

AN EXPLORATORY STUDY INTO THE NATURE OF  
SELF-REGULATED LEARNING IN TEACHER EDUCATION\*

Maaïke Endedijk, Jan Vermunt, and Mieke Brekelmans

IVLOS, Utrecht University

Perry den Brok

Eindhoven School of Education, Eindhoven University of Technology

Nico Verloop

ICLON, Leiden University

**Paper EARLI 2007\*\***

*\*This study is part of a project funded by the Netherlands Organization for Scientific Research (NWO), division social sciences (project 411-03-304).*

*\*\*This is work in progress. The abstract and some references are missing, some parts need further elaboration and the APA-style is not consequently used. Suggestions for improvement can be send to [m.d.endedijk@uu.nl](mailto:m.d.endedijk@uu.nl). If you want to make a reference to this paper, please contact the presenting author for the most recent version (+31 302532269).*

## AN EXPLORATORY STUDY INTO THE NATURE OF SELF-REGULATED LEARNING IN TEACHER EDUCATION

University-based teacher education is more and more organized in dual learning programmes in which two types of learning environments are combined: studying at the university and learning from practice at schools. These programmes often call upon a high degree of self-regulated learning (SRL) in student teachers: they have to self-evaluate their competencies, clarify their learning needs, formulate personal development plans, document their learning progress in a portfolio, reflect on their learning, adjust their learning processes and combine knowledge gained from teaching experiences and university courses. However, it is unclear whether student teachers are competent enough to regulate their learning processes to this extent, as well as how educational institutes can stimulate the development of this competence. Taks (2003) designed several learning practices to support and stimulate self-directed learning in teacher education, but had to conclude that full student-responsibility in learning practices in teacher education is hard to accomplish. For student teachers it is quite difficult to formulate meaningful learning goals, accomplish activities adjusted to these goals and reflect on learning experiences in this context.

Yet, to date research into SRL has focused primarily on student learning in traditional instructional settings, in this article also called academic learning. Different research foci have improved the understanding of academic self-regulation and have had important implications for school practices (Schunk, 2005). Because of the unique features of the student teachers' learning process, it is urgently needed to obtain scientific knowledge on the nature of self-regulated learning in dual learning contexts as

well, in order to find possible ways to stimulate the development of student teachers' SRL. This article aims at describing the nature of self-regulated learning in a dual learning environment as teacher education. The study is undertaken from a phenomenographic perspective (Marton, 1986; Akerlind, 2005). As with all phenomenographic research, the aim is to investigate variation in the underlying meaning of, or ways of experiencing, a phenomenon (in this case SRL), resulting in a set of categories of description. Furthermore, relations between these categories of description within learning experiences will be examined to describe qualitatively different ways of experiencing SRL as found in the group of student teachers examined.

#### Theoretical framework

Research on SRL during the last decade has provided insights into processes and models of SRL and useful applications of theory. In most theories self-regulation 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 behaviour, guided and constrained by their goals and contextual features in the environment (Pintrich, 2000). This process consists of different phases which represent a general time-ordered sequence that individuals would go through as they perform a task, although different phases can occur simultaneously (Pintrich, 2000). Phase 1 involves planning and goal setting as well as activation of perceptions and knowledge of the task and context and the self in relation to the task. Phase 2 concerns various monitoring processes that represent metacognitive awareness of different aspects of the self and task or context. Phase 3 contains efforts to control and regulate different aspects of the self or task and context. Finally, Phase 4 represents various kinds of reactions and reflections on the self

and the task or context (Pintrich, 2000). Research has demonstrated that both teachers and students draw on SRL strategies to cope with situational demands in the classroom (Randi, 2004). However, most of the studies have been focused on student learning, much less is known about the content of the phases of (student) teachers' regulation of their own learning.

From studies into student teachers' learning processes we know that these learning processes differ in essential aspects from student learning. Student teachers learn from many different sources of information and daily practice at the workplace has a big influence on their learning process. In the dual learning environment, the learning process is less linear and predictable than in contexts of academic learning. Furthermore, student teacher learning is more often embedded in activities that have a (working) goal in itself, instead of formulating learning goals and choosing tasks to reach them (Darling-Hammond & Sykes, 1999). Besides, much of that learning is unplanned and serendipitous, and does not have preset objectives or easily identifiable outcomes. Sometimes learning has significance over a very long timescale (Van Eekelen, Boshuizen & Vermunt, 2005). Nevertheless, from the perspective of lifelong learning, and because teachers act as role models for their students (especially since the focus on active and self-responsible learning at secondary schools has become more dominant), it is very important that student teachers during their education become competent in regulation this complex learning process.

Until now, only a few empirical studies into (student) teachers' self-regulation have been conducted. These studies have detected student teachers' conceptions of or attitudes towards SRL (Kremer-Hayon & Tillema, 1999) or have given suggestions for improving teacher education (Lin, Schwartz, & Hatano, 2005). Some studies have

focused on the preferences of (student) teachers for a certain (regulation of) learning style. The results of these studies have shown that student teachers say to rely minimally on self-regulation strategies (Donche, Vanhoof, & Van Petegem, 2003; Van Eekelen et al, 2005). Oosterheert and Vermunt (2001) found five different orientations towards regulation of learning to teach. Four of these strategies differed on the dimensions self-regulation versus external regulation, and directed towards performance improvement versus directed towards knowledge construction. The fifth orientation described student teachers holding tenaciously to their own field experience and hardly being able to report on self-regulation (Oosterheert & Vermunt, 2001).

Concluding, although considerable research has been devoted to the process SRL in the context of academic learning, rather less attention has been paid to this phenomenon in student teachers' learning processes. There is some information about the perception to and knowledge about student teachers' self-regulation and their preferred learning style. Student teachers *say* not to rely a lot on self-regulation strategies, but to our knowledge no research has been done about student teachers' self-regulation activities they undertake in different learning situations. To describe the nature of SRL in the context of teacher education, this study aims at answering the following two questions: *"Which categories of description can be identified to represent the variation in experiencing self-regulated learning in teacher education?"* and *"How are these categories of description related to each other within learning experiences?"*.

This study has been conducted at a post-graduate teacher education programme, meaning that students first have to finish their master's degree in a specific subject and then enter the one-year programme to obtain their teaching degree for secondary education. During their training year, student teachers attend weekly classes at the

university, while they are also doing teaching practice at schools or having a paid job as a teacher. Student teachers have much freedom in designing their personal curriculum, based on their prior experiences and concerns. They keep a portfolio in which they make self-evaluations and a personal development plan to direct their learning process. One part of this personal development plan concerns their own responsibility for their learning processes.

## Method

### *Sample*

Twenty-eight students of one Dutch post-graduate academic teacher education institute volunteered in this study. The student teachers were selected with the aim of capturing as much variation as possible in the following variables: Teaching experience, supervising teacher educator, school subject and gender. Seven student teachers who were not willing to participate (mostly because of lack of time), were replaced by other student teachers with the same characteristics on the variables.

### *Instrument*

For the measurement of self-regulated learning an open question log, called week report, was developed. This instrument asked student teachers to describe six times a self-chosen learning experience, stimulated by ten open questions. The choice for this instrument was based on the results of a pilot study in which four instruments to measure self-regulation in teacher education, including the week report, were compared (Endedijk, Vermunt, Brekelmans, Den Brok & Verloop, 2006). The questions of the week report were developed based on the conceptual model of Pintrich (2000), which represents a blueprint for the development of new instruments for measuring SRL. For

the different phases of self-regulated learning, as described in the theoretical framework, two or three questions were formulated. Phase 2 (monitoring) and 3 (control/regulation) were taken together, because not much separation between these two processes have been found in self-report instruments (Pintrich, 2000). Based on the results of the pilot study two questions were added about the learning context (question 4) and the learning subject (question 1) to increase the interpretability of the week reports. Student teachers were instructed to choose a learning experience from the last week and this could be any kind of experience that was part of their development as a teacher. The instruction asked them to answer every question that was relevant for their learning experience. The format of the instrument can be found in Appendix A.

#### *Procedure*

After the first contact by phone or e-mail, the student teachers received the instruction orally during an individual meeting with the researcher, and afterwards also on paper. Because of the diversity of student teachers' learning processes as described previously, the student teachers were stimulated to describe different kind of learning experiences: learning experiences that took place in the context of the teacher education institute as well as in the context of the practice school, either planned learning experiences and spontaneous learning experiences, and both successful and unsuccessful learning experience. It was explained to the student teachers that in case of an unplanned learning experience, some questions were not relevant. The student teachers were therefore instructed to answer these questions with "not relevant".

To stimulate student teachers to complete the reports weekly and send them back, they received a weekly reminder by mail and they were called when they did not answer within two weeks. In total 134 week reports were collected, 18 student teachers

completed all six week reports as required, four student teachers quitted after four or five week reports. Two student teachers did not send in more than three week reports and three others did not complete in a single report. One student teachers' week report was excluded from analysis, because the reported experience was not related to learning to teach. The reason for student teachers to stop before finishing all six reports was mostly because of illness, quitting teacher training or lack of time.

#### *Data analysis*

The data were analysed in two phases. In the first phase, the data were analysed in an iterative manner, repeatedly reading through the week reports to come to a set of categories covering the space of variation in self-regulation in the reported learning experiences. The first step of the analysis was becoming familiar with the answers on the questions of the week reports through reading all the week reports several times. During this phase memos were made to store first ideas about student teachers' self-regulated learning. Marton and Booth (1997) presented three primary criteria for judging the quality of a phenomenographic outcome space: Each category has to reveal something distinctive about a way of understanding the phenomenon; The categories are logically related as a hierarchy of structurally inclusive relationships; and the outcomes are parsimonious – i.e. that the critical variation in experience observed in the data be represented by a set of as few categories as possible. To meet these criteria, a process of continuously cycling between the quotes and the preliminary categories was needed. For this process the program ATLAS.ti was used, which made it possible to have the complete week report visible during the categorization of a fragment to maintain the context-boundness. After every iteration, the preliminary set of categories was critically examined by colleague researchers. Five iterations were needed to reach a stable set of



categories, covering the qualitatively different descriptions of self-regulated learning as reported in the week reports in as few categories as possible. During this process eight variables emerged, each representing a different aspect of the regulation process, around which the set of categories could be structured. All answers on the questions of the week report were coded in terms of the developed set of categories.

The second phase consisted of a Homogeneity Analysis using Alternating Least Squares (HOMALS) to determine relations between the categories within the learning experiences. This analysis can be interpreted as a classic Principal Component Analysis (PCA) for variables measured on a nominal level. HOMALS determines in an efficient way the relations between the categories of the variables, the variables themselves and the cases. The graphical representation of the object scores and of the category quantifications are the central outcomes of this analysis. Object scores are the values assigned to the cases on the dimensions of the solution and the category quantifications are the average object scores for all cases in the category (Van de Geer, 1985). In an optimal solution, objects within the same category are plotted as much as possible close together and objects in different categories as much as far apart together (Van de Geer, 1985).

For the interpretation of the dimensions the following procedure was used. First, on the basis of the category quantifications (loadings of the categories on the dimensions) the categories loading extremely high or low on the dimension were identified for every variable and these were summarized in a table. Similarities within the high and within the low scoring categories and differences between these opposite scoring categories were used for the interpretation of the dimensions. The plotted object

scores (loadings of the cases on the dimensions) were used as a validation for the interpretation.

## Results

### *Categories of description for self-regulated learning in teacher education*

Eight variables with in total 55 categories describing aspects of student teachers' self-regulated learning emerged from the phenomenographic analysis of the 133 reported learning experiences. In the following sections an overview of the variables and a global description of the corresponding categories will be given including some illustrating examples from the data. An overview of the set of categories of description can be found in Appendix B.

#### *1 Description of the learning object*

Student teachers started the week reports with a description of their object of learning. Even though the object of learning is not an aspect of SRL, differences were found in the *way of describing* the learning object which seemed to be related to SRL. Eight qualitative different kind of descriptions of learning outcomes were identified. The description often concerned teaching behaviour in terms of a skill, but also in terms of knowledge. Student teachers reported that they learned how to do something (procedural knowledge), that they learned what a good or bad way of doing is (norm of behaviour) or that they discovered a strict rule of behaving (rule of thumb). An example of the last category is: *"You should never promise students to come back later to help them, because they will keep you to this promise"*. Also "new information" in terms of knowledge or facts and "discovering a relation between concepts or events" were categorized as descriptions of learning outcomes. Besides, awareness of one's own learning was a reported learning

outcome. Furthermore, some student teachers did not describe a precise learning outcome, but only an experience they had. In these cases it was often possible to guess what the student teacher had learned, but this was not a part of the description.

### *2 Learning goal orientation*

This variable describes the argumentation of the student teachers for choosing the object of learning of the reported learning experiences. In case of an unplanned learning experience no learning goal orientation could have taken place, therefore these experiences were coded as “not relevant” on this variable. Within planned learning experiences the reported argumentations covered two main aspects, namely a judgment of the current situation and the learning goal a student teacher wanted to reach. These aspects were mentioned separately but also in combination. Furthermore, one of these aspects could be described explicitly or implicitly. For example, the combination of an explicit current situation in combination with an implicit goal: *“I am not satisfied about my students’ low discipline in the classroom”*. An opposite example is: *“I want to learn to be a more authoritative person”*. In this learning experience an explicit goal and an implicit judgment of the current situation was described as a motivation for learning.

### *3 Self-efficacy beliefs*

Self-efficacy beliefs concerns the student teachers’ beliefs with respect to their expectation of succeeding in the reported learning experience. This question was also not relevant for an unplanned learning experience, because it refers to the orientation phase of the learning process. Student teachers reported whether they expected to succeed in the learning experience. In some cases the self-efficacy beliefs were based on hope that the learning experience would end positively without an argumentation for it, or they stated that success is a choice, or in other words, *“failure is not an option”*. Other

argumentations concerned confidence or experience of the student teacher with the subject, the method of learning or the context in which the learning experience took place. Also the student teachers' confidence in their own qualities or efforts was mentioned as an argument. This could be a positive as well as a negative influence, for example: *"I was so uncertain about myself, that I couldn't imagine that this would be a success"*.

#### *4 The learning strategy*

The student teachers were asked to describe their learning strategy. Five qualitative different learning strategies could be discerned. These included learning by doing, learning in interaction (especially in the form of getting feedback), learning by listening or reading and by applying theory into practice. Student teachers also reported reflection or evaluation as a method of learning in combination with one of these learning strategies, for example: *"I learned this by just trying it and after that evaluating the students' reaction on it"*.

#### *5 Argumentation for a strategy*

In addition to the question about their learning strategy, student teachers were also asked to report their argumentation to choose this strategy. This question was also not relevant for an unplanned learning experience. In a lot of cases this question was not answered or student teachers mentioned that it was not a conscious choice or they said to be instructed to learn in a certain way, for example by a teacher educator. Therefore, the arguments given for choosing the learning strategy could only be discerned in two categories. The first is an argument for a way of learning, for example: *"I chose for this strategy, because it didn't cost me a lot of time and I expected good results"*. Secondly, sometimes student teachers did not report an argumentation for their own learning, but

for their way of teaching: *"This pedagogy is clear for my students and you can see immediately effect on their learning"*.

#### *6 Monitoring of the learning results*

The categories of this variable contain the different ways student teachers knew they learned something. These categories were quite comparable with the ones about the choice of the learning strategy. Student teachers reported that they knew they learned something by experiencing it went well, getting information from (behaviour of) others, and reflecting on information of others or on their own behaviour. Another argumentation was based on the novelty of the information; student teachers reported that for them something new always led to a learning experience.

#### *7 Self-evaluation of the learning process*

The student teacher were asked to reflect on their learning experience to find out what he or she in retrospect would have done differently. In some cases student teachers reported that they would have done everything the same, that they preferred to have learned the object in an earlier stage of their development, or that what they wanted to change was out of their reach or under control of others. In cases they wanted to have done things differently they mostly reported about mistakes they made or problems in the context of the learning experience and how they would do things differently next time, for example: *"Next time I will ask for a bigger classroom for my lessons"*. Student teachers also reported about possible changes in their learning strategy to obtain a better result.

#### *8 Forethought on a new learning experience*

This variable deals with the student teacher's plans to proceed with the learning experience. Seven different categories were identified, from which five are behaviour-

directed; trying again to reach the same learning result in the same way (in case of an unsuccessful learning experience), trying to maintain their behaviour in the way they learned in this experience, further improvement of the learned behaviour, adapting learned theory into practice or a description of a concrete action plan. This last category contains only reports of concrete activities without a reason for doing this: *"Next time, I am going to sit on a table in front of the classroom"*. In some cases the student teachers mentioned a goal or a wish for the future without any concrete actions to reach this: *"I would like to be less like a perfectionist, to be able to focus on more important thing. I want to be a normal perfectionist, not an extreme one"*. In other learning experiences no new plans were set.

#### *Comparison of categories of description*

Among this set of categories of description differences between categories seem to be related to the learning object, the learning situation and the richness of the answer. First of all, most categories describe regulation activities focused on teaching goals and aimed at regulating teaching behaviour. Not only in terms of what student teachers learned, but also in how they (knew they) learned and how they evaluated their learning. The words "doing" and "behaviour" are frequently repetitive words. Variables also contain categories related to the regulation of the learning process, but this is only a small minority of the reported learning experiences. Secondly, differences were found with respect to the level of collaboration with others during the learning experience. These others could give feedback or information, regulate the learning environment, or influence the learning experience by (not) cooperating. The last emerging difference between categories is the richness of the answers. Most variables have a "no answer" category as well as categories which show a more rich and deep argumentation. For

example variable 5 “Argumentation for a learning strategy” shows that the differences in categories of this variable are primarily based on the presence of a rich argumentation in comparison with no answer or mentioning that it was not a conscious choice. To test these proposed relations among categories of different variables within learning experiences a homogeneity analysis was conducted, which will be reported in the following section.

#### *Relations between the categories of description*

In total 133 different learning experiences were reported. A HOMALS was carried out on the complete set of 133 week reports, 8 variables and 55 categories to determine relations between the categories within the learning experiences. All learning experiences were coded according to the above described set of categories. In this analysis the category “not relevant” of variables 2, 3 and 5, were regarded as missing values. This prevented these categories to be near to each other because of always co-occurring together and thus influencing the HOMALS-solution. Based on the scree test (Cattell, 1966), a solution with two dimension will be interpreted. The eigenvalues of the two dimensions were respectively 0.44 and 0.36.

#### *Interpretation of the first dimension*

An overview of the on the first dimension high and low scoring categories per variable is provided in Table 1. The letters in front of every category refer to Appendix B in which all categories are summed up.

Table 1

*High and low scoring categories per variable on dimension 1.*

Variable	Low on dimension 1	High on dimension 1
1 Description of the learning object	E New information/facts	G awareness of own learning A Teaching behaviour
2 Learning goal orientation	F No answer	E Explicit judgment of current situation and an implicit goal
3 Self-efficacy beliefs	D Experience with learning strategy	F Own qualities/efforts E Experience with learning context
4 The learning strategy	C Learning by listening/ reading	E Learning by reflecting/ evaluating A Learning by doing
5 Argumentation for a strategy	B Part of an instruction	C Argument for way of teaching A No conscious choice D Argument learning strategy
6 Monitoring of the learning results	F No Answer E Novelty of information	B Information from (behaviour) of others
7 Self-evaluation of the learning process	C Learning process under control of others	D Change in learning context or own behaviour
8 Forethought on a new learning experience	H No answer D Applying learned theory into practice	A Trying again

Differences between the opposite scoring categories can be explained by the type of the learning process. The low scoring categories show regulation of a learning of theory that occurred in a context that was structured for this learning process. In a structured context (for example, a meeting at the educational institute), student teachers described in these learning experiences their learning object in terms of new information and learned this by listening or reading. They had experiences with this learning strategy, which influenced their self-efficacy beliefs and after the learning experience they proceeded with applying this learned information in practice. The learning process was reported to be under control of others, what resulted in the feeling of student

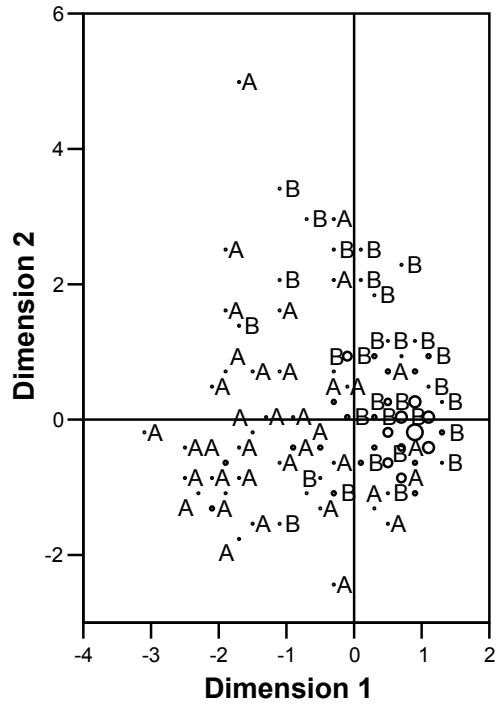


teachers in not having a possibility to choose a learning strategy and to change things during the learning process.

The high scoring categories fit more into regulation of behavioural learning in a context that was not structured for this learning process (for example, during teaching at the practice school). Student teachers learned in these learning experiences teaching behaviour or they became more aware of their learning process. They learned by doing and they argued for this learning strategy or for the way of doing. They monitored their learning with help of information of others and proceeded by trying again when they did not succeed.

To validate this interpretation all learning experiences were coded according to the structure of the context. A learning experience in an structured context were for example lectures at the educational institute or at the practice school and organized feedback situations with teacher educators or peers. Examples of unstructured contexts are the classroom at the practice school, conversations with colleagues and at home in bed. All the learning experiences (object scores) are plotted on the two dimensions in Figure 1, labelled by the type of context in which they occurred. This figure shows that the learning experiences in a structured context (A) are positioned on the left side of dimension 1 and the learning experiences in an unstructured context (B) are positioned on the right side of dimension 1. Therefore, the first dimension depicts the learning experiences in a structured learning context from those in an unstructured learning context.

Figure 1. Plotted learning experiences on two dimensions labeled by the structure of the learning context



A=object score of a structured learning context

B=object score of an unstructured learning context

*Interpretation of the second dimension*

Also for the second dimension all high and low scoring categories were identified per variable and these are summarized in Table 2.

Table 2

*High and low scoring categories per variable on dimension 2.*

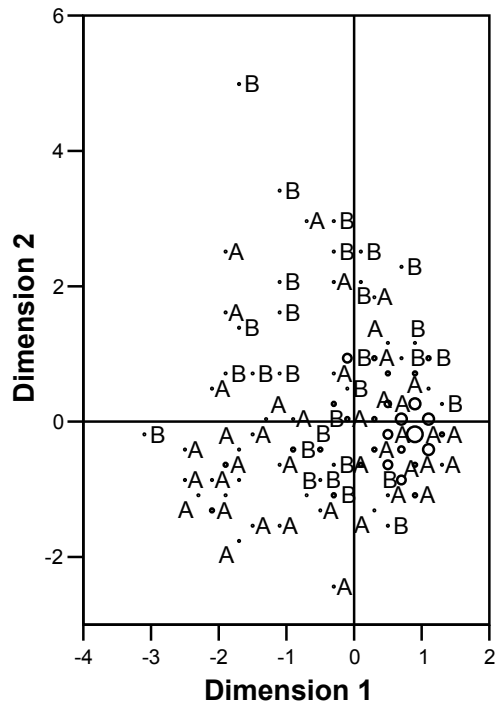
Variable	Low on dimension 2	High on dimension 2
1 Description of the learning object	C Norm of behaviour & D Rule of thumb	B Procedural knowledge G Awareness of own learning
2 Learning goal orientation	F No answer	C Judgment of current situation
3 Self-efficacy beliefs	A Hope without argumentation	F Own qualities/efforts D Experience with learning strategy
4 The learning strategy	F No answer	C Learning by listening/ reading
5 Argumentation for a strategy	E No answer	B Part of an instruction D Argument for way of learning
6 Monitoring of the learning results	F No answer	E Novelty of information
7 Self-evaluation of the learning process	F No Answer	E Change in learning strategy
8 Forethought on a new learning experience	H No answer	F Formulating new goal or wish G Nothing

An emerging result of this dimension is the clustering of the no answer categories on the low side of dimension two. Also for self-efficacy beliefs no argumentation is given and the learning object is described in a superficial way as a norm of behaviour or a rule of thumb. On the contrary, the high scoring categories are not only marked by giving answers and argumentations, but these are also more often focused on the learning process itself. With phenomenographic analysis we identified both categories describing regulation of learning as well as regulation of behaviour, especially the categories describing the regulation of learning cluster high on this dimension. In these learning experiences procedural knowledge and awareness of one's own learning was reported as a learning outcome and self-efficacy was based on the knowledge of own qualities or efforts or experience with a learning strategy. An argumentation for a learning strategy was given and also the self-evaluation was

focused on the way of learning. Looking forward to a new learning experience was done in terms of new learning goals or wishes. Concluding, this dimension can be interpreted as a distinction between a more aware and regulative way of learning in opposite to a lack of awareness and regulation. However, awareness and regulation of the learning process is often more described as a characteristic of a person than of a learning experience, the level on which this analysis was performed. Therefore, we also tried to find another explanation for this dimension that is more on the level of the learning experience. All student teachers were instructed to report different kind of learning experiences, both planned and unplanned. It may be possible that this dimension is related to the planned character of the learning experiences. On the contrary, also the questions who were not relevant for unplanned learning experiences, and thus only answered in case of a planned learning experiences showed a pattern of not answering on the low side of this dimension.

To verify this possibility all learning experiences were coded according to the planned character of the learning experience. This was based of one of the questions of the week report which asked the student teacher to describe whether he or she "*had the intention to learn this*". All the learning experiences (object scores) are plotted on the two dimensions in Figure 2, labelled by the planned character. This figure shows that the largest part of the planned learning experiences (A) are positioned on the lower side of dimension 2 and most of the unplanned learning experiences (B) are positioned on upper side of dimension 2. This suggests a relationship between the awareness and regulation of the learning process and the planned character of the learning experience.

Figure 2. Plotted learning experiences on two dimensions labeled by the planned character of the learning experience



A=object score of an unplanned learning experience

B=object score of a planned learning experience

### Conclusion and discussion

The aim of this study was to describe the nature of self-regulated learning in a dual learning programme as teacher education. Two questions were posed: *“Which categories of description can be identified to represent the variation in experiencing self-regulated learning in teacher education?”* and *“How are these categories of description related to each other within learning experiences?”*. Phenomenographic analysis of 133 week reports resulted in a set of 55 categories of description. These categories showed the variety in SRL in teacher education spread over eight different variables. It was proposed that the categories

within the variables differed with respect to the focus of the regulation process, collaboration with others and the richness of the answers. HOMALS identified an implicit structure within the categories that partly confirmed these ideas. The first dimension underlying the categories of description covered the differences in structure of the learning situations in which the learning experiences occurred. The second dimension measured differences in awareness and regulation of the learning process in which richness of the answers as well as the focus of the regulation process were crucial elements. In the following sections, we will search for explanations for these findings.

The existence of the first dimension in the data demonstrates that different patterns of self-regulation occur in different learning contexts. It is reasonable to expect that in different situations different learning objects and strategies of learning may occur. However, it is not said that the regulation of these learning processes also should differ. This suggests that the differences in the structure of learning context may be essential for the way of self-regulated learning. The differences in regulation in these contexts may explain the differences found in regulating behaviour of student teachers' themselves. The way how student regulation and teacher regulation may influence each other has previously been described by Vermunt and Verloop (1999) for the context of academic learning. However, we do not expect that this effect will be that large in teacher education: In teacher education one can hardly speak of external regulation, which is a form of support that leaves the learner little autonomy and hardly any responsibility for the learning process (Boekaerts, 1997). Within the pedagogy of teacher education in which the concerns of the student teachers are central in their learning processes, the concept of scaffolding will be more appropriate. The scaffolding metaphor

captures the idea of an adaptable and temporary support system that helps an individual during the initial period of gaining expertise (Boekaerts, 1997).

The second dimension exposed a distinction between high awareness and regulative way of learning versus lack of awareness and regulation with a relation to the planned character of the learning experience. Although planning and goal-setting is a key-factor in describing differences between skilful and naïve self-regulators (Schunk & Zimmerman, 1998), this dimension has not necessarily to be related to differences in competences between student teachers. The relation between this dimension and the planned character of the learning experience may also fit in an interpretation in which the learning situation is the explaining factor. In unplanned learning experiences, there is still the opportunity to regulate different aspects of the learning process, but less focus on the learning process itself may cause less awareness and regulation. In planned learning experiences there is from the beginning more awareness of being in a learning process, which makes it easier to steer the learning process. Further analysis with student teachers instead of the learning experience as the unit of analysis is necessary to find out whether this dimension is more person or situation related. Thus far, we can conclude that a planned learning experience fits more in high awareness and a more regulative way of learning. These findings are in line with research in the field of workplace learning from which we know that informal learning takes place on different levels of consciousness and that this is related to different levels of regulation. Eraut (2004) makes a distinction between deliberative, reactive and implicit learning. Especially the distinction between deliberative and reactive learning is comparable with the differences in regulation found within this dimension. Deliberative learning consists of learning where there is “a definite learning goal and time is set aside for acquiring

new knowledge” as well as “engagement in deliberative activities such as planning and problem solving, for which there is a clear work-based goal with learning as a probable by-product”. Reactive learning is intentional, but “occurs in the middle of the action, when there is little time to think”. (Eraut, 2004 p. 250). In a model describing the relations between time, mode of cognition and type of process Eraut (2004) shows that a deliberative or analytic mode of cognition is related to more conscious monitoring of thought and activity, self-management and evaluation, whereas a rapid or intuitive mode of cognition leads to implicit monitoring and short, reactive reflections. From the perspective of SRL this distinction may lead to valuing a deliberative way of learning above reactive learning, but then an essential part of the learning process at the workplace will be neglected. In our opinion, a better direction for improvement of regulation of reactive learning is to learn student teachers to situate these reactive learning experiences in their (self-regulated) process of development.

The format of the instrument used in this study may have underrepresented the regulation of this process of development, spread over multiple experiences. Although student teachers were instructed to describe learning experiences on different levels, the focus on the learning *experience*, may have caused reports of learning experiences limited to one experience. Furthermore, we have to realise that a HOMALS solution is only valid for the used cases and categories. This limits the possibility to generalize the results of this part of the study. Further research has to be done to confirm the existence of the different dimensions in a larger group of participants. This will not only test the validity of this study in other populations, but also makes it possible to find patterns of self-regulation within the different learning situation related to the student teachers’ quality of self-regulation.



Compared to what is known about self-regulation of student learning in traditional instructional contexts some differences and similarities were found in this dual learning context. Because of the used framework of Pintrich (2000) to develop the instrument, the main elements of SRL as described in his model also derived from the phenomenographic analysis. However, some of the variables consisted of different categories, were of different importance or contained a richer description of categories. According to Boekaerts and Corno (2005), for the most part theorists in educational psychology narrow the scope of students' SRL capability through a focus on the academic side of education: namely on learning goals. In this study, a lot of the reported learning processes were unplanned, not goal directed or directed by performance goals instead of learning goals. According to the definitions of Pintrich (2000) and Schunk & Zimmerman (1998) these would be signs of lack of self-regulation, even when these learning experiences contained in the monitoring and reflection phase a highly regulative way of learning. Therefore, in line with Boekaerts and Corno (2005), Eraut (2004) and Randi (2004), we argue that in teacher education SRL is not always directed towards a *learning* goal, but also often towards work-based goals with learning as a by-product. The same kind of categories as mentioned by Schunk and Zimmerman (1998) were identified with respect to the object of self-monitoring and the degree of self-evaluation and the attributions of learning, although the identified categories of this study also showed more variety, due to differences with respect to the learning context.

The in this study identified set of categories shows the unique nature SRL in teacher education and will be valuable for assessing the quality of student teachers' SRL. This could reveal deficiencies in student teachers' strategies to regulate their learning processes in different situations and assist with the design of teacher education

programmes to help student teachers developing these strategies. The identified relations between categories demonstrate the influence of the learning situations on student teachers' way of self-regulative learning. Based on this study, further research can be done in this context, taking into account the different learning situations and the less predictable and planned learning process of student teachers.

## References

- Akerlind, G. S. (2005). Variation and commonality in phenomenographic research methods. *Higher Education Research & Development*, 24(4), 321-334.
- Boekaerts, M. (1997). Self-regulated learning: a new concept embraced by researchers, policy makers, educators, teachers and students. *Learning and Instruction*, 7(2), 161-156.
- Boekaerts, M., & Corno, L. (2005). Self-regulation in the classroom: A perspective on assessment and intervention. *Applied Psychology: An International Review*, 54(2), 199-231.
- Cattell, R. B. (1966). The scree test for the number of factors. *Multivariate Behavioral Research*, 1, 245-276.
- Darling-Hammond, L. & Sykes, G. (1999). *Teaching as the learning profession : handbook of policy and practice*. San Francisco: Jossey-Bass Publisher.
- Donche, V., Vanhoof, J., & Petegem, P. V. (2003). *Beliefs about learning environments: How do student teachers think, reflect and act concerning self-regulated and cooperative learning in Flanders (Belgium)*. Paper presented at the AERA, Seattle.
- Endedijk, M. D., Vermunt, J. D., Brekelmans, M., Den Brok, P., & Verloop, N. (2006). *Measuring self-regulation in complex learning environments*. Paper presented at the ICO Toogdag, Amsterdam.
- Eraut, M. (2004). Informal learning in the workplace. *Studies in continuing education*, 26(2), 247-273.
- Van de Geer, J. P. (1985). HOMALS. In *Department of Data Theory, University of Leiden; nr. UG-85-02*. Leiden: Department of Data Theory.

- Kremer-Hayon, L., & Tillema, H. H. (1999). Self-regulated learning in the context of teacher education. *Teaching and Teacher Education, 15*, 507-522.
- Lin, X., Schwartz, D. L., & Hatano, G. (2005). Toward teachers' adaptive metacognition. *Educational Psychologist, 40*(4), 245-255.
- Marton, F. (1986). Phenomenography - A research approach to investigating different understandings of reality. *Journal of Thought, 21*(3).
- Marton, F., & Booth, S. (1997). *Learning and awareness*. Hillsdale, NJ: Lawrence Erlbaum.
- Oosterheert, I. E., & Vermunt, J. D. (2001). Individual differences in learning to teach: relating cognition, regulation and affect. *Learning and Instruction, 11*, 133-156.
- Pintrich, P. R. (2000). The role of goal orientation in self-regulated learning. In M. Boekaerts, P. R. Pintrich & M. Zeidner (Eds.), *Handbook of self-regulation*. San Diego: Academic Press.
- Randi, J. (2004). Teachers as self-regulated learners. *Teachers College Record, 106*(9), 1825-1853.
- Schunk, D. H. (2005). Commentary on self-regulation in school-contexts. *Learning and Instruction, 15*, 173-177.
- Schunk, D. H., & Zimmerman, B. J. (1998). *Self-regulated Learning from teaching to self-reflective practice*. New York: The Guildford Press.
- Taks, M. (2003). *Zelfsturing in leerpraktijken: Een curriculumonderzoek naar nieuwe rollen van studenten en docenten in de lerarenopleiding*. [Self-regulation in learning practices: A curriculum study into new roles of students and teachers in teacher education] Enschede: PrintPartners Ipskamp.

- Van de Geer, J. P. (1985). HOMALS. In *Department of datatheory, University of Leiden; nr. UG-85-02*. Leiden: Department of datatheory.
- Van Eekelen, I. M., Boshuizen, H. P. A., & Vermunt, J. D. (2005). Self-regulation in higher education teacher learning. *Higher Education, 50*(3), 447-471.
- Vermunt, J. D., & Verloop, N. (1999). Congruence and friction between learning and teaching. *Learning and Instruction, 9*, 257-280.

Appendix A Example of a week report

**WEEK REPORT - For a learning experience at the practice school**

Name:

Date:

*Description of the learning experience with help of the following questions:*

1. **What did you learn?**
2. **Did you have the intention to learn this? If yes, Why did you want to learn this?**
3. **Did you have the feeling that you were going to succeed? Why?**
4. **In what context did the learning take place (think about place, time, presence of others, your mood etc.)?**
5. **How did you learn it? Why did you choose this strategy?**
6. **From whom did you receive or miss help during this learning experiences? Did you ask for it?**
7. **How did you come to realize you learned something?**
8. **What kind of effect did this learning experience have on your self-confidence and motivation?**
9. **What elements of this learning experience did you experience as satisfying? What would you change the next time?**
10. **How will you proceed with this? Are you making new plans?**

Appendix B Set of categories of description of student teachers' self-regulated learning

1. Description of the learning object
  - a. Teaching behaviour
  - b. Procedural knowledge
  - c. Norm of behaviour
  - d. Rule of thumb
  - e. New information/facts
  - f. Relation between concepts or events
  - g. Awareness of own learning
  - h. Description of an experience
2. Learning goal orientation
  - a. Judgment current situation & explicit goal
  - b. Explicit goal
  - c. Judgment of current situation
  - d. Explicit goal & an implicit judgment of current situation
  - e. Explicit judgment of current situation & an implicit goal
  - f. No answer
  - g. Not relevant (in case of an unplanned learning experience)
3. Self-efficacy beliefs
  - a. Hope without argumentation
  - b. Success as a choice
  - c. Experience with learning object
  - d. Experience with learning strategy
  - e. Experience with learning context
  - f. Own qualities/efforts
  - g. No answer
  - h. Not relevant (in case of an unplanned learning experience)
4. The learning strategy
  - a. Learning by doing
  - b. Learning in interaction (feedback)
  - c. Learning by listening/reading
  - d. Learning by applying theory into practice
  - e. Learning by reflecting/evaluating
  - f. No answer
5. Argumentation for a strategy
  - a. No conscious choice
  - b. Part of an instruction
  - c. Argument for learning strategy
  - d. Argument for way of teaching
  - e. No answer
  - f. Not relevant (in case of an unplanned learning experience)
6. Monitoring of the learning results
  - a. Experience of what works
  - b. Information from (behaviour) of others
  - c. Reflection on information of others
  - d. Reflection on own behaviour

- e. Novelty of information
- f. No answer
- 7. Self-evaluation of the learning process
  - a. Everything the same
  - b. Earlier moment of learning
  - c. Learning process under control of others
  - d. Change in learning context or own behaviour
  - e. Change in learning strategy
  - f. No answer
- 8. Forethought on a new learning experience
  - a. Trying again
  - b. Maintaining same behaviour
  - c. Improving behaviour
  - d. Applying learned theory into practice
  - e. Describing action plan
  - f. Formulating new goal/wish
  - g. Nothing
  - h. No answer