (1.1), there were reflective patterns in which the student teachers proved their awareness of essential themes in their teaching work at a given moment, and which they saw as being very important from the viewpoint of their own professional development. This was the most common course ($n = 12$) of reflective patterns. In the *second* category (1.2), the reflective patterns were quite similar to the previous ones, but they contained validation, focusing either on the introspective practical situation or on an essential theme in a teacher's

Table 4. An example of 'Learning from practice'.

Original portfolio text	Reflective unit *identified with the form of reflection (1–6)*	Reflective pattern *defined according to the content of reflection*
During this teaching practicum, my aim was to become more familiar with the idea of how a teacher's role presupposes guidance, supports and encourages a pupil, and creates optimal learning environments	(5) Appropriation	Learning from practice
In this way, the characteristic that I mentioned before is emphasised in a teacher's work: to create and to maintain a positive will to learning	(5) Appropriation	
More and more I would like to emphasise a pupil's active role and responsibility in her or his own learning. It is also important that a pupil utilises her or his previous knowledge and conceptions when using new knowledge. Pupils need personal guidance in learning	(6) Transformation	
Besides a teacher's assessment methods, the pupils' self-evaluation and peer-evaluation should be emphasised	(5) Appropriation	
It is important to think about one's own professional attitude all the time, so that a teacher is able to develop herself, because there is always something to develop. It would be dangerous to think that I would sometimes be in such a situation that I wouldn't have anything to develop	(6) Transformation	
The teaching profession changes all the time along with society, and every teacher who values the profession has to follow the times, to educate themselves and acquire new knowledge, in order to serve as an example for the pupils. With these thoughts in mind, it is possible to develop professionally	(6) Transformation	
My own aim is to be a reflective teacher and to keep my own personality as a part of my work. (Student 8, 74–80)	(6) Transformation	

work. This was quite a common pattern of reflection ($n = 8$) as well. *Thirdly* (1.3), the student teachers described the experienced practice and evaluated it ($n = 5$), but the reflection did not lead further, for example, towards new professional ideas or their future actions. In the *fourth* category (1.4), the experienced practice was associated with similar previous situations ($n = 5$), but reflection did not continue any

Table 5.   An example of 'Learning from prior knowledge'.

Original portfolio text	Reflective unit *identi-fied with the form of reflection (1–6)*	Reflective pattern *defined according to the content of reflection*
The conception of knowledge behind my own professionality has not been as clear for me as has my conception of humanity. When I considered some theoretical aspects of these issues, I realised that I am able to articulate my thoughts	*(3) Integration*	*Learning from prior knowledge or theory*
In my work, I want to emphasise the development of observation and communication skills. The ability to express one's own thoughts is also very important from the viewpoint of self-respect	*(5) Appropriation*	
In today's world it is also important to learn to use information sources correctly and to learn to question the information. Moral and value issues are also emphasised more and more, and pupils are not necessarily guided to consider these issues	*(1) Introspection*	
In a multicultural world it is important to know both one's own culture and other cultures. With this knowledge it is possible to live in harmony with people from different countries, so that we respect each other's habits and choices	*(5) Appropriation*	
Above all, I would wish that my pupils would learn knowledge and skills, so that they would become socially acceptable citizens. Partly for these reasons, I try to connect my theoretical teaching to everyday life events and to integrate the subjects with each other. (Student 8, 69–73)	*(5) Appropriation*	

further. *Fifthly* (1.5), the experienced practice was associated with similar previous situations or integrated with theory ($n = 2$). The student teachers' reflection did not lead to the realisation of different things or developmental challenges, but it attempted to conceptualise the meaningful practical professional experiences.

From the viewpoint of professional development, the first, second and fifth patterns of reflection are especially essential, because they are dynamic and they produce new understandings and conceptualisations, and thus, promote the reflection process. In contrast, the third and fourth patterns of reflection are static, and their contribution to the development process is not so central.
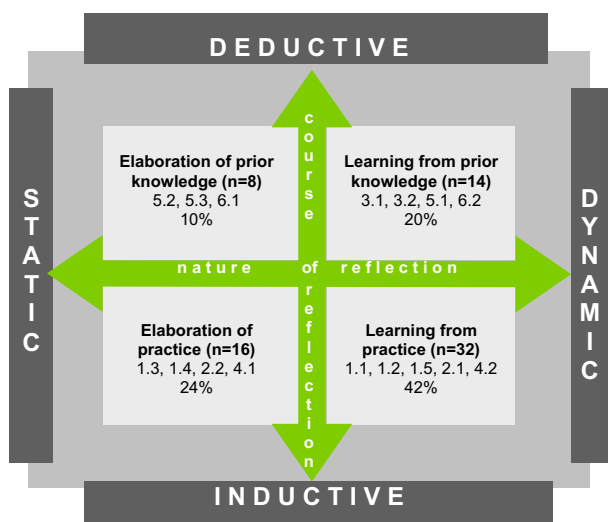
Figure 3. The quality and amount of reflection episodes in the data.

Association as a starting point

Associative reflection in the beginning of the reflective pattern means that student teachers link their prior knowledge, feelings or attitudes with new knowledge and insights. Student teachers reported incidents that were similar to their prior experiences as pupils or teachers. They also reflected on experiences in which they had discovered that their prior knowledge and beliefs were no longer consistent with their new experiences. Here, only two kinds of reflective patterns were defined. *Firstly* (2.1), the student teachers considered the associative previous experiences along with validation, and simultaneously realised something essential concerning their own professional development ($n = 7$). The student teachers had some insights from their practical and introspective experiences and validated them. *Secondly* (2.2), the student teachers presented previous experiences, which were followed by descriptions of previous experiences ($n = 4$). Their reflection proceeded inductively from practical experiences towards more conceptualised patterns of thought.

In conclusion, associative reflection on previous experiences is connected with all other forms of reflection except the integrative reflection of theory. An interesting notion is that the nature of the first pattern of reflection is dynamic in nature, whereas the second pattern is more static and practical.

Integration as a starting point

Integration involves a reflective attitude where student teachers actively map out the understandings provided from their teaching experience and its associations. In this process, they actively explored the relationships between their teaching experiences and theoretical viewpoints and drew tentative conclusions from them. Two patterns of reflection emerged. In the *first* place (3.1), the integrative and theoretical reflection was followed by the student teachers' introspective descriptions. After that, the student teachers realised their own professional developmental challenges. In this

process, the reflective patterns contained validating thoughts (*n* = 4). In the *second* place (3.2), the integrative and theoretical reflection was followed by the introspective description, after which something central in relation to the student teachers' own professional development was realised (*n* = 3).

Both of these patterns are dynamic in nature. The integrative reflection of theory is connected with all other forms of reflection to some extent, although in some cases only weakly.

Validation as a starting point

Validation as a starting point for a reflective pattern means testing the old and new ways of thinking and acting in teaching situations. Student teachers often balanced the pros and cons of their new understandings and their prior knowledge and beliefs. They also explored the consistency of their experiences with their previous experiences and even with the experiences of their colleagues. Validation requires the application of some sort of new learning so that it can be tested in practice. It was possible to define two different patterns of reflection here. *Firstly* (4.1), the student teachers' validating reflection was followed by the description of practical and introspective experiences (*n* = 3). *Secondly* (4.2), the student teachers' validating reflection went on side by side with reflection on practical, introspective experiences or situations (*n* = 3). This brought about a realisation of some challenges in relation to their own professional development. The reflective patterns contained integrative theoretical reflection from which the student teachers derived support for their professional development and transformative thoughts. After the validating reflection, the student teachers presented central professional ideas concerning a teacher's work. Among these ideas it was also possible to observe that the first reflective pattern was static, whereas the second was more dynamic.

Appropriation as a starting point

Appropriation in the student teachers' statements refers to the process of making learning one's own and reacting to it in a personal way. Such learning, which the student teachers reported to be a significant influence on their professional knowledge and action, was appropriated in this way. Three different reflective patterns had appropriation as a starting point. In the *first* pattern (5.1), the student teachers presented some essential professional ideas and then considered a challenge that was connected with their own professional development (*n* = 5). The student teachers neither validated nor integrated the ideas and professional challenges with theoretical ideas. *Secondly* (5.2), the student teachers considered an essential professional idea in relation to their previous practical experiences, but did not validate or conceptualise the development ideas and introspective practical descriptions in relation with theory (*n* = 3). The *third* kind of reflective pattern (5.3) started with a central professional idea, and was followed by evaluative and validating reflection (*n* = 2).

It is interesting that the reflective patterns often ended up with appropriative reflection. The student teachers started either from practical, introspective issues or from more theoretical ones, but they finished their considerations with appropriative reflection. The first and second patterns of reflection are dynamic in nature, whereas the third is static.

Transformation as a starting point

Transformation in the beginning of reflective patterns concern experiences that are reported to affect the personal and professional foundations of student teachers. There were statements that predicted readiness in testing new manners and methods, change in future teacher behaviours and commitment to action. Two different reflective patterns were defined here, although their constitution was not easy and the criteria for them were not as clear as they were with the previous ones. *Firstly* (6.1), the student teachers considered and associated their professional challenges in relation to their previous experiences (*n* = 2). *Secondly* (6.2), the student teachers reflected on their own professional challenges and after that realised some essential and important themes related to their own work as teachers (*n* = 2).

It was interesting to note that validation permeated the reflective patterns. The amount of theoretical and integrative reflection was quite low, which proves that the student teachers did not reflect on future challenges or directions side by side with theoretical issues. Also static and dynamic characteristics were observable here: the nature of the first subcategory is static, and the second subcategory has dynamic qualities.

Reflective patterns in student teacher portfolios can thus start from a practical situation and proceed towards more theoretical viewpoints – or vice versa – or they can be something between these two extremes. Also, the reflective patterns under each of these starting points have diverse qualities. They contain various kinds of reflection or are relatively unvarying in nature. Table 1 summarises the classification of the reflective patterns according to their starting points and presents the descriptions of reflective patterns constructed from student teachers' portfolio presentations.

How does written reflection contribute to student teachers' professional learning and practical knowledge construction?

After the detailed analysis of the reflective patterns, the patterns were considered in light of two main dimensions: inductive–deductive and static–dynamic (see Figure 3), which emerged in the analysis of the reflective patterns. *Inductive* in this phase of analysis means that the practical experiences (introspective reflection and associative reflection) function as a starting point for the reflective pattern. *Deductive* means that the theoretical and abstract aspects (integrative reflection, appropriation and transformation) are the basis for a reflective pattern, which proceeds towards more practical issues. *Static* means that the nature of reflection is declaratory, while *dynamic* refers to a more conceptual idea or a need for professional development or transformation.

The four quadrants shown in Figure 3 were also named on a more general level according to their common characteristics and nature. The reflection of the student teachers was not confined to only one quadrant in the figure, but rather all student teachers had different kinds of reflective patterns in their portfolios. This shows that they have multifaceted capacities to reflect on their professional practices. We obtained results concerning the second research question from this analysis. The nature of the quadrants in Figure 3 are explained and considered here. In order to sustain the clarity and coherence of the section, the original data excerpts from one participant are presented.

Elaboration of practice

Within the reflective patterns in this category, the student teachers described, evaluated and validated their practical experiences, but they did not go any further in their reflection, for example, towards some developmental ideas. They also compared their practical experiences with previous and similar situations, but their reflection did not continue thereafter. The student teachers clarified their prior experiences or validated things and apportioned them to descriptions of practice. Student teachers noted the similarities and differences between their previous experiences, and they were able to analyse and consider those experiences critically. This might prove that a thorough exploration of practical teaching experiences plays an important role in the development of student teachers' reflective skills. Student teachers' personal practical theory is essentially constructed around the most significant ones of these experiences (cf. Tripp 1993; Woods 1993). About 24% of the reflective patterns represented this kind of reflection. The following data excerpt presents this type of reflection (1.4).

Elaboration of prior knowledge

The student teachers described and evaluated their existing knowledge or considered an essential professional idea or challenges in relation to their previous practical experiences. They also reflected on their developmental ideas critically and evaluated them as well. An interesting viewpoint was that the student teachers did not try to conceptualise their ideas and did not attempt to relate them to theoretical knowledge. Based on this observation, it can be stated that student teachers deliberated on their existing knowledge base extremely carefully and made themselves explicitly conscious of its contents. Their reflection proceeded from theory to practice – not from practice to theory. It could be easier for student teachers to observe how theoretical concepts become concrete in practice rather than to theorise about the practice on more abstract levels. As much as 10% of student teachers' reflective patterns represented reflection of this kind. In these processes, the guidance of an experienced colleague would be crucially important (cf. Ponte et al. 2004). The following quote from a portfolio text demonstrates this type of reflective pattern (5.2.).

Learning from practice

The student teachers came to see important issues in teachers' work from current, practical situations, and they perhaps considered these issues very important in relation to their own professional development. Their reflections might contain validation, and they were focused either on an experienced practical situation or on the realisation of an essential theme in a teacher's work or professional challenges. The student teachers compared their practical experiences with similar, previous situations or theories. In this case, the student teachers' reflection did not lead to any special insights or developmental challenges, but aimed at conceptualising significant practical and professional experiences. The majority of the reflective patterns analysed (46%) were of this type. This is actually quite a promising result, which proves that students considered the professional matters quite actively in their portfolios during their teaching practice. The next data excerpt presents this type of reflective pattern (4.2).

As the portfolio excerpt presents, the student teachers evaluated previous experiences, and through these evaluations had realised something that is important in the personal professional development. Reflective patterns based on 'bottom–up' reasoning from practical experiences also proved that student teachers endeavoured to achieve more conceptual ways of thinking and a more general understanding of their instructional process. Mansvelder-Longayroux, Beijaard, and Verloop (2007) have found similar results in their research on student teachers' reflection in portfolios.

Learning from prior knowledge

After reflecting on the theoretical issues, the student teachers related these issues to their practical experiences. According to our analysis, portfolio texts also contained theoretical viewpoints that contributed to student teachers' personal and professional development. The student teachers presented several insights concerning their professional development and thereafter, considered development challenges. Despite this quite a demanding reflection, 20% of student teachers' reflective patterns represented this quadrant. They also reflected on these issues in a reverse order: they presented their personal professional challenges, and based on that became aware of some new and important ideas. This proves that student teachers' reflective skills are truly multifaceted: they are able to move flexibly from practice to theory and from theory to practice in their pedagogical thinking. The following data excerpt presents an example of this type of reflection (3.2).

As Figure 3 shows, the *learning from practice* – quadrant is clearly emphasised in student teachers' reflection, whereas the other three parts are smaller. An interesting detail is that integrative reflection with theory appears only in the quadrant *learning from prior knowledge*. The student teachers seemed to learn from theory, but they did not evaluate or criticise it at all. This means that theoretical knowledge held an authoritative position in student teachers' reflection. Our analysis also proves that practical experiences have a significant role in the development of student teachers' reflective skills. A large number of student teachers' reflection episodes contained authentic practical elements.

It can be considered that the static (left) side of the figure functions as a basis for the dynamic (right) side, although it is not possible to draw any straightforward conclusions about the connections between these two sides. Student teachers described and evaluated their practice, and this proves that there probably are some preliminary tendencies towards the dynamic side. This same course could be perceived in the case of prior knowledge, which is also described and evaluated. When the number of reflective episodes is considered, the direction from static to dynamic can be perceived.

Conclusions and discussion

Based on the research results, three conclusions arise: first, contrary to many previous studies (Francis 1995; Harrington, Quinn-Leering, and Hodson 1996; McIntyre, Byrd, and Fox 1996; Dinkelman 2000), our study shows that student teachers were capable of using various different forms of reflection when analysing their teaching experiences and practical knowledge of it. This challenges a widespread belief that student teachers rely solely on self-related concerns in their reflection. The multifaceted connections that student teachers exhibited between theory and practice

shed an optimistic light on the student teachers' potential to reflect. As our study shows, student teachers can reflect beyond solely practical teaching issues, articulate multiple concerns about their practice and think through the issues in an integrative manner with the aid of the guided framework for reflection throughout the process (cf. Shulman 1998). Besides, they were able to consider themselves as future teachers on a more general level and set long-term aims for their professional development.

Second, our results suggest that student teachers' self-centred reports were closely intertwined with more considered episodes. The reflective patterns show their abilities to explain, justify and argue their considerations. These patterns indicate that students possess various different ways of professional learning. They are able to describe and evaluate the practical side of teaching and their prior knowledge of it, as well as learn both from practice and their prior knowledge. This potential is necessary for them in their work as teachers. Thus, the criticism of student teachers as simply 'story-tellers' seems to be too harsh. Perhaps teacher educators should strive to improve their own tools for understanding and structuring reflection in portfolios (Baumfield et al. 2009; Kemmis 2012; Thompson and Pascal 2012). Third, we challenge the assumption that it is too laborious for student teachers to move beyond the immediate concerns towards long-term inquiries of their profession. In the guided and facilitated context without multiple challenges, student teachers were able to question their practices, identified social and cultural constraints, and explicate a vision for their future work (cf. Rajuan, Beijaard, and Verloop 2008).

Limitations of the study

This study was based on qualitative portfolio data from relatively small number of student teachers. The portfolios were collected once at the end of teaching practice and thus, they represent only a certain period of reflection instead of repetitive measurement. The chosen method was still relevant for the aims of this study, although we are not able to guarantee the total authenticity of the reflections self-reported by the student teachers. Any additional data were not collected for the study, which would probably have resulted in different results.

Our theoretical framework also has its limitations, since it exposes the forms and patterns of reflection from certain restricted viewpoint. This approach enables us to focus tightly on them in line with the aims of the study, whereas it impedes us from reaching the essential contentual, contextual or temporal characteristics of reflection that would be of great importance in order to understand the complexity and variety of the patterns of reflection.

Suggestions for future research

By exploring the patterns of student teacher reflection and their contribution to professional learning and knowledge construction, our study opens new paths of research within this area. Further research is needed to explore the characteristics and qualities on patterns of reflection and their emergence in various contexts of teacher education, not only in teaching practice, and over a longer period of time. More research is also required to investigate the relations between student teachers' patterns of reflection, patterns of learning as well as characteristics of learning environment in teacher education, because they all contribute to the quality of teacher

expertise constructed during teacher education. This study has modelled the patterns of reflection thoroughly, and thus, it can function as a small stepping stone for the forthcoming studies.

Implications

This study has the potential to advance teacher educators' understanding of student teacher reflection and its versatile paths. The results could be used in the development of teacher education practices, pedagogies and curricula to promote professional reflection in more systematic ways. Our promising results show the importance of learning-focused and deliberated pedagogy in teacher education (cf. Beijaard, Korthagen, and Verloop 2007).

To conclude, our study has advanced understanding of student teacher reflection and provided new perspectives to this thoroughly explored research area. Through this novel approach, the study offers possibilities to structure and understand the continuous importance and potential of reflection for teachers' professional development during and after teacher education (cf. Grossman, Hammerness, and McDonald 2009).

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