Individual differences in student teachers' self-regulated learning: An examination of regulation configurations in relation to conceptions of learning to teach

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Abstract

This study aimed at describing the individual differences in student teachers' self-regulated learning to teach in postgraduate professional teacher education programmes. Cross-sectional data were collected from 28 student teachers about their regulation activities and conceptions of learning to teach through open question logs from multiple learning experiences and interviews. The findings showed that the self-regulation activities of student teachers could be represented by five different configurations. In addition, it appeared that student teachers' regulation relate differently to their conceptions of learning then expected from the literature. The implications of these findings are discussed for a better understanding of the role of self-regulated learning in the professional development of student teachers.

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1. Introduction

In postgraduate professional teacher education programmes two types of learning environments are often combined: studying at university and professional learning in practice. To foster the integration of student teachers' professional learning in practice with learning at the university, it is considered important that teacher education programmes support the development of self-regulated learning skills of their student teachers (Endedijk, Vermunt, Verloop, & Brekelmans, 2012; Hagger, Burn, Mutton, & Brindle, 2008). Although the concept of self-regulated learning (SRL) plays a prominent role in the design of teacher education programmes (Kremer–Hayon & Tillema, 1999), research into SRL has mainly focused on how teachers can promote SRL of their students (Bolhuis & Voeten, 2001; Kramarski & Michalsky, 2009; Niemi, 2002; Perry, Hutchinson, & Thauberger, 2008) rather than teachers' regulation of their own learning. Research on how student teachers plan, execute, control and evaluate their learning experiences is still in its infancy (Endedijk et al., 2012) and it is still unclear how student teachers differ in the self-regulative activities they use.

Research has identified individual differences in student teachers' conceptions of learning and preferences for learning and regulation activities in the context of postgraduate professional teacher education programmes (e.g., meaning-oriented vs. reproduction-oriented) (Donche & Van Petegem, 2005; Endedijk, Donche, & Oosterheert, 2014; Oosterheert & Vermunt, 2001). Moreover, findings from studies in academic learning contexts showed that conceptions of learning influence how students approach learning in particular contexts and that misfits (or dissonances) between their conceptions of learning and preferences for learning and regulation activities can occur when student teachers enter a new learning environment (Cano, 2005; Vermunt & Verloop, 2000; Vermunt & Vermetten, 2004).

Although these studies have provided evidence for the role conceptions of learning play for student teachers' professional learning experiences, they do not explicitly focus on the variety of student teachers' self-regulative activities across multiple learning experiences in different contexts. Moreover, research into the relation between student teachers' conceptions of learning and their concrete SRL activities is missing. The present study, therefore, focuses on individual differences in student teachers' regulation of their learning across multiple learning experiences and the relation with their conceptions of learning to teach. In this way, this study will make a contribution to a better understanding of student teachers' professional learning and the role of self-regulation.
2. Theoretical framework

2.1. Self-regulated learning of student teachers

In academic learning theories, SRL is defined as an “active, constructive process whereby learners set goals for their learning and attempt to monitor, regulate and control their cognition, motivation, and behavior, guided and constrained by their goals and contextual features in the environment” (Pintrich, 2000, p. 453). This process consists of different phases that represent a general time-ordered sequence that individuals are likely to go through as they perform a task, although different phases can occur simultaneously (Pintrich, 2000). Most models of self-regulation distinguish the similar phases as described by Zimmerman (2000) (see also Pintrich, 2004; Winne & Perry, 2000; Zimmerman, 2000):

- Forethought phase: This phase includes the processes proceeding the efforts to learn, consisting of task analysis and self-motivational beliefs (e.g., self-efficacy). The two key activities of task analysis are setting goals and the planning of the strategies to be used.
- Performance phase: This phase contains the processes that occur during learning, consisting of monitoring and self-control, for example by tracking one’s performance and choosing task strategies that assist in learning.
- Self-reflection phase: This phase influences forethought regarding subsequent learning efforts, consisting of self-evaluation and self-reactions which could lead to satisfaction or to inferences for subsequent learning activities (Zimmerman, 2000).

Most studies on student teachers' regulation of learning focused on how student teachers regulate their learning while following a course at the university, rather than how they regulate their learning from practice (e.g., Corrijan & Taylor, 2004; Järvenoja & Järvelä, 2007). As learning at the workplace is less intentional and planned, does not have pre-set objectives or identifiable outcomes, and is more contextual and collaborative than academic learning (Hodkinson & Hodkinson, 2005; Tynjälä, 2008), student teachers need to learn different regulation skills to prepare themselves for further professional learning. For example, student teachers need to learn to plan and design their own learning tasks and environment, besides only learning to regulate well-designed and structured learning tasks (Niemi, 2002).

A first study on the nature of student teachers’ regulation activities in a professional teacher education programme has shown that student teachers use a large variety in activities to regulate their learning (Endedijk et al., 2012; Vermunt & Endedijk, 2011). Although student teachers’ regulation activities differed from students’ learning in academic contexts, the main phases of Zimmerman’s model could still be discerned (Endedijk et al., 2012). In addition, Endedijk et al. (2012) showed that two dimensions were underlying the variety of regulation activities. The first dimension discerned passive from active regulation of learning. Passive regulation was characterised by lack of argumentation for decisions student teachers had made, statements that someone else was in charge of the learning process, and an unawareness of many aspects of the regulation process. Student teachers showing active regulation in a learning experience reflected more deeply on the learning content, the learning process and their own role in it. They made their own decisions for a learning strategy, but also actively used information from others and used that in their reflections.

The second dimension found distinguishes prospective versus retrospective regulation of learning. Prospective regulation concerned the first phase of the learning process. The learning experiences were planned, goals were set and arguments for choosing a learning strategy were given. The phase after a learning experience received less attention; the monitoring, reflection, and evaluation were more superficial. Retrospective regulation was often unplanned, so no goal-setting or deliberate thinking about learning strategy and self-efficacy had been taken place. This kind of regulation focused on the monitoring, evaluation and reflection part of the learning process.

2.2. Student teachers’ conceptions of learning and their relation with regulation activities

Research on students’ conceptions of learning has started with the work of Säljö (1979), who found a hierarchy of five conceptions in which learning was conceptualised by students as: (a) increasing one’s knowledge, (b) memorising and reproducing, (c) applying, (d) understanding, and (e) seeing something in a different way. This taxonomy was confirmed by a study of Marton, Dall’Alba, and Beaty (1993), who also added a sixth conception: (f) changing as a person. The first three conceptions describe quantitative views on learning in which learning is seen as reproduction of material which reflects a surface approach, and the latter three are more qualitative views and focus on the role of meaning in learning, reflecting a deep approach (Marton et al., 1993; Säljö, 1979). Reproduction-oriented learning versus meaning-oriented learning has remained the main dimension for describing individual differences in students’ conceptions of learning.

In the past decade also more context-specific conceptions of learning have been identified, resulting for example in descriptions of conceptions of web-based learning (Tsai, 2009) and conceptions of learning engineering (Lin & Tsai, 2009). Research on the conceptions of learning to teach is still scarce. Oosterheert and Vermunt (2001) studied student teachers’ conceptions of learning in relation to their preferences for learning and regulation activities. The conceptions that they identified in the context of learning to teach included: learning by doing; developing a personal style by trial and error; improving teaching performance by shifts in objects of attention; and raising consciousness, addressing attention, integrating, and letting go. Further analysis identified that the main dimension underlying these conceptions of learning in relation to their preferences of learning and regulation activities was also reproduction-oriented learning versus meaning-oriented learning.

Their study revealed that in the context of learning to teach, this dimension cannot be defined in terms of focusing on reproducing knowledge versus on understanding theories, but that reproduction-oriented learning is indicating whether student teachers are directed at improving performance through gathering (and reproducing) practical suggestions and that meaning-oriented learning implies learning by questioning and developing their frame of reference. In addition, a second dimension, open versus closed learning, showed differences in how student teachers approach their problems: whether they acknowledge their problems and try to find solutions independently or whether their problems remain more implicit and they need others to solve those (Oosterheert & Vermunt, 2001).

Although the relation between conceptions of learning and regulation activities has not been studied before in the domain of student teacher learning, we know from studies in the domain of Higher Education that self-regulation with a meaning-oriented conception of learning, or external regulation with a reproduction-oriented conception of learning, are combinations that occur most often and are theoretically coherent (Vermunt, 1998). Also the study of Endedijk and Vermunt (2013) showed that student teachers with a meaning-oriented learning pattern in general use significantly more often active regulation activities. On the other hand, research also has shown that when students enter a new learning environment, there may be a temporary misfit between their conceptions of learning and the learning activities that are required in this new environment (Brownlee, Purdie, & Boulton-Lewis, 2003; Vermunt & Vermutten, 2004). This misfit, or dissonance, occurs when students’ conceptions of learning are not congruent with their learning activities (Cano, 2005; Vermunt & Verloop, 2000). Strong dissonant learning patterns are often related to poor academic performance (Beishuizen, Stoutjesdijk, & Van Putten, 1994; Cano, 2005; Vermunt & Verloop, 2000), whereas slightly dissonant learning patterns can be seen as good study practices that had been changed by the
environment (Lindblom-Ylänne, 2003). Getting insights in the type of dissonant combination is therefore meaningful for understanding how people develop their way of learning (Vermunt & Minnaert, 2003). Since the professional teacher education programme is a total different learning environment for student teachers than their academic study programme, we expect dissonant relations to occur between conceptions of learning to teach and regulation activities in this domain.

3. The present study

The study of Endedijk et al. (2012) identified the variety in regulation activities of student teachers’ professional learning. Previous studies also showed that student teachers’ conception of learning affect the way they approach their learning tasks. Although a relation between conceptions of learning and regulation activities has been suggested in the literature, it is not clear what differences can be empirically found between student teachers in the way they regulate and approach their learning and to what degree these differences are related to their different learning experiences in professional postgraduate programmes.

The present study focuses on individual differences in students’ regulation of learning across multiple learning experiences and the relation with more situation-independent conceptions of learning to teach. We use the dimensions and instrument of Endedijk et al. (2012) to conceptualise and measure SRL of student teachers in the context of postgraduate professional teacher education programme. In order to be able to study multiple experiences in different contexts of learning, we chose a design with a limited number of participants. More specifically, we aimed to answer the following research questions:

1. What are individual differences in student teachers’ regulation of learning across multiple learning experiences in a postgraduate professional teacher education programme?

2. How are student teachers’ regulation of learning and conceptions of learning to teach related to each other?

4. Method

4.1. Context and participants

The study took place in a Dutch postgraduate professional teacher education programme for teaching in upper secondary education. The programme is similar to postgraduate professional teacher education programmes in other countries (Tryggvason, 2009). The programme is a one-year programme in which students enrol with a master’s degree in a specific subject area. Student teachers attend weekly lectures at the university, while also doing teaching practice at schools or having a paid job as a teacher. Student teachers who have a paid job start from the first day as a teacher at a secondary school. The other student teachers are more gradually exposed to the teaching profession, ranging from observing other teachers and peers, taking over some lessons from an experienced teacher to being responsible for all aspects of teaching.

In order to study the variety of student teachers’ SRL, a random stratified sample was used based on the following variables: teaching experience, supervising teacher educator, school subject, and sex. In order to have at least two student teachers from every school subject, we selected twenty-eight student teachers from the total population of 85 student teachers to participate in the study. For seven student teachers who were not willing to participate (mostly because of lack of time), other student teachers with the same characteristics in terms of these variables were asked to volunteer. Of the 28 student teachers, nineteen were female and nine had a paid job as a teacher. On average, the student teachers were teaching 7 lessons per week.

4.2. Instruments

Student teachers’ regulation of learning was measured using the Learning Report (Endedijk et al., 2012), which is an open question log. Student teachers were asked to complete this Learning report about six self-chosen learning experiences, stimulated by open questions about different regulation activities. The amount of six learning experiences was chosen to give student teachers the possibility to include the variation within and between both learning contexts (university and practice school) of the programme. The questions of the Learning Report were based of the conceptual model of SRL as described above (Zimmerman, 2000). For every phase of SRL two or three questions were included in the Learning Report (Endedijk et al., 2012). The questions concerning the forethought phase were related to student teachers’ goal orientation (Question 2), sources of self-efficacy (Question 3), and strategic planning (Question 4). The questions concerning performance phase described their learning strategy control (Question 5) and monitoring of the learning results (Question 6). The questions concerning the self-reflection phase were focused on self-reflection on the learning outcome (Question 1), self-evaluation of the learning experience (Question 7) and inferences for subsequent learning experiences (Question 8). The descriptions of the questions can be found in Appendix 1.

To explore student teachers’ conceptions of learning to teach, a semi-structured interview was conducted. Questions were selected from the interview schedule developed by Oosterhuis and Vermunt (2001).

4.3. Procedure

All student teachers were asked to choose a recent learning experience (no older than one week) for the Learning Report. To cover the diversity of student teachers’ learning processes they were asked to include learning experiences that took place at the teacher education institute and at the practice school. These learning experiences could be planned as well as spontaneous; successful and unsuccessful. As in case of unplanned learning experiences, some questions were not relevant, which student teachers could answer with not relevant.

Student teachers received a weekly reminder by e-mail, and a reminder by phone when they had not responded within two weeks. In total, 133 Learning Reports were collected. Eighteen student teachers completed all six Learning Reports, and four student teachers completed four or five reports. Two student teachers did not send in more than three Learning Reports, and four others did not complete a single report. The main reasons for failing to complete all six reports were illness, quitting teacher training, or lack of time.

4.4. Data analysis

The data of the Learning Reports were analysed in three phases. In the first phase, fragments of SRL were coded with help of the programme ATLAS.ti (Muhr, 1997) in a meaningful set of categories drawing on the eight questions of the Learning Report. Per question, five to seven categories emerged from the data, representing the qualitative differences in student teachers’ regulation of learning with respect to that particular aspect. The ‘not relevant’ answers were coded as not relevant and these categories were not included in the rest of the analysis (see Appendix 1; for a more detailed description of the categories we refer to Endedijk et al., 2012). From the total of 1197 fragments of the 133 learning experiences that were coded, 10% was coded by an independent second researcher to compute inter-rater reliability (overall Cohen’s Kappa of 0.90).

In the second phase, Multiple Correspondence Analysis (MCA) on all 133 learning experiences of student teachers was performed (Mair & De Leeuw, 2008). MCA is a non-parametric factor analytical procedure that orders variables (the categorical scores on the eight regulation questions) along a small number of (underlying) dimensions or
components. In the third phase a configuration was made describing student teachers’ individual regulative activities across the six learning experiences. For every student teacher graphs were made of the position of his or her six experiences on the dimensions as found at the MCA. In case student teachers had not submitted all six learning experiences, only those who reported four or more learning experiences were included in this configuration analysis (N = 22).

Content analysis of the interview data with regard to student teachers’ conceptions of learning to teach showed that in our data two main different conceptions of learning were found. Our category description was refined by making use of the descriptions of Oosterheert and Vermunt (2001), resulting into the following two categories:

1. Reproduction-oriented conception of learning to teach: learning to teach is seen as learning by doing, trying again, keeping what works, looking for tips and tricks.
2. Meaning-oriented conception of learning to teach: learning to teach is viewed as learning by deepening understanding, gaining insights, reflecting, looking for structure, looking for information from others, looking for theoretical information, and looking for food for thought. In addition, these student teachers also often mentioned that learning by doing and experimenting was important, but not enough.

All interviews were coded according to these two categories by two researchers. The first independent categorisations led to an agreement of 79%. Discussion between the two researchers and the involvement of a third expert on student teacher learning led to a final agreement on all cases. Crosstabs were used to portray the relation between student teachers’ regulation of learning and their conceptions of learning.

5. Results

5.1. Configurations of student teachers’ regulation activities across multiple learning experiences

The results of the MCA showed that all 133 learning experiences of the student teachers were distributed along two dimensions (see Fig. 1). The first (horizontal) dimension was interpreted as passive versus active regulation of learning while the second (vertical) dimension was interpreted as prospective versus retrospective regulation of learning (see also Endedijk et al., 2012). Together with the two dimensions, the four quadrants constitute the framework and key concepts underlying student teachers’ regulation activities across multiple learning experiences. Each quadrant reflects a set of regulation activities as embedded in specific learning experiences of student teachers. To understand the framework, we will first describe the four quadrants:

1. Passive prospective regulation (N = 25, 19% of the total set of 133 learning experiences): a learning experience positioned in this quadrant was often planned, but the choices in the learning process were often made by others and not well thought out by the student–teacher. The focus of regulation was on the forethought phase of the learning process.
2. Active prospective regulation (N = 47, 35%): the learning experience in this quadrant was actively set up by the student teacher, but the focus remained on the start-up phase of the learning process while the reflection phase of the learning process received less attention.
3. Active retrospective regulation (N = 37, 28%): in this quadrant, a learning experience was often unplanned, or not well thought out in advance by the student teacher, but the active regulation took place during evaluation and reflection on the learning experience.
4. Passive retrospective regulation (N = 24, 18%): this quadrant could be characterised by its lack of regulation, as the learning experience was often unplanned, and student teachers only realised afterwards that they had learned something, but without any active evaluation or reflection.

For every individual student teacher pictures were made to visualise the spreading of his or her six learning experiences in the dimensional framework. The findings show a considerable variation in student teachers’ regulation of learning across different learning experiences. Five different regulation configurations could be discovered in the data. Examples of graphs representing these five configurations are given in Fig. 2. Five student teachers show a great variety of self-regulative activities across different learning experiences as indicated by the spread of their learning experiences over three or more quadrants. We labelled this configuration as a versatile regulation configuration. The regulation configuration of the other seventeen student teachers show less variety of self-regulation across different learning experiences: at least five out of six learning experiences are spread over two of the four quadrants (at least 80% if the student teacher had completed only four or five Learning Reports). Within this group of seventeen student teachers, four different configurations consisting of a combination of two different patterns of self-regulative activities across learning experiences could be distinguished. One student teacher shows a passive regulation configuration, combining both passive prospective and passive retrospective self-regulative activities across different learning experiences. Another regulation configuration we found in our sample concerns the active regulation configuration, in which active prospective and active retrospective regulation are combined (n = 8). Six student teachers combine active and passive prospective regulation in their learning experiences and were therefore categorised as having a prospective regulation configuration. Finally, two student teachers combined active and passive retrospective self-regulative activities across different learning experiences. We labelled this configuration as the retrospective regulation configuration.

5.2. Relations between conceptions of learning and regulation configurations

The findings from the interview data show that eight student teachers could be categorised as having a meaning-oriented conception of learning to teach. The following quote of one of the eight students is a good illustration of such a conception of learning to teach.

I force myself to think in a systematic way about what I am doing and how I am doing it. To coach myself. Besides, the theoretical background is also important, so also reading about it. That can also give more grip and what I said before, talking and discussing with colleagues.

[A beginner male student teacher of science]
The other twenty student teachers were categorised as having a reproduction-oriented conception of learning to teach. An illustrative quote of one of the students having this type of conception of learning to teach is the following:

_I would prefer to have a syllabus; that is all I need. That would make a large part of the teacher education programme unnecessary. It is not the same for everybody, but I would prefer a syllabus with a script for every part of the lesson what you have to do._

[experienced, male, Science]

In Table 1 the relation between the regulation configurations and the conceptions of learning to teach is presented. Following the notions of dissonance as mentioned earlier (Cano, 2005), an active regulation...
Table 1
Frequencies of the different combinations of regulation configurations and conceptions of learning to teach.*

<table>
<thead>
<tr>
<th>Regulation configuration</th>
<th>Conception of learning to teach</th>
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<tbody>
<tr>
<td></td>
<td>Reproduction-oriented</td>
</tr>
<tr>
<td>A Passive regulation configuration</td>
<td>1</td>
</tr>
<tr>
<td>B Active regulation configuration</td>
<td>6</td>
</tr>
<tr>
<td>C Prospective regulation configuration</td>
<td>5</td>
</tr>
<tr>
<td>D Retrospective regulation configuration</td>
<td>1</td>
</tr>
<tr>
<td>E Versatile regulation configuration</td>
<td>3</td>
</tr>
<tr>
<td>Missing</td>
<td>4</td>
</tr>
<tr>
<td>Totals</td>
<td>20</td>
</tr>
</tbody>
</table>

*Theoretically consonant combinations are presented in bold, theoretically dissonant combinations are presented in italics.

c configuration and a meaning-oriented conception of learning as well as a passive regulation configuration and a reproduction-oriented conception of learning is theoretically assumed to be a consonant combination (Beishuizen et al., 1994; Vermunt, 1998). From this perspective, three student teachers showed coherence between their conception of learning to teach and regulation configuration (presented in bold type in Table 1); one student teacher combining reproduction-oriented learning with a passive regulation configuration and two student teachers combining a meaning-oriented conception of learning to teach with an active regulation configuration. Six student teachers show a dissonant combination by demonstrating an active regulation configuration with a reproduction-oriented conception of learning to teach (presented in italics in Table 1). The regulation configurations C, D, and E include both actively and passively regulated learning experiences. This means that in these configurations some learning experiences are consonant with the student teachers’ conception of learning to teach and others are dissonant related.

6. Conclusion and discussion

The aim of this study was to determine individual differences in student teachers’ regulation of learning across multiple learning experiences in a postgraduate professional teacher education programme and relate these differences to student teachers’ conceptions of learning to teach.

The results showed that two dimensions underlie student teachers’ regulation of learning in different learning experiences. These dimensions discerned passive from active regulation and prospective from retrospective regulation. Five different configurations of regulation of learning were found. These configurations represented the variety in regulation of learning within individuals as well as between individuals. The variety in regulation of learning within student teachers showed that when student teachers learn in multiple contexts, they employ different regulation activities across learning experiences. Furthermore, the results showed that the five configurations of regulation were not related to conceptions of learning as suggested from the literature: only three of the 22 student teachers showed a fully consonant combination between regulation of learning and conception of learning to teach and six student teachers showed a dissonant combination.

The findings showed that some student teachers showed both active and passive self-regulation activities across different learning experiences during their programme. It may be that these student teachers are in a change phase of their learning pattern, which often occurs on entry to a new learning environment (Boulton-Lewis, Wilss, & Lewis, 2003; Brownlee et al., 2003; Cano, 2005; Lindblom-Ylänne & Lonka, 2000): student teachers may be capable of active regulation in some situations, but not (yet) in all (Vermutten, Lodewijks, & Vermunt, 1999). Furthermore, in learning experiences at the practice school, there might be a tension between the inward focus on the development of self-as-teacher and the outward focus on the concerns about their students, as described by Conway and Clark (2003). For example, some teaching situations might be too intense for student teachers to also focus on their own monitoring and reflecting on their own learning. Future studies should address the issue of whether passive regulation is caused by a lack of capacity, or by a deliberate or non-deliberate choice of the learner in a certain situation. By doing this, these studies may help to increase our understanding of conditions fostering or inhibiting student teachers’ passive and active regulation.

This study also showed that individual student teachers differ in their focus on prospective or retrospective regulation. Although teacher learning can also be planned, much of teacher learning is unintentional in the sense that it is more on-going and incidental (Hodkinson & Hodkinson, 2005). From the field of workplace learning we know that a large part of learning in informal settings consists of reactive and unconscious learning, and only a small part of learning is deliberate learning (Eraut, 2004, p. 250). A theory of SRL for the context of learning to teach should therefore not only focus on planned learning processes, but also acknowledge the more reactive regulation processes that are an essential part of learning from experience.

In this study we used the terms consonance and dissonance to look at the relation between regulation configurations and conceptions of learning of individual student teachers. It appeared that three student teachers showed a consonant combination and six student teachers showed a dissonant combination. These six student teachers showed examples of dissonance in terms of disintegration (Vermunt & Verloop, 2000): their learning conceptions are not in line with their activities. This dissonant combination does not have to be interpreted as negative, since this type of dissonance may also be an important condition for change and development or reaction to the environment (Vermutten et al., 1999; Vermunt & Minnaert, 2003). The combinations of ten student teachers could not be directly classified as clearly consonant or dissonant and do not fall within one of the five dissonance categories of Vermunt and Verloop (2000). Their classification is based on research with the Inventory of Learning Styles, a questionnaire in which students react to statements about their way of learning across events. In our study, however, we used an event-specific instrument to collect data from multiple learning experiences per student teacher. Our data showed that within one student teacher both actively and passively regulated learning experiences were found. Therefore, regulation of some learning experiences was in line with their conception of learning to teach and others were not. Based on these results, a different type of dissonance was unravelled: namely dissonance within student teachers’ regulation of learning, subsequently causing a partly dissonant learning pattern of student teachers’ regulation configuration with their learning conceptions. The existence of this type of contextual dissonance could be interpreted from the perspective of friction (Lindblom-Ylänne, 2003): contextual demands of the specific learning experience evoke that students in some situations regulate their learning more active or more passive than they normally would do.

Because of our small sample we were not able to develop a very detailed set of conceptions of learning to teach, since our aim was to relate it to our detailed set of regulation configurations. Further research with a larger sample is necessary to test statistically the complex relationship between regulation configurations, contextual influences and personal factors such as conceptions of learning. This will also give the possibility to make a more detailed distinction in conceptions of learning to teach.

We also recommend to focus on the developmental aspect in future research: how do regulation configurations and conceptions change over time and how do they influence each other? As the data for this study have been collected at one teacher education institute, also more research is needed in other settings to validate our results.

This study showed the benefits of an instrument such as the Learning Report to disclose the variation in regulation activities within student teachers. Dissonant combinations and variation in learning across learning environments are much harder to unravel with general questionnaires about student teachers’ learning preferences (Lindblom-
Yläne, 2003), but those instruments are more practical in use for large-scale and longitudinal studies. Therefore, future research has to find ways to upscale qualitative instruments as the Learning Report or to seek different methods in order to capture and value the variation within persons over time and across learning experiences.

In today’s teacher education institutes as well as in other institutions for vocational education, SRL is highly valued (Kremer–Hayon & Tillema, 1999). We hope that the results of our study will help to get a better and more informative picture of how student teachers can vary in their regulation activities, as well as in their conceptions of learning how to teach. These ‘thick’ descriptions might help teacher educators to recognize different configurations of self-regulation. Furthermore, the high frequency of dissonant combinations of regulation configurations and conceptions of learning, points out that it is important for teacher educators to look at both regulation activities and conceptions of learning as an indicator for the lifelong learning competency of student teachers.

Appendix 1. Variables, questions and categories used for coding the different regulation activities in the Learning Reports

<table>
<thead>
<tr>
<th>Variable</th>
<th>Corresponding question in the digital log</th>
<th>Categories used for coding</th>
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<tbody>
<tr>
<td>1 Self-reflection on the learning outcomes:</td>
<td>What did you learn?</td>
<td>Rule of thumb; Knowing that; Knowing how; Knowing about myself; Specific teaching practice; Knowing why; Description of an experience.</td>
</tr>
<tr>
<td>2 Goal orientation: Did you plan to learn this, and if so, why did you want to learn this?</td>
<td>Judgement of current situation; Learning goal; Judgement of current situation &amp; learning goal; Direction of growth with learning goal; Direction of growth with judgement of current situation; No answer.</td>
<td></td>
</tr>
<tr>
<td>3 Sources of self-efficacy: What made you think you would [not] succeed in learning this?</td>
<td>Experience with learning object; Experience with learning strategy; Experience with learning context; Own qualities/efforts; Hope without argumentation; No answer.</td>
<td></td>
</tr>
<tr>
<td>4 Strategic planning: How did you learn this?</td>
<td>Learning by doing; Reflecting on evaluating; Interacting or getting feedback; Processing information; Applying theory to practice; No answer.</td>
<td></td>
</tr>
<tr>
<td>5 Learning strategy control: Why did you learn it in this way?</td>
<td>Argument for a way of teaching; Argument for a learning strategy; Part of an instruction; No conscious choice; No answer.</td>
<td></td>
</tr>
<tr>
<td>6 Monitoring of the learning results: How did you realise that you learned something?</td>
<td>Reflection on own performance; Experience of what works; Information from (behaviour of) others; Reflection on information of others; Novelty of information; No answer.</td>
<td></td>
</tr>
<tr>
<td>7 Self-evaluation of the learning experience: If you look back, about which aspects are you satisfied and what would you do differently next time?</td>
<td>Evaluation of learning strategy; Evaluation of learning context or own behaviour; Evaluation of moment of learning; Completely satisfied; Learning process under control of others; Evaluation of learning content; No answer.</td>
<td></td>
</tr>
<tr>
<td>8 Inferences for subsequent learning experiences: How do you proceed with this learning experience?</td>
<td>Action plan; Formulating new goal/wish; Consolidation; Improving practice; Applying to practice; No specific changes; No answer.</td>
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References


