Experienced teachers' informal learning in the workplace

Annemarieke Hoekstra

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Experienced teachers' informal learning in the workplace

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(met een samenvatting in het Nederlands)

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Voor

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Annemarieke Hoekstra
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Chapter 1

Introduction

In a rapidly changing society, teachers, like other professionals, are expected to keep learning throughout their teaching career. Teachers are, for instance, expected to keep pace with new insights into how students learn and integrate these into their teaching practice. During the large-scale school reforms of the past decades, it has become clear that teachers play a key role in the implementation of educational reforms. Currently, research focus on teacher learning is growing, and school boards as well as policy makers are becoming more and more aware of the necessity of assisting teachers in their professional development. In the Netherlands, numerous efforts are being made to enhance teacher learning, varying in degree of successfulness. Few of these efforts, however, are based on theoretical understandings of how teachers learn at work. A sound conceptual framework for describing the process of teacher learning at work is still lacking. The studies in this dissertation are aimed at contributing to such a conceptual framework of teacher learning in the workplace.

Until now, teacher learning has mainly been studied in contexts of professional development programs. A number of studies, however, report that teachers indicate they learn from activities undertaken during their daily work even when they are not engaged in any professional development program (e.g., Dunn & Shriner, 1999; Lohman & Woolf, 2001; Smaller, 2005). Not much is known about how teachers learn in such an informal learning context i.e. a context characterized by a lack of systematic support for teacher learning. The general aim of the research reported in this dissertation is to describe how experienced secondary school teachers learn at work in an informal learning context.

1.1 Context of the study

1.1.1 Part of a larger research project

This study into experienced teachers' informal learning in the workplace is part of a larger research project, aimed at providing a conceptual framework of teacher learning in the workplace as it takes place both in an informal and formal learning context.

Individual teacher learning is mainly studied in the context of professional development programs (Richardson & Placier, 2001). Cochran-Smith and Lytle (1999) point out that in the literature on teacher learning and development, many different conceptions exist of what teacher learning is, either explicitly formulated or implied by the authors. In studies on teacher learning in the context of professional development projects, teacher learning is mostly defined in terms of the outcomes of a professional development program: the improvement of teachers' knowledge and skills. The *process* of teacher learning has not been studied very often (Beijaard & De Vries, 1997), nor has the relation between the process and the outcomes of teacher learning. A sound conceptual framework for the study of teacher learning as a process is still lacking (e.g., Desforges, 1995). The larger research project, of which this dissertation is a part, is aimed at contributing to such a framework.

In this larger project, teacher learning is studied in three different learning environments: a trajectory of reciprocal peer coaching, a trajectory of guided collaborative groups and an informal learning environment (this dissertation). In the first project, teacher learning is studied as it takes place in an environment of a guided and facilitated trajectory in which dyads of teachers observe each others' lessons and coach each other in their learning in practice (Zwart, Wubbels, Bergen, & Bolhuis, 2007). In the second project, teacher learning is studied as it occurs in an environment that facilitates teachers' interdisciplinary collaborative groups, aimed at shared understanding and problem solving of issues regarded relevant by the teachers (Meirink, Meijer, & Verloop, 2007). The third project, which is the subject of this dissertation, focuses on teacher learning in an environment in which no trajectory aimed at teacher learning is organized or facilitated. A fourth project consists of an overall study concerning these three projects. The aim of the overall project is to develop a conceptual model of teacher learning in the workplace, based on empirical findings from the three other projects. Such a model may form a basis for further study of teacher learning as it takes place in the workplace.

1.1.2 Focus on fostering active and self-regulated student learning

In the larger research project it was decided to focus on one particular domain of teacher learning: fostering students' active and self-regulated learning. From 1998 onwards, large reforms took place in the Netherlands in the three upper grades (students aged 15-18 years) of secondary education. These reforms encompassed, among other things: mandatory change of the curriculum of all

subjects, the creation of new subjects and restrictions on the amount of tests per year. The time for subject-matter became restricted to a maximum number of study hours for students. Along with these mandatory changes, schools were encouraged to promote students' active and self-regulated learning (ASL). The adoption of this new pedagogy required for stimulating ASL was not legally enforced, but the government did promote this new pedagogy for two reasons. First of all because this pedagogy is in line with current theoretical conceptions of how students learn. The second reason was that studies had shown that students who entered higher education were not sufficiently capable of regulating their own learning. The new pedagogy was considered a way of preparing students for higher education.

The promotion of the new pedagogy for stimulating ASL was accompanied by concrete and specific proposals from a governmental study group (Stuurgroep Profiel Tweede Fase Voortgezet Onderwijs, 1994, 1996). It was, for example, proposed that certain hours formerly meant for subject-matter lessons became "free option hours" in which students could practice, under supervision, working more independently from the teacher. Schools were free to choose whether they wanted to implement the reforms in a policy-poor way; that is, only implement what was legally enforced, or implement the reforms in a policy-rich way and take over the recommendations from the governmental study group.

Even though schools differed in the extent to which they implemented the reform, all teachers are expected to change their teaching practices towards stimulating ASL. For a great number of teachers this innovation means a shift in their thinking and acting as a teacher. Teachers need to learn what it means to support ASL and why this is desirable, and also learn the kinds of behavior involved in stimulating students' ASL. At the start of the study in 2004, most teachers in the Netherlands were still struggling with this new role.

Focusing our research on exactly this domain of teacher learning had certain advantages. First, it was reasoned that experienced teachers are more likely to learn about ASL than about a certain topic of their profession that most experienced teachers need not learn about, for instance, classroom management. A focus on the innovation would thus enhance our chances of finding instances of teacher learning. Second, the innovation requires teachers to change rather drastically. The innovation is not just the incorporation of a new topic in the curriculum, but pertains to teachers' deeply held beliefs of what education is and their role as a teacher. Third, this domain of learning

applies to all teachers in the upper grades of secondary schools in the Netherlands. The extent to which each teacher had incorporated the promotion of ASL in his/her teaching practice could therefore be compared among all the teachers involved in the research. Moreover, insights into teacher learning within this domain are relevant to all teachers who teach in secondary schools in the Netherlands.

1.2 Conceptual framework

1.2.1 Teacher learning

In interviews, teachers themselves describe that they learn every day (Kwakman, 1999). They report to learn by doing their job, but also from other activities outside their job, such as parenting or being a sports coach. The question surfaces whether learning is the same as working, and whether people learn from all the activities during their life.

So what is learning? In an overview of conceptions of learning, Shuell (1986) describes that most definitions of learning reflect the following criteria; (1) learning implies a change in behavior or in knowledge, (2) this change must be relatively lasting, and (3) should result from practice or experience and not for instance from biological maturation or the use of drugs.

During the last few decades, studies on teacher learning have mainly focused on teachers' knowledge and how this knowledge comes about (Munby, Russell, & Martin, 2001; Richardson & Placier, 2001). In this dissertation, we not only focus on teachers' knowledge, but also on teachers' behavior as it changes over time. During their careers, teachers, after all, need to change their own behaviors to meet changing requirements. Both knowledge and behavior are thus important elements to study in a context of change. Changes in cognition and/or teaching behavior are seen as the outcomes of learning. These changes are not considered to be permanent, but relatively lasting as teachers carry on with their job.

In the workplace, learning is integrated in the work process, and occurs through engagement in work-related activities (Eraut, 2004; Straka, 2004). Hager (2005) states that "both work practices and the learning that accompanies them are processes" (p. 842). Learning in the workplace can thus be best understood as a process that is part of everyday work practices. In line with a perspective on learning as an active process (Shuell, 1990), learning, in this dissertation, is studied as it occurs through engagement in work-related

activities (Eraut, 2004; Straka, 2004). The activities thus constitute the learning process. When teachers' work activities lead to a change in their cognition and/or teaching behavior, we call these activities learning activities. Our definition of teacher learning is: *engaging in activities that lead to a change in cognition and/or teaching behavior.*

1.2.2 Informal learning

A number of authors have suggested that informal learning is a particular type of learning. These authors do not agree on what aspects of learning are characteristic of informal learning. Marsick and Watkins (1990) for instance, refer to informal learning as incidental and unintentional, while others state that informal learning is all learning that takes place in the workplace, including learning in organized programs such as mentoring and coaching (Colley, Hodkinson, & Malcolm, 2002). Billett (2002) argues that any attempt to characterize informal learning in such terms as incidental or unplanned is imprecise and misleading. Even though Billett acknowledges that learning in an informal setting can be less conscious and unintentional than in formal settings, he points to the fact that learning in formal settings can have the same character. Straka (2004) explains that learning can take place in a continuum of learning situations that range from completely formal to completely informal. In all these situations learning can be explicit or implicit, and planned or incidental. In line with the arguments of Billett and Straka, the word *informal* in this dissertation does not refer to any particular characteristic of the learning itself, but to the context in which this learning takes place. The word informal is associated with a lack of systematic support for learning and used to distinguish from learning in and through more formal settings where learning is systematically supported, such as the trajectory of reciprocal peer coaching, and the interdisciplinary collaborative groups organized in the other two studies of the larger research project. The word *informal* in this dissertation thus refers to a type of *learning environment*, not to a type of learning. In the studies reported in this dissertation, informal learning is defined as: *Learning that takes place in a context characterized by a lack of systematic support for learning.*

1.2.3 Levels of consciousness

In educational psychology there has been much interest in the activities with which learning can be actively and consciously directed towards pre-established learning goals. It is possible that teachers in an informal learning environment

are engaged in conscious goal-directed learning. A teacher might, for instance, want to learn more about instructional formats that stimulate students to evaluate their own work. This teacher may set aside time and effort to find and read a book and discuss the matter with peers.

However, an important message from studies and papers on informal learning is that conceptualizations of learning should not be restricted to conscious, self-directed forms of learning (Eraut, 2004; Marsick & Watkins, 1990; Straka, 2004). Learning in an informal environment may be incidental (Marsick & Watkins, 1990), unplanned (Straka, 2004), and may even take place beyond the learner's awareness (Eraut, 2004). For this reason, learning in this dissertation is not only studied as it takes place in and from goal-directed activities, but also as it takes place in reaction to events and situations, and as it takes place implicitly through recurring activities. More specifically, the first study of this dissertation is based on a theoretical typology of informal learning (Eraut, 2004) that takes several levels of consciousness into account. This typology consists of three types of learning: deliberative, reactive and implicit learning. Deliberative learning is conscious and planned. Reactive learning is also conscious, but happens unplanned. Implicit learning happens outside conscious awareness of learning.

1.2.4 Teachers' learning activities in an informal learning environment

In a review of research on teacher change, Richardson and Placier (2001) consider studies on individual teacher learning based on: (1) a biographical perspective by studying the critical incidents and 'relevant others' that influence teachers' understanding of themselves, their teaching and their views on student learning, (2) a perspective examining the stages of the teaching career, and (3) a perspective of learning in the context of professional development projects. All these studies stress the importance of experience for learning. But most of these studies do not describe the process by which teachers change.

For an understanding of the process through which teachers' change, scholars have embraced the work of Argyris and Schön (1978) and Schön (1983, 1987). Argyris and Schön describe learning during and from work in terms of reflection-in-action and reflection-on-action. In literature on teacher development, the notion of learning through reflection in and on action was welcomed as an alternative to the view of learning as the acquisition of knowledge for practice.

More recently, the concepts of reflection-on-action and reflection-in-action have been criticized. Regarding reflection-on-action it is argued that in such a process the role of others in providing critical input is undervalued (Day, 1999). Pertaining to reflection-in-action, authors have argued that, unlike Schön (1983) implies, reflection as it occurs in practice is never entirely rational (Eraut, 2004; Yinger, 1986). More specifically, scholars who studied teachers during their daily practice found that teaching is not only driven by rational thinking, but to a large degree by aspects such as emotions (Day & Leitch, 2001; Hargreaves, 1998b; Sutton & Wheatley, 2003) and needs (Dolk, 1997; Korthagen & Lagerwerf, 2001). For these reasons, this dissertation adopts a perspective on learning that embraces not only cognitive but also behavioral, motivational, and emotional aspects of learning activities.

Berings, Doornbos, and Simons (2006) view on-the-job learning as: "implicit or explicit mental and/or overt activities and processes, embedded in working and work-related performance, leading to relatively permanent changes in knowledge, attitudes or skills" (p. 334). This definition resembles the way teacher learning is understood in this dissertation, in the sense that these authors also stress the role of activities in the learning process and focus both on implicit and explicit, and also on mental and overt activities. Overt activities in this description express the behavioral component of activities, whereas mental activities may include the cognitive, motivational, and emotional component.

As a starting point for the description of teachers' activities, the research reported on in this dissertation aims to combine insights from two different types of research on learning activities. The first type of studies provide inventories of overt work activities teachers report to learn from, such as collaborating, reading, and experimenting with teaching methods. In the past decade a number of scholars have studied teacher learning by asking teachers what kind of activities they learn from in the workplace (Dunn & Shriner, 1999; Kwakman, 2003; Lohman & Woolf, 2001; Scribner, 1999; Smaller, 2005; Van Eekelen, Boshuizen, & Vermunt, 2005). Most of these studies provide classifications of activities teachers report to learn from. Taken together, these classifications reveal four major categories of activities:

1. Learning by doing;
2. Learning by experimenting;
3. Learning by getting ideas from others;
4. Learning by reflecting.

Moreover, the studies show that each of these activities can occur individually or in interaction with peers.

The second type of study focuses on the mental activities involved in learning, such as analyzing and evaluating (e.g., Mansvelder-Longayroux, Beijaard, & Verloop, 2007; Pintrich, 2004; Vermunt & Verloop, 1999). Vermunt and Verloop, for instance, studied students' mental learning activities in educational settings. They divide mental activities into cognitive, affective and regulative learning activities. Cognitive activities refer to mental activities dealing with getting to understand the subject-matter, such as relating, memorizing, applying and structuring. Affective activities refer to mental activities dealing with emotions such as concentrating, motivating and expecting. Regulative learning activities refer to the regulation of the other two types of activities. Examples of regulative activities are planning, testing, reflecting, and evaluating.

Combining the insights of these studies becomes possible when learning activities are understood to comprise simultaneously behavioral, cognitive, motivational and emotional aspects. The behavioral aspect of an activity can be, for instance, reading or collaborating, while the cognitive aspects may involve analysis and evaluation. Motivational and emotional aspects may involve affective activities such as concentrating and feeling surprised. An approach to work activities that builds on and combines the insights from both types of research discussed provides a learning perspective on work-related activities necessary to study a learning process that is integrated in work.

1.2.5 Conditions fostering informal teacher learning in the workplace

It is not easy to identify the factors in the school context that foster informal teacher learning. In a review study on teacher learning, Richardson and Placier (2001) argue that the relationship between school context and teacher learning is complex and ambiguous. The school as a learning environment for teachers can be studied from a number of perspectives. Lohman (2000), for instance, interviewed teachers on their learning and asked them about individual and environmental influences that they perceive have an impact on their learning. Lohman identified a number of what she calls 'environmental influences' on teacher learning, of which a great number can be related to the school. Examples of these environmental influences are: physical aspects of the building, school schedule, financial resources, policies and procedures, and

incentives and rewards. These factors can all be considered structural aspects of the school as an organization.

However, there may not be a straightforward relationship between structural aspects of the school and teacher learning. After all, when a building is designed for a certain purpose and way of use, it does not necessarily follow that the people who use the building use it the way the architect foresaw. Therefore, in this study we will not focus on structural conditions at the school level, but on the conditions within teachers' direct work environments as they play out in practice. Moreover, the focus is on how teachers experience these conditions, as teachers' own perceptions of workplace conditions may be more closely related to how they learn than more objective descriptions of these conditions. From literature on teacher learning in the workplace (Bakkenes, De Brabander, & Imants, 1999; Bakkenes, Vermunt, Wubbels, & Imants, 2006; Imants, 2003; Louis, Marks, & Kruse, 1996; Rosenholtz, 1989; Smylie, 1995; Smylie & Hart, 1999) five conditions for learning were derived: (1) autonomy as experienced by the teacher, (2) teacher collaboration, (3) reflective dialogue, (4) receiving feedback, and (5) shared norms and responsibility within the school. In our research, these five conditions are considered a starting point for data collection and analysis of the conditions for learning within the teachers' work environments.

Within the context of the reform encouraging teachers to adopt a new pedagogy of fostering students' active and self-regulated learning (ASL), cultural influences from within the school may influence what the teachers learn, more specifically whether they become more or less oriented towards the reform. Lasky (2005) explains that when teachers make sense of teaching and themselves as a teacher, the interpretations they make are mediated by the cultural tools and bound by the social structures (Coldron & Smith, 1999) that exist in the social space in which they work. Examples of the cultural tools that mediate teachers' sense making are the language, technology, teaching materials, and policy mandates available to them. Thus, when teachers redefine teaching and their own role as a teacher within the context of a reform, their interpretations depend on reform related concepts, educational tools and materials accessible to them.

The social structures that may bind teachers' understanding of teaching and themselves as teachers include "cognitive frameworks and affective templates as well as institutional practices" (Coldron & Smith, 1999, p. 715). Consider, for instance, a school that institutionalizes a practice in which teachers are to give

frontal instruction during one third of the lesson and students are to work independently on student tasks during the rest of the lesson. A teacher in this school cannot merely define his pedagogical role as a guide of student learning processes, as he partially has to fulfill the role of subject-matter instructor. However, the social structures that bind teachers' role definitions do not necessarily need to be institutionalized to be influential. It may also be that a school does not prescribe teachers how to allocate lesson time and a teacher decides to merely act as a guide of student learning. In this case it may be the students who start asking for frontal instruction as they may be socialized to perceive learning mainly as memorizing subject-matter through following teacher instruction. Besides the five conditions considered in the literature as fostering teacher learning, the present study will also focus on the dominant conceptions and practices regarding ASL within the school in relation to teachers' informal learning.

1.3 Research questions

The main aim of this dissertation is to contribute to a better understanding of experienced teachers' informal learning. The overall problem definition of the dissertation is:

- *How do experienced teachers learn in an informal learning environment?*

This dissertation covers three empirical studies, each adopting a different focus on this problem. The aim of the first study is to further conceptualize the concept of informal learning, and empirically underpin this conceptualization with data of teachers' learning activities as they occur on-the-job. This first study particularly focuses on classroom teaching activities that teachers learn from. The main question in this study is:

- *How can the activities be described through which teachers learn informally from classroom teaching?*

The aim of the second study is to describe teachers' informal learning by studying the relation between teachers' learning activities and the changes in their conceptions and behavior during a one-year period. The main question in the second study is:

- *What is the relation between teachers' learning outcomes and their learning activities in an informal learning environment?*

The third study aims to describe the relation between teachers' informal learning and conditions within their direct work environment. The main question of the third study is:

- *What is the relation between experienced teachers' informal learning in the school and school conditions that are assumed to foster teacher learning?*

1.4 Methodology of research into informal teacher learning

This section discusses a number of methodological issues concerning existing research into teacher learning and learning in the workplace.

Studies into teacher change indicate that in the beginning of teachers' careers, teachers change as a result of various events that greatly impact the beginning teacher. In later years, learning has a more subtle and gradual nature and takes place over a greater time-span (Richardson & Placier, 2001). Most studies into teacher change have relied on teachers' retrospective accounts of how their experiences have contributed to their development over the course of their career (Hoekstra & Beijaard, 2006). Such self-reports about change are increasingly questioned for their validity, because of their subjectivity and their appeal to memory, which is selective and often 'colored' by other experiences. Studies on stages in the teaching career mostly involve cross-sectional studies and do not take into account how a teacher shifts from one stage to another (Richardson & Placier, 2001). Neither of these types of studies offers insights into the gradual learning processes of experienced teachers. Or, in other words, these studies do not describe the activities that contribute to the subtle and gradual changes in a teacher's cognition and behavior.

In a review of methodological practices in on-the-job learning research, Berings et al. (2006) conclude that, up till now, the only research instruments used in current research on learning in informal learning environments are questionnaires and interviews. The authors argue that in questionnaires, administered only once, "deliberate learning, whether it is mental or overt, is satisfyingly measured, but that it is more difficult to measure spontaneous learning when using questionnaires" (p. 354). They further state that interviews

"can better provide insight into tacit processes and interpretations of experiences" (p. 354). The authors do acknowledge, however, that the use of interviews also has its limitations. They explain that talking about learning processes at work may be difficult, for employees are not used to considering their work from a learning perspective and may feel uncertain about reporting learning through, for instance, making mistakes. The authors therefore suggest the use of observations in combination with interviews would help the employees to become more aware of and make explicit the learning processes embedded in the observed experience. In the next section we will describe our research methods and research design. After that we will explain how our methods and design are aimed at addressing the issues discussed in section 1.4.

1.5 Research methods used in our studies

The overall design of the study can be considered as a multiple case study of 32 teachers, with a mixed methods approach (Johnson & Onwuegbuzie, 2004). For the first study in this dissertation, a multiple case study was conducted which focused on 4 of the 32 teachers. This multiple case study was aimed at exploring the activities teachers learn through from classroom teaching. The four teachers involved were interviewed twice at the start of the study. One interview, namely the concern interview, aimed to elicit the four teachers' major concerns regarding their teaching practices. The other interview, the context interview, aimed to study teachers' perceptions of their direct work environment. Six times throughout the year lessons of these four teachers were recorded and after each of the six recorded lessons the teachers were interviewed. The observational data is used to study the behavioral component of teachers' activities, while the interview data is used to study the mental component.

The whole group of 32 experienced teachers, including the four teachers in the first study, was more distantly followed over a period of one year. Figure 1.1 provides an overview of the data collection scheme. In our research we limited the study of teachers' change in cognition to studying changes in teachers' conceptions regarding ASL. At the start of the study in October 2004 and at the end in October 2005, data on the teachers' conceptions and behaviors was collected, twice by means of the same questionnaires. As we studied teacher learning regarding the domain of fostering students' active and self-regulated learning (ASL), these questionnaires referred to teachers'

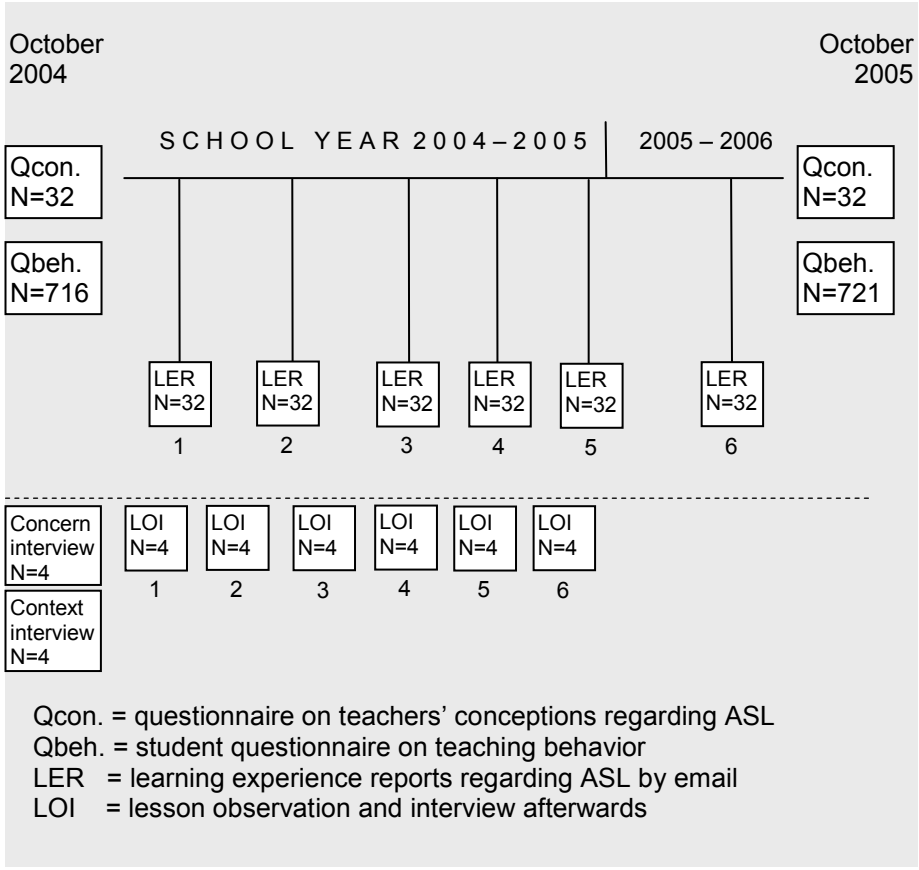

Figure 1.1 Overview of data collection.

conceptions and behaviors regarding this domain. For the study of teachers' behaviors, questionnaires were developed to be filled out by the students. In these questionnaires, students could give an indication of how frequently the teachers showed particular behavior regarding ASL. Our analysis of teachers' individual changes in conceptions and behavior was based on the individual differences in scores on the questionnaires between moment 2 (October 2005) and moment 1 (October 2004).

During the months between these two measurement moments, qualitative data was collected for the study of the work-related activities that might contribute to teachers' individual change. For all 32 teachers, teachers' written reports of learning experiences regarding ASL were collected six times during

the year via email. These written reports were intended to reveal data on both the behavioral and mental component of teachers' consciously undertaken activities. The relation between teachers' reported activities and their individual changes in conceptions and behavior have been analyzed both qualitatively and quantitatively.

The research instruments together, used in a longitudinal design, intend to cover a number of important elements in the teachers' learning processes, including the implicit activities in teacher learning. Table 1.1 displays which element of the learning process is intended to be covered by which instrument(s).

Table 1.1
Overview of instruments used to measure several elements of learning

	Instruments					
Element to be studied	Lesson observation	Interview after the lesson	LER [a]	Qcon [b]	Qbeh[c]	Context interview
Mental component of activities	-	X	X	-	-	-
Behavioral component of activities	X		X	-	-	-
Implicit activities, both mental and behavioral	X	X	-	-	-	-
Teacher change in conceptions	-	-	-	X	-	-
Teacher change in behavior	-	-	-	-	X	-
Conditions in direct work environment	-	-	-	-	-	X

[a]LER = learning experience report.
[b]Qcon. = questionnaire on teachers' conceptions regarding ASL.
[c]Qbeh. = student questionnaire on teaching behavior.

The research methods used in our studies have several features aimed at tackling the methodological problems mentioned in section 1.4 of methods used in former research on teacher learning and informal learning. First of all, measuring teachers' conceptions and behaviors both at the start and end of the study allows us to study teacher change without having to rely on teachers' retrospective accounts of how they change. For a more standardized method of studying teacher change, teacher questionnaires are used as a means to measure

teachers' conceptions and student questionnaires are used to study teachers' behaviors. A comparison of the questionnaire data at the end of the study and those at the start formed the basis for studying changes in conceptions and behavior.

Secondly, individual teachers are followed over a period of time. In contrast to cross-sectional studies, following individual teachers over a period of time also allows for the study of the process by which teachers change.

Thirdly, Berings et al. (2006) consider the combination of interviews and observation to be a method to make learning more aware and the learning embedded in work experience more explicit. In this dissertation, however, it is argued that the use of observations to make learning processes more explicit in interviews has its limitations too, mainly because it does not allow for the study of elements of the learning process that remain implicit. By following the teachers over the period of a year, using recurrent observations and interviews, it is possible to detect subtle shifts in cognition and behavior that the teacher him/herself may not be and does not have to become aware of. These observed shifts may reveal the implicit elements of teacher learning.

1.6 Theoretical relevance

The relevance of this dissertation lies mainly in its contribution to a conceptual framework of teacher learning in the workplace, which is the aim of the larger research project. As the study seeks to explore learning from more than a strictly cognitive perspective, it aims at expanding current understandings of teacher learning. More specifically, the study aims to explore learning beyond teachers' conscious and goal-directed endeavors by looking at activities on several levels of conscious awareness. Activities are conceptualized as encompassing cognitive, motivational, emotional as well as behavioral aspects.
A better understanding of how these aspects of the activities interact and how activities on several levels of conscious awareness interact with each other may provide insight into the processes that enhance or inhibit teacher learning in the workplace.

Moreover, the dissertation contributes to the innovation of methodological practices for the study of teacher learning embedded in daily work. A combination of observation and interviews in a longitudinal design aims to explore teachers' activities on several levels of conscious awareness. In the last chapter of this dissertation the strengths and limitations of the employed

research methods will be discussed and implications for further research will be provided.

1.7 Practical relevance

In professional development projects there is a tendency to focus on the organization of conscious and goal-directed learning activities. In such projects, teaching is often considered a rational activity. A better insight into teachers' learning taking place beyond these organized learning activities may help teachers, teacher educators and school managers to take the more implicit activities involved in learning into account. In addition, insights into how the conditions that foster teachers' learning in the workplace are shaped may help teacher educators, school managers and policy makers to explicitly include both the teacher as a person and the school as a context for learning in the design of professional development projects and educational reforms.

Both the research reported on in this dissertation and the conceptual framework that should result from the larger research project provides policy makers with empirically underpinned knowledge of how teachers learn in the workplace. Such knowledge could be used to design powerful environments for teacher learning, in which both the conscious and goal-directed as well as the more spontaneous and less conscious learning activities of teachers are addressed. Moreover, insights into how experienced teachers informally learn in the workplace may be helpful in designing teacher education in such a way that student teachers are prepared for continuous learning throughout their careers. In Chapter 5 we will elaborate on how this may be achieved.

1.8 Overview of this dissertation

In this dissertation three studies are presented, each in one chapter. After this introductory chapter, the second chapter reports on a multiple case study of four teachers, aimed at describing the activities through which teachers' may learn in and from their work. This first study particularly focuses on classroom teaching activities teachers may learn from.

The third chapter presents a study into the relation between teachers' activities and their changes in conceptions and behavior. The conceptions and behavior regarding students' active and self-regulated learning (ASL) of 32 teachers were measured at the beginning and end of a year. The teachers were

also asked to report on their learning experiences. By relating teachers' reported activities to their change scores, insights were obtained about the type of learning activities that contribute to teachers' change in conceptions and behavior.

The fourth chapter reports on the third study, which particularly aims at describing the relation between teachers' informal learning and conditions for learning within the teachers' direct work environment. In this third study, two teachers were studied who differed in learning outcome. One teacher changed in conceptions regarding ASL and the other teacher did not. The case studies highlight and illustrate these two teachers' informal learning in relation to conditions that in literature are assumed to foster teacher learning. Also, the dominant conceptions and practices regarding ASL within the schools in which these teachers work are taken into account.

In the fifth chapter the main results of these three studies are summarized and discussed, followed by implications for practice and suggestions for future research.

Chapter 2

Experienced teachers' informal learning from classroom teaching[1]

Abstract

The purpose of this chapter is to explore how experienced teachers learn informally, and more specifically, how they learn through the activities they undertake when teaching classes. Regarding these activities we studied four aspects: behavior, cognition, motivation and emotion. During one year, data was collected through observations of and interviews with four experienced teachers. For the analysis we used Eraut's distinction into three types of learning which differ in the degree of consciousness involved. We found several activities represented each of these types of learning. The findings demonstrate how cognitive, affective, motivational, and behavioral aspects are interrelated in classroom teaching and that learning from classroom teaching occurs at several levels of awareness. Hence, we argue that a theory of teacher learning should account for activities involved in the alignment of behavior to plan and account for the role of motivation and emotion. The findings suggest that improving the quality of teaching requires greater attention be paid to the interactions between teachers' cognition, emotion, motivation and behavior, and to promoting teachers' awareness of their implicit beliefs and behavioral tendencies.

[1] This chapter is published as: Hoekstra, A., Beijaard, D., Brekelmans, M., & Korthagen, F. (2007). Experienced teachers' informal learning from classroom teaching. *Teachers and Teaching: Theory and Practice, 13,* 191-208.

2.1 Introduction

This chapter aims to contribute to our understanding of the learning processes of individual teachers who are not involved in any professional development programs. Teachers report that they not only learn through participation in formal learning programs, but that they also learn during work in the absence of any program or structure organized for learning. Teachers indicate they learn through the activity of teaching itself (see, for instance, Kwakman, 2003; Lohman & Woolf, 2001). In their review on teacher change, Richardson and Placier (2001, p. 908) state that: "This form of [naturalistic] change has not been … examined much in the literature until recently."

When studying teacher learning, an important question is from what perspective to do so. In the studies discussed by Richardson and Placier (2001), teacher change has mostly been studied from a cognitive perspective, based on the assumption that teachers' behavior in the classroom is directed by teachers' rational thinking (see, for instance, Clark & Peterson, 1986). Several authors, such as Eraut (2002) and Yinger (1986), have raised doubts regarding this assumption, stating that teacher behavior is also driven by less-rational aspects. Scholars who studied teachers during their daily practice indeed found that teaching is not only driven by rational thinking, but to a large degree by aspects such as emotions (Day & Leitch, 2001; Hargreaves, 1998b; Sutton & Wheatley, 2003) and needs (Dolk, 1997; Korthagen & Lagerwerf, 2001).

Moreover, most studies on teacher change underline the importance of experience for learning. These studies rely mainly on teachers' own accounts of how past experiences have contributed to change. In the literature regarding informal learning in the workplace (Eraut 2004; Marsick & Watkins, 1990) it is argued that this learning remains partly implicit and is thus not available to the learner's conscious awareness. Hence, this learning cannot be found in teachers' reports. Until now, most studies on teacher change have mainly focused on conscious learning processes. Unconscious aspects of learning and emotional, motivational, and behavioral aspects of learning have received less attention (Korthagen, 2005). Our study therefore adopts a broader perspective for exploring teachers' informal learning than just the cognitive, and addresses both the conscious and less conscious aspects of learning.

In-line with notions of learning as an active process (Shuell, 1990), learning is studied as it occurs through engagement in activities. Because teachers report that they learn from teaching, the specific focus is on the activities teachers

undertake during classroom teaching. These activities have not yet been studied in depth from a learning perspective. The central question of this chapter is: *How can the activities be described through which teachers learn informally from classroom teaching?*

The aim of our study is to empirically underpin the concept of informal learning, hereby adopting a broader perspective than only a cognitive on the activities involved. Our findings may indicate clues for designing staff development projects that take into account the way teachers informally learn in the workplace.

2.2 Theoretical framework

2.2.1 Informal learning

In this study *learning* is defined as: being consciously or unconsciously involved in activities that lead to a change in cognition and/or behavior. We take into account that these activities comprise simultaneously behavioral, cognitive, motivational, and emotional aspects. The word 'change' is used as a neutral term to express that learning is not necessarily an improvement in terms of the educational norms advocated by others. In other words, when a teacher changes in a direction others consider to be wrong, we still call this learning.

In this chapter teacher learning is studied in a context where no program or structure for learning is explicitly organized by external actors and learning takes place through engagement in work activities. In literature on workplace learning this is also referred to as *informal* learning (Eraut 2004; Straka, 2004).

2.2.2 Levels of consciousness

Learning may take place on several levels of consciousness. In a formal learning context, organized activities are consciously undertaken by teachers with the intention to learn. Teachers may for example discuss learning goals or evaluate their own teaching practices with a peer. In this formal context, teachers might also learn unconsciously. For example, they might unconsciously develop beliefs about collaboration with other teachers or about professional development. Learning in an informal context can equally take place on a conscious and an unconscious level. Teachers might, for example, consciously experiment with new instructional formats to change their teaching practice. Unconsciously, teachers might, through a series of unpleasant experiences, develop an aversion against certain methods of instruction.

A theoretical typology of informal learning that takes several levels of consciousness into account is the typology of Eraut (2004). This typology consists of three types of informal learning: deliberative, reactive and implicit learning. Deliberative learning is conscious and planned. Reactive learning is also conscious, but happens unplanned. Implicit learning happens outside conscious awareness. Although Eraut gives examples of activities that might be involved in each type of learning, these examples, to our knowledge, only serve to illustrate the concepts, and are not derived from empirical research. Below the three types will be discussed, including the kind of activities that might be involved.

Deliberative learning

Deliberative learning involves engagement in activities either directed towards a "definite learning goal" or directed towards a "clear work-based goal" (Eraut, 2004, p. 250). When engaged in activities directed towards a *learning goal*, time is set aside for learning. A teacher might for example want to learn more about instructional formats that stimulate students to evaluate their own work. This teacher sets aside time and effort to find and read a book and discuss the matter with peers. On the other hand, work-based goal directed activities are any activity teachers undertake within the context of their job aimed at optimizing their teaching, for instance optimizing instruction to increase students' knowledge of the subject-matter taught.

The difference between *learning goal* and *work-based goal* is important, since in cognitive psychological theories of learning only activities directed towards a *learning goal* are considered to be learning activities (Vermunt & Verloop, 1999). In addition, most models of self-regulated learning are based on the assumption that learners consciously direct their activities towards a *learning goal* (Boekaerts & Corno, 2005; Pintrich, 2004; Zimmerman, 1995). When applied to informal learning however, the activities involved in self-regulated learning may be more often directed towards *work-based goals* than towards explicit *learning goals*.

Deliberative learning involves consciously undertaken goal-directed activities. To describe the types of learning that are less goal-directed and conscious, Eraut (2004) uses the labels reactive learning and implicit learning.

Reactive learning

Eraut (2004) gives examples of activities through which people learn reactively: "noting facts, ideas, opinions, impressions; asking questions; observing effects of actions" (p. 250). We can understand reactive learning to occur through activities that a teacher is consciously aware of, but which he/she does not undertake in order to change his or her teaching practices in a certain way. Schön's (1983) description of reflection-in-action can serve as a starting point to describe reactive learning. Two types of reflection-in-action Schön describes are hypothesis testing and move testing. In hypothesis testing a teacher understands a situation as being in need of a certain action or intervention. When the teacher's activities do not lead to the desired outcome, the teacher might conclude that he/she is dealing with a different type of situation. Schön calls this *reframing*. In move testing a teacher makes a move - in other words, undertakes a concrete teaching activity. When the outcomes are as expected, the activity is continued. When, however, the activity leads to unexpected negative outcomes, the activity is adjusted or aborted. Activities through which teachers learn reactively may thus include *reframing the situation* and *adjusting own actions*.

Implicit learning.

For a definition of implicit learning, Eraut (2004) refers to Reber (1993), who defines implicit learning as "the acquisition of knowledge that takes place largely independently of conscious attempts to learn and largely in the absence of explicit knowledge about what was acquired" (p. 5). Knowledge thus acquired is called tacit knowledge. Eraut links a few examples of activities to the acquisition of tacit knowledge. These activities include memorizing episodes, storing situation-action knowledge in procedural memory, and the implicit processing of knowledge. However, it might not only be tacit *knowledge* that is stored in memory. The tacit knowledge that is stored may be integrated with emotional and motivational aspects (Miltenburg & Singer, 1999). For example, if a teacher repetitively experiences frustration in interaction with two particular students who never complete their homework and laugh about it, this teacher may acquire a tacit-belief that these students are uncooperative. This understanding may be accompanied by an automatic trigger of frustrated feelings and a behavioral tendency to approach these students in a reproachful manner. Such a combination of tacit belief, feeling and tendency comes to operate automatically in situations similar to the situation in which it was

acquired (Miltenburg & Singer). Repetitive experiences thus may be activities through which teachers learn implicitly.

2.3 Method

This study is an exploratory multiple case-study. Exploratory studies are aimed at defining questions and hypotheses to be used in further research (Yin, 1993). A case study approach was adopted as a means to study informal learning in its natural context. Within-case analysis allowed us to study the activities of a single teacher chronologically and in relation to each other. In cross-case analysis, the activities found in the cases of single teachers were compared and contrasted in order to further refine our conceptualization of informal learning. This research design allows for exploration of the kind of activities through which teachers learn from teaching. We did not seek to provide a complete overview of all possible activities in informal learning.

2.3.1 Participants

In our study, four experienced teachers were followed during the 2004-2005 school year. These four teachers are employed at four different schools in several average size cities in the Netherlands. The teachers participated in the research project voluntarily and were aware that it would focus on teacher learning in the workplace. The four teachers who volunteered taught pre-university education classes, teaching students who were 15 to 17 years old.

Table 2.1
General characteristics of teachers who joined the study

	Gender	Age	Years of teaching experience	Subject taught
Nicole	female	55	22	Biology
Albert	male	46	20	Physics
Paul	male	37	7	Chemistry
Miranda	female	35	7	Dutch

In Table 2.1 some general characteristics of the participants are displayed. For anonymity reasons the teachers were given a pseudonym.

2.3.2 Data collection

To study teachers' activities from classroom teaching, data was collected on teachers' classroom teaching over a period of a year. Interview data was collected to gain insight into teachers' conscious cognitive, emotional and motivational aspects of activities. To gain more insight into behavioral aspects and less conscious activities, observational data was collected. After an initial interview, each teacher was visited six times during the year. Over the year, for each teacher a total of six lessons with the same class was recorded on videotape. After the lesson, situations from the lesson were discussed with the teacher. In the interview following the recorded lesson, cognitive, emotional and motivational aspects of activities were operationalized as questions concerning thinking, wanting and feeling.

Focus on teachers' concerns

In order to increase chances of actually finding examples of teacher learning, we decided to focus on those activities during teaching about which the teacher has a concern. We assume that by studying these activities, we are more likely to find teacher learning than by studying activities that a teacher has no concerns about. The concerns identified were all formulated by the teachers as something important for them to strive for. As such, the formulated concerns imply a wish for change.

Elicitation of teachers' concerns

At the beginning of the school year an initial open interview was held individually with all four teachers. They were asked to talk freely about their teaching, their worries and challenges. When the teachers finished elaborating on a topic in depth, they were asked what other things hold their attention in their teaching practice. We did not inform the teachers why we wanted to know their concerns, since this would increase their awareness of the topic and hence would be too strong an intervention. We assumed that if something was a major concern for the teacher, it would certainly come up in a 50-minute conversation about their teaching.

Video-recording of lessons and interview afterwards

A researcher (first author) sat in the back of the classroom to record teachers' lessons. During the lesson she selected concern-related situations to be presented to the teacher in the following interview. The researcher tried to

select four different situations within a lesson. In the following lessons observed, she tried to select situations that were similar to situations selected in earlier lessons. In the one-hour interview it was only possible to discuss a maximum of four situations.

After the lesson the teacher was interviewed. Each interview started with two questions: "How was this lesson for you?" and "Did anything important or unexpected happen during this lesson?" These questions were asked in order to be certain that no situation, which according to the teacher was a very obvious learning situation, would have be overlooked. It rarely occurred that a situation was overlooked, but if the teacher mentioned a concern-related situation that was not selected by the researcher, this situation was added to the selection to be discussed.

After these first two questions concerning the lesson as a whole, the four selected situations were presented to the teachers on a television screen, to help them recall the situation. After each situation was watched, the teachers were asked: "How did you feel in this situation?" "What did you want?" and "What did you think?" They were also asked whether they were consciously aware of the feelings, needs and thoughts they reported.

2.3.3 Data analysis

Concern-interviews

The audio taped initial open interviews, held to elicit teachers' concerns, were summarized by one researcher. The summaries of the interviews were read and analyzed by three researchers independently. When a teacher formulated several concerns, we selected one concern according to the following decisions. Firstly, the concern should be of relevance in classroom teaching in the current school year. Secondly, it occurred that all four teachers formulated at least one major concern related to a reform implemented in 1998 in the Netherlands. In this reform teachers are encouraged to promote the active and self-regulated learning of students. It was decided to select the concerns that were related to the reform, for this provided the researchers with one frame of reference that could be used for the data collection and analysis of all four cases.

All three researchers discerned from the summary what they thought was a major concern of each teacher in light of the reform. In a discussion following the comparison of the analysis, a consensus was reached on the formulation of this concern. This formulation served as a means for researchers to select concern-related situations from lessons observed.

Within-case analysis

Based on a second reading of the concern interview, the first author formulated some leading questions for analysis related to the main concern as identified before data collection. For example, Nicole's concern was to change her teaching practices to address students' intrinsic motivations and to make sure students started working on their own accord. Two of the leading questions for analysis of Nicole's data were: "How does Nicole deal with situations in which students seem unmotivated?" and "How does Nicole deal with situations in which students work on their own accord and ask Nicole for help?"

Table 2.2
Illustration of data of one situation in the case of Nicole

Example of part of the description of situation and Nicole's behavior	Example of interview data regarding this situation	Example of initial comments
Four students sit together in a group. The girl at the left asks a question. Nicole starts reading the assignment the girls are working on. The girl at the right starts answering the question. The girls have a discussion.	When they ask a question I have to quickly read those pieces of text and anticipate their question, which is rather difficult. Those two are working on the same question, so when I noticed that the other girl already had a standpoint towards the question, then I tried to get that out of her, because then I do not have to think myself, and in the meantime I can make up my mind, then I can calmly read the question…[…] When I walked away from these girls I felt content that these students started discussing without my intervention.	This situation is related to Nicole's concern because even though she did not intend the students to discuss together and do the thinking, this is what happened, as Nicole felt the need to read the assignment first for her own orientation. The fact that the students started their discussion on their own accord gives her a pleasant feeling.

1. First interpretation of the data

As a first analysis step, the data was studied per case in chronological order with the leading questions in mind. The first author studied and described the video-data, transcribed the interview-data and wrote down some initial interpretations. Table 2.2 provides an example of how the data of one situation was displayed in the case of Nicole. This situation that occurred in the second lesson was selected because Nicole gave students space to discuss together instead of answering their question. Nicole herself did not indicate this situation as being important or

unexpected. The complete document with the data of one teacher was then read by all four authors. In a meeting some of the situations recorded on video-tape were watched together and in this meeting the initial interpretations of the first author were reconsidered and extended.

2. Noting deliberative, reactive and implicit activities

As a next analysis step the data was studied once more per case by the first author. Notes were made on deliberative, reactive and implicit activities as identified in the data, hereby addressing the behavioral, cognitive, motivational and emotional aspects. The criterion to discern a teachers' deliberative activity was that the teacher had initiated the activity with a concern-related goal in mind. Reactive activities were identified as activities a teacher undertook unplanned in reaction to an event, which the teacher in the interview related to the topic of his/her concern. An implicit activity was identified when a teacher was engaged in activities or a situation that to the researcher appeared relevant to the teacher's concern, but that the teacher did not recognize as relative to his/her concern. From the situation in Table 2.2 it was concluded that Nicole's activities are examples of reactive learning. The students started working on their own accord and Nicole had to read the assignment first for her own orientation. The result of this situation was that Nicole became aware of and had a positive feeling about the students working on their own accord. She did not however have the intention beforehand to encourage the students to work on their own accord or to intervene in the situation as little as possible.

An example of an implicit activity for Nicole also occurred in another recorded situation. A student asked a question when Nicole was explaining to the class as a whole. Nicole started to answer this question for the whole class. She reported afterwards that she thought the question made sense and that the subject-matter was indeed difficult. In this situation Nicole did not refer to her concern-related goal to encourage students to think for themselves and work on their own accord. This was noted as an implicit activity, for Nicole showed no awareness for her concern-related goal. Because she experienced her behavior as meaningful, her belief that the subject-matter was too difficult for the students to study by themselves was reconfirmed.

3. Verifying notes on patterns of activities

   The notes made during the second analysis step were made when studying the data of one teacher in chronological order. Some of these notes were on patterns of activities. A third step in analysis consisted of verifying whether it was indeed plausible to speak of a pattern. For example, when studying a particular situation in Nicole's second recorded lesson, a hypothesis was made that when Nicole experiences feelings of uncertainty she is more inclined to use teaching methods she feels comfortable with. For the third analysis step, those segments of the data were selected in which Nicole reported feelings of uncertainty and situations in which she demonstrated her own traditional teaching behavior. This smaller sample of data was then reread and situations were compared, and it was found that in light of this sample this hypothesis was indeed plausible.

4. Understanding the story

   In order to understand how different activities of a teacher help or hinder the teacher from achieving his/her concern-related goals, a fourth analysis step was undertaken. This step consisted of putting all interpretations of the activities of a teacher together and presenting them in a coherent manner. This resulted in a two page report on the activities a teacher was engaged in within the domain of his/her concern. The report addressed the chronology of activities over a year's time and how they were related to the teacher's concern. To verify and increase the intersubjectivity of the findings, the selection and interpretations of activities made by the first author were regularly discussed by the research team. Also, when a two-page report of the case of one teacher was completed, all four authors read the report and compared it with the initial data. The report was then discussed and adjusted accordingly.

Cross-case analysis

After studying the activities within the case as an entity, cross-case analysis was conducted to create an overview of the different types of activities the teachers in this study were engaged in. For this a matrix was created similar to the content-analytic summary table (Miles & Huberman, 1994). Firstly, the activities of all four teachers were divided into three groups: deliberative, reactive and implicit activities, and put in three columns of the matrix. Furthermore, within each group activities were compared and contrasted with

each other in order to sort them into further subcategories. For the names of subcategories of deliberative activities we drew upon notions from literature regarding self-regulated learning: *orienting* (Vermunt, & Verloop, 1999) and *seeking feedback,* (see, for instance, Vancouver & Day, 2005) and from the literature on teachers' learning activities: *experimenting* (Kwakman, 2003; Lohman & Woolf, 2001). For the subcategories of reactive activities, we drew upon the notions of *awareness,* (Pintrich, 2004) *reframing* and *adjusting own actions* (Schön, 1983). The notions of *combinations of tacit beliefs, feelings and behavioral tendencies* (Miltenburg & Singer, 1999) were used to describe implicit activities. We used our own words to describe *practicing* and *deploying what works,* for we could not find notions in the literature to better describe these phenomena. This way an inventory was created of activities we found the teachers engaged in during teaching. In the following section these activities are described and illustrated.

2.4 Results

Table 2.3 provides an overview of activities discerned in the data and the cases in which we found examples of these activities.

Table 2.3
Overview of activities discerned and cases they were found in

		Found in data of:			
		Nicole	Albert	Miranda	Paul
Activities in deliberative learning	Orienting	x	x	x	x
	Practicing:				
	Deploying what works	x	x	x	x
	Experimenting with something new	x	x	x	
	Practicing new behavior	x		x	
	Seeking explicit student feedback			x	
Activities in reactive learning	Becoming consciously aware as such	x	x	x	x
	Becoming consciously aware and adjusting course of action	x	x	x	x
	Becoming aware and reframing		x	x	
Activities in implicit learning	Implicit acquisition and strengthening of a belief				x
	Inhibiting role of tacit beliefs, feelings and behavioral tendencies	x			

2.4.1 Activities in deliberative learning

Orienting

The first category, *orienting*, involves forethought on how to proceed and was found in the data of all four teachers. Either one option for further behavior is considered, or two or more alternatives are compared. Albert, for example, considered two alternatives in the following situation. After he asked a question in frontal interaction with the classroom, the students did not react. Albert started to explain the answer himself.

About this situation he reported:

> If you'd spent a bit more time on this, you could have initiated the answer and let the students finish it. That is what I actually preferred. … I chose not to do so because it would have cost too much time. I was fully aware of that. Because I wanted the students to work for themselves, too.

Albert thus chose to limit time spent on frontal explanation in favor of time for students to work on assignments, which is for Albert a concern-related goal. Thus in *orienting,* current goal and expectations based on past experiences are connected in order to choose behavior to better pursue a concern-related goal.

Deploying what works

Deploying what works was also found in the data of all four teachers. Paul, for instance, was faced with a group of students challenging him in two ways: a lower cognitive level and an unmotivated attitude of some students. Based on earlier positive experiences, Paul consciously gave frontal explanation to the students more often in order to keep up with the schedule for this class. And in order to motivate students to work harder, he more frequently planned tests, also creating more partial tests that only dealt with parts of a chapter. Through deploying what works, Paul's teaching practices became more teacher regulated. This contributed to achieving his goal, since at the end of the school year the students in this class had finished, according to Paul, an acceptable number of chapters with reasonable marks for their tests.

Experimenting with something new

A deliberative activity aimed at achieving a concern-related goal found in the data of three teachers was experimenting with something new. In the fourth observed lesson, for instance, Miranda experimented with peer review. This led

to new experiences for her: "For me it was also a surprise how it would work out. … At the end of the lesson there were students who reported that reviewing can be effective." During the school year we found Miranda using peer review as an instructional format more often. A successful experiment thus contributed to changing behavior.

Practicing new behavior

We found instances of practicing new behavior in the data of only two of the four teachers. During the lessons that were videotaped, we found Nicole struggling in her attempts to address students' intrinsic motivation, so that they would start reading their textbooks and working on their assignments of their own accord. She experimented with several forms of short introductions at the beginning of the lesson, in which she tried to invoke students' curiosity and make sure they were curious enough to start reading the textbook of their own accord. Nicole's success with this new behavior varied from lesson to lesson.

One way Nicole motivated herself to keep working towards her goal was to express her concern to the students. At a certain point in the fourth recorded lesson, Nicole told the students that she did not want to be a repetition of the text book. About this situation she reported:

> I didn't feel as desperate as in the situation before that. Because I heard myself tell these things and thought: yes, I still believe in this. It was like I was confirming myself. I was consciously aware of that in the situation.

Nicole also employed another activity aimed at changing her teaching practice: she sometimes withheld herself from the behavioral tendency to give an extended frontal explanation. After a student asked a question, for instance, she reported the following: "'Yes!' I thought, 'nice example!' That's why I say, 'Man! That's interesting' and then I withhold myself from explaining it. I want to explain it, but I prefer it when they find it out for themselves."

Practicing new behavior also involves emotion regulation as the following data of Albert show. Albert reported on a situation that took place at the beginning of the second lesson: "I planned to mainly let them work themselves, with only a short frontal introduction and then putting them to work." However, in order to pursue this goal, Albert had to deal with a feeling of irritation about the fact that a number of students showed up much too late for class. He reported: "I only notice the irritation … I don't try to oppress it, but

to get it gone by being busy with the lesson in a good way. My attention is then with the students." These three examples of activities teachers employ to practice new behavior involved motivating oneself, and control over behavioral tendencies and emotions.

Seeking explicit student feedback

A fifth type of deliberative activity we only found in the data of Miranda was seeking explicit feedback about the teaching practice. Miranda included student comments in her evaluation of her own teaching practices and during her lessons she explicitly asked feedback from the students. At the end of the peer reviewing lesson Miranda heard two students talk:

> There were students who said to each other that they found it effective. I heard that and I asked her: "do you like that?" and then she said she found it useful. It is nice for me to know that, it confirms my objective.

2.4.2 Activities in reactive learning

Becoming consciously aware as such

All four teachers reported instances of becoming aware of certain concern-related aspects during the lesson. Albert wrote part of his teaching materials several years ago. He was committed to the problem-based introduction of phenomena in physics and found that existing schoolbooks did not serve his purpose well enough. In the first lesson observed, Albert introduced a self-made problem-based assignment to the students. When the students were working in pairs, Albert walked around and assisted the students in their reasoning about the problem. Several groups of students Albert assisted had questions about the concept of potential energy. He reported afterwards:

> I noticed later that they did not have a clear idea of what that [potential energy] was. … And thinking back I think I have not done that entirely well. Some concepts were not clear enough for the students. To understand the whole story you actually have to know more about the phenomenon potential energy. I ignored that concept because it was mentioned in the former assignment, but in that assignment the question: what exactly is potential energy? was not dealt with either.

At the end of the interview, Albert mentioned that after this lesson he intended to alter the assignment and make sure it would pay more attention to the concept of potential energy.

Becoming consciously aware and immediately adjusting course of action

It often happened that the four teachers who joined this study became consciously aware of some undesirable consequences of their own actions and adjusted their actions to the situation at hand. For example, when Paul found himself confronted with the fact that his students had more questions than expected during frontal explanation, he became consciously aware of the fact that this frontal part of the lesson would take too long. Since Paul was highly committed to his goal to keep pace with the schedule, this made him feel uneasy. Paul: "I felt a little stressed out and a bit unhappy that the explanation was going to take too long, so I thought I want to conclude the explanation now." And he did conclude the explanation.

Becoming consciously aware and reframing

Several instances of reframing were found in the data of Albert and Miranda. In two of Miranda's lessons, it occurred that she interpreted student behavior as students not being very willing to work on the given task. Miranda approached these students in an attempt to correct their behavior, but in interaction with the students it appeared they had been working on the task seriously, but just had not written down very much since they were still discussing the subject-matter. Miranda: "I assumed that they had not done much, but that appeared to be wrong. It surprised me." Miranda said she was consciously aware of this. In the third lesson a similar situation occurred, where a student had not done much. In this situation, the activity encompassed feelings of surprise. Miranda:

> I was surprised that this girl had not done anything yet, and I assumed that she did not feel like working at all. It surprised me that this particular girl had difficulties with this task. I realized: Jeez, that's also possible.

2.4.3 Activities in implicit learning

Implicit acquisition and strengthening of a belief

In his lessons, Paul was faced with the unmotivated work attitude of a number of students. Paul reported feelings of anger and irritation about their attitude, but in contact with these students, Paul was very permissive. Paul initially

showed an implicit tendency to focus attention elsewhere. This noncommittal attitude seemed connected with his belief that a number of the students did not need to work hard in order to get acceptable marks: "There are guys and girls who can make the assignments in less than no time, and just whip through them." And after the second lesson: "There are students who can afford that, by doing nothing they can still score a sufficiently good mark." After the fourth lesson: "I noticed that a number of students did not work … there are students in this class who do not need to work though." In the same interview after the fourth lesson Paul reported: "In this specific lesson I made a conscious choice: I'll help those who work, and for those who don't work, I'll warn them, but I won't put too much energy in them." Here Paul consciously makes the choice to show behavior that he had already shown before on a less conscious level. Each time he displayed this behavior, the underlying belief seemed to get stronger. It even resisted counter information when one of the students, Pete, received a relatively low mark. When handing over the test results to Pete, Paul told him to start working, since his mark demonstrated he did need to work. After the next videotaped lesson, Paul saw that Pete and Mike were not working on their assignments. Watching the video, Paul said: "I see now that Pete and Mike are not working behind my back. As a matter of fact, this is not a real disaster, because they really pick up everything in no-time." It seems that Paul's belief about the capacities of Pete and Mike grew strong during the year, so strong that it resisted counter information, when Pete got an insufficient mark.

The data also provided examples of situations in which a teacher was not aware of a discrepancy between an operating whole of beliefs, feelings and behavioral tendency and a 'planned change'. Nicole's concern was to encourage students' intrinsic motivation so that they would start working and regulate their learning on their own accord. She wanted to reduce direct instruction time and increase the time students collaboratively worked on tasks. In several lessons Nicole relapsed into her old teaching behavior. This especially happened when Nicole perceived the students to be uncertain. In the second lesson she reported:

> I have to present an overview of this theory quickly and strongly, because they said they did not see the structure anymore. I was consciously aware of my thoughts. I wanted to put the subject-matter on the rails, so that they'd leave the classroom with a good feeling, like 'oh is that what we're doing'. That was my

> intention. … [I thought] now I have to make sure that they know exactly what to expect.

Comforting the students when they felt uncertain made Nicole feel good. In the third lesson she told the students that she would repeat the most important subject-matter of the last months. About this situation she reported:

> I noticed that they liked it that I put that on the rails. I gave them a feeling of certainty about the exams next week, because they really don't look forward to that. … That is nice. It strokes my ego, that I know what they want and that I meet their needs. … It was exactly how I wanted it to be and I enjoyed it.

Nicole seemed to have the implicit belief that students should not feel uncertain. The behavioral tendency Nicole had is to reassure the students and to regulate their learning activities. Reassuring students satisfied her need to feel good about herself. At the same time she had the belief that when she presents the subject-matter to the students, then at least "they all know it." She felt uncertain, not having control over what students learn when they are working in groups on the tasks she gave them. Feeling her own uncertainty or experiencing students' uncertainty, Nicole sometimes relapsed into her old teaching behavior, thus inhibiting herself to changing her teaching to encourage students to start working on their own accord.

2.5 Discussion

The aim of this study was to explore – in an informal context – the activities teachers may learn from during classroom teaching. Based on empirical evidence, we were able to describe activities related to three types of informal learning distinguished by Eraut (2004): deliberative, reactive and implicit learning. By adopting a broader perspective than only a cognitive and by addressing several levels of consciousness, we found important types of activities involved in teacher learning that are not accounted for in current theories of teacher learning.

As regards teachers' *deliberative learning,* the practicing activities that involve the alignment of behavior to plan, aimed at changing behavior, are not described in the literature on self-regulated learning. When the theory on self-regulated learning is applied to informal learning, it should be extended by

activities such as practicing new behavior and suppressing a behavioral tendency. The literature on self-regulated learning does, however, describe the activities involved in orienting and seeking feedback (Pintrich, 2004; Vermunt & Verloop, 1999). Apparently these activities are used in work-based goal-directed action in the same way as they are in learning goal-directed action.

Pertaining to *reactive learning*, the data indicates that monitoring happens on a less conscious level than theory on self-regulated learning maintains. Vermunt and Verloop (1999) describe that "monitoring means that learners actively observe whether their learning activities lead to progress in the intended direction" (p. 262). Although we do not know whether the teachers were actively observing progress in the intended direction during their teaching, the fact that teachers did not systematically become aware of concern-related aspects suggests that they were not always monitoring in the sense of active observation. Monitoring often seemed to happen on a less conscious level. In this respect further research into the nature of monitoring during teaching seems to be relevant.

Regarding *implicit learning*, the fact that teachers are not aware of their implicit learning makes this phenomenon hard to study, especially because patterns only become available after intensive study of data collected over a period of time. We found two phenomena, each only in the data of one teacher. The data of one teacher showed how interrelated beliefs, feelings, and behavioral tendencies can implicitly be acquired over time through repetitive experiences. Miltenburg and Singer (1999) call such a whole of interrelated elements a cognitive-affective scheme. They describe that cognitive-affective schemes come to operate in an automatic manner. This concurs with the data of another teacher demonstrating that when not regulated, elements in the cognitive-affective scheme are automatically triggered and influence teachers' behavior, even when a teacher explicitly tries to change this behavior.. Underlying this phenomenon are non-rational factors: teaching appears to be largely driven by emotions (compare Day & Leitch, 2001; Hargreaves, 1998b) and needs (compare Evelein, 2005). Although the role of less rational and less conscious aspects is increasingly addressed in research on *teaching*, there are no theories available that adequately account for the role of these aspects in teachers' *learning* from teaching. Since evidence of implicit learning was only found in the data of two teachers, our conclusions regarding implicit learning are therefore limited.

Overall, the fact that teachers differed in which activities they employed in the context of their concern may indicate that teachers differ in their learning approach.

In sum, our findings indicate that a theory of teacher learning should take into account that learning during classroom teaching takes place at several levels of conscious awareness, and that the activities involved encompass not only cognitive but also behavioral, motivational and emotional aspects. A theory of teacher learning should also address the influence of individual and contextual factors on teacher learning. For example, our data demonstrated that some teachers, when confronted with challenging situations, tend to rely on teaching behavior that has rendered success in the past.

In this respect, interesting questions for further research would be how activities that teachers learn from are related to individual characteristics such as motivation to learn and tolerance for uncertainty, and factors within the school such as available support for learning.

2.5.1 Limitations to our study

Although we have been able to contribute to the body of knowledge on informal learning, the method used has its limitations. First, our method of data collection may have influenced the learning process. Three of the four teachers reported that watching themselves on video and talking about their teaching practices was one of the more important learning activities during the year we studied them. We tried to reduce the influence of the researcher by not informing the teacher that we focused on one of the concerns they mentioned in the initial open interview. Nevertheless, we cannot be certain whether the activities we found might occur in a similar way in situations where the teacher is not part of a research project.

Second, our findings are based on the data of only four situations from six lessons of four teachers, and were related to a particular concern. We do not know if our inventory of activities gives a full record of these four teachers. It could be that by focusing on concern-related activities we have only been able to capture a specific type of activity. There may be other types of activities, not related to any concerns of a teacher that a teacher may learn from. We also do not know to what extent our inventory describes the activities of other teachers.

Third, it would be interesting to know how often certain activities occurred in each teacher's entire learning process. But since we have only focused on a

part of the learning of the teachers, it is unclear to what degree the activities we found are representative of all of the teachers' activities over the whole year.

Fourth, this study has focused particularly on learning from classroom teaching, but teaching is not the only activity teachers may learn from. They may also learn informally from activities such as interacting with colleagues, marking students' assignments, creating materials, self-study and activities at home such as parenting. In this respect it would be interesting to study the relations between these activities and the classroom teaching activities.

2.5.2 Implications for professional development

Our findings demonstrate that teachers do not always learn optimally during their teaching. This can partly be explained by the informal nature of the learning environment: teachers often do not consider themselves as learners. This may also explain why they are sometimes not sufficiently alert in picking up clues from the environment to learn from. Neither do teachers seem to allow themselves to make mistakes, for they feel their primary responsibility is students' learning, not their own learning. The interrelatedness of cognitive, affective, motivational and behavioral aspects in classroom teaching suggests that real change can only occur when all of these four aspects are addressed. The consequence for teacher professional development is that besides a focus on changing teachers' cognition, there should be ample attention to teachers' affects and motivations. Teachers should also be stimulated to practice new behavior, even when this elicits uncertainty in themselves and their students. Through such guided practice of new behavior, cognitive-affective schemes may be acquired that afterwards support new behavior (see, for instance, Wubbels, 1992). Such approaches may complement strategies such as observations in the classroom, critical questioning of behavior and feedback, which will in our view also be strengthened through the broader perspective on teacher learning that we propose.

We believe that attention to the fact that teacher learning involves more than cognitive activities only and that learning takes place at several levels of consciousness may contribute to bridging the gap between theory and practice in teacher education and professional development projects.

Chapter 3

Experienced teachers' informal learning: learning activities and changes in cognition and behavior[2]

Abstract

This chapter focuses on informal teacher learning: work-related learning that is not systematically supported. The central question addressed is: What is the relation between teachers' learning outcomes and their learning activities in an informal learning environment? In the study the conceptions and behavior regarding students' active and self-regulated learning (ASL) of 32 teachers were measured at the beginning and end of a year. The teachers were also asked to regularly report on their learning activities. The results show how teachers differ in the way they change and the activities they report. Activities that focus on new practices and simultaneously involve meaning-oriented mental activities could be related to a change towards more ASL-oriented conceptions.

[2] Hoekstra, A., Brekelmans, M., Beijaard, D., & Korthagen, F. (2007). *Experienced teachers' informal learning: learning activities and changes in behavior and cognition.* Manuscript submitted for publication.

3.1 Introduction

How do teachers learn? Although there is a body of literature describing teacher learning in formal learning contexts, little is known yet about the kind of teacher learning that occurs in the absence of any facilitation for learning (Richardson & Placier, 2001). In this chapter the focus is on experienced teachers' informal learning in an innovative context. Informal learning, in this study, refers to work-related learning that is not systematically supported by others. More insight into teachers' informal learning at work is highly important, because in today's society lifelong learning is becoming the standard in all kind of professional fields. But, unlike professionals in many businesses and industries where workplace training is common practice, the majority of teachers in the Netherlands -- and probably other countries too -- do not often receive much systematic support for their learning. After the induction phase when entering the profession, teachers are usually only incidentally supported in their learning. Hence, for experienced teachers, informal learning is usually the only option for learning.

Nevertheless, teachers report that even when learning is not supported, there are all kinds of activities they undertake during work that they learn from (Dunn & Shriner, 1999; Kwakman, 2003; Lohman & Woolf, 2001). The question is, however, what this unsupported learning through daily work looks like and whether and how teachers change through this learning. More insight into teacher learning in an informal learning environment may help to organize support for teacher learning in a way that increases activities that contribute to desired changes and decreases activities that prevent this change. The main question we will therefore address is: What is the relation between teachers' learning outcomes and their learning activities in an informal learning environment? In this question, learning outcomes refer to changes in cognition and/or behavior.

This study aims to contribute to understanding teachers' informal learning by combining the insights from two types of studies on learning activities. The first type provides inventories of observable work activities teachers report to learn from, such as collaborating, reading, and experimenting with teaching methods (e.g., Lohman & Woolf, 2001). The second type focuses on the mental activities involved in learning (e.g., Mansvelder-Longayroux et al., 2007). In our study these insights were the starting point for the collection of data during one year from 32 experienced teachers. These teachers did not join any professional

development program during that year. The collected data included both qualitative and quantitative data of teachers' learning experiences and their conceptions and behavior.

3.2 Conceptual framework

In line with a social-constructivist perspective on learning as an active process (Shuell, 1990), we studied learning as it occurs through engagement in learning activities. In educational contexts learning activities are organized by teachers and educators. In the workplace, however, learning is integrated in the work process, and occurs through work activities (Eraut, 2004; Straka, 2004). Most conceptualizations of learning imply a relatively lasting change in behavior or capacity for behavior. This change should be the result from practice or experience, and not processes as biological maturation (Shuell, 1986). Hence, in this study we define learning as engaging in activities that lead to a change in cognition and/or behavior.

3.2.1 Learning activities

When teachers' work activities lead to a change in cognition and/or behavior we call these activities *learning activities*. In our study of teachers' learning activities in the workplace we draw on two types of studies on (student) teacher learning. One type studies observable learning activities, such as collaborating and reading. The other type focuses on the nature of the mental activities involved in learning, such as memorizing and analyzing.

In the past decade a number of scholars have studied teacher learning by means of interviews, logbooks and questionnaires in which teachers indicated what kind of activities they learn from in the workplace (Dunn & Shriner, 1999; Kwakman, 2003; Lohman & Woolf, 2001; Scribner, 1999; Smaller, 2005; Van Eekelen et al., 2005). Most of these studies provide classifications of activities teachers report to learn from. Taken together, these classifications reveal four major categories of activities: (1) Learning by doing; (2) Learning by experimenting; (3) Learning by getting ideas from others; and (4) Learning by considering own teaching practice. The studies show that each of these activities can occur individually or in interaction with peers. Individually means, 'not in interaction with colleagues'; it does not necessarily mean, 'when being alone'. Individually undertaken activities include activities such as browsing the Internet and reading, but also activities taking place in classroom teaching.

Regarding the first category, teachers describe that they learn from their experiences as they carry out their job as a teacher. In literature on workplace learning it is stated that informal learning may be incidental (Marsick & Watkins, 1990), unplanned (Straka, 2004), and may even take place beyond learners' awareness (Eraut, 2004). In an earlier study, we studied teachers' learning by doing, taking the possibly unplanned and implicit nature of learning into account (see Chapter 2). This study revealed that amongst others, two different activities seem to be important in the teachers' learning process. One of these activities is experiencing friction. The study showed that during teaching, teachers sometimes realized that their behavior or teaching method did not have the expected consequence. Teachers were either happily surprised by the enthusiasm and activity of the students or they experienced that their "good idea" or usual teaching behavior did not work out as they expected. Teachers thus became aware of a discrepancy between what they expected and what they perceived to happen. In this chapter this awareness is referred to as *experiencing friction*. The second activity found was struggling with behavioral tendencies. When teachers practice new behavior, they sometimes struggled with behavioral tendencies which were part of their old routine, and they sometimes fell back on their old routines.

In sum, four main categories of teachers' learning activities can be distinguished: (1) Learning by doing, including: (1a) learning by experiencing friction, (1b) learning by struggling with behavioral tendencies; (2) learning by experimenting; (3) learning by getting ideas from others; and (4) learning by considering own teaching practice. The four main categories of activities may occur either individually or collaboratively.

Nature of teachers' mental activities

It does not only matter whether or not a teacher undertakes the activities as described above, but also what a teacher thinks when undertaking the activity. For instance, regarding learning in interaction, it is argued that teacher collaboration contributes to their learning (e.g., Little, 1999). However, some studies have shown that when two teachers attend the same meeting, one teacher may learn a lot while the other may learn nothing (Little, 2002). Teachers' mental activities involved in the collaboration seem to determine whether a teacher learns from the collaboration or not. For this reason, the nature of teachers' mental learning activities was included in this study.

A starting point for examining the nature of teachers' mental activities was a distinction made by Mansvelder-Longayroux et al., (2007), who discriminated between meaning-oriented and action-oriented learning in her study of student teachers' reflection as reported in their portfolios. Student teachers who were action-oriented mostly described a situation and then evaluated whether their behavior or their teaching method was adequate or not. The aim of their learning was the improvement of their own performance as a teacher. Some of the students reported meaning-oriented learning: Learning aimed at understanding the processes underlying teaching. When writing their portfolios they were engaged in mental activities such as critical processing, analyzing and diagnosing.

3.2.2 Teachers' conceptions and behavior in the context of reform

As regards teachers' cognition, studies have distinguished between several different types of knowledge and beliefs, according to their nature, content or both (Munby et al., 2001). This chapter concentrates on teachers' conceptions of teaching and student learning. Klatter (2003) describes conceptions of learning as systems of interrelated beliefs about different aspects of learning. Analogously to this description, conceptions of teaching can be described as systems of interrelated beliefs about different aspects of teaching.

In the present study, teachers' conceptions are studied in the context of a reform that was implemented in 1998 in the Netherlands. In this reform, teachers are encouraged to foster students' active and self-regulated learning (ASL). Previous research into teachers' conceptions of teaching and student learning in the Netherlands indicates that teachers differ in the extent to which they embrace ASL-oriented conceptions of teaching and learning (Bolhuis, 2000; Oolbekkink-Marchand, Van Driel, & Verloop, 2006). It was decided to focus on exactly this domain of teacher learning, because as the reform encourages teachers to change their teaching practice, most experienced teachers are more likely to learn about ASL than about aspects of their profession that may be less problematic, for instance, classroom management. A focus on this innovation would thus enhance our chances of finding instances of teacher learning.

In their study on secondary school teachers' conceptions of student learning, Bolhuis and Voeten (2004) distinguished three topics that refer to central issues in research on active and self-regulated learning. These are (1) self-regulation of learning, (2) learning as active construction of knowledge, and

(3) the social nature of learning. In this chapter, the study of teachers' conceptions of teaching and student learning is limited to these three topics, as they are relevant within the context of the reform.

The same three topics were also the starting point of our study of teachers' behavior regarding ASL. We will focus, for instance, on how often teachers stimulate their students to formulate their own opinion, how often they give students tasks to work on collaboratively and how often they discuss with students how to best approach a certain task.

3.2.3 Research questions

Even though the reform, in which context this study took place, was implemented years before, at the time of data collection many teachers still struggled with the requirements. It was possible though, that at the start of the study a number of the research participants fully agreed with the theory behind the innovation and already showed the behavior required. This is why firstly the teachers' positions regarding the reform at the start of the study were considered, before examining teachers' change. More specifically, our research questions were:

1. How can the teachers at the start of the study be positioned in relation to each other by their conceptions and behavior regarding ASL?
2. Did the teachers' conceptions and behavior regarding ASL change in the course of one year? And if so, how?
3. What activities did the teachers report to have learned from during this year?
4. To what extent can the changes in conceptions and behavior be related to the activities reported by the teachers?

3.3 Method

3.3.1 Participants

For this study 32 experienced teachers from 21 different schools in larger and medium size cities in the Netherlands were recruited via school principals and teachers' subject-matter communities' mailing lists. A minimum of five years of teaching experience was required to make sure that teachers were not working at a novice level. All these teachers taught in the upper grades of secondary pre-university schools in the Netherlands (students aged 15-18). There were one to four teachers per school. Teachers joined the research voluntarily. Table 3.1

gives a summary of the teachers' sex, subject-matter, age, and teaching experience.

Table 3.1
Characteristics of Research Participants

Sex		
Female	14	
Male	18	
Subject-matter		
Languages and Arts	13	
Sciences, including Computer Science	14	
Social Studies (societal studies, economics)	5	
Average age	46	sd=9.4 min 27, max 63
Average years of teaching experience	21	sd=10.0 min 6, max 40

3.3.2 Data collection

In October 2004 and one year later, in October 2005, the research participants filled out a questionnaire regarding their conceptions pertaining to stimulating active and self-regulated student learning. This questionnaire is further referred to as the *questionnaire on ASL conceptions*. They also received questionnaires to be filled out by their students regarding the teacher's ASL stimulating behavior, further referred to as the *student questionnaire on ASL behavior*. Each teacher was asked to distribute this questionnaire in one class in the same grade level both in 2004 and 2005. For example, if one teacher's grade 10 class filled out the form in 2004, in 2005 she was asked to distribute the questionnaire also among her then grade 10 class. The questionnaire was only distributed after the teacher had taught a class for at least 10 weeks. In 2004, a third of the teachers collected data from several different class levels to ensure comparability in class levels between 2004 and 2005. In the period between the two measurement moments, the teachers were also asked to report six times on their learning experiences regarding students' active and self-regulated learning via email to be sent to the first author. A frequency of more than six reports per teacher was considered too much of a burden for the teachers who voluntarily joined this study. Every six weeks, teachers received a reminder and a deadline for sending their learning experience reports.

3.3.3 Instruments

Questionnaire on ASL conceptions

In order to measure teachers' conceptions of teaching and learning in the context of the reform, a questionnaire was developed with three scales, representing the three underlying topics of self-directed learning (see section 3.2). These scales will be further referred to as: student regulation, construction and collaboration. The scale on student regulation of learning represents both cognitive and affective regulation. Teachers could score all items on a 5-point Likert scale ranging from (1) *absolutely disagree* to (5) *absolutely agree*. To obtain optimal scales, a large group of items were pre-tested in a pilot study involving 74 experienced teachers. Certain items were removed to obtain reliability scores larger than .70 (Cronbach's alpha). The new scales were retested on a group of 94 experienced teachers. Again items were deleted from the scales following the same criteria. The reliability scores of the resulting scales varied between .73 and .89 (Cronbach's alpha) based on the group of 94 teachers. Table 3.2 provides examples of items, numbers of items per scale, and the reliability scores (Cronbach's alpha) of the scales, based on a dataset of the 32 teachers that joined the present study.

Student questionnaire on ASL behavior

For the measurement of teacher behavior, a student questionnaire was developed along the same topics as the questionnaire measuring teachers' conceptions. In many research projects student perceptions of teachers' behavior proved themselves to be reliable (D'Apollonia & Abrami, 1997). And since student scores are based on at least three months of experience with this teacher, the scores represent a more general impression of a teacher's behavior than the impression an observer would be able to give based on observations of a few lessons. The items of the questionnaire of teachers' conceptions were reformulated in terms of teacher behavior. Students could score all items on a 5-point Likert scale, ranging from (1) *This teacher hardly ever shows this behavior* to (5) *This teacher almost always shows this behavior*. The questions were discussed with different groups of students in several construction rounds. Subsequently, the questionnaire was distributed among 100 students to pilot the instrument, and based on the outcomes scales were further refined. Based on a new data set of

Table 3.2
Questionnaire on ASL Conceptions, Items, Scales and Reliability Scores

Scale	Examples of items (translated from Dutch)	number of items	α 2004 N=32	α 2005 N=32
Student regulation	*Cognitive* Students learn better if they themselves assess whether the learning process evolves according to plan. It is important that I as a teacher ask the students how they think to address a task effectively. *Affective* Students learn better if they are aware of their emotions. It is important that I as a teacher stimulate the students to think about what they like to do and what they like less.	20	.89	.90
Construction	Students learn better if they themselves create links between components of the subject matter. It is important that I stimulate students to underpin their own opinion.	7	.82	.84
Collaboration	Students learn better if they think about their tasks together with their peers. It is important that I as a teacher let the students regularly collaborate.	7	.85	.82

Table 3.3
Student Questionnaire on Their Teachers' ASL Behavior, Items, Scales and Reliability Scores

Scale	Examples of items (translated from Dutch)	number of items	α 2004 class level N=54	α 2005 class level N=32
Stimulating student regulation	*Cognitive* This teacher asks us how we think we should address a task. *Affective* This teacher encourages us to think about how we can deal with feelings of anxiety and uncertainty.	8	.84	.84
Stimulating construction	This teacher stimulates us to underpin our own opinion.	5	.81	.78
Stimulating collaboration	This teacher gives us collaborative tasks.	7	.88	.90

139 groups of 94 teachers, a number of items were removed to obtain optimal reliability of scale scores (Cronbach's alpha's between .78 and .96). Table 3.3 provides examples of items per scale, numbers of items per scale, and the reliability scores (Cronbach's alpha) based on the groups of students of the data set of the 32 teachers involved in the present study. For each scale, reliability scores represent the internal consistency of the class average scores in 2004 and 2005. As the first author regularly observed the lessons of six of the teachers, she was able to confirm face validity for the scores on the *student questionnaire on ASL behavior* of these six teachers.

Teachers' learning experience reports

Six times during the school year, the teachers were invited to report, by email, a learning experience related to the promotion of active and self-regulated learning of students in as much detail as possible. For efficiency reasons it was decided to collect written reports instead of interview data. At the start of the study the teachers received some instruction on the kind of information needed to examine both their mental and more observable learning activities. Not only reports of successful experiments were explained to be welcome, but also disappointing experiences, general reflections on ASL, incidents in the classroom that make a teacher think, etcetera. To obtain a comprehensive overview of the teachers' activities, teachers were asked to write a coherent report about their learning experience. In order to stimulate teachers to not only report concrete actions in their story, they received a yellow card, to be kept in their agenda, with a list of questions such as: "What did you learn?" "What were your thoughts beforehand, during and afterwards?" "What did you want to achieve?" "Who was involved in the situation?" These questions were asked to help teachers think of different aspects to include in their reports on their learning experience.

3.3.4 Data analysis

Grouping teachers by their scores on conceptions and behavior

In order to determine teachers' positions at the start of the study, groups of teachers were constructed based on teachers' scores on the *questionnaire on ASL conceptions*. Another group division was made based on teachers' scores on the *student questionnaires of their teachers' ASL behavior*. Criteria for group membership were the extent to which teachers scored above average or below average on certain scales (see results section for specification). By means of multivariate

analysis it was determined whether groups scored significantly different from each other on the scales. Grouping allowed us to retain information about the score pattern of teachers over the three scales, which would have been lost if, for instance, sum scores had been used. Relationships between group membership with age and years of teaching experience was assessed by means of ANOVA. For the relation between group membership and type of subject-matter taught contingency coefficients were calculated.

Analysis of change

To analyze teachers' change the Reliable Change Index (RCI) was used (De Fruyt, Van Leeuwen, Bagby, Rolland, & Rouillon, 2006; Jacobson & Truax, 1991). The RCI allowed us to determine which part of the score difference between scale scores on the first and second measurement represents teachers' change and which part is an artifact of the inaccuracy of the questionnaires.

Teachers' change scores on the *student questionnaires of ASL behavior* were obtained from the difference between class average scores from two different groups of students for each of the three scales. This change in behavior could theoretically represent a teacher's variation in behavior in two different groups of students and thus not represent a change in behavior over time. In order to check this, we have compared teachers' change scores over time with the differences between class average scores. 17 teachers collected data from two classes of students on the first measurement. We compared differences between classes of these teachers measured at the same moment with differences between classes measured at the start and end of the study. In 94% of the cases a comparison could be made, a teacher's absolute change score over a year's time was larger than this teacher's difference in class average scores measured at the same moment. This confirms that the change scores over time, as determined by the RCI, more likely represent a teacher's change in behavior rather than a variation in behavior related to teaching different groups of students.

Analysis of teachers' learning experience reports

One of the aspects teachers reported in their learning experience reports was what they had learned. The analysis of the teachers' reports started with highlighting these reported learning outcomes, according to a procedure described by Zwart et al. (2007). Next, the combination of activities was coded that according to the teachers' report contributed to this outcome. For instance,

if a teacher reported to have experimented with a student task on peer assessment, which led her to learn that students learn a lot from assessing each other's work, 'students learn a lot from assessing each others' work' was coded as a learning outcome, while the experiment was coded as a learning activity. Codes for activities were derived from the categories of activities discussed in the conceptual framework. Each activity was coded to be either undertaken individually by the teacher, or in interaction with colleagues. Also, the nature of the teachers' mental activities involved was coded as action-oriented, meaning-oriented or none reported. Thus codes were created for six modes of each category as displayed in Table 3.4 for the category of experimenting.

Table 3.4
Six Modes of a Category of Activities

	Nature of mental activities		
Experimenting	Action-oriented	Meaning-oriented	No mental activities reported
Individually	mode 1	mode 2	mode 3
In interaction	mode 4	mode 5	mode 6

For instance, Alisson, a French teacher wrote about a learning experience in which she experimented with 'student lessons', where students prepared to teach and then taught a part of the lesson. Alisson reported that she got the impression that the students thought they learnt well this way, and that they liked it. Alisson concluded: "I am positive about this teaching method and I will use it again". This whole activity was coded as 'individually experimenting involving action-oriented mental activities'. For further analysis the number of times each code appeared in all the reported learning experiences of each teacher was counted.

Relating change scores to activities

In order to relate activities to changes in conceptions, four clusters of teachers were created based on both their initial and change scores on the *questionnaire on ASL conceptions*. Analogously to these clusters, four clusters of teachers were distinguished based on their initial and change scores on the *student questionnaire on ASL behavior*. To relate activities to teachers' change scores, the learning activity frequencies per cluster of teachers were compared by means of ANOVA. For those teachers who did not send six stories of their learning

experiences, the individual frequencies of their activities were first corrected for the number of learning experience reports they sent.

3.4 Results

3.4.1 Teachers' positions at the start of the study

As regards the first question, the results show that at the start of the study the 32 teachers considerably differed from each other in ASL-oriented conceptions and ASL-oriented behavior. Figure 3.1 presents an overview of each teacher's position in two groups: a position in group A to D, based on their score on the *questionnaire of teachers' ASL conceptions* and a position in group 1, 2, or 3 based on the scores on the *student questionnaire of teachers ASL behavior*. In Figure 3.1, each teacher is represented by a square with a number 1 to 32.

The position on the vertical line reflects teachers' group membership according to their conceptions. Group A, (in cells A3 and A1) are *ASL-oriented* in their conceptions; these teachers have above average scores on the three scales. Group D teachers have below average scores on the three scales: these teachers are much less ASL-oriented in their conceptions. The remaining teachers showed two strikingly different score patterns. One score pattern consisted of above average scores on collaboration, and average or below average on the other two scales. Teachers with this pattern are called *collaboration oriented* (group B). The other pattern consisted of above average scores on construction, and average or below on the other two scales. Teachers with this pattern form group C, called *construction oriented*. Multivariate analysis indicated that the groups scored significantly different from each other on the *questionnaire on ASL conceptions* (Wilks' Λ=.513; F(9/63.428)=2.224; p=.032).

The 32 teachers were also divided into three different groups based on the students' scores of their behavior. Unlike the group division based on the teachers' conceptions, a group with above average scores on the construction scale only could not be distinguished. Hence three groups were created: teachers with *ASL-oriented behavior* (group 1, cells with number 1), teachers with *collaboration oriented behavior* (group 2), and a group of teachers with *little ASL-oriented behavior* (group 3). Multivariate analysis indicated that these three groups scored significantly differently from each other on the *student questionnaire on ASL behavior* (Wilks'Λ=.359; F(9/63.428)=3.684; p=.001).

The groups of teachers based on *ASL conceptions* do not significantly differ in age (F(3/27)=1.224; p=.272) or years of teaching experience

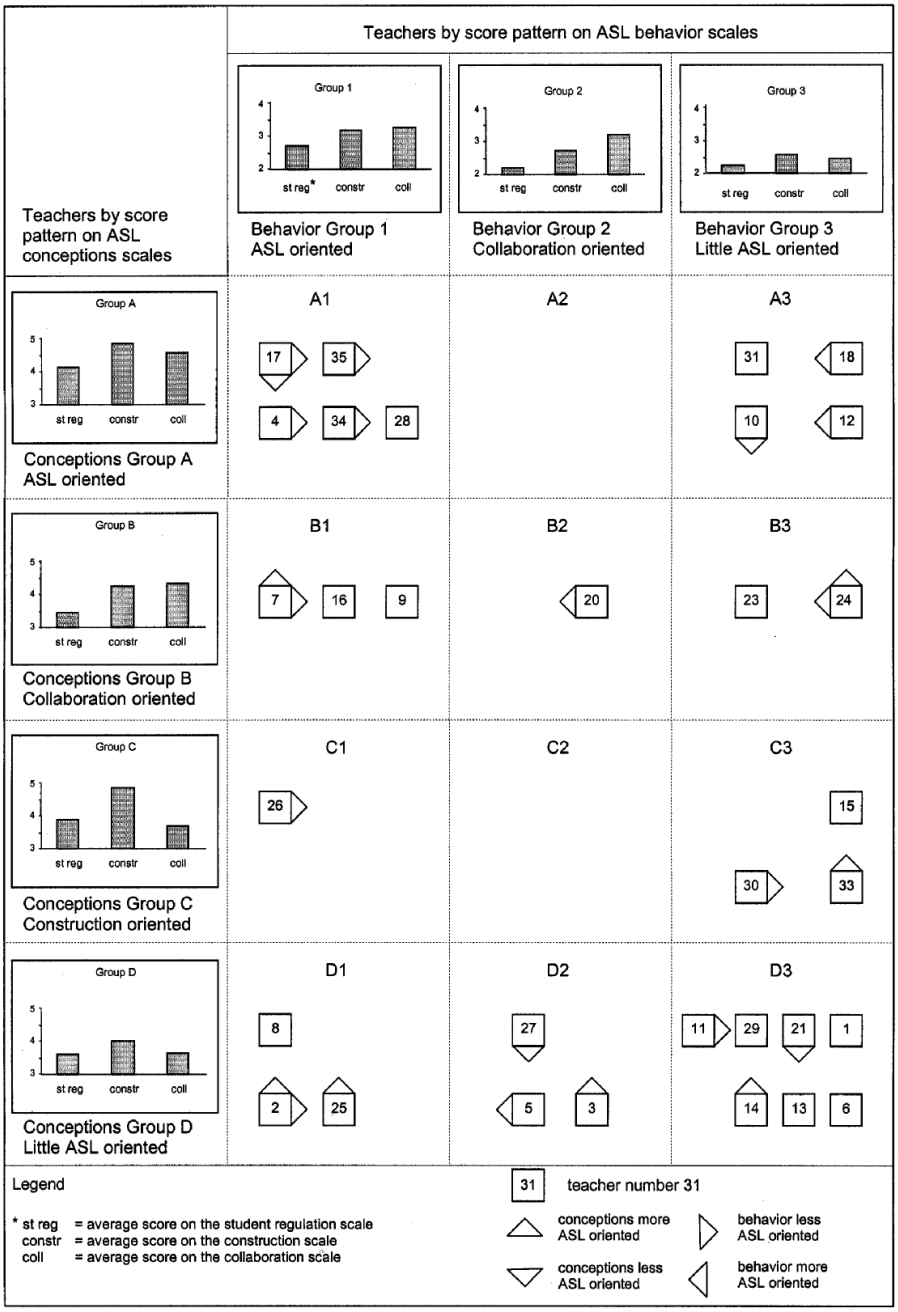

Figure 3.1
Overview of each teacher's position in two groups based on their scores on the conceptions and behavior scales.

(F(3/27)=1.224; p=.320). Moreover, the groups of teachers based on *ASL behavior* also do not significantly differ in age (F(3/27)=1.026; p=.397) or years of teaching experience (F(3/27)=2.048; p=.130). In our sample group, membership is not significantly related to type of subject taught: cross-tabulations between groups based on *ASL conceptions* and type of subject (language and arts, sciences, social studies) revealed a contingency coefficient of .249 (approx. p=.909). Cross-tabulations between groups based on *ASL behavior* and type of subject revealed a contingency coefficient of .361 (approx. p=.570).

Figure 3.1 shows how at the start of the study the 32 teachers involved differed from each other in their ASL-oriented conceptions and ASL-oriented behavior. Teachers in the upper right corner are ASL-oriented in both their conceptions and behavior, whereas the teachers in the lower left corner are less ASL-oriented in both. For one third of the teachers, their own ASL-conceptions do not seem to be in line with how their students perceive their ASL-behavior.

In sum, it can be concluded that at the start of the study 9 participants have conceptions in line with the theory of the reform and 12 showed ASL-oriented behavior. As regards teachers' initial ASL conceptions, it can be seen that a number of teachers place special emphasis on collaboration, but not on student regulation, while others emphasize the importance of construction. Membership of groups based on ASL-conceptions or ASL-behavior could not be related to age, years of teaching experience or subject taught. For two-thirds of the teachers, conceptions and behavior are in line with each other.

3.4.2 Teacher change

Pertaining to the second research question: the data shows that after a year 21 teachers, 66%, had changed in conceptions and/or their behavior. Table 3.5 provides an overview of the change scores of all teachers both in their conceptions and their behavior according to their students, and numbers of teachers for whom these scores overlap. In this overview a teacher whose scores became significantly higher (as assessed with the RCI, see method section) on at least one of the three scales is considered to have become more ASL-oriented. A teacher who scored significantly lower on at least one of the three scales is considered to have become less ASL-oriented.

Table 3.5
Number of Teachers Changed in Conceptions and in Behavior

	Direction of change			
Kind of change	More ASL-oriented	Not changed	Less ASL-oriented	*Total*
Conceptions	9	18	5	32
Behavior	7	21	4	32
Overlap: (no) change both in conceptions and behavior	1	11	1	13

Table 3.5 shows that 18 teachers did not change in their conceptions and 21 not in behavior. However, this group only partially overlaps as 11 teachers, 34%, did not change at all. Seven teachers changed in their conceptions but not in their behavior and 10 changed in behavior, but not in conceptions. One teacher consistently changed towards more ASL-oriented conceptions and behavior and one teacher towards less ASL-oriented conceptions and behavior. Two teachers showed an inconsistent change as they changed towards more ASL-oriented conceptions but towards less ASL-oriented behavior.

As regards teachers' change scores, it can be concluded that two thirds of the participating teachers did change either in conceptions or behavior, but only two teachers changed on both. One of these two teachers changed in conceptions and behavior congruent with the reform, while the other changed in the opposite direction.

3.4.3 Teachers' activities

To answer the third research question, the teachers' learning experience reports were analyzed. The 32 teachers reported 167 learning experience reports in total. The minimum number of learning experience reports was 2, sent by one teacher. The maximum number was 9, also sent by one teacher. As explained in the method section each learning experience report consisted of a description of a number of activities and events, coherently reported in relation to a certain learning outcome. In the 167 reported learning experiences, a total of 246 activities could be distinguished. Table 3.6 shows how often an activity was found in the digital logs of all 32 teachers together. These numbers are followed by a number between brackets that denotes how many teachers reported this mode of the activity at least once.

Table 3.6
Frequencies of Activities Reported

	Mode of learning activity							
	Individual			In interaction with peers				
Main category of activities	Meaning-oriented	Action-oriented	None	Meaning-oriented	Action-oriented	None	Total times reported	Relative frequency %
Experimenting	10 *(7)*	37 *(21)*	-	8 *(4)*	7 *(7)*	-	62 *(27)*	25
Considering own teaching practice	38 *(20)*	22 *(15)*	-	11 *(8)*	12 *(8)*	3 *(2)*	86 *(30)*	35
Experiencing friction	-	-	45 *(19)*	-	-	6 *(3)*	51 *(22)*	21
Struggling with behavioral tend.	3 *(3)*	8 *(6)*	-	-	-	-	11 *(9)*	4
Getting a new idea from others	7 *5)*	18 *(12)*	2 *(2)*	5 *(4)*	2 *(2)*	2 *(2)*	36 *(21)*	15
Total	58	85	47	24	21	11	246	100

Note. Number between brackets indicates number of teachers who reported this activity at least once.

Experimenting

Experimenting was reported 62 times (25%). Teachers mostly experimented with new student tasks, such as a task where students have to write a newspaper article or collaboratively draw a mental map on a certain topic. Teachers also reported to have tried out new behavior, for instance showing a more positive attitude towards the students. Mental activities involved were more often action-oriented (N=44) than meaning-oriented (N=18). Most of the experimenting activities reported were undertaken individually, 47 times, whereas collaborative experiments were reported only 15 times.

Considering one's own teaching practice

The activity most often reported (N=86, 35%) was considering one's own teaching practice. Teachers usually reported to consider their teaching approach individually. However, it also happened that teachers reported to consider teaching approaches in interaction with a colleague. A physics teacher for

instance, reported that he and another physics teacher discussed certain unsatisfying aspects of a teaching method they shared, and together formulated some conclusions. As opposed to experimenting, considering one's own teaching practices involved more meaning-oriented (N=49), than action-oriented mental activities (N=34).

Experiencing friction

Twenty-two teachers reported 51 times (21%) that they learned from a situation in which they became aware of a discrepancy between the situation at hand and their own expectation. Teachers mostly experienced friction due to an unexpected event. But, it also happened that over some period of time, teachers realized that their own usual approach did not work any longer. Experiences of friction were only described by the teachers as an event that either resulted in greater awareness or a strong emotion. As such, experiences of friction did not involve action or meaning-oriented mental activities. They often formed the starting point for teachers to consider their own teaching approach. Individually experiencing friction was reported 45 times, while experiencing friction in interaction with peers, was only reported 6 times.

Struggling with behavioral tendencies

Nine teachers reported that they struggled with the tendency to perform their old behavior. This activity only formed 4% of the total number of activities reported. Teachers either reported that they were aware of their tendency to act in the old way, but suppressed this tendency. Or teachers reported that they fell back into their old behavior. A Latin teacher, for instance, reported that in the beginning of the school year she had had the intention to use collaborative student tasks. However, after a number of months in which a group of students seemed to rebel a lot, she decided to only give frontal instruction to this group in the first part of the lesson and in the second half she let the group work in strict silence. She thus returned to her old teaching behavior. Struggling with behavioral tendencies was only reported as it occurred individually, not in collaboration.

Getting a new idea from others

Getting a new idea from others refers to activities in which teachers learn about teaching methods, materials, or interpretations of others and evaluate them. This activity was reported 36 times and formed 15% of the total number of

activities. Some teachers reported hearing about an idea and formulating the intention to experiment with it in the next year. Getting a new idea from others may thus not result in an immediate change in behavior. Feedback from colleagues was hardly ever reported by the teachers. Getting ideas from others involved mostly action-oriented (N=20) and less meaning-oriented (N=12) mental activities. Moreover, individually getting a new idea from others was reported 27 times, while getting ideas in collaboration was only reported 9 times.

In sum, the analysis of the teachers' learning experiences shows that the 32 research participants reported being engaged in activities that in previous research are associated with teacher learning (see the conceptual framework section). Each category of activities derived from the literature was reported, however, not with the same frequency. One quarter of the activities reported occurred in interaction with peers. Almost half, namely 43%, of the reported mental activities were meaning-oriented, while the remaining 57% were action-oriented.

3.4.4 Relation between activities and changes in conceptions and behavior

To answer the fourth research question, the number and type of activities reported by teachers who changed were compared to the activities reported by teachers who did not change. For this comparison four clusters of teachers were created. The first cluster consists of teachers who were ASL-oriented at the start of the study, and remained so. These teachers were considered as a distinct group, because in Figure 3.1 it can be seen that none of the teachers who were ASL-oriented in their conceptions (cells with letter A) became more ASL-oriented in their conceptions. The figure shows, moreover, that the teachers who were ASL-oriented in their behavior (cells with number 1), do not become more ASL-oriented in behavior after a year. Both observations indicate the existence of a ceiling effect in both of the instruments. Apart from this, it can be argued that the teachers who were ASL-oriented at the start of the study were not expected to change anymore regarding the domain of the reform. For these reasons the ASL-oriented teachers who did not change were regarded as a separate group of teachers. Cluster 2 are those teachers who became more ASL-oriented in their conceptions. Cluster 3 consists of those teachers who were *collaboration oriented, construction oriented* or *little ASL-oriented* at the start of the study, and who did not change in conceptions. Cluster 4 are those teachers who became less ASL-oriented in their conceptions.

Table 3.7
Average Frequencies of Activities per Cluster of Teachers Based on Change scores in Conceptions

Cluster of teachers	N	Main category of learning activity					Orientation of mental activities		Individual and collaborative activities	
		Experimenting[a]	Considering	Experiencing friction	Struggling with behavioral tendencies[a]	Getting ideas[a]	Meaning oriented[b]	Action-oriented[b]	All individual activities	All collaborative activities
Remained ASL-oriented	7	2.6	5.4	2.0	0.1	0.5	4.1	4.4	7.8	1.2
Became more ASL-oriented	7	3.5	4.1	1.6	0.0	2.3	4.3	5.7	8.2	2.2
Did not change	14	1.6	3.3	1.8	0.5	1.0	2.1	4.2	5.4	2.8
Became less ASL-oriented	4	1.1	3.8	2.9	1.1	0.8	1.5	5.3	8.6	0.3

[a]Clusters differ significantly in the average number of reported learning activities ($p < .05$).
[b]These numbers represent the total amount of activities that involved meaning-oriented or action-oriented mental activities.

Table 3.7 shows the average frequencies of activities reported per cluster of teachers. An analysis of variance (ANOVA) indicated that the four clusters of teachers differed significantly in the frequencies with which they reported experimenting ($F(3/28)=4.188$; $p=.014$), struggling with behavior ($F(3/28)=3.287$; $p=.035$), and getting ideas ($F(3/28)=3.116$; $p=.042$). Regarding the activities reported by the teachers who did not change (cluster 3), the table shows that these teachers reported activities that in literature on teacher learning are considered learning activities. For this cluster of teachers, undertaking these learning activities related to ASL did not contribute to a change in ASL conceptions.

Regarding the activities reported by the teachers who became more ASL-oriented (cluster 2) in their conceptions, the data shows that compared to the other clusters, these teachers did experiment and did get ideas more often. They did not report to have struggled with behavioral tendencies. A closer inspection of the data (not visible in the table) revealed that for these teachers, getting ideas usually involved action-oriented mental activities, while experimenting usually involved meaning-oriented mental activities.

As regards the teachers who became less ASL-oriented (cluster 4) in their conceptions, the data show that these teachers reported struggling with their behavioral tendencies the most, and on average also experienced more friction. These teachers, moreover, did not report many meaning-oriented mental activities, nor much collaboration.

As regards the cluster 1 teachers, the table shows that the average frequencies in activities are more comparable to the frequencies of the cluster 2 teachers, than to the frequencies of the activities of teachers in clusters 3 and 4. This indicates that the cluster 1 teachers might also have become more ASL-oriented, had the instruments allowed for measuring this.

In sum it can be concluded that the activities teachers report in the context of their learning experiences do not always contribute to a change in conceptions, at least not within a year. Getting ideas from others involving action-oriented mental activities, and experimenting involving meaning-oriented mental activities can be related to a change in conceptions congruent with the reform, while a combination of relatively a lot of struggling with behavioral tendencies and experiences of friction, without much experimenting or interaction with peers, seems to contribute to a change incongruent with the reform.

Table 3.8
Average Frequencies of Activities per Cluster of Teachers Based on Change scores in Behavior

Cluster of teachers	N	Main category of learning activity					Orientation of mental activities		Individual and collaborative activities	
		Experimenting	Considering[a]	Experiencing friction	Struggling with behavioral tendencies	Getting ideas	Meaning oriented[b]	Action-oriented[b]	All individual activities	All collaborative activities
Remained ASL-oriented	5	3.0	3.6	1.4	0.4	1.0	3.3	4.7	6.5	2.7
Became more ASL-oriented	5	2.2	2.8	1.6	0.2	0.8	2.8	3.2	5.2	2.6
Did not change	13	1.8	2.7	1.6	0.6	1.6	2.0	4.2	5.7	2.3
Became less ASL-oriented	9	2.2	6.7	3.0	0.2	1.4	4.2	6.2	10.0	0.9

[a]Clusters differ significantly in the average number of reported learning activities ($p < .05$).
[b]These numbers represent the total amount of activities that involved meaning-oriented or action-oriented mental activities.

As regards the relation between activities and changes in *behavior*, the data shows (see Table 3.8) that this relation is less straightforward. The clusters based on teachers' behavior differed significantly in the average frequency with which considering one's own teaching practices was reported. Cluster 4 teachers most often reported considering their own teaching practices. It is striking that the clusters do not differ significantly regarding the frequencies with which teachers reported to have experimented. Closer examination (not visible in table) shows that cluster 2 teachers most often involved meaning-oriented mental activities when experimenting, while the cluster 1 and cluster 4 teachers most often involved action-oriented mental activities in their experiments. The data also shows that teachers in cluster 4 mostly reported activities they undertook individually and reported very few activities undertaken in collaboration.

In sum, this data indicates that a focus on individual activities and experimenting involving mostly action-oriented activities, and often considering one's own teaching practices, can be related to a change towards less ASL-oriented behavior, while more collaborative activities and experimenting involving meaning-oriented mental activities can be related to a change towards more ASL-oriented behavior.

3.5 Discussion

In this chapter the central question was whether and how teachers who receive no systematic support for learning change in conceptions and behavior in a context of innovation. The results of this study indicate that 7 teachers remained ASL-oriented in their conceptions and 5 remained ASL-oriented in their behavior. The majority of the remaining teachers changed in their conceptions and/or behavior even though their learning was not systematically supported. However, this change was not always in favor of the reform efforts. In fact, only one teacher in the study became more oriented towards stimulating students' active and self-regulated learning (ASL) in both his conceptions and behavior. The activities teachers reported in their learning experiences could be related to teachers' changes in conceptions and behavior, but only to a certain extent.

The results indicate that getting new ideas from others involving action-oriented mental activities and experimenting involving meaning-oriented mental activities seem to be most conducive of a change towards more ASL-oriented conceptions. Experiencing a lot of friction and struggling with

behavioral tendencies seems to contribute to a change towards less ASL-oriented conceptions.

The findings show, moreover, that a strong focus on individual activities and experimenting involving action-oriented mental activities can be related to a change towards less ASL-oriented behavior. More collaborative activities and experimenting involving meaning-oriented mental activities seem to contribute to a change towards more ASL-oriented behavior.

These findings confirm that what teachers themselves report to be activities in the workplace they learn from; for a number of teachers indeed these activities seem to contribute to a change in conceptions or behavior as measured by means of questionnaires. The fact that meaning-oriented mental activities can be related to a change in conceptions as well as behavior confirms the importance of reflection as advocated by numerous authors (e.g., Korthagen & Kessels, 1999).

It seems to matter what orientation of mental activities is involved in a certain type of activity: experimenting involving meaning-oriented and getting ideas from others involving action-oriented mental activities can be related to a change towards more ASL-oriented conceptions. This shows that it is worthwhile to take the relation between observable and mental components of activities into account in further studies on teacher learning.

As regards the methodology of research into teacher learning in an informal learning environment, the use of student questionnaires to measure teachers' behavior and changes in behavior seems to be promising. However, the results of this study show that the relation between the activities teachers reported during a year and teachers' changes in their behavior is not very straightforward. This might be due to the fact that we have relied on teachers' own reports of their learning experiences. Other studies, in which data on teachers' learning experiences was gathered in the same way, show that teachers mostly reported a change in cognition as a learning outcome (Meirink et al., 2007). Teachers may be more inclined to perceive a change in cognition to be a learning outcome, rather than a change in behavior. As learning in the workplace partially remains implicit (Eraut, 2004), it is also possible that teachers have not been aware of the activities contributing to changes in their behavior. As teacher learning not only involves changes in cognition, but also changes in behavior, research methods should be developed that better examine the activities of teachers leading to changes in behavior. Methods that only involve teachers' own reports do not seem to suffice.

Teachers' learning activities are closely linked to the environment in which they work. Experiencing friction, for instance, partially depends on the situations teachers are confronted with in their work. Certain groups of students may increase a teacher's struggle with behavioral tendencies. Getting ideas from others, moreover, depends on the availability of ideas in the environment. For these reasons further research into teachers' informal learning should take the role of the environment into account.

3.5.1 Limitations of this study

There are several reasons to limit the conclusions to the particular situation examined in this study. The first reason is that the picture of informal learning as reported by the 32 teachers in this study may be more ideal than it is for the average teacher in the Netherlands who does not receive support for learning. This is because most of the 32 teachers' motivation to join the study was that they wanted to pay more attention to their own learning. The 32 teachers may thus have been more motivated to learn than the average teacher.

A second limitation is that we have only studied teacher learning relating to one domain, namely active and self-regulated student learning. The results of this study thus may be domain-specific. In future research teachers' informal learning on several domains might be compared.

A third limitation is that in a naturally occurring informal learning environment, teachers are not asked to report about their learning experiences. At the end of the period of data collection many teachers reported that among all the activities they learned from during the year, writing the learning experience report was one of their more important learning activities. Teachers reported that they normally do not take the time to really consider their learning. Could it be, now that teachers actually took the time, they had a chance to consider their experiences in a more meaning-oriented way? This may also be the reason that thinking activities were most often reported.

3.5.2 Practical implications

The most important implication of this study is that teachers differ in the way they learn informally within the context of the reform. Support for teacher learning should therefore be differentiated. Those teachers who are continuously experimenting and collaborating should be encouraged in their endeavors. Their learning should be facilitated by giving these teachers ample opportunities to interact with peers, to report about their learning and to access

resources for learning. As for the teachers who work more isolated and who experience more friction and struggle, we believe these teachers should be able to experiment with new practices in a safe learning environment, where their interpretation of classroom situations is guided and where their immediate concerns are addressed. A teacher educator, or a colleague who adopts the role of peer-coach, could give feedback on teachers' learning experiences and help teachers see the relation between their own behavior and what the students do, by asking questions that stimulate meaning-oriented mental activities. These questions may be: Why did your teaching approach have these consequences? What aspects of your behavior were relevant for this consequence and what aspects of the students' behavior? Do you know why the students behaved this way? How do you know that? A teacher educator may also provide alternative interpretations of classroom situations. Learning in more formal settings like these could thus be better fitted to the way teachers learn informally.

From the perspective of encouraging life-long learning, teachers may also be helped to improve their informal ways of learning by encouraging them to use a variety of tools for learning, such as: asking for peer feedback, reflecting in a meaning-oriented way, trying out new materials together with colleagues, and scanning the environment for new ideas.

In conclusion, we could say that the exploration of teachers' informal learning, reported on in this study, indicates that a teacher's focus on new practices in combination with meaning-oriented mental activities may be the most conducive to teacher change in conceptions in-line with reform efforts.

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Chapter 4

Experienced teachers' informal learning: the relation between informal learning and conditions for learning in schools[3]

Abstract

The aim of this chapter is to explore the relation between experienced teachers' informal learning and conditions for teacher learning in the school, from the perspective of the individual teacher. The chapter presents a contrasting case study of two teachers who differ in the way they learn informally in the workplace. This learning takes place in the context of a reform that encourages teachers to foster students' active and self-regulated learning. One teacher changed in her conceptions of teaching and learning congruent with the reform. The other teacher did not change in conceptions. The case studies draw on both quantitative and qualitative data.

From the literature we derived five conditions for learning in the workplace that appear to foster teacher learning: teacher autonomy, collaboration, reflective dialogue, receiving feedback, and shared norms and responsibility. On the organizational level the schools in which the two teachers teach are comparable in the extent to which they foster teacher learning. However, the findings show that on the individual level the conditions in one case are more conducive to teacher learning than in the other case. The analysis reveals that these conditions are shaped in the interactions between the individual teachers and others in the organization.

The most important implication of these findings is that in order to enhance teachers' informal learning in the workplace, not only the school management, but also individual teachers need to contribute to creating optimal conditions for teacher learning.

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[3] Hoekstra, A., Korthagen, F., Brekelmans, M., Beijaard, D., & Imants, J. (2007). *Experienced teachers' informal learning: the relation between learning activities and conditions for learning in schools*. Manuscript submitted for publication.

4.1 Introduction

The learning of experienced teachers has mainly been studied in the context of professional development programs. Less research has focused on teachers' informal learning which takes place in a work environment in which teachers are not systematically supported in their learning (see also Chapter 2, this dissertation; Richardson & Placier, 2001). The present chapter focuses on teachers' informal learning, which occurs through teachers' daily work activities (Eraut, 2004; Straka, 2004). As such, teachers' informal learning may be influenced by characteristics of the school in which they work. In research on conditions fostering teacher learning in schools (e.g., Bakkenes et al., 1999; Imants, 2003; Rosenholtz, 1989; Smylie, 1995; Smylie & Hart, 1999), a number of conditions in the school are considered to be conducive or restrictive to teacher professional development. However, in their review on teacher learning, in which studies on organizational influences on teacher learning are discussed, Richardson and Placier (2001) write:

> We found from our review of these studies that the relationship between school contexts and teacher change is complex and ambiguous. … In some cases, individual teachers change despite their unsupportive social context, and, in other cases, they do not change, despite changes in the organization that would support it. (p. 923)

In this chapter this complex and ambiguous relation will be further explored.

Research on teacher learning is divided into two main discourses: research on individual teacher learning and research on the school as a context for teacher learning. These two bodies of literature "largely stand on their own – almost entirely uninformed by each other" (Richardson & Placier, 2001, p. 937). In most studies on individual teachers' learning the contextual aspects are undervalued (Beijaard, Meijer, & Verloop, 2004; Reynolds, 1996). On the other hand, the literature on the conditions fostering teacher learning in schools (e.g., Geijsel, Sleegers, Van den Berg, & Kelchtermans, 2001; Imants, 2003; Rosenholtz, 1989), does not pay much attention to the perspective of the individual learner. In the present chapter teacher learning in the context of the school will be studied, from the perspective of the individual learner, while drawing on insights from the literature on the school as a context for learning.

The main question addressed in this chapter is: What is the relation between experienced teachers' informal learning in the school and school conditions that are assumed to foster teacher learning?

4.1.2 Context of the study

In two prior studies (see Chapters 2 and 3 of this dissertation), we focused our study of teacher learning on one particular domain of the teaching profession. This domain relates to a reform initiated in the Netherlands in 1998 for the upper grades of the two higher tracks of secondary education (higher general secondary education and pre-university education). In the context of this reform, teachers are encouraged to adopt a new pedagogy fostering students' active and self-regulated learning (ASL). The new pedagogy involves teachers becoming facilitators of students' learning processes, assisting students in developing their own strategies for learning. Although adoption of the new pedagogy as such was voluntary, in the years following 1998 many schools and teachers seriously struggled to implement aspects of the new pedagogy. Teachers and schools were not always successful in their attempts. Active and self-regulated learning was sometimes even reduced to students planning their learning activities with the help of study guides prepared by the teachers, and to students working individually apart from the subject teacher in so-called study classes. For a great number of teachers the new pedagogy meant and means a shift in their thinking and acting as a teacher. At the start of our study in 2004, many teachers still struggled with the requirements of this reform.

4.2 Conceptual framework

4.2.1 Informal learning

Informal teacher learning, in this study, refers to teacher learning that takes place in a context characterized by a lack of any program or project externally organized for teacher learning. Informal teacher learning is conceptualized as an ongoing process that primarily takes place through engagement in work activities (Eraut, 2004; Straka, 2004). Our definition of learning is: engaging in activities that lead to a change in teaching cognition and/or behavior (e.g., Shuell, 1986). When teachers' work-related activities lead to a change in cognition and/or behavior we consider these work activities learning activities. Activities are understood to simultaneously involve both behavioral and mental components. For instance 'reading a book' is a description of the behavioral

component of an activity, while 'critically processing and analyzing what is read' is a description of the mental component.

4.2.2 Teachers' activities in relation to learning outcomes

In two earlier studies we explored teachers' work-related activities from the perspective of informal learning. The results from these two studies will be used to describe the learning activities and learning results of the two teachers in the contrasting case study. In the first study we sought to describe the activities teachers learn from when teaching classes (Chapter 2, this dissertation). The purpose of the second study was to shed light on the activities in teachers' written reports of their learning experiences and to relate these activities to teachers' changes in conceptions and behavior regarding fostering students' active and self-regulated learning (ASL) (Chapter 3, this dissertation).

In the second study two aspects of teachers' activities could be related to teacher change. These aspects are: (1) whether the activities focus on new practices or on current practice, and (2) whether the teachers' mental activities involved were meaning or action-oriented. Those teachers who became *more* ASL-oriented in their conceptions reported more activities with a focus on new ideas and practices, such as experimenting and getting ideas from others. These teachers also reported more meaning-oriented activities, which pertain to questions such as why to employ certain teaching practices. Those teachers who became *less* ASL-oriented in their conceptions reported relatively more activities focusing on current practices, such as struggling with behavioral tendencies and experiencing friction: they became aware that at times their teaching behavior did not have the intended consequences. These teachers also reported very few meaning-oriented activities.

The two aspects, a focus on new versus a focus on current teaching practices, and meaning-oriented versus action-oriented mental activities, served as a conceptual framework for the illustration of the way the two teachers in the present study learn.

4.2.3 Conditions fostering teacher learning in schools

In order to study the relation between conditions for learning and individual teachers' learning activities, we have included a number of conditions in our study that pertain to teachers' direct and daily experiences of the environment they work in. To identify such conditions we analyzed literature on the school

as a context for learning, in which aspects of the teachers' direct work environments are discussed. This literature consists of studies regarding conditions fostering teacher learning in the workplace (Bakkenes et al., 1999; Louis et al., 1996; Marks & Louis, 1999; Rosenholtz, 1989; Smylie, 1995; Smylie & Hart, 1999; (for an overview, see Bakkenes et al., 2006; Imants, 2003)). From these studies five conditions were derived: (1) teacher autonomy; (2) teacher collaboration; (3) reflective dialogue; (4) receiving feedback; and (5) shared norms and responsibility within the school. These conditions have in common that they do not pertain to conditions for learning at the organizational level, but rather apply to structures and procedures within the daily work environment of the individual teacher. As such, these conditions can be assumed to play a role in how teachers carry out their daily work activities.

The first condition is *teacher autonomy*. Within organizations, autonomy refers to the degree to which individuals in a social structure determine their own work methods, schedules, and goals. Perceived autonomy refers to a sense of control over one's environment. Rosenholtz (1989) points out that teachers' "professional autonomy … increases motivation, responsibility and commitment." (p. 141). Autonomy can be experienced individually and collectively as a member of a team. Teachers who experience autonomy feel free in the way they shape their teaching practice. Teachers may also feel encouraged by the school management to act autonomously within the boundaries of their job and to undertake learning activities such as developing new materials and experimenting with new methods. Teachers who feel they have too much autonomy may experience this as professional isolation (Bakkenes et al., 1999).

A second condition is *teacher collaboration.* Many studies have shown the importance of collaboration for teacher learning (e.g., Little, 1990; Louis et al., 1996; Smylie, 1995; Rosenholtz, 1989). Little has distinguished levels of interdependence within teacher collegiality. Interdependence refers to the extent to which teachers depend on each other for the successful completion of their tasks. A high degree of interdependence, where more than one teachers' expertise is needed for problem solving, offers more opportunities for learning than a situation where teachers divide tasks and each teacher individually solves a part of the problem (Imants, 2003). The most important activity that may contribute to teacher learning in collaboration is getting new ideas from others and hearing about other teachers' experiences with certain teaching methods.

As a third condition, teachers may engage in *reflective dialogue*. Reflective dialogue is considered a core characteristic of professional communities (Louis et al., 1996). Reflective dialogue can be distinguished from experience swapping, in which teachers tend to attribute poor results and negative behavior to the students and their backgrounds (Rosenholtz, 1989). Through reflective dialogues teachers engage in meaning-oriented mental activities. Compared to individual reflection, reflective dialogue has the potential to derive meaning from the experiences of more than one teacher. Moreover, comparing their own interpretations with those of others may help teachers become aware of what they take for granted and make their own assumptions subject to critical analysis (Louis et al.).

The fourth condition is *the availability of feedback*. Within an informal learning environment teachers may ask each other or give each other information about the quality of their work, especially their students' learning and their teaching. These teachers use their colleagues' input to further improve their own teaching. Within the school as an organization, more objective feedback can be derived from the monitoring of students' results and by means of students' surveys (e.g., Imants, 2003). Team leaders may use this more objective information to discuss the teacher's performance with the teacher in an annual evaluation meeting. Teachers thus obtain more objective insight into the results of their behavior and may start looking for possibilities for improvement where needed. Feedback thus may be the starting point for undertaking learning activities.

A fifth condition is *shared norms and responsibility*, which pertains to the extent to which educational norms are shared among teachers (Smylie, 1995) and the extent to which teachers feel a shared responsibility to achieve parallel goals (Louis et al., 1996; Rosenholtz, 1989). An explicitly formulated educational vision can inspire teachers to implement educational innovations in their own teaching practice. Shared norms and responsibility are considered to be an imperative for teachers to know where they are and to know where they need to go, while the absence of shared norms and responsibility leaves teachers uncertain about how well they are doing (Rosenholtz, 1989). Little (1999) states that "strong professional communities exert collective influence on their members through their shared beliefs about teaching and through their norms for professional interaction" (p.33). Little also argues that where such a strong professional community is absent, "teachers who innovate do so alone, guided by their independent initiative and relying on their own resources" (p.

33). Loose professional communities thus may not enhance teacher learning, but also do not necessarily inhibit teachers to change. Shared norms may play a role in teacher learning as a motivator for teachers to undertake activities to improve their own instruction.

4.2.4 School culture regarding the reform

The five school factors discussed above mainly involve conditions that may affect *how* teachers learn, for instance, by experimenting or through getting feedback. We also assume that certain shared practices within the school do influence *what* teachers learn. We assume that the *dominant conceptions and practices regarding ASL* within the school affect the direction in which teachers change their beliefs and behaviors. When teachers make sense of teaching and themselves as a teacher, the interpretations they make are mediated by cultural tools (Lasky, 2005) and bound by "cognitive frameworks and affective templates as well as institutional practices" (Coldron & Smith, 1999, p. 715) that exist in the social space in which they work. Examples of the cultural tools that mediate teachers' sense making are the language, technology, policy documents, and teaching materials available to the teachers. When teachers learn in interaction with colleagues they may be influenced by the cognitive frameworks that prevail in the school. Within the context of our study, the cognitive frameworks regarding fostering active and self-regulated student learning (ASL) are especially of interest.

4.3 Method

In order to study teachers' learning within the context in which they work, we conducted a comparative case study of two contrasting cases. At the start of the study both teachers expressed a wish to change towards better fostering students' active and self-regulated learning. The cases are contrasting in the sense that one teacher, Miranda, changed in her conceptions regarding active and self-regulated learning over the period of the year of study, while the other teacher, Paul, did not. Miranda and Paul teach at two different schools, which from an organizational perspective appear comparable in the conditions that foster or hinder teacher learning.

4.3.1 Data collection

Available data derived from our former studies

In the first of our previous studies, we studied the activities teachers learn from during classroom teaching. Four teachers were interviewed, their lessons were recorded six times during a year and they were interviewed after each recorded lesson. Miranda and Paul, the two teachers who are the subject of the present study, were among these four teachers. (For a detailed description of data collection and analysis see Chapter 2.)

In the second of our previous studies, 32 experienced teachers, including the 4 that joined the first study, were followed over a period of one year (see Chapter 3). At the start of the school year and one year later, data on teachers' conceptions was collected, twice by means of the same questionnaires. As it was decided to study teacher learning regarding the domain of fostering students' active and self-regulated learning (ASL), these questionnaires referred to teachers' conceptions regarding this domain. The individual differences in scores between the first and second measurement at the start and end of the study, corrected for the standard error of difference (by using the Reliable Change Index; e.g., Jacobson & Truax, 1991), were considered for the study of teachers' individual change in conceptions.

During the months between these two measurement moments, qualitative data was collected for the study of work-related activities that might contribute to teachers' individual change. For all 32 teachers, written reports of learning experiences regarding ASL were collected six times during the year via email. For each of the 32 teachers, activities were derived from the written reports, which were then related to changes in ASL-conceptions.

Both studies provided data on the work activities Miranda and Paul learned from during their work. The second study also showed whether or not Miranda and Paul changed in their ASL-conceptions. This data is used in the present study to describe the activities of Miranda and Paul that could be related to their informal learning.

Context interview

We developed a semi-structured interview around the five conditions discussed in the conceptual framework: autonomy, collaboration, reflective dialogue, receiving feedback, and shared norms and responsibility. A question related to autonomy was, for instance: Does the school management give you enough room to teach the way you want to teach? Some questions concerning

collaboration were: Do you often collaborate with your colleagues? With whom do you collaborate? What do you do when you collaborate? To ask the teachers whether they engaged in reflective dialogue, we asked them: Do you and your colleagues engage in deep conversations about student learning or your work as a teacher? Concerning receiving feedback, we asked questions such as: Do you receive feedback from your colleagues? Does your school management organize annual evaluative meetings with individual teachers? A question related to shared norms and responsibility was, for instance: Do you experience a shared responsibility for student learning with your colleagues? After the questions about each condition, we asked the teacher whether the condition plays a role in the teacher's learning, and if so how the teacher noticed this. For instance, after the questions regarding collaboration, we asked: Does collaboration play a role in your learning? The complete interview scheme was tested by three researchers who each interviewed three teachers in a pilot study. Questions were refined to obtain the required level of detail and comparability. The context interview data of both Miranda and Paul was collected by the first author of this study.

Questionnaire perception of dominant ASL conceptions in the school

In order to measure teachers' perceptions of dominant ASL conceptions in the school, a questionnaire was constructed that consists of 12 items pertaining to ASL conceptions, preceded by the line: "Among my colleagues the opinion prevails that … " Examples of items are:

- (Among my colleagues the opinion prevails that) it is important to let students regularly collaborate with each other.
- … is important to let students organize their own work as much as possible.
- … students learn better if they themselves have to monitor their learning process.

Teachers could score all items on a five point Likert scale ranging from (1) *absolutely disagree* to (5) *absolutely agree*. The 12 items together formed the scale: teachers' perceptions of dominant ASL conceptions in the school, further referred to as 'ASL-conceptions in the school'. The Cronbach's alpha of the scale is .82. This score was calculated based on a data set of 94 teachers, including the 32 that joined our study.

4.3.2 Data analysis

Analysis of teachers' activities and change in ASL conceptions

The two teachers described in this chapter also participated in the first and second study (see Chapters 2 and 3). Data on the two teachers' activities derived from these two studies were combined in a matrix. Teachers' activities were sorted under the headings discussed in the conceptual framework: (1) focus on new practices versus a focus on current practices; (2) action-oriented versus meaning-oriented. Also information on whether or not the teacher changed in conceptions was added.

Analysis of the conditions in the teachers' work environment

As regards dominant ASL conceptions in the school, quantitative data was available. For the teachers' scores, it was assessed whether a teacher belonged to the 25% out of 32 teachers with the highest scores, the 25% of the teachers with the lowest scores or the 50% of teachers in between.

For the five conditions for learning, the context interview formed the main data source. The interview was transcribed verbatim. The first author, who conducted the interviews, created a case summary matrix for each teacher. She started with a matrix with five rows, one for each condition, and two columns: one column to describe the condition in each teacher's school and one column to describe the relation between these conditions and the teacher's learning. During the process of analysis it became clear that there is a difference between what is organized or common in the school at the one hand, and what the teacher him/herself contributes to this condition on the other hand. For instance, there is a difference between whether collaboration is facilitated within the school, and whether the teacher actually joins in this collaboration. For this reason a matrix with three columns was created. In the first column summarized data on the organizational contribution to each condition was displayed. In the second column data on the teacher's own contribution to each condition was summarized. The third column consisted of the researchers' interpretation of the role each condition plays in the teacher's learning. After the first author finished the matrixes, another researcher, who co-developed the interview scheme, verified whether the interpretations were good representations of the data and whether any relevant information was left out of the matrix. For both matrixes the second researcher agreed to a large extent with the first author. After a discussion between the first author and second researcher one or two sentences were added to the matrix and some lines were

revised. These matrixes formed the bases for the case descriptions regarding the relation between conditions for learning in the workplace and the teachers' learning.

4.4 Results

In this section we will describe the learning process, the conditions for learning in the workplace and the dominant conceptions and practices regarding ASL in the school of two contrasting cases. The case of Miranda illustrates the case of a teacher who became more reform-oriented in her conceptions regarding fostering active and self-regulated learning (ASL). The case of Paul on the other hand, describes a teacher who was not ASL-oriented in his conceptions and did not change in this over the year of study, although he expressed the wish to become better at fostering students' ASL.

4.4.1 Introduction of the cases

Miranda

At the start of the study Miranda is a 39-year-old mother tongue language teacher. Miranda has two little children. Her life partner and father of her children is also a mother tongue language teacher at another school.

Miranda teaches at a school unit for students in the upper grades and higher tracks (age 16-18). She is experienced in teaching students from all tracks. She teaches three classes per day on average. During the research period Miranda is the department chair. In addition to her tasks as a teacher, Miranda shares the student counselor role within the school with a colleague from another department. Regarding her subject teaching, the facilities for professional development in the school are restricted. She has to visit the city library to read a professional journal.

The school where Miranda works is located in a middle sized city in a suburban region in the eastern part of the Netherlands. Recently the school was involved in a merger process. Miranda's unit is located in a relatively small building apart from the other school building. The students in this school unit are mostly white middle-class students. For Miranda informal contacts with colleagues in school have diminished since the merger. The school has an educational policy plan. As part of the implementation of the new pedagogy regarding ASL, the school has introduced eight weekly free option hours for

students within the timetable. Decision making about planning of instruction and testing is the main focus in the department meetings.

At the start of the study Miranda expresses her concern: "How to make sure that students actively deal with the subject-matter". She wants students to "understand why they need to learn it, and learn which approaches work for them and which do not."

Paul

In 2004 Paul is a 37-year-old chemistry teacher with 7 years of teaching experience. Paul did not start teaching immediately after his studies, but first worked outside education for a few years. When we first met Paul, his first born child, a daughter, is 6 months old.

Paul is teaching at a large comprehensive school in a smaller city, close to a large city in the Netherlands. He teaches pre-university classes and higher general education classes that prepare for college. Paul is head of the chemistry department. The chemistry department meets about three times a year, and consists of Paul and two older colleagues, who both teach in a teacher-oriented way. These meetings focus on selection of method, coordinated testing, common instruction of subject-matter, and pace of instruction. Paul is also a member of the team for teachers in the higher general education track. The team of higher general education teachers meets every week, and participation is mandatory. These meetings focus on student progress, as compared to the school norms, and how individual students can be helped to reach these norms. Paul is a member of the national association of chemistry teachers, and he reads professional journals.

The comprehensive school hosts students from lower social economic status and middle class families. The population of the school is multicultural. The school has formulated very explicit behavioral rules for the students, which are displayed on posters throughout the school. For a few years the school has experimented with the new pedagogy of ASL, mainly by stimulating students to study the subject matter independently outside the classroom. However, as this practice appeared disappointing, teachers agreed to teach their classes within the four walls of their classrooms again. The school has developed a policy that includes fixed norms for the percentage of students that should be transferred to the next grade, and for the percentages of students that should graduate each year.

At the start of the study, Paul explains that one of his major concerns is "how to keep in pace with the schedule with a group of students so heterogeneous in level, in a context in which the students should be encouraged to actively and independently work on the subject-matter".

The schools

Although the two schools may differ on specific details, the general image is that these schools both resemble the description of traditional secondary schools. In their analysis of elementary, middle, and high schools as teachers' professional communities, Louis et al. (1996) show that high schools show the lowest scores on community characteristics. The two schools in which Miranda and Paul work as teachers seem to correspond to this general image of low scores on community characteristics.

4.4.2 Miranda

Miranda's activities related to informal learning

Based on the data from our former two studies, in which Miranda and Paul participated, it can be concluded that the activities of Miranda, in the domain of ASL in the year under study, can be characterized as focused on new practice, besides a focus on current practices and to a large extent as meaning-oriented, besides action-oriented (see Appendix 1, p. 155, for an overview of Miranda's activities).

Focus on new practices. Besides focusing on current teaching practices, Miranda's activities have a strong focus on new materials, ideas and teaching methods. She was often observed when experimenting with a certain teaching format and also practicing new behavior during teaching. In one of the observed situations, for instance, a student asked Miranda for help. The student was busy formulating peer feedback on an essay of his classmate. Miranda was observed asking this student a lot of open questions. During the interview after the lesson Miranda explained the situation:

> A few times during this lesson I had given the students an answer rather quickly. Then I thought, I should not do this, because they are busy formulating good points of feedback for the student whose work they are assessing. So I have to help them to describe their own feedback explicitly. Thus, I should not be answering questions which they have not even adequately formulated. So I thought, I should better join in with what the

> student says. … In the conversation with this particular student, I was aware that I should not immediately tell him how I would formulate the feedback. I was being very careful in joining in with what he said.

In this situation Miranda noticed during the lesson that her own behavior of quickly answering students' questions did not contribute to the learning goal she had in mind for the students and that the students should practice giving their own feedback to their peer student. When the student hesitantly starts to say what he thinks about the essay, Miranda suggests: "Okay, if that is how you feel about it, than write that down!" The observed situation is an example of how Miranda is practicing to address the students in such a way that they are stimulated to give their own opinion and formulate their own feedback, instead of writing down Miranda's suggestions.

Meaning-oriented mental activities. Five out of the six learning experience reports Miranda sent dealt with experiments with new teaching formats or student tasks. Both in her teaching and in her learning experience reports, Miranda showed meaning-oriented reflection. In the above citation, for instance, Miranda is not only concerned with *how* to teach, but also with *why* to behave in a certain way: because students should practice formulating their own points of peer feedback. Her mental activities during this situation can thus be considered to be meaning-oriented.

Sequences of activities. Besides a focus on new practices and a high number of meaning-oriented mental activities, Miranda's activities occurred in sequences revolving around a certain topic. For instance, Miranda reported that she was dissatisfied with the way writing instruction was organized at school. She described:

> I came to the conclusion that students keep repeating the same individual mistakes. This is partially due to the way writing instruction is organized at our school. Writing is usually a one-shot task. There is no time for students to rewrite their work. … I have previously worked with students assessing their own work. Students found this difficult because they often did not recognize their own mistakes. … Some time ago I read about a peer assessment task for students in the journal for mother tongue teachers. … I haven't done much with it, until the situation occurred that in a student-self-work hour I was supervising, students asked me whether they could help me mark other students' work, because they did not have other useful tasks to work on. … I

> let them do that and they told me that they learned a lot, because now they saw other students' mistakes and started to wonder about the quality of their own work. … A few lessons later, I have used peer assessment as a means of school exam preparation. … My goal with this: extra exercise in formulating and thinking about how something can provide insight for the reader.

A number of activities led up to Miranda experimenting with a new task: firstly, dissatisfaction with the status quo; secondly, reading about peer assessment tasks; thirdly, an incident where students asked her whether they could help her assess other students' work; fourthly, listening to students' opinion about and experiences with this task; and finally, experimenting with the task and integrating it in her teaching practice. This sequence of activities reveals that the activities Miranda is engaged in logically follow each other in time.

Contribution of conditions for learning in the case of Miranda

The description of the conditions for learning is based on the case summary matrix that resulted from the analysis. This matrix is displayed in Appendix 2 (p. 155 of this dissertation).

Autonomy At the school level, Miranda feels restricted in her freedom to organize her own teaching by the mandatory year planning and cumulative marks of the students. Before the year of study, together with department colleagues, Miranda contributed to a joint protest against the measure that students' marks should be based on tests of all three years. Together with her colleagues she also contributed to bending the school rules regarding what should and should not be tested. The department members thus claimed more autonomy as regards year planning and tests. On the other hand, each department member experiences individual autonomy as regards to how to teach. Due to this individually defined autonomy and lack of shared practice, Miranda experiences little inspiration from department members to improve her teaching. However, the lack of agreement also provides her with the space to teach in her own way. Miranda:

> Because [the department colleagues and the school management] do not interfere, I can do my own things. Indeed, some experiments with -isms in literature, that I let students present. I can do that because we have no agreements on how to teach. This surely yields something to my teaching … I should appreciate that better. … Now that I think about it, I really like that.

Miranda thus enjoys the freedom she experiences, and uses it to develop her own teaching by experimenting with new student tasks and teaching methods.

Collaboration. Miranda explains that department teachers do not collaborate much. Even though her department creates the year planning and cooperates on making student tests, each teacher works on his/her own task for the department, and teachers thus experience little interdependency. Miranda feels that it is uncommon to ask other teachers for help. Collaboration reduces work-load but hardly contributes to Miranda's learning, because collaboration in department meetings does not involve any discussion about how to teach. Miranda: "I have the idea that I do not use my resources for learning optimally, because I usually get inspired by people, or by things I read, and that part is lacking right now."

Reflective dialogue. Miranda finds compensation for this lack of inspiration by discussing her teaching practices with her colleague Bob, and with her life partner, who is also a mother tongue teacher. In informal contacts with colleagues outside her department, she seeks opportunities for learning by reflective dialogue about her teaching practices and receiving feedback. In answer to the question how these conversations help her, she explains:

> I can better place what happened. … It is also a form of relief. Like I said before, about that poetry lesson, it was such a chaos. I discussed that lesson with a colleague, and he asked questions like: 'How could it have been different?' and 'What would the students have learned then?' I came to the conclusion that the lesson wasn't so bad. The students were really actively involved and hence the chaos, you know. That was pleasant for me, like I realized: Oh yeah, this is also a way of looking at the lesson.

The conversation helped Miranda reinterpret the chaos in her classroom. Reflective dialogue thus helped Miranda evaluate her teaching in a meaning-oriented way.

Receiving feedback. Miranda explains that it's unusual among her department colleagues to provide or receive feedback about their teaching practice. At the school level, feedback is organized in yearly evaluations of teaching by the team leader. Lesson observation and a student survey are used by the team leader as a starting point for an evaluative talk with the teacher. Ironically, Miranda does

not really value this singular organized source for feedback in the school. Miranda explains that she does not learn much from these conversations:

> My team leader is a really nice man, but he does not inspire me … I'm always very critical towards myself, and I am surprised when somebody gives me feedback about something I have not thought about myself. … In those annual talks, they only told me things I already knew and reflected upon, you know. I regret that.

Miranda does, on the other hand, seek feedback from the students by asking students how they appreciate her teaching. She also occasionally seeks feedback from colleagues in informal conversations.

Shared norms and responsibility. When asked whether teachers in her school feel a shared responsibility for student learning Miranda answers:

> In theory, yes, … but when we talk about it, for instance when we have to make the year planning, it appears that we have a shared responsibility, but that we all understand this responsibility in a different way. … I do not engage in department conversations on how to teach, none of us does, then it works … we never really discuss it.

When school discussion is organized regarding shared norms, the conversations are shaped in such general terms that it does not directly relate to teachers' own professionalism. Miranda:

> Last year we had team days … we had to discuss school norms … norms were mentioned like: professionalism, humor, commitment, really those general norms. But okay, what really matters is how, for instance, professionalism is carried out. Is it about assessing each other? Or respecting each other? … but we do not talk about that.

Miranda really regrets this lack of agreement: "To me it only causes a lot of frustration, nothing more." Miranda: "This [lack of explicitly shared norms] plays a role in my teaching, in such a way that I teach according to my own norms."

Dominant conceptions and practices regarding ASL

Miranda perceives that her colleagues differ in conceptions regarding ASL. On the scale 'dominant conceptions on ASL within the school' she scores her colleagues conceptions of ASL as average. The former section describes how Miranda reflects on her teaching practices in informal contacts with her colleagues. The colleague, in the event described in that section, helps Miranda to construct an interpretation of her lesson as conducive of fostering ASL. Miranda describes a context in which she likes to try out new things:

> I notice with [department] colleagues, they are somewhat older; they do the same year after year, same material, same subject. That drives me totally nuts. … So it is a bit like: you do what you want and I do what I want … It is not that we say let us collaboratively work on the improvement of the students' writing file (part of the curriculum) … But on the other hand, it does not really inhibit me to teach the way I want to.

It thus seems that the lack of agreement among colleagues regarding ASL gives Miranda the opportunity to seek advice from colleagues who are reform-oriented and deviate from the practices of colleagues who are less reform-oriented.

In sum, we can describe the conditions for learning regarding ASL for Miranda as follows: Miranda enjoys a certain degree of autonomy which enables her to experiment with new teaching methods and materials. The lack of shared norms in practice contributes to this freedom. Miranda does not profit much from formally organized collaboration and feedback, but she seeks and finds her own opportunities for reflective dialogue and her own sources of feedback from students and peers, and in informal discussions with colleagues from other departments. Miranda thus enjoys the autonomy, collaboration and reflective dialogue that contribute to her undertaking activities focusing on new practices and mental activities that are meaning-oriented. The lack of shared norms does not foster her learning, but also does not hinder her to teach the way she wants to. A number of practices within the school are aimed at fostering students' ASL. Also, within and outside the school, resources are available to Miranda in the form of colleagues' cognitive frameworks and teaching materials that help her shape and interpret her teaching practices in a method conducive to ASL.

4.4.3 Paul

Paul's activities related to informal learning

The activities of Paul in the domain of ASL in the year of study can be characterized as mostly concerned with current practices and as mainly action-oriented (see Appendix 1, p. 155, for an overview of Paul's activities).

Focus on current practices. Paul is very much concerned with how to achieve his goals in terms of achieving acceptable student results. He is, for instance, concerned with the learning speed of a group of students that is heterogeneous in their intellectual level. In dealing with this situation Paul relies on teaching strategies that have yielded success in the past. Paul resolves to give more frontal instruction, something he believes the students need. After watching a situation of frontal instruction Paul, for instance, remarks: "I do not care when not every student copies this. Some students do not need it. But two thirds of this group needs to have this example in their notebook." When he perceives that the students are not motivated, he decides to test students more regularly, because this is a strategy he has experienced success with. In his teaching Paul thus usually deploys what works in a situation.

Focus on new practices. Even though Paul's activities are mostly concerned with current teaching practices, Paul also sometimes tries out new practices. In three of the four reported learning experiences, Paul reports trying out something new. Paul does not explicitly explain why he experimented in these occasions. However, the researchers observed that the three experiments share one particular characteristic: they only occur under circumstances that do not diminish Paul's feeling of control over student results. In the first reported experiment Paul experimented with how to use two science kits for an international project: Biocase and Infocase. This international project was not part of the curriculum; most students were not enrolled in the science program and thus when the experiment failed, Paul would not risk a decrease in student results. In the second reported experiment, Paul used a computer student-task to replace some tasks from the student text book. Even though for Paul this was a new form of student task, the contents of the tasks are the same as in the text book. In the third reported experiment, Paul let two students demonstrate a chemistry lab in front of the group. Paul picked these two students because they were "very interested and enthusiastic about chemistry" and "they already had some experience with this chemistry lab." In this third experiment Paul thus makes sure that the experiment will go well, by picking students who will very likely be successful. All in all it can be observed that Paul is not only

focused on current practices, but sometimes also tries to integrate new elements in his teaching practice. Our interpretation is that this is more likely to happen when Paul feels safe about the effect of a new practice for students' results.

Action-oriented mental activities. In the data of Paul, only action-oriented mental activities were found. The new science kits used in the international project were externally developed for interdisciplinary science experiments for the students, and consisted of two different sets of little suitcases with science materials and task descriptions. Groups of students received two suitcases, one from each set. The students had to do five experiments from each suitcase. Paul reports:

> I have learned a lot from this lesson. First of all the number of experiments was too large. It is possible to do all in one lesson, but not during the first time. … Experiments from the Biocase suitcase cost a lot more time than experiments from the Infocase suitcase. The science teaching assistant also told me it is handier to give each set of reactors (chemicals) a different color. … I feel content that I learned a lot for the next time.

This type of reflection is typical for Paul. It is action-oriented. No instances of meaning-oriented mental activities were found in the data of Paul.

Contribution of conditions for learning in the case of Paul

The description of the conditions for learning is based on the case summary matrix that resulted from the analysis. This matrix is displayed in Appendix 2 (p. 157 of this dissertation).

Autonomy. Unlike Miranda, Paul does not feel any restrictions from the school management or its policies, but there is more influence from the department on Paul's teaching:

> There is no involvement from the school board or school management about the way you teach … within our department we agree to achieve the same goals and administer the same tests. … Especially those same tests need to be tuned to one another, also what we teach and what not in the lessons. …A lot is possible, but it really all is own initiative, here in school. There is not a lot of regulation in this.

Paul thus experiences a lot of autonomy within the school. The only 'rules' he need to stick to are the shared tests he develops with his colleagues from his subject-matter department. In answer to the question what this autonomy means for his own development as a teacher, Paul answers:

> That development I experience that… how can I say? I personally find it difficult to develop oneself in school…. I sometimes regret that there is so little encouragement and involvement from the school management.

Paul thus does not appreciate the autonomy he has as much as Miranda does.

Collaboration. Paul does not collaborate often with his subject-matter department colleagues. Contact with subject-matter colleagues is largely informal and consists of helping each other out on certain tasks, such as the construction of student tests. In answer to the question what collaboration with his colleagues generates for him, he answers:

> It gives me a good feeling, of how, how can I say, it takes a bit of work out of my hands. It is a division of work. One does something and another does something else, so we do not do the same things twice…

In general Paul dislikes deviating from his own teaching practice:

> I have my own way of teaching; I find it very difficult to deviate from my own way. But when I notice it is possible to do it another way, than I occasionally try a little thing. Then I come, for instance, with an extra rehearsal task for the students.

Informal conversations with peers sometimes contribute to Paul experimenting with concrete new ideas. Paul also attends weekly meetings of the team of higher general education teachers. Paul explains: "In the team meetings, we have sometimes discussed what kind of students these students are and how we have a shared approach to, for instance, students of this school level." Paul reports: "I experience these [discussions] as very positive. They give me some anchoring point, so to speak." Collaboration for Paul is thus a means to share work and reduce work load. The discussions about students and student results in the team meetings, on the other hand, help him to deal with the students from the higher general education track.

Reflective dialogue. Paul occasionally and informally discusses student learning and teaching with one department colleague and with other science colleagues. Paul stresses that "difficult discussions" are not his strongest quality. Informal discussions hardly stimulate Paul to engage in meaning-oriented reflection.

Shared norms and responsibility. Paul explains that in team meetings, teachers collaborate to achieve school norms: "That is one of the goals of the student discussions, that we keep an eye on the students with learning difficulties. …We insist on having a certain percentage of students being promoted to the next grade level." Paul appreciates the shared responsibility he feels as a result of these team meetings:

> It gives me a feeling of "I'm not solely responsible for this class". It gives me some confidence. When you hear that a class does not do well and has the same problem with another teacher, it is a shared responsibility to do something about it. It makes me feel that you are not alone in this.

On the other hand, the strict norms regarding student promotion and graduation have a direct consequence for the way Paul works and feels about his students' results: "It really encourages you to do your best … If a class does well this generates a good feeling." In answer to the question what happens when a class does not perform well, Paul says: "That gives me a really bad feeling." As a consequence of the strict and explicit norms for student results, Paul feels strongly responsible for his students to have high enough marks.

Receiving feedback. Paul rarely receives feedback. But as a result of the shared responsibility for teaching, a colleague once gave him the advice to explain a certain piece of subject-matter to the students again. Paul explains:

> When I hear something from a colleague, I try to do something with it, at least when I agree with him. Look, sometimes I get feedback that I cannot use. When they tell me: "Wouldn't you explain this again in your group, because your results are disappointing" I really cannot use that kind of feedback, because I have already explained it and I have tested it, so I really cannot do much more about it. … I can only try to focus on the topic a little more when it comes back in a following chapter.

When asked about how he values feedback, Paul replies: "I value feedback positively… although I find it scary to be criticized." It seems that Paul tends to experience feedback as a form of criticism.

Dominant conceptions and practices regarding ASL

Paul does not elaborate much on the practices and dominant conceptions regarding fostering ASL within the school. His score of the dominant ASL-conceptions within the school belonged to the 25% of teachers with the lowest scores (see section on data analysis). Paul reports that during the first years the reform was implemented, student results appeared disappointing. Together with two other colleagues from the chemistry department it was decided to give more frontal instruction. Paul himself reported: "I felt I'd rather be safe than sorry." Giving frontal instruction is thus for Paul a safe way of teaching. Paul also reports that in the past he has occasionally tried to change his teaching practice:

> In the past I sometimes let the students work in groups. On the one hand this was encouraged by the school management, but on the other hand, because it did not happen in other lessons, it was rather difficult to continue with this.

Within the context of the school, Paul's attempts to change his practices towards fostering ASL were thus not collaboratively supported.

In sum, we can describe the conditions fostering Paul's learning as follows: Paul does not appreciate his autonomy very much. His freedom leaves him somewhat clueless as to how to develop himself and his teaching practice. The discussions in the team meetings form a welcome anchoring point as Paul recognizes that colleagues too struggle with teaching the students of this school level. Attending the team meetings contributes to a feeling of shared responsibility and a strong focus on students' results. Paul hardly ever engages in reflective dialogue, nor does Paul receive much individual feedback. As regards the dominant conceptions and practices regarding ASL within the school, it can be concluded that dominant conceptions, teacher-oriented practices and a strong focus on student results, foster the reinforcement of teacher-oriented teaching practices, making it difficult for Paul to change his teaching. It seems that few resources are available to Paul that would help him to become more ASL-oriented in his conceptions and behavior.

4.4.4 Cross-case comparisons

In this section the differences between the two cases will be highlighted, starting with the two teachers' informal learning. First of all, the data illustrates a difference in activities that could be related to teacher change in conceptions. The case of Miranda shows a teacher who was often found looking for activating student tasks and shaping her own behavior to foster students' active learning. In that sense her activities involved a number of new practices within the domain of ASL. Moreover, the data in the case of Miranda shows many meaning-oriented mental activities. At the end of the study, Miranda's conceptions regarding teaching and student learning became more oriented towards fostering students' active and self-regulated learning (ASL). The case of Miranda thus illustrates the relation between, on the one hand, activities that focus on new practices, involving meaning-oriented mental activities, and on the other hand a change towards more ASL-oriented conceptions. Even though Paul reported learning how to use certain student tasks and how to stimulate students to work on their assignments, his learning did not involve new practices in the sense of innovative practices regarding ASL. Moreover, the data regarding Paul shows mainly action-oriented mental activities. Paul's conceptions were initially little ASL-oriented and did not change during that year. The description of this second case also illustrates how teachers' activities relate to whether or not a teacher changes in ASL conceptions.

Even though on the organizational level the conditions for learning in the two schools seem to be comparable, on the individual level it can be seen that the conditions for learning seem to be more optimal in the case of Miranda than in the case of Paul. Miranda enjoys autonomy, collaboration and reflective dialogue; she seeks feedback and is not hindered by a lack of shared norms. Paul, on the other hand, lacks direction within the large boundaries of the autonomy he is granted. Paul receives hardly any feedback and also does not engage much in reflective dialogue. Shared norms and responsibility in the school seem to direct Paul towards more teacher-oriented teaching.

Pertaining to the dominant conceptions and practices in the schools regarding the new pedagogy of ASL, it can be seen that in Paul's school there is an emphasis on teacher-oriented teaching. As the school in which Miranda works recently merged with another school, dominant conceptions and practices regarding ASL are heterogeneous, allowing Miranda to seek like-minded people and resources. It seems that in the direct work environment of Paul, such resources are hard to find.

4.5 Conclusions

A number of conclusions can be drawn from the data. Firstly, the data from these two cases confirms that experiencing sufficient autonomy, collaboration, reflective dialogue and receiving feedback can be positively related to teachers' informal learning in the workplace. The experience of too much autonomy, a lack of interdependence in collaboration, a lack of reflective dialogue and a lack of accepted feedback in the case of Paul, seems to have contributed to a situation in which Paul continued and reinforced existing practices that did not concur with the new pedagogy. Moreover, dominant conceptions and practices within the school regarding the new pedagogy also seem to have affected both teachers' informal learning.

Secondly, it appears that the relation between the extent to which norms are shared within the school and teacher learning is not linear: it does not seem the case that the more norms are shared, the more teachers learn. In the case of Miranda, a lack of shared norms allowed her to teach according to her own reform-oriented norms, whereas in the case of Paul the shared norms that emphasize teacher-oriented teaching seem to have contributed to reinforcing existing practices.

Thirdly, and most importantly, even though it seems that certain conditions should be met in the workplace in order for teachers to learn, it can also be seen that teachers themselves contribute to shaping these conditions. Miranda uses the freedom she has to experiment with new practices; she seeks out her colleagues for collaboration and feedback and avoids too much discussion with her department colleagues who always teach in the same way. Miranda thus plays an active part in creating positive conditions for her own learning. However, it is not totally up to her to create optimal conditions for learning. For if no colleagues were available for feedback, collaboration and discussion, and if innovative practices were not tolerated in the school, Miranda could not have created these conditions. Thus the conditions are partially shaped by the availability of resources in the school and partially by Miranda herself. In the case of Paul too, it can be seen that conditions for learning are shaped in the interaction between Paul and others within the school. Paul uses the autonomy he is granted to reinforce existing practices. He also experiences the lack of interest and involvement from the school management who provide little direction for him on how to develop himself. Paul does not seek feedback and

only collaborates when he has to. In addition, Paul is much more compliant with dominant school practices than Miranda.

4.6 Discussion

The observed phenomena has interesting consequences for our understanding of teachers' informal learning in the context of reform and for workplace conditions that enhance or restrict this learning.

As regards the role of autonomy, the case of Paul seems to confirm that when teachers experience too much autonomy this may be counterproductive to teachers' learning (e.g., Bakkenes et al., 1999). In this respect we may think of the relation between management regulation and teacher regulation in terms of constructive or destructive friction, which are concepts used by Vermunt and Verloop (1999) to describe the relation between teacher behavior and student learning. They explain that when students, who are self-regulating in their learning, are placed in an environment that is strongly teacher regulated, these students may experience a friction in regulation which is destructive to their learning. Similarly, students who are used to relying on teacher regulation, and who find themselves in an environment that is only loosely teacher regulated, may experience a gap in regulation, which may be similarly destructive to their learning. For constructive learning, Vermunt and Verloop explain, there needs to be a balance between student and teacher regulation. These types of friction may also apply to the regulation of teacher learning. Miranda, who is more self-directed in her learning than Paul, thrives in an environment where the school management does not interfere with the way she teaches. Paul, on the other hand, is less self-directed in his learning and experiences a lack of external direction and support for his own learning.

In addition, it may be concluded from our case descriptions that it is not a given that shared norms and goals will enhance teacher learning. Shared goals may indeed increase teachers' effectiveness in terms of acceptable student results as in the case of Paul. However, the exact nature of the goals i.e. whether they are reform-oriented or not, and the way they are shared and dealt with among management and staff, may equally inhibit teachers to become more innovative in their teaching. Little (1999) explains that a strong professional culture can reinforce traditional practices, as seems to be the case for Paul, or foster innovative practices, depending on the orientation of its participating members. Little therefore states that "the significance of these

strong professional cultures for high school reform rests in their particular orientation" (p. 34). Our study showed, however, that a lack of agreement among teachers about the goals of education and about what good teaching is does not necessarily inhibit teacher learning. The case of Miranda is a clear example of how, in a situation lacking a strong professional community, teachers can innovate on their own "guided by their independent initiative and relying on their own resources" (Little, p.33). Thus, both the individual self-directed and innovative teacher in a loose professional community and a group of teachers in a reform-oriented professional community may become more reform-oriented.

Moreover, in comparing the two cases, it appears that it may not be solely the conditions for learning, but also the teacher's own disposition towards learning, that seem to have affected these two teachers' informal learning. In the case description it can be seen that Miranda is always critical towards herself and she explains how she likes variety within her teaching job. It seems that Paul, on the other hand, tends to be on the safe side and prefers order and stability. It appears that Paul seems to be a lot less certain than Miranda about his ability to change his teaching practice.

The most important implication of our findings is that in order to enhance teachers' informal learning in the context of reform, not only the school management and organization, but also each individual teacher needs to contribute to creating optimal conditions for teacher learning. In one of our earlier studies (Chapter 2) it was found that teachers do not usually consider themselves learners. A first step in creating optimal conditions for teacher learning would be that both the teachers themselves as well as the school management consider not only the students, but also the teachers as learners.

We started our chapter with a citation from Richardson and Placier's (2001) review, who found that the literature on individual teacher learning versus the school as a learning environment for teachers 'largely stand on their own'. Even though since their publication a few articles have aimed at bridging this gap, e.g. Hodkinson and Hodkinson (2005), we believe that researchers from the two strands should also focus on the interaction between the individual teacher and the organization, for this is where the conditions for teacher learning may be shaped and thus could be improved. More specifically, it seems important to deepen our knowledge of the relations between teachers' personal factors, the conditions for learning in the workplace, and teacher learning.

Chapter 5

Conclusions and discussion

The aim of the research reported in this dissertation was to describe how experienced secondary school teachers learn at work in an informal learning context. The main question addressed was: *How do experienced teachers learn in an informal learning environment?* To answer this question, a learning activity approach was adopted to study the processes by which teachers learn through their daily work. In this approach, activities were conceptualized as overt or mental activities that can be conscious or not, and that have a cognitive, behavioral, emotional and motivational component.

Three studies were conducted, which are reported in Chapters 2, 3, and 4 of this dissertation. Each of these studies focused on teacher learning in the context of a reform in which teachers are encouraged to adopt a pedagogy of fostering students' active and self-regulated learning (ASL). The studies were also part of a larger research project, involving other PhD projects and a post-doc project. This larger project was aimed at developing a conceptual framework of teacher learning in the workplace.

This chapter presents the main conclusions from the three reported studies, followed by an overall conclusion in answer to the main question addressed in the dissertation. After that, we will discuss the theoretical implications of our findings and our research methods used. The chapter ends with suggestions for future research and the practical implications of our conclusions for fostering teacher learning in the workplace.

5.1 Main conclusions of the three studies

5.1.1 Experienced teachers' informal learning from classroom teaching

The purpose of the first study was to explore how experienced teachers learn through the activities they undertake when teaching classes. In particular, the aim was to further conceptualize informal learning and empirically underpin this conceptualization with data of teachers' learning activities, as they occur on-the-job. The main question addressed in this study was: *How can the activities be described through which teachers learn informally from classroom teaching?* A multiple case study was conducted, for which data was collected from four experienced teachers over the period of a year. These data was collected by conducting

classroom observations and interviews. Based on the data, teachers' classroom activities were distinguished on three levels of conscious awareness: the level of deliberative learning, which involves conscious and planned activities; the level of reactive learning, involving conscious but unplanned activities; and the level of implicit learning. The activities involved in implicit learning take place beyond the teachers' conscious awareness. On each level, cognitive, behavioral, motivational, and emotional aspects of activities were considered. Chapter 2 provides an inventory of teachers' classroom activities on these three levels of conscious awareness. Activities distinguished on the level of deliberative learning were orienting, practicing, and seeking explicit student feedback. It appears that while practicing, teachers regulated their emotions and motivation and suppressed behavioral tendencies. Pertaining to reactive learning three kinds of activities were found: becoming consciously aware as such; becoming consciously aware and adjusting one's course of action; and becoming consciously aware and reframing. On the level of implicit learning, two activities could be distinguished: (1) the implicit acquisition and strengthening of a belief, and (2) inhibiting change by acting upon tacit beliefs, feelings, and behavioral tendencies in situations where a teacher attempts to change his/her behavior.

The main conclusion drawn from this first study is that teachers' learning during classroom practice may take place on several levels of conscious awareness. A variety of activities can be distinguished at each level and these activities not only encompass cognitive, but also behavioral, motivational, and emotional aspects.

5.1.2 Activities and changes in cognition and behavior

The purpose of the second study was to relate teachers' activities to changes in teachers' cognition and behavior. The main question addressed in this second study was: *What is the relation between teachers' learning outcomes and their learning activities in an informal learning environment?* For this study, the conceptions and behavior regarding ASL of 32 experienced teachers were investigated twice three months after the start of two consecutive school years. In the year in between these two measurement moments, the teachers reported learning experiences regarding ASL six times by email. The activities teachers reported in these emails were analyzed based on a list of categories derived from literature on mental and overt learning activities. As this second study relied on

teachers' self-reported learning activities, only conscious activities -- thus only deliberative and reactive activities -- were studied. Moreover, the study focused on observable and mental activities, which mostly included the behavioral and cognitive aspects of activities. Four groups of teachers were distinguished who differed in learning outcomes. The type of activities each group reported and the frequency with which they reported each type of activity were compared.

From this second study it was concluded that two thirds of the participating teachers changed either in conceptions or behavior; but only two teachers changed on both. One of these two teachers conceptions and behavior became more ASL-oriented, while the other changed in the opposite direction. From the analysis of teachers' written learning experiences it could be concluded that activities were reported for each category derived from the literature, however, with various frequencies. One quarter of the activities reported occurred in interaction with peers. Almost half, 43%, of the mental activities involved were meaning-oriented, while the remaining 57% were action-oriented.

Finally, pertaining to the relation between activities and learning outcomes it was concluded that the activities teachers reported in their learning experiences could be related to teachers' changes in conceptions and behavior, but only to a certain extent. The activities *getting new ideas from others in combination with action-oriented mental activities* and *experimenting in combination with meaning-oriented mental activities* seem to be most conducive to a change towards more ASL-oriented *conceptions*. The activities *experiencing friction* and *struggling with behavioral tendencies* seem to contribute to a change towards less ASL-oriented conceptions.

As regards the relation between teachers' activities and changes in teachers' ASL *behavior* it was concluded that a strong focus on individual activities and the activity *experimenting in combination with action-oriented mental activities* could be related to a change towards less ASL-oriented behavior. Collaborative activities and the activity *experimenting in combination with meaning-oriented mental activities* seem to contribute to a change towards more ASL-oriented behavior.

5.1.3 Informal learning and conditions for learning in the school

The purpose of the third study was to relate teachers' informal learning to conditions that in literature are considered to foster teacher learning in the workplace. The main question addressed in this study was: *What is the relation between teacher learning in the school and school conditions that are assumed to foster teacher*

learning? In a contrasting case study, two cases were compared of teachers who differed in their learning outcome. Miranda changed towards more ASL-related conceptions and Paul did not change. For the description of these two teachers' informal learning, this third study built on the data and findings of the two previous studies. In the case descriptions, the way these two teachers learned informally was related to five conditions that in literature, on the school as a learning environment for teachers, are considered to foster teacher learning in the workplace, namely: (1) teacher autonomy; (2) collaboration; (3) reflective dialogue; (4) receiving feedback; and, (5) shared norms and responsibility. As teachers are bound by the social practices in the environment in which they work, we also collected and analyzed data on the dominant conceptions regarding ASL in the school as perceived by the teachers, by means of a short questionnaire.

The case studies confirm that experiencing sufficient autonomy, collaboration, reflective dialogue, and receiving feedback can be positively related to teachers' informal learning in the workplace. In addition, the findings indicate that the dominant conceptions in the school may influence whether or not the teacher changed in conceptions. However, it does not seem to be the case that the more norms are shared, the more teachers learn. Moreover, the extent to which teachers have autonomy, collaborate, receive feedback, are involved in shared reflection, and share norms and responsibility is partially dependent on the teacher him/herself. The conditions are thus not mere attributes of the school context of the teacher, but are created through the interaction between the teacher and the organization. We concluded chapter four by stating that both context factors within the school as well as the teachers' own dispositions to learning seem to contribute to how these conditions for learning are shaped.

5.1.4 Overall conclusion

The main question of this dissertation was: *How do experienced teachers learn in an informal learning environment?* In light of the findings from the three studies reported on in this dissertation, this question can be answered as follows: In an informal learning environment teachers learn through engagement in daily workplace activities. However, engagement in daily activities does not always contribute to a change in conceptions or behavior. It seems that activities that have certain characteristics contribute to a change towards more ASL-oriented conceptions and behavior, while other activities - with other characteristics -

contribute to the reinforcement of current practices. There are also activities that seem to contribute to a change away from ASL-oriented conceptions and behavior.

For a change towards more ASL-oriented conceptions to occur, it seems that activities need to have a focus on new practices and need to involve mental activities that are meaning-oriented. Activities that focus on new practices are for instance experimenting and getting new ideas from others. These activities are deliberative or reactive. Collaborative activities seem to contribute to a change towards more ASL-oriented *behavior*. In classroom teaching, the activity practicing new behavior could be distinguished, which is a deliberative activity. Activities that contribute to conceptions and behavior becoming more ASL-oriented are thus mainly conscious activities.

A number of activities, on the other hand, seem to reinforce existing behavior or conceptions, such as deploying what works, and repeated negative experiences that reinforce existing beliefs. Teachers who were not ASL-oriented at the start of the study and who did not change in conceptions and behavior also reported less meaning-oriented activities than those teachers who remained or became more ASL-oriented.

Those teachers whose conceptions became less ASL-oriented reported few meaning-oriented activities and reported mainly activities that show a concern with current practice. Amongst these activities are: experiencing friction, and struggling with behavioral tendencies. When these activities do not involve meaning-oriented mental activities, they seem to contribute to a learning process that results in a change towards less ASL-oriented conceptions.

Certain conditions in teachers' direct work situations seem to be related to teachers undertaking activities that contribute to a change towards more ASL-oriented conceptions. These conditions are: sufficient teacher autonomy, teacher collaboration, receiving feedback and reflective dialogue. Both context factors within the school as well as the teachers' own dispositions to learning contribute to how these conditions for learning are shaped. The relations that shape these conditions are complex and may vary amongst teachers.

Overall, it can be concluded that our learning activity approach, in which activities are conceptualized as taking place on several levels of conscious awareness, and that focuses not only on cognitive, but also on motivational, emotional and behavioral aspects of activities, yielded interesting insights concerning teachers' informal learning. These insights have a bearing on a number of learning activities that were not described in earlier studies, the

relation between activities and learning outcomes, and factors that affect informal learning.

In the following sections we will discuss the implications of these insights. First we will discuss the implications of a learning activity approach to learning (section 5.2). Then we will focus on types of learning outcomes (section 5.3), and factors that may affect informal learning in the workplace (section 5.4).

5.2 A learning activity approach to learning

5.2.1 Activities on several levels of conscious awareness

The findings of the three studies reported in this dissertation show that learning in an informal learning environment is integrated in teachers' everyday work-related activities. Our findings regarding activities on three levels of conscious awareness indicate that the typology of Eraut (2004) applies to teacher learning. The analysis of teachers' classroom teaching activities on three levels of conscious awareness showed that teacher learning in an informal context is sometimes merely self-initiated and self-regulated, but more often, teacher learning occurs through a mix of both self-initiated and unintentional activities. Also the activities reported by the teachers in the second study often reveal the role of unexpected events and unintentional activities in teachers' self-reported learning experiences. The findings of our second study thus suggest that the type of learning teachers are aware of can be deliberative or reactive.

These findings concur with the findings of Van Eekelen et al. (2005) who studied college teachers' workplace learning. Van Eekelen et al. found that only one third of the learning experiences reported by the teachers in her study were planned, while the rest of the activities were either spontaneous or a mix of self-regulated and spontaneous activities. In a study of student-teachers' regulation of learning, Oosterheert, Vermunt, and Denessen (2002) found that not only active and intentional learning activities, but also reactive, non-intentional learning activities contributed to student teachers' knowledge growth. We may conclude that besides deliberative activities, reactive activities are an important source of informal learning in the workplace.

The implicit activities found in our study were mainly activities that seem to have reinforced existing cognition and/or behavior. A number of theories offer an understanding of how implicit activities could actually contribute to learning from experience. Oosterheert and Vermunt (2003) point in this respect to the

role of "dynamic sources": implicit dynamic self-regulating processes in the human brain. The notion of dynamic sources comes from Iran-Nejad (1990) who builds on theories of how the human nervous system works. Iran-Nejad argues that subsystems in the human mind are capable of regulating local internal construction processes on their own, thus beyond the learners' awareness. Based on such dynamic self-regulating processes, the brain offers possible interpretations of phenomena to the conscious mind. Through these dynamic processes the brain also points the learner's attention to sensory data that are of interest to the learner. Oosterheert and Vermunt argue that it is such implicit dynamic sources in the brain that point student teachers' attention towards certain cues from the environment to learn from. In future research the role of teachers' attention during their work and the relation between attention and teachers' interest and motivation could be further studied.

Marton and Booth (1997) describe a similar view on learning. They emphasize the role of perception and awareness in (professional) learning and state that after the learning process "the learner has become capable of discerning aspects of the phenomenon other than those she had been capable of discerning before" (p. 142). Marton, Dahlgren, Svensson, and Saljö (1977, p. 23) refer to this kind of learning as "a change in the eyes through which we see the world".

The above framework offers an understanding of types of implicit activities that may contribute to a change towards more ASL-oriented conceptions. In the case of Miranda in Chapter 4, we described that Miranda felt unhappy about her writing instruction and had found an example of a student task using peer review in a certain section of a teacher magazine. It may very well be that Miranda's unhappiness with the existing situation might have fueled the dynamic sources in her mind, which in turn pointed her conscious attention to the relevant section of the teacher magazine. The dynamic sources thus act as a search light, sifting important from less important sensory inputs. These types of activities were not systematically captured in our study. Future research may focus on the types of implicit activities that contribute to changes in conceptions and behavior and the factors influencing this kind of learning.

5.2.2 A focus on both overt and mental components of activities

In this dissertation, learning activities are conceptualized as simultaneously involving a cognitive, behavioral, motivational and emotional component. The study of teachers' activities addressing these four components was not easy, but

sometimes revealed some interesting insights not found in previous research regarding teachers' learning. For instance, in our study of teachers' activities in classroom teaching, we focused on what teachers thought, wanted, felt, and did in the situation. We observed situations where teachers intended to change their behavior and were practicing new behavior during teaching. The data revealed that this activity involved attention to the goal to change, regulation of emotions, and suppression of a behavioral tendency to act in the old/normal way. It was also found that when a teacher was not consciously aware of his/her goal to change, that the teacher followed the behavioral tendency to act in the old/normal way. The data showed that these behavioral tendencies were related to implicit beliefs and emotions associated with the old way of teaching. For instance, Nicole wanted to get the students more actively involved in their learning process by getting them actively engaged in student tasks while she herself would only guide them from the sideline. At times Nicole temporarily 'lost sight' of her goal and started to instruct frontally, acting upon the implicit belief that after she had written everything on the blackboard, the students would have definitely learned the subject-matter. In situations like these, where a teacher is not deliberately or reactively engaged in learning, the teacher is usually not aware of the emotional, motivational, and behavioral aspects that steer his/her behavior, and also cannot easily distinguish between these aspects.

Because we focused on more than only cognitive aspects of activities, we were able to develop an understanding of informal learning that adds to theories of learning in educational psychology. For instance, in literature on students' learning activities (e.g., Pintrich, 2004; Vermunt & Verloop, 1999; Zimmerman, 1995), activities that are concerned with changing behavior have received little attention. A possible reason for this may be that the study of student learning is mainly concerned with acquiring new knowledge. Our study, however, showed that practicing is an important activity in changing behavior and that this activity involves, amongst others, the suppression of inadequate behavioral tendencies.

The framework used in our second study for the analysis of teachers' self-reported learning activities, was for the main part based on existing inventories of teachers' learning activities. The learning activities distinguished by means of this framework could not easily be related to teachers' change in behavior. The teachers who did and did not change in behavior did not differ much in the frequencies with which they reported the activities categorized by means of this

framework. It may thus be that previous studies into teachers' learning activities have not yet fully captured the activities involved in teachers' change in behavior. In order to understand which activities contribute to teachers' change in behavior over time, future research should pay more attention to the relation between cognitive, behavioral, motivational, and emotional components of teachers' activities and teachers' change in behavior. The activity practicing, as it is described earlier in this section, may be used as a starting point for such research.

In the second study the combined analysis of the more overt aspects of activities and teachers' mental activities yielded interesting insights. This study showed that a combination of more overt aspects of activities, namely experimenting and getting new ideas, in combination with meaning-oriented reflection, could be related to a change congruent with the reform. Put more generally, a combined focus on both the overt and mental aspects of activities appears to contribute to more insight into the activities that contribute to teachers' change in conceptions.

5.2.3 Moving beyond a merely cognitive approach

In the second study, a number of activities derived from existing inventories of learning activities could be related to teachers' change in conceptions of active and self-regulated learning. These activities were experimenting and getting new ideas from others in combination with meaning-oriented mental activities, which could be related to a change towards more reform-oriented conceptions. The description of these activities fits into an approach of learning as a rational endeavor, where rational is understood as analytical, conscious, and logical (Epstein, 1990). However, our study shows that activities do not only involve cognitive aspects and also do not always take place on a conscious level. It thus seems that informal learning in the workplace involves more than merely a rational endeavor. It is time that research on teacher learning moves beyond such a cognitive approach of learning.

As authors such as Nias (1996) and Hargreaves (1998a) state, it is time that research on teacher learning moves beyond a one-sided rational approach of learning. Teaching is a profession in which feelings and emotions play an essential role, but until recently "the more unpredictable passionate aspects of learning, teaching and leading … are usually left out of the change picture." (Hargreaves, 1998b, p. 558). Recent studies in neuroscience indicate that knowledge used in daily functioning is for a large part emotional (Immordino-

Yang & Damasio, 2007). Immordino-Yang and Damasio argue that emotions should not be regarded as 'toddlers in a China shop' running around in need of regulation, but that emotions are a structural part of knowledge and should be addressed accordingly. Our approach of activities as simultaneously involving cognitive, motivational, emotional as well as behavioral components can contribute to the development of a conceptual framework of teacher learning that moves beyond a merely cognitive approach. The notion of cognitive-affective schemes becoming automatically triggered in classroom situations (see Chapter 2), could be a component of such a conceptual framework.

5.2.4 Definition of learning activity

Research on learning activities, whether they are students' learning activities (e.g., Vermunt & Verloop, 1999) or teachers' learning activities (e.g., Kwakman, 2003) has provided inventories of learning activities. These activities were called learning activities because the learners undertook these activities to learn, or learners considered the activities as activities they usually learn from. Our findings confirm that a number of activities derived from the provided inventories could indeed be related to changes in teachers' conceptions. However, the findings also show that the activities of a number of teachers could not be related to changes in ASL conceptions or behavior. In our definition of learning, activities are learning activities when they lead to a change in cognition and/or teaching behavior. Strictly following our definition, the activities these teachers reported can thus not be considered learning activities when no change is found in cognition and/or behavior. Our definition also means that an activity such as experimenting involving meaning-oriented reflection can be a learning activity for one teacher but not a learning activity for another teacher. The intriguing question then is: what makes an activity a learning activity? For the sake of clarity, it would perhaps be helpful to introduce the term 'potential learning activities', and study the conditions under which these potential learning activities really contribute to a relatively lasting change in cognition and/or behavior. In addition, it should be noted that one of the risks of describing the teachers' learning processes in terms of single activities may be that our view on the learning process becomes too fragmented. It may well be that certain combinations of learning activities are most beneficial to teacher learning and that the order in which they occur is important. Therefore the relations between combinations of potential learning

activities and the conditions under which they contribute to certain learning outcomes need to be further explored.

5.3 Learning outcomes

Learning outcomes, in our study, were operationalized as teachers' change in ASL conceptions and behavior. In the following section we will discuss our findings as regards these learning outcomes. Next, we will briefly elaborate on other possible outcomes of teachers' informal learning in the workplace, which we may not have been able to capture in our study.

5.3.1 Changes in ASL conceptions and behavior as learning outcomes

We have studied teachers' learning in the context of innovation, in which teachers are encouraged to adopt a pedagogy of fostering students' active and self-regulated learning (ASL). Teachers' learning outcomes were studied by means of questionnaires regarding ASL conceptions and ASL behavior, for we assume that both teachers' conceptions and behavior should be ASL-oriented for the new pedagogy to be successful. The data reported in the second study showed that only 1 out of 32 teachers became more oriented towards fostering ASL in both conceptions and behavior. The second study also showed that 11 teachers did not change in ASL behavior or in conceptions regarding ASL. The rest of the teachers, two thirds of the group, changed mostly either in conceptions or in behavior regarding ASL.

The finding that 11 teachers did not change in ASL conceptions or behavior, and that a number of teachers even changed away from the reform, means that in an informal learning environment the joining teachers did not learn optimally as regards the type of teacher change that is encouraged by the reform. Pertaining to change in teachers' conceptions, which were conceptualized as a set of interrelated beliefs, the findings concur with other studies that show that teachers' beliefs do not easily change (Richardson & Placier, 2001; Spillane, Reiser, & Reimer, 2002; Van Driel, Beijaard, & Verloop, 2001; Yerrick, Parke, & Nugent, 1997). Yerrick et al. describe how teachers assimilate new notions into their existing belief systems and use new language to describe their teaching without changing the underlying beliefs. Spillane et al. argue that the difficulty of teachers' change in the context of reform can be explained by a framework of teachers as sense-makers. This framework underscores the importance of prior knowledge for understanding and

encoding information from new situations. The authors describe three implications of this framework which explain the difficulty of teacher change. Firstly, new information is understood in terms of prior knowledge. This means that each teacher constructs his/her own interpretations of the same message; in our case a message from the government and the school management about the new pedagogy. Secondly, for experienced teachers, new instructional approaches, such as the new pedagogy, do not just involve encoding new ideas, but also a restructuring of existing beliefs. Restructuring existing knowledge appears to be more difficult than merely encoding new knowledge. Thirdly, the authors describe that the mechanisms for accessing and applying new knowledge structures usually rely on superficial characteristics of a situation. For example, on a superficial level, classroom situations may be perceived to foster active learning if students are working independently on their tasks. But on a deeper level it could be that the students are working independently on memorizing the subject-matter, which is not in line with the theory of learning as knowledge construction, which is one of the key concepts underlying the new pedagogy. Considering the difficulty of conceptual change (Spillane et al.), it is not surprising that a number of the teachers under study did not change in conceptions.

It is remarkable that research on teacher learning is mostly concerned with teachers' change in cognition, as if behavioral change automatically follows from a change in cognition. Our first study showed that a teacher with a strong intention to change, whose conscious conceptions were largely in line with the new pedagogy, did not always succeed in changing her behavior. The question is how teacher change can be promoted if we take these findings seriously. During the last decades, several promising approaches have surfaced in the literature. For example Van Eekelen, Vermunt, and Boshuizen (2006) have based an intervention for teachers on a model for behavioral change, derived from the field of behavioral therapy. In their study these authors focused on teachers' willingness to learn, which is considered the start of a change sequence, consisting of various phases. Further research into informal teacher learning in the workplace may use this line of thinking and derive concepts from psychological research on behavioral change, such as the concept of phases in change sequences, to describe teachers' change in behavior.

Also referring to therapeutic frameworks, Korthagen and Vasalos (2005) describe the so-called multi-level learning approach for promoting teacher

development, which takes several aspects of teacher learning into account, such as behavior, beliefs and teacher identity as well as cognitive, motivational and emotional factors. After conclusion of the research reported on in this dissertation, we have experimented with this approach in a follow-up study in which one of the teachers from our second study was supervised. We are currently preparing a publication on the promising results of this follow-up study.

5.3.2 Other possible outcomes of informal learning

The finding that a number of teachers did not change in ASL conceptions and behavior does not mean that these teachers did not learn at all. Teachers themselves state that they learn every day. Although we can not be certain that they did indeed learn, it may well be that we were not able to fully capture their learning. Certainly there is a lot to learn, also within the context of ASL that falls out of the scope of how we have studied teacher change regarding ASL. For instance, teachers may learn how to foster self-regulated learning of those two students who are so smart they pass all their tests without working on their tasks. How to activate students' learning activities with this new task on a topic the teacher is not too familiar with? How to facilitate the collaborative learning process of this group of students who do not seem to like each other? Teachers, who are learning to deal with these situations, may be perpetuating their role as a facilitator of students' ASL and may not have changed in their scores on our questionnaires on conceptions and/or behavior. However, these teachers' personal practical knowledge may have become more elaborated, and their behavior may have become more adept to address specific students and work with certain materials. Similarly, teachers who perpetuate their role as instructor and knowledge transmitter may have learned for instance new ways of explaining certain concepts. Our definition of learning as engaging in activities that lead to a change in cognition and/or teaching behavior does include these types of detailed learning outcomes, but our instruments have measured teachers' conceptions and behavior on a rather general level. Moreover, our requirement that the difference between the two measurement moments should be larger than the standard error of difference may have sifted out more subtle changes. Future researchers of teachers' informal learning in the workplace may consider developing instruments with which these more detailed learning outcomes can be measured. See section 5.5 for an evaluation of research methods.

In studies on teachers' learning we should distinguish between teachers' informal learning in the workplace in general, and the type of teacher learning necessary for teachers to succeed in adopting and enacting a new pedagogy in their daily teaching practice. This means that in future research on teachers' informal learning in the workplace, different types of change could be distinguished and related to the activities that contribute to these changes.

5.4 Individual and social factors affecting informal learning in the workplace

In the third study reported in this dissertation, insights in literature on the conditions fostering teachers' informal learning in the workplace were used to study the relation between informal learning of individual teachers and conditions within their direct work environment. The cases indicate that these conditions are shaped in the interaction between the teacher and others within the direct work environment of the teacher. It seems that teachers differ in the way in which they contribute to creating the conditions that foster their own learning. Miranda, who is more self-directed in her learning than Paul, thrives in an environment where the school management does not interfere with the way she teaches. Paul, on the other hand, is less self-directed in his learning and experiences a lack of external direction and support for his own learning.

Starting from the understanding that conditions for learning in the school are partially constructed by the teachers and partially by others in the school, the role of both the teacher and others should be further explored. Future studies could relate individual and organizational characteristics to the patterns of interaction between the teacher and others within the school. This way we may start to understand what type of teachers profit best from which kind of organizational circumstances.

5.5 Evaluation of the research methods

For the study of teachers' learning we have used a number of different instruments, which together aimed at covering relevant aspects of teacher learning (see also Table 1.1, Chapter 1). In the former section we discussed some new insights derived from the data collected by using these instruments

in combination with each other. In this section we will evaluate the individual methods and instruments and provide suggestions for improvement.

5.5.1. The study of teachers' classroom activities by means of repeated observations and interviews

In the first study, presented in Chapter 2, teachers' activities were studied over the period of a year regarding their major concern. It was decided to conduct a longitudinal study so that activities could be studied as they took place over time. This way we did not have to solely rely on teachers' retrospective account of how they learned. In this section we will evaluate the advantages and disadvantages of the method we used for the study of the activities teachers learn from during classroom teaching.

One of the aims of the study was to describe teachers' activities on several levels of conscious awareness. For the study of implicit activities it was important not to promote teachers' awareness of their own learning regarding their concern, because when teachers become aware of what we focused on, their activities would no longer be implicit. For this reason, the teachers themselves were not informed about the fact that the research focused on one of their concerns. During classroom observations, the researcher selected classroom situations that could be related to the teachers' concern. In collecting data in the first study, teachers were repeatedly asked what was going on inside them in classroom situations that were selected by the researcher. Even though the selected situations were thematically related by the researcher, after the data collection was over, the teachers reported to have little idea why certain situations were selected and others were not. Our efforts to raise as little awareness as possible were thus successful. Hence, the chance that teachers had started to more consciously focus on their concern because of the research was minimized, and our opportunities of finding instances of implicit activities increased.

As teachers were not aware of their implicit activities, this phenomenon appeared hard to study. The patterns discussed in Chapter 2 only became apparent after intensive study of data that were collected over the period of a year. In the selection of situations the researcher had to rely on situations that occurred in the classroom during one lesson. For each teacher, data from four situations from each of the six lessons was available. During analysis we discovered patterns in behavior and implicit activities were sometimes linked to certain students, or certain student tasks. It appeared then that sometimes only

a few of the 24 situations in the data set of one teacher involved these students or student tasks. Further study of teachers' implicit activities in teaching may profit from the collection of data from more lessons and from stricter selection criteria for data collection. This could be, for instance, realized as follows.

First of all, a researcher may attend all the lessons of a teacher during the period of a whole week. During this week, the researcher could select situations from a number of different lessons during a day for further discussion at the end of the day. During the week, the researcher may also discuss with the students the extent to which situations are representative of the teacher. After this week, the researcher may have an idea of how representative certain situations are for the regular lessons of a teacher. Thorough study of these situations may provide directions for further detailed study of situations relevant to the study of certain possibly implicit activities. After a month, the researcher may attend another week of lessons, and be much more focused in the selection of situations and may even decide to only attend lessons taught with certain classes. Thus, relevant situations from, for instance, a number of relevant lessons observed 10 times throughout the year, could highly increase possibilities for the discovery of patterns in the data that indicate implicit activities. A possible risk of more specific selection criteria is that the teacher may become aware of the criteria and the researcher's focus, which in turn could have an impact on the level of consciousness and perhaps also the type of activities that occur in the situations under study.

Optimizing the research methods for the study of implicit activities may have consequences for the study of deliberative and reactive activities. A disadvantage of our decision to limit teachers' awareness about the fact that the research focused on one of their concerns, was that we could not ask the teachers explicit questions regarding their deliberative and reactive (consciously undertaken) activities in relation to their concern. For the study of teachers' deliberative and reactive activities we had to rely on teachers' general answers on what they thought in the situation and teachers were not explicitly asked what they thought in the situation *in relation to their concern*. This complicated and limited the analysis of teachers' deliberative and reactive activities.

Researchers less interested in studying teachers' implicit learning and more in teachers' deliberative and reactive activities in informal learning could use a more focused way of interviewing. At the risk of increasing the formality of the learning environment through research (see also section 5.5.6), a teacher and

researcher may more explicitly discuss the activities teachers undertake in classroom teaching that contribute to changes in cognition and/or in behavior. However, it should be kept in mind that this more explicit approach would likely increase teachers' awareness and thus have an impact on the reactive activities of the teacher.

5.5.2 The study of teachers' activities by means of self-reported learning experiences

In order to be able to study the activities of a larger group of teachers, we had decided to limit ourselves to studying teachers' deliberative and reactive, i.e. conscious, activities. For the study of conscious learning in the workplace, learners' self-reports are considered useful methods (Berings et al., 2006). The 32 teachers who joined our study were asked six times during the year to report on a learning experience regarding fostering active and self-regulated student learning. At the start of the study, teachers received instruction that all kinds of learning experiences were welcome: they could be either successful or disappointing experiences, concern the teaching material, the students or the teacher him/herself, parents, peers etcetera, take place in the classroom, in interaction with peers, at home or in any other context. Moreover, the teachers were asked to report on certain aspects of their learning experiences, including their thoughts and feelings regarding the experience. They received a yellow card with relevant questions, to be kept in their agenda as a job-aid (see section 3.3.3 in this dissertation).

The use of written reports on learning experiences of the 32 teachers in our study had certain, mostly practical, advantages. First of all, even though the researcher had to invest considerable time in reminding teachers to send in their reports, the method of data collection took relatively little time. Secondly, the report did not depend on possibilities for face to face contact between teacher and researcher. Teachers could write their reports wherever a computer was available. Thirdly, unlike in the case of interview data, the written reports of teachers were already typed out, and thus immediately ready for analysis. Fourthly, considering the relatively large number of mental activities found in the written reports, our instruction for teachers on what aspects of their learning experiences to report resulted in the desired detail regarding teachers' thoughts in the situations, which enabled us, for instance, to distinguish whether a teacher was action or meaning-oriented in his/her reflection.

However, the use of teachers' written reports of learning experiences has certain far reaching consequences for the interpretation of our data. After all,

giving the teachers an instruction and a job-aid for their reports on learning experiences may in itself have evoked a learning process different from a process that would have 'naturally' occurred in an informal learning context. In this respect we should ask ourselves to what extent the learning environment of the joining teachers was truly informal (see also section 5.5.6).

A possible problem in the use of written reports is that frequencies of activities derived from these reports may depend on how elaborate a teacher is in his/her report. This problem did, however, not occur in our study. As the activities were coded on a relatively general level, an elaborate story of an experiment was coded exactly the same as an experiment reported on in three sentences. As a result we found no correlation between the total number of activities per teacher and the number of words a teacher had used in his/her reports. Thus the frequencies of teachers' activities, which were the input for further analysis, did not depend on how elaborate teachers were in their descriptions.

Another more problematic issue is that teachers may differ in their ability to verbalize their learning experience in a written report. It appeared that most teachers were able to write about what they and others had done in the situations in which they learned, but reporting on thoughts and feelings seemed to be more difficult for some of the teachers. In a few cases where the teachers could not describe their feelings and thoughts regarding the experience they reported, we could not determine whether their mental activities were action or meaning oriented. In such a case it seems important to interview the teacher about the reported experience. In this study this was not feasible considering the time-frame of our study and geographical distance between researcher and teachers.

Another problem is the fact that teachers were asked to send six reports throughout the year. Teachers were free to choose which learning experience they wanted to report on. The particular choice of experiences reported by one teacher may be a reflection of this teacher's hidden agenda to join the research. Most teachers' motivation to join the study was that they wanted to learn. Some teachers considered the incentive to write about their learning as an opportunity to be more reflective towards their own practice. A few other teachers had a negative attitude towards the reform. Some of these teachers seem to have chosen to report particularly those learning experiences, which, in their eyes, supported their argument against the reform. Hence, in the interpretation of

the data and findings, it should be kept in mind that teachers may have had different aims in writing their reports.

Future research into informal teacher learning in the workplace will benefit from a combination of observations and methods that rely on teachers' self reports. In addition, future research may explore the possibilities of modern technology, for instance personal digital agendas. Teachers may, for instance, touch a certain button when they feel they are learning, and - at the same time or shortly afterwards - indicate where they are and with whom. This could even be done during teaching. At the end of the day, a researcher and the teacher may review the noted situations and discuss teachers' learning experiences.

5.5.3 Questionnaire on conceptions regarding active and self-regulated learning

The use of a questionnaire to study teachers' conceptions of teaching and learning regarding fostering active and self-regulated student learning (ASL) had certain advantages.

Firstly, the questionnaire allowed us to study teachers' conceptions of teaching and student learning regarding the domain of ASL without testing or assessing teachers' explicit knowledge regarding the concepts of 'active' and 'self-regulated' learning. As a matter of fact it happened that in one of the questionnaires with open questions on teachers' definition of ASL a teacher expressed little idea what the concepts of ASL mean, and still showed conceptions very much in line with the social-constructivist theory on which the ASL pedagogy is based.

A second advantage of the use of questionnaires was that they allowed us to measure a change over the period of a year. In the first chapter we argued that teacher change has mainly been studied by asking teachers to describe how they think now and how they thought before. It was argued that teachers' memory may be colored. With our measurement of conceptions at the start and end of the year of study, we did not have to rely on teachers' memory. As conceptions were measured in a standardized way on both the first and the second measurement, we were able to establish teachers' change in conceptions, the direction of this change, and to compare teachers with each other.

A disadvantage of the way our questionnaire was constructed is that some of the scales had a ceiling effect, that is, we were not able to measure change when at the start of the study teachers already scored very high on the three ASL scales. These teachers' conceptions may have become more elaborate or

even more oriented towards fostering ASL, but unfortunately our questionnaire was not able to measure whether these teachers became more ASL-oriented or did not change in conceptions. The use of 7-point scales instead of 5-point Likert scales in the questionnaire would possibly allow for a more nuanced assessment of teachers' conceptions.

5.5.4 Questionnaire for students on their teachers' behavior regarding ASL

We used student questionnaires to measure teacher behavior regarding ASL, which had certain advantages. Since student scores were based on at least three months of experience with the teachers' behavior, the scores represent a more general impression of the teachers' behavior than an observer would have been able to provide, based on a limited number of observations. Moreover, the use of student questionnaires was a lot less time consuming than observation would have been. As lessons of 6 of the 32 participating teachers were observed regularly, we were able to compare our impression of the ASL behavior of these six teachers with the scores on the student questionnaire on ASL behavior of these six teachers. For all six teachers the students' scores matched our own impression.

A disadvantage of the use of questionnaires to measure teachers' behavior was that we were not able to capture all behavior relevant to the field of ASL. The students appeared to understand and interpret the teachers' behavior much less consistently with regards to the three underlying constructs of ASL (construction, collaboration and self-regulation; see section 3.2.2 in this dissertation) than the teachers did on the conceptions questionnaires. Therefore, about a quarter of the items had to be removed in order to create scales with sufficient reliability. As a result a number of relevant behaviors were not included in our study.

Another disadvantage was that the questionnaires measured the frequency with which teachers showed behavior that fosters ASL. A number of teachers reported to have experimented with student tasks and teaching formats that foster ASL. These teachers may have expanded their behavioral repertoire in fostering ASL, which can be considered as a change in behavior and thus a learning outcome. This learning outcome would, however, only show in our data if the change also contributed to an increase in frequency of ASL-behavior recognized by the students. If the student task or teaching format replaced a

task or format that stimulates students' ASL to the same extent, this learning outcome probably remained invisible in our data.

5.5.5 Ethical issue

A final remark on our method of studying teachers' activities in classroom teaching pertains to an ethical issue. Unlike many studies on teacher learning, our study on teacher learning in informal learning environments did not have a goal of improving teacher learning within the project. We therefore decided not to intervene until after the data collection for this study was completed. One of the phenomena we found in the data of one teacher is the way this teacher's change process was inhibited by implicit beliefs regarding the goals of teaching and herself as a teacher. This teacher was observed during a whole year in which the researcher tried to avoid raising the teacher's awareness of the phenomenon under study. At the same time, the researcher observed that the teacher fell back on her old teaching behavior and failed to achieve her goal. Assuming that the final goal of educational research is to improve education, the question we as researchers should ask ourselves is: Should we allow ourselves to not interfere while we observe problems of this kind? In the hope that our study of the case may possibly improve similar situations in the practice of a larger number of teachers in the future, our answer to this question was positive. Moreover, after data collection was over, we discussed our observations thoroughly with the research participants and we pointed out possible ways of receiving assistance.

5.5.6 Studying informal teacher learning: a contradictio in terminis?

In the former sections we discussed the methods we used to study teachers' activities in classroom teaching and in more general settings. We discussed how our research methods may have raised teachers' awareness of their learning, and how the instruction and job-aid used could be interpreted as forms of intervention. This may be in conflict with the way we defined informal learning: as learning in an environment that lacks systematic support for learning. In the continuum between informal and formal learning, the learning environment in which we studied teacher learning should thus not be considered as entirely informal, but as very slightly formal, as the research has slightly formalized the setting. Nevertheless we refer to this environment as informal, to distinguish it from learning in the context of projects explicitly organized for professional development.

5.6 Suggestions for further research

This section summarizes the suggestions for further research derived from our discussion so far. Regarding the role of implicit activities in teacher learning, we suggest that in further research the implicit activities contributing to a change in cognition and/or behavior could be further explored and conceptualized. In addition, the role of teachers' conscious awareness in learning and the relation between attention and teachers' interest and motivation could be further studied. We also propose that in further studies, the relation between the cognitive, behavioral, motivational and emotional components of teachers' activities and teachers' change in behavior should receive more attention.

As regards the learning outcomes, we suggest that in further research different types of changes in cognition and behavior could be distinguished. Future researchers of informal learning may consider using instruments with which more detailed learning outcomes can be measured. Different types of learning outcomes could then be related to the different types of work-related activities as studied in this dissertation. Research on change in therapeutic settings may also inform the study of change in behavior, for instance by describing phases in the process of behavioral change. Examples of approaches that may be beneficial to teacher learning are an approach based on a model for behavioral change and the so-called multi-level learning approach that addresses several aspects of teacher learning at the same time.

Additionally, by describing teachers' activities in terms of single activities, our understanding of teacher learning may become too fragmented. It would be preferable to study the relations between potential learning activities and the conditions under which they contribute to certain learning outcomes.

Moreover, in order to explain differences between teachers in the way they learn informally in the workplace, we suggest that future researchers focus on the interaction between the individual teacher and others in the school and relate interactional patterns to individual and organizational characteristics.

Further study of teachers' implicit activities in teaching may profit from the collection of data from more lessons and from stricter selection criteria for data collection. Future research into informal teacher learning at work will benefit from a combination of observations and methods that rely on teachers' self reports, and explore the use of modern technology to assist in data collection.

The use of 7-point scales instead of 5-point scales in the questionnaire on ASL-conceptions possibly allows for a more nuanced assessment of conceptions.

5.7 Practical implications

Our studies indicate that in an informal learning environment teachers do not learn optimally. More specifically, in order to change one's teaching practices towards fostering active and self-regulated learning, informal learning opportunities appear insufficient for some teachers. In this section we will first elaborate on how informal learning in the workplace may be improved. After that we will formulate some suggestions for interventions aimed at helping teachers to change their practice.

5.7.1 Optimizing informal learning in the workplace

In the first study it was suggested that teachers do not consider themselves learners in the workplace, and consequently are not alert in picking up cues from the environment to learn from, and do not allow themselves to make mistakes. For informal learning to become the rule in teachers' workplaces, teachers need to start seeing themselves as learners. To see oneself as a learner means to acknowledge that there is room for improvement and that there is a chance of failure. This may be threatening for experienced teachers who are used to being considered, and perhaps also consider themselves, seniors and experts in their own domain. Thus, in the context of reform, the school management should also start seeing teachers as learners.

Teachers need trusting relationships, in which disappointing results are not immediately condemned; teachers need openness and mutual respect, also in relation to the school management (e.g., Day, 1999; Hashweh, 2003; Nias, 1998). Such relationships could be fostered in professional communities of teachers (e.g., Louis et al., 1996; McLaughlin & Talbert, 2001). Moreover, teachers need time to learn, time to consult each other, time for collaboration and they need second chances (e.g., Mitchell & Mitchell, 2005). Thus, a school needs structures for support, such as teams, space, time and resources, and a culture of support (e.g., Little, 1995). In the third study it was argued that both the teachers and the school organization should contribute to creating the conditions that foster learning in the workplace. Thus, for many schools, acknowledging that teachers are also learners means adopting a new mindset, which has consequences for relationships and structures within the school.

Considering teachers as learners means that teachers also need to know how to learn within the workplace. The second study showed that teachers learn in different ways in the workplace. A number of teachers, such as Miranda, showed a wide repertoire of learning activities. Teachers such as Miranda could fulfill a role in the school in guiding other teachers to expand their learning repertoire. A teacher like Paul was disappointed in earlier attempts to change and restricted himself to activities that he considered himself capable of. This kind of teacher is more vulnerable in a context of reform (e.g., Hargreaves, 2004). A safe learning environment, in combination with guided reflection, can encourage these teachers to expand their repertoire of learning activities and to increase self-efficacy beliefs. The next section elaborates on how teacher learning could be addressed in more formal learning environments.

5.7.2 Organizing teacher learning in a more formal environment

Based on both literature and empirical data Hashweh (2003) describes that:

> Teachers undergo accommodative change when they are internally motivated to learn; become aware of their implicit ideas and practices and critically examine them; construct alternative knowledge, beliefs, and practices; resolve the conflicts between the prior set of ideas and practices and the new; and do so in a social climate characterized by collaboration, trust, reflection and deliberation. (p. 421).

Meeting the conditions that Hashweh describes means that the activities and possible outcomes of learning need to address teachers' own concerns so that teachers are intrinsically motivated. Compare the concern-based approach described by Korthagen and Lagerwerf (2001). Moreover, our studies equally stressed that in order to learn to change behavior, teachers need to become aware of their implicit beliefs, for these may hinder their more conscious attempts to change. We also suggest that in addition to Hashweh's conditions, teachers need to practice new behavior and let go of long held beliefs that have become redundant or may even be hampering in the new situation.

What Hashweh (2003) does not stress, but which has become apparent from our studies, is that both the learning teacher and the facilitator of the learning teacher need to be aware of the emotional aspects of learning. Letting

go of long held beliefs involves feelings of loss and pain (Hargreaves, 2004). Our first study showed that trying out new things can evoke feelings of uncertainty, for learners are not sure that they can control the new situation. Moreover, acknowledging that there is room for improvement means that the current situation is not optimal. Teachers may experience this as a threat to their self-esteem, which they may not want to face. In sum, programs designed to help teachers learn in the context of reform need to address not only Hashweh's conditions but should also address teachers' emotions and involve the practicing of new behavior.

5.7.3 Preparing teachers for learning in the workplace

Teacher education can also contribute to preparing teachers for learning in the workplace. Just as students in the higher tracks of secondary education need to learn how to learn, as a preparation for being a college or university student, student teachers need to learn how to learn as a preparation for learning during their teaching in the workplace. Student teachers should not start their career with beliefs that learning to teach consists of applying the knowledge acquired in teacher education or that learning to teach is similar to learning to survive, but with the belief that starting to teach is the beginning of a career-long process of learning. During teacher education student teachers can be prepared for career-long learning by becoming aware of and developing strategies for learning from their own and other teachers' practice. Teacher educators can assist student teachers in expanding the repertoire of learning activities they use when they learn in and from their teaching practice. This should be, much more than is the case now, one of the core elements of education programs for student teachers (learning to reflect on their own learning, becoming aware of implicit beliefs, becoming 'owners' of their own learning processes, pay attention to the role of emotion in teaching etc.). In turn, schools need to offer student teachers diverse opportunities for learning and create adequate facilities for that (support from a mentor who is skilled in how to challenge student teacher learning, attention for student teachers' implicit beliefs, time for exchanging experiences with peers and other colleagues in the school, being an active member of a subject-matter department and/or other teams in schools, etc.). Preparing teachers for learning in the workplace should be a collective effort of both teacher education institutes and schools, which is an important challenge in the near future.

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Summary

Introduction

The aim of the research reported in this dissertation is to describe how experienced secondary school teachers learn at work in an informal environment. The study is part of a larger research project aimed at providing a conceptual framework of teacher learning in the workplace as it takes place both in informal and formal learning environments. Considering the literature on teacher learning, it can be seen that until recently, teacher learning has mainly been studied in the context of professional development programs. Teachers themselves, however, report that they learn from the daily activities they undertake as part of their job. Not much is known yet about how teachers learn in such an informal learning environment. Hence, the overall problem definition of the dissertation is: *How do experienced teachers learn in an informal learning environment?* We focus on experienced secondary school teachers and in particular on one domain of teacher learning: fostering students' active and self-regulated learning (ASL).

Teacher learning is defined as engaging in activities that lead to a change in cognition and/or teaching behavior. Informal learning in our study refers to learning that takes place in a context characterized by a lack of systematic support for learning. Because learning in an informal learning environment may be planned or unplanned, conscious or beyond the learner's awareness, we have aimed to study teacher learning on several levels of conscious awareness. Moreover, as the role of emotions and needs in the teaching profession is increasingly recognized, this dissertation adopts a perspective on learning that embraces not only cognitive and behavioral, but also motivational and emotional aspects of the activities involved in learning.

The theoretical relevance of the research lies mainly in its contribution to a conceptual framework of teacher learning in the workplace. A better understanding of the activities through which teachers learn in an informal learning environment may provide insight into the processes that enhance or inhibit teacher learning in the workplace. The study also contributes to the methodology of research into teachers' learning embedded in their daily work.

Study 1: Experienced teachers' informal learning from classroom teaching

Chapter 2 reports on our first study into experienced teachers' informal learning from classroom teaching. The purpose of the first study was to explore

how experienced teachers learn through the activities they undertake when teaching classes. The central question of this study was: How can the activities be described through which teachers learn informally from classroom teaching? Four teachers participated in the study. Each teacher was interviewed at the start of the study regarding his or her current major concerns regarding his/her teaching practice. Throughout the year, six lessons of each teacher were observed and video-taped. After each lesson the teacher and researcher watched the video of the lesson and discussed four situations that occurred during the lesson that were related to the teacher's main concern. The observational data was used to describe the behavioral component of activities, while the interview data was used to describe the mental component, which involves cognitive, motivational, and emotional aspects.

The starting point for the analysis of teachers' activities was a typology of Eraut (2004) who distinguishes three types of learning. The first type is deliberative learning, which involves conscious and planned activities. The second type is reactive learning, involving conscious, but unplanned activities. The third type is implicit learning. The activities involved in implicit learning happen beyond the teachers' conscious awareness.

On the level of teachers' *deliberative learning* three types of activities could be distinguished: orienting, practicing, and seeking feedback. In orienting it appeared that teachers deliberate how to proceed. In this deliberation, expectations of outcomes of their own behavior played an important role. Practicing involved three different kinds of activities: (1) experimenting with new behavior and teaching methods, aimed at finding out how and whether a new practice works; (2) deploying what works, where a teacher intentionally uses behavior that has been successful in the past to address a current problem; and (3) practicing new behavior, where teachers regulate their emotions and suppress inadequate behavioral tendencies in order to enable themselves to employ behavior that is new to them and has not yet become routine. The third type of activity that could be distinguished on the level of deliberative learning was seeking feedback from the students, which was only found in the data of one teacher who explicitly asked the students how they appreciated aspects of her lessons.

Pertaining to *reactive learning* three kinds of activities were also found: becoming consciously aware as such, becoming consciously aware and adjusting one's course of action, and becoming consciously aware and reframing. Adjusting one's own behavior was often found in the data. In such cases, a

teacher became consciously aware of some undesirable consequences of the current behavior and changed it, sometimes first consciously deliberating how to proceed. Reframing occurred when a teacher became consciously aware that an initial perception of the situation appeared to be wrong.

Regarding *implicit learning*, the fact that teachers are not aware of their learning made this phenomenon hard to study. Patterns only became apparent after intensive study of data collected over a long period of time. Closer examination of within-case patterns revealed the implicit influence of certain beliefs, feelings and behavioral tendencies in the situation. The data showed how, for one teacher, interrelated beliefs, feelings, and behavioral tendencies were implicitly acquired over time through repetitive experiences. The data of another teacher showed that when not regulated, implicit beliefs and behavioral tendencies automatically came to operate and limited this teacher's conscious attempts to change her teaching practice.

The main conclusion drawn from this first study is that teachers' learning during classroom practices may take place on several levels of conscious awareness; that a variety of activities can be distinguished at each level; and that these activities do not only encompass cognitive, but also behavioral, motivational and emotional aspects.

Study 2: Relations between activities and learning outcomes

Chapter 3 reports on our second study, which aimed at studying the relation between teachers' activities and learning outcomes, i.e. changes in cognition and/or teaching behavior, as they occurred over the course of a year. The central question of this study was: What is the relation between teachers' learning outcomes and their learning activities in an informal learning environment? The study of teachers' learning outcomes was limited to teachers' conceptions and behavior regarding ASL. 32 experienced teachers' conceptions and behavior regarding ASL were measured in October 2004 and October 2005. Teachers' conceptions were measured by means of a questionnaire consisting of three scales pertaining to three important concepts underlying the theory on ASL: learning as construction, regulation of learning, and learning in collaboration. Teacher behavior was measured by means of student questionnaires. For each teacher one group of students filled out a questionnaire on how often their teacher showed behavior promoting ASL. In the following year a group of students from the same grade level filled out the questionnaire. In order to assess whether a teacher changed in conceptions

and/or teaching behavior, differences in scores on the two measurements were corrected for the standard error of the difference of the scales. Score differences bigger than the standard error of the difference were considered to represent real change.

During the year, the teachers reported learning experiences regarding ASL six times by email. For the analysis of the activities teachers reported in their learning experiences, a framework for analysis was derived from literature on learning activities. This framework included the following activities: (1) learning by doing, including: (1a) learning by experiencing friction and (1b) learning by struggling with behavioral tendencies; (2) learning by experimenting; (3) learning by getting ideas from others; and (4) learning by considering one's own teaching practice. The mental activities involved were coded as either action-oriented, i.e. aimed at finding out what works in practice, or meaning-oriented, i.e. aimed at understanding why certain aspects of teaching work in certain situations and why others do not.

Analysis of the questionnaires showed that at the start of the study, 9 out of 32 teachers had ASL-oriented conceptions and 12 teachers showed ASL-oriented behavior. Moreover, for two-thirds of the teachers conceptions and behavior were in-line with each other. As regards teachers' change scores, it was concluded that two thirds of the participating teachers did change either in conceptions or behavior, but only two teachers changed on both. One of these two teachers became more ASL-oriented in conceptions and behavior, while the other changed in the opposite direction.

From the analysis of teachers' written learning experiences, it could be concluded that each category of activities derived from the literature was indeed reported, however, with various frequencies. One quarter of the activities reported occurred in interaction with peers. Moreover, almost half (43%) of the mental activities involved were meaning-oriented, while the remaining (57%) were action-oriented.

The activities teachers reported in the context of their learning experiences did not always contribute to a change in conceptions, at least not within a year. Getting ideas from others in combination with action-oriented mental activities, and experimenting in combination with meaning-oriented mental activities could be related to a change towards more ASL-oriented conceptions, while a combination of struggling with behavioral tendencies and experiencing friction, without much experimenting or interacting with peers, seemed to contribute to a change towards less ASL-oriented conceptions. Finally, a strong focus on

individual activities and experimenting in combination with action-oriented mental activities could be related to a change towards less ASL-oriented behavior. Collaborative activities and experimenting in combination with meaning-oriented mental activities could be related to a change towards more ASL-oriented behavior.

Study 3: Informal learning and conditions for learning in the workplace

Chapter 4 describes our third study. The aim of this study was to explore the relation between experienced teachers' informal learning and conditions for learning within the direct work environment of the teacher. The central question of the study was: What is the relation between experienced teachers' informal learning in the school and school conditions that are assumed to foster teacher learning? The study can be characterized as a contrasting case study. The cases illustrate the informal learning process of two teachers who were both involved in the two former studies. The cases are contrasting in that the two teachers showed different learning outcomes: one teacher became more ASL-oriented in her conceptions regarding teaching and student learning, while the other did not change in conceptions regarding ASL.

In the case studies, the teachers' learning processes are related to five conditions that in the literature are assumed to foster teacher learning in the workplace: teacher autonomy, collaboration, reflective dialogue, receiving feedback, and shared norms and responsibility. At the start of the study, the teachers were interviewed regarding their perceptions of these conditions and how they relate to their learning processes. As teachers are bound by the social practices in the environment in which they work, we also collected and analyzed data on the dominant conceptions regarding ASL in the school as perceived by the teachers, by means of a short questionnaire. Next, the two teachers' activities as analyzed in the two former studies were summarized. The case descriptions illustrate how one teacher's activities were often focused on new practices and to a large extent meaning-oriented, while the other teachers' activities were less focused on new practices and only action-oriented.

Although on the organizational level the two schools in which the two teachers teach appeared comparable in the extent to which they foster teacher learning, the findings show that on the individual level the conditions in one case are more conducive to teacher learning than in the other case. For example, one teacher enjoyed the autonomy she was granted by the school

management and used it to pursue her own goals, while the other teacher experienced too much autonomy and lack of direction.

The case studies confirm that experiencing sufficient autonomy, collaboration, reflective dialogue and receiving feedback can be positively related to teachers' informal learning in the workplace. In addition, the findings indicate that dominant conceptions in the school may have influenced whether or not the teacher changed in conceptions. However, it does not seem to be the case that the more norms are shared, the more teachers learn. In one case a lack of shared norms allowed the teacher to teach according to her own norms and become more ASL-oriented, even though here colleagues were less ASL-oriented. In the other case, strongly shared norms seem to have contributed to the fact that the teacher did not change in conceptions, even though he wanted to. The data thus indicates that shared norms are not necessarily conducive to teacher learning.

In conclusion, even though it seems that certain conditions should be met in the workplace in order for teachers to learn, it can also be seen that teachers themselves contribute to shaping these conditions. The conditions for learning in the school are thus not merely an attribute of the organization, but are shaped in the interaction between the teacher and others in the school.

Discussion

The main question of the research was: How do experienced teachers learn in an informal learning environment. In light of the findings from the three studies reported on in this dissertation, this question can be answered as follows: In an informal learning environment, teachers learn through engagement in daily workplace activities. It seems that activities focusing on new practices and involving meaning-oriented mental activities contribute to a change towards more ASL-oriented conceptions and behavior, while activities focusing on current practices and lacking meaning-oriented mental activities seem to contribute to the reinforcement of current practices, or even to a change away from ASL-oriented conceptions and behavior. Overall, it was concluded that our learning activity approach, in which activities are conceptualized as taking place on several levels of conscious awareness, and focusing not only on cognitive, but also on motivational, emotional and behavioral aspects of activities, yielded interesting insights. These insights have a bearing on a number of learning activities not described in earlier studies, the

relation between activities and learning outcomes, and factors that affect informal learning.

Our findings regarding activities on three levels of conscious awareness indicate that the typology of Eraut applies to teacher learning. Moreover, the findings that teachers' conscious activities can be either deliberative or reactive concur with the findings of other studies on teachers' activities, where teacher learning was described as only partially planned. The implicit activities found in our study were mainly activities that seem to have reinforced existing conceptions and/or behavior. Future research may focus on the types of implicit activities that contribute to changes in conceptions and behavior, such as the implicit acquisition of new behavioral patterns through repetition.

By focusing on cognitive, motivational, emotional and behavioral components simultaneously, we could describe combinations of activity components that have not received much attention in most theories of learning; for instance, emotion regulation in practicing new behavior. As our research shows that teacher learning is not merely a conscious and cognitive endeavor, it is asserted that in addition to a focus on conscious and cognitive aspects, research on teacher learning should focus more on motivational, emotional, behavioral and implicit aspects of teacher learning.

The findings of the second study concur with studies that show teachers' beliefs do not easily change. Moreover, it can be observed that research on teacher learning is mostly concerned with teachers' change in cognition, as if behavioral change automatically follows from a change in cognition. Our data indicates this is not self-evident. Further research into teachers' learning may build on clinical-psychological frameworks of human behavioral change, such as the concept of phases in change of behavior and approaches towards the promotion of behavioral change that take motivational and emotional aspects into account.

As conditions for teacher learning seem to be shaped in the interaction between the teacher and others in the organization, future studies could relate individual and organizational characteristics to the patterns of interaction that shape these conditions, and further elaborate on the relation between these conditions and teacher learning.

Regarding the research methods used in the first study, it is suggested that further study of teachers' implicit activities in teaching may profit from the collection of data from more lessons and from stricter selection criteria for data

collection. Teachers' written learning experience reports proved themselves useful for the study of teachers' deliberative and reactive activities. However, because of the instruction and help teachers received in writing their reports, their learning was perhaps not completely informal. Moreover, we cannot be certain to what extent the activities found in each report depend on teachers' ability to verbalize their learning experiences and on the goal teachers may have had in writing their reports.

The questionnaires on teachers' conceptions allowed us to measure teachers' conceptions in a standardized way, to establish data on teachers' change in conceptions, and to compare teachers with one other. A disadvantage was that some of the scales had a ceiling effect.

The use of the student questionnaires on teacher behavior cost the researchers relatively little time and yielded data which was congruent with our own observations. However, the questionnaires did not allow us to study all teacher behavior relevant to ASL. In sum, in the interpretation of the findings it should be kept in mind that we have not been able to capture all possible learning outcomes.

For informal learning to become the rule in the teachers' workplace, teachers as well as school management need to consider teachers as learners. In addition, not only the school organization but also the teachers should contribute to creating the conditions that foster teacher learning in the workplace. For school organizations this means that a school needs structures that support learning, such as collaborative teams, space, time and resources, and a culture of support, such as trusting relationships, openness and respect. Considering teachers as learners also means that teachers need to know how to learn within the workplace. Teachers who employ an extended range of learning activities may assist other teachers in expanding their learning repertoire.

In more formal programs for teacher learning, teachers could be assisted in becoming aware of their implicit ideas. They could critically examine these ideas and be supported in constructing alternative knowledge and beliefs. In addition, teachers need to practice new behavior. In order to make this kind of change possible, it seems important that teacher educators, school managers and teachers themselves pay more attention to the role of emotions in the change process. Finally, pre-service teacher education can contribute to improving teachers' informal learning in the workplace by encouraging student teachers to develop effective strategies for this kind of learning.

Samenvatting

Inleiding

Het doel van het onderzoek waarover in dit proefschrift wordt gerapporteerd, is te beschrijven hoe ervaren docenten uit het voortgezet onderwijs leren tijdens het werk. Het onderzoek maakt deel uit van een groter project dat erop gericht is een conceptueel kader te ontwikkelen voor het leren van docenten in de beroepspraktijk, zowel in informele als formele contexten. In de literatuur over het leren van docenten werd tot voor kort het leren van docenten vooral beschreven binnen de context van formele scholingsprojecten. Echter, docenten zelf melden dat zij ook leren tijdens de dagelijkse activiteiten die zij uitvoeren in het kader van hun beroep. Er is nog niet veel bekend over hoe het leren van docenten in zo'n informele leeromgeving plaatsvindt. De vraagstelling van het proefschrift luidt dan ook: *Hoe leren ervaren docenten in een informele leeromgeving?* Het onderzoek richt zich op ervaren docenten uit het voortgezet onderwijs en focust op een specifiek domein van het leren van docenten, namelijk het bevorderen van het actief en zelfstandig leren (AZL) van leerlingen.

Het leren van docenten is gedefinieerd als het ondernemen van activiteiten die leiden tot een verandering in cognities en/of gedrag. Informeel leren verwijst naar leren dat plaatsvindt in een context die wordt gekenmerkt door een gebrek aan systematische ondersteuning voor leren. Omdat leren in een informele leeromgeving zowel gepland als ongepland, en zowel bewust als onbewust plaats kan vinden, hebben we het leren van docenten bestudeerd op verschillende niveaus van bewustzijn. Wegens de groeiende erkenning voor de rol die emoties en behoeften in het werk van docenten spelen, wordt in het proefschrift een perspectief op leren gehanteerd dat niet alleen cognitieve en gedragsmatige aspecten van activiteiten omvat, maar ook emotionele en motivationele aspecten.

De theoretische relevantie van het onderzoek kan vooral gevonden worden in de beoogde bijdrage aan het conceptuele kader van leren van docenten in de beroepspraktijk. Een beter begrip van de activiteiten die onderdeel uitmaken van het informeel leren van docenten, zou verder inzicht kunnen bieden in de processen die het leren van docenten bevorderen dan wel verhinderen. Het onderzoek draagt tevens bij aan de methodologie van onderzoek naar het leren van docenten zoals dat is ingebed in de dagelijkse beroepspraktijk.

Studie 1: Het informeel leren van ervaren docenten tijdens het lesgeven

Het tweede hoofdstuk doet verslag van onze eerste studie naar het leren van docenten tijdens het lesgeven. Het doel van deze studie was te verkennen hoe ervaren docenten leren door de activiteiten die zij ondernemen terwijl zij lesgeven. De centrale vraag van deze studie luidde: Hoe kunnen de activiteiten worden beschreven waardoor docenten informeel leren tijdens het lesgeven? Aan het onderzoek namen vier docenten deel. Elke docent werd aan het begin van de studie geïnterviewd met betrekking tot de onderwerpen die hem of haar het meest bezighielden in het eigen werk op dat moment. Vervolgens werden, verdeeld over de periode van een jaar, van iedere docent zes lessen geobserveerd en op video opgenomen. Na iedere les werd de video door de docent en de onderzoeker samen bekeken en werden vier situaties uit de les besproken die verband hielden met een onderwerp dat de docent het meest bezighield aan het begin van het jaar. De observatiedata werden gebruikt om de gedragsmatige component van docentactiviteiten te beschrijven, terwijl de interviewdata gebruikt werden om de mentale component te beschrijven, die zowel cognitieve als emotionele en motivationele aspecten omvatte.

Een typologie van informeel leren van Eraut (2004) vormde het uitgangspunt voor de analyse van docentactiviteiten. Het eerste type leren dat Eraut onderscheidt, is weloverwogen ('deliberative') leren, dat bewuste, geplande activiteiten omvat. Het tweede type is reactief leren, waarbij het gaat om bewuste, ongeplande activiteiten. Het derde type is impliciet leren. De activiteiten die deel uitmaken van impliciet leren, vinden plaats buiten het bewuste gewaarzijn van de lerende docent om.

Op het niveau van *weloverwogen leren* konden drie typen activiteiten worden onderscheiden: oriënteren, uitvoeren en feedback vragen. Tijdens het uitvoeren overwogen docenten soms hoe verder te gaan met de les. In die overwegingen speelden verwachtingen over de gevolgen van het eigen gedrag een grote rol. Uitvoeren omvatte drie verschillende soorten activiteiten: (1) experimenteren met nieuw gedrag en nieuwe manieren van lesgeven, waarbij docenten erop gericht zijn uit te vinden of een bepaalde lespraktijk werkt, (2) gedrag inzetten dat werkt, waarbij docenten reageren op een problematische situatie door gedrag in te zetten dat in eerdere situaties succesvol was, (3) nieuw gedrag oefenen, waarbij docenten hun emoties en inadequate gedragstendensen onderdrukten om zichzelf in staat te stellen nieuw gedrag te vertonen. Het derde type activiteiten was feedback vragen. Deze activiteit werd slechts in de

data van één docente gevonden, die haar leerlingen tijdens de les vroeg wat zij van bepaalde aspecten van haar les vonden.

Op het niveau van *reactief leren* konden ook drie typen activiteiten worden onderscheiden: bewustworden als zodanig, bewustworden en het aanpassen van gedrag, en bewustworden en herinterpreteren. Docenten pasten hun gedrag vaak aan tijdens het lesgeven. In zulke situaties werd de docent zich bewust van ongewenste consequenties van het eigen huidige gedrag, waarna de docent ander gedrag inzette, soms eerst bewust overwegend hoe nu verder te gaan. Herinterpreteren gebeurde in situaties waarin een docent zich ervan bewust werd dat de aanvankelijke interpretatie van een situatie niet de juiste was.

Het feit dat docenten zich niet bewust zijn van hun *impliciete leren*, maakte dat dit fenomeen moeilijk te bestuderen was. Activiteitenpatronen konden pas gevonden worden na intensieve analyses van data die gedurende lange tijd waren verzameld. Nauwkeurige bestudering van patronen in de data binnen cases, leverde inzicht op in de impliciete invloed van bepaalde overtuigingen, gevoelens en gedragstendensen in situaties. De data van een van de vier docenten laten zien dat een geheel van onderling gerelateerde overtuigingen, gevoelens en gedragstendensen van de docent impliciet versterkt werd doordat de docent herhaaldelijk in vergelijkbare situaties hetzelfde deed en dacht. De data van een andere docent maken duidelijk dat impliciete overtuigingen en gedragstendensen automatisch opgeroepen worden en dat deze, wanneer zij niet worden gereguleerd door de docent, het gedrag van de docent sturen en de docent hinderen in haar bewuste pogingen haar lessen en haar eigen gedrag te veranderen.

De belangrijkste conclusie van deze eerste studie is dat het leren van docenten tijdens het lesgeven kan plaatsvinden op verschillende niveaus van bewustzijn, dat op elk niveau verschillende activiteiten kunnen worden onderscheiden en dat deze activiteiten niet alleen cognitieve, maar ook gedragsmatige, emotionele en motivationele aspecten omvatten.

Studie 2: Relaties tussen activiteiten en leeropbrengsten

Het derde hoofdstuk doet verslag van onze tweede studie, die gericht was op de bestudering van de relatie tussen docentactiviteiten en leeropbrengsten. Met leeropbrengsten doelen we op veranderingen in cognities en/of docentgedrag zoals deze gedurende een jaar plaatsvinden. De hoofdvraag van deze tweede studie luidde: Wat is de relatie tussen leeropbrengsten van docenten en de leeractiviteiten die zij ondernemen in een informele leeromgeving? We hebben

de studie naar de leeropbrengsten van docenten beperkt tot opvattingen en gedrag met betrekking tot het bevorderen van AZL. De opvattingen en het gedrag in relatie tot AZL van 32 ervaren docenten uit het voortgezet onderwijs zijn gemeten in oktober 2004 en oktober 2005. De docentopvattingen werden gemeten met behulp van vragenlijsten die bestonden uit drie schalen die betrekking hadden op drie belangrijke concepten die de basis vormen van de theorie over AZL: leren als constructie, de regulatie van leren en samenwerkend leren. Docentgedrag werd gemeten met behulp van leerlingvragenlijsten. Leerlingen uit één van de bovenbouwklassen van de docent vulde op de vragenlijst in in hoeverre de docent gedrag vertoont dat AZL bevordert. In het jaar daarop werd een andere groep leerlingen van hetzelfde niveau en leerjaar gevraagd om hetzelfde te doen. Om te bepalen of de opvattingen en/of het gedrag van een docent gedurende het jaar was veranderd, hebben we de verschillen in scores tussen de twee meetmomenten afgezet tegen de standaardfout van het verschil. Als de verschilscore van een docent groter was dan de standaardfout van het verschil, werd deze verschilscore gezien als een echte verandering in opvattingen of gedrag.

Tijdens het jaar hebben de docenten via e-mail leerervaringen gerapporteerd die betrekking hadden op het bevorderen van AZL. Voor de analyse van leeractiviteiten op basis van de gerapporteerde leerervaringen, hebben we een analysekader gebruikt dat gebaseerd is op literatuur over leeractiviteiten. Dit kader bestond uit de volgende activiteiten: (1) leren door te doen, bestaande uit (1a) leren door het ervaren van frictie en (1b) leren door te worstelen met gedragstendensen, (2) leren door te experimenteren, (3) leren door ideeën op te doen van anderen en (4) leren door na te denken over de eigen lespraktijk. De aan deze activiteiten gekoppelde mentale activiteiten werden gecodeerd als zijnde ofwel handelingsgericht, dat wil zeggen erop gericht uit te vinden wat werkt in de praktijk, ofwel begripsgericht, namelijk erop gericht te begrijpen waarom bepaalde aspecten wel het gewenste effect hebben en andere niet.

De analyse van de vragenlijsten liet zien dat 9 van de 32 docenten AZL-gerichte opvattingen hadden aan het begin van de studie en dat 12 docenten AZL-gericht gedrag vertoonden. We konden ook vaststellen dat van tweederde van de docenten de opvattingen en het gedrag met elkaar spoorden. Tweederde van de docenten was na een jaar veranderd in opvattingen en/of gedrag. Echter, slechts twee van deze docenten veranderden zowel in opvattingen als gedrag. De opvattingen en het gedrag van een van deze twee docenten waren

na een jaar meer AZL-gericht, terwijl de opvattingen en het gedrag van de andere docent minder AZL-gericht werden.

Op basis van de analyse van de per e-mail gerapporteerde leerervaringen kon worden geconcludeerd dat elk van de van tevoren vastgestelde categorieën van activiteiten in de gerapporteerde leerervaringen teruggevonden kon worden. De frequentie van activiteiten die per categorie gevonden werden, liep echter uiteen. Een kwart van de activiteiten vond plaats in interactie met collega's. Bijna de helft van de mentale activiteiten, namelijk 43%, waren begripsgericht, terwijl de overige 57% actiegericht was.

De activiteiten die docenten rapporteerden in hun leerervaringen, konden niet altijd gerelateerd worden aan veranderingen in opvattingen, tenminste niet binnen een jaar. Ideeën opdoen van anderen in combinatie met handelingsgerichte mentale activiteiten en experimenteren in combinatie met begripsgerichte activiteiten konden in verband gebracht worden met het meer AZL-gericht worden van docentopvattingen, terwijl een combinatie van worstelen met gedragstendensen, het ervaren van frictie, relatief weinig experimenten en relatief weinig interactie met collega's in verband gebracht kon worden met het minder AZL-gericht worden van docentopvattingen. Een sterke focus op individuele activiteiten en experimententen gecombineerd met handelingsgerichte activiteiten, kon worden gerelateerd aan docentgedrag dat na een jaar minder AZL-gericht was. Tenslotte, activiteiten die plaatsvonden terwijl docenten samenwerkten en experimenteerden in combinatie met begripsgerichte mentale activiteiten konden worden gerelateerd aan het meer AZL-gericht worden van docentgedrag.

Studie 3: Informeel leren en voorwaarden voor leren op de werkplek

Hoofdstuk 4 gaat in op onze derde studie. Het doel van die studie was de relatie te verkennen tussen het informeel leren van ervaren docenten en voorwaarden voor leren in de directe werkomgeving van de docent. De centrale vraag van deze studie was: Wat is de relatie tussen het informeel leren van ervaren docenten en de voorwaarden waarvan wordt aangenomen dat die het leren van docenten bevorderen? De studie kan worden gekarakteriseerd als een contrasterende case studie. De cases illustreren het informeel leren van twee docenten die beiden aan de voorgaande twee studies deelnamen. De cases contrasteren in zoverre dat de ene docente meer AZL-gericht werd in haar opvattingen, terwijl de andere docent qua opvattingen niet veranderde.

In de casestudies is het leerproces van de docenten gerelateerd aan de volgende voorwaarden die in de literatuur verondersteld worden het leren van docenten te bevorderen: docentautonomie, samenwerking, reflectieve dialoog, feedback krijgen en gedeelde normen en verantwoordelijkheid. Aan het begin van de studie zijn de docenten geïnterviewd met betrekking tot hun perceptie van deze voorwaarden en de relatie tussen de voorwaarden en hun eigen leerproces. Omdat docenten tijdens hun werk gebonden zijn aan de praktijk die gangbaar is in hun werkomgeving, hebben we door middel van een korte vragenlijst ook data verzameld en geanalyseerd met betrekking tot de perceptie van de docenten van de dominante AZL-opvattingen in hun school.

Op basis van de analyses uit de vorige twee studies zijn de activiteiten van de twee docenten samengevat. De case beschrijvingen laten zien hoe de activiteiten van de ene docent vaak gericht waren op nieuwe lespraktijken en ook vaak gepaard gingen met begripsgerichte mentale activiteiten, terwijl de activiteiten van de andere docent minder gericht waren op nieuwe praktijken en alleen maar handelingsgericht.

Hoewel de twee scholen waar de twee docenten werken op het niveau van de organisatie vergelijkbaar lijken te zijn wat betreft de mate waarin zij het leren van docenten bevorderen, laten de resultaten zien dat op het niveau van de individuele docent de voorwaarden in de ene case het leren van de docent meer bevorderen dan in de andere case. Wat autonomie betreft, was de ene docent bijvoorbeeld blij met de autonomie die zij van de schoolleiding kreeg om zelf haar lessen vorm te geven, en zij gebruikte haar vrijheid om haar eigen doelen na te streven, terwijl de andere docent teveel autonomie ervoer en een gebrek aan sturing.

De casestudies bevestigen dat het ervaren van voldoende autonomie, samenwerking, reflectieve dialoog en aanwezigheid van feedback verband houden met het informeel leren van docenten. Bovendien maken de resultaten aannemelijk dat de dominante opvattingen in de school invloed hadden op het al dan niet veranderen van opvattingen bij de twee docenten. Het lijkt echter niet zo te zijn dat hoe meer docenten ervaren onderwijsnormen met collega's en de schoolleiding te delen, hoe meer zij leren. In de ene case kon de docent door een gebrek aan gedeelde normen volgens haar eigen normen lesgeven en meer AZL-gericht worden, ondanks het feit dat haar collega's niet zo AZL-gericht waren. In de andere case lijkt het erop dat de sterke mate waarin normen gedeeld werden door collega's en schoolleiding, ertoe heeft bijgedragen dat de docent niet veranderde qua opvattingen, ook al wilde hij dat wel. De data

laten dus zien dat gedeelde normen niet noodzakelijkerwijs het leren van docenten bevorderen.

Tot slot kunnen we zien dat, ook al lijkt aan bepaalde voorwaarden te moeten zijn voldaan om het mogelijk te maken dat docenten tijdens het werk leren, de docenten zelf bijdragen aan de vormgeving van de voorwaarden voor hun leren op de werkplek. De voorwaarden voor het leren van docenten zijn dus niet louter aspecten van de organisatie die buiten de docent om vorm krijgen, maar zij komen voort uit de interactie tussen de docent en anderen in de school.

Hoofdconclusies en reflectie

De hoofdvraag van het onderzoek was: Hoe leren ervaren docenten in een informele leeromgeving? In het licht van de bevindingen van de drie studies kan deze vraag als volgt worden beantwoord: In een informele leeromgeving leren docenten door de activiteiten die zij ondernemen in het kader van hun dagelijks werk. Activiteiten die gericht zijn op nieuwe lespraktijken en gepaard gaan met begripsgerichte mentale activiteiten lijken bij te dragen aan een verandering naar meer AZL-gerichte opvattingen en gedrag. Activiteiten die gericht zijn op de huidige lespraktijk en die niet gepaard gaan met begripsgerichte mentale activiteiten lijken bij te dragen aan een verandering naar minder AZL-gerichte opvattingen en gedrag. Over het algemeen kan worden geconcludeerd dat onze leeractiviteitenbenadering, waarbinnen activiteiten worden bestudeerd op verschillende niveaus van bewustzijn met een focus op zowel de cognitieve als de emotionele, motivationele en gedragsaspecten van activiteiten, enkele interessante inzichten heeft opgeleverd. Deze inzichten hebben betrekking op een aantal activiteiten dat niet in eerdere studies beschreven is, de relatie tussen activiteiten en leeropbrengsten en factoren die informeel beïnvloeden.

Het feit dat we activiteiten op drie niveaus van bewustzijn konden beschrijven, wijst erop dat de typologie van Eraut van toepassing is op het leren van docenten. De bevinding dat de bewuste leeractiviteiten van docenten zowel gepland kunnen zijn als in reactie op onverwachte activiteiten plaatsvinden, komt overeen met eerdere studies naar de leeractiviteiten van docenten. De impliciete activiteiten die wij in onze studie vonden, droegen vooral bij aan het in stand houden van opvattingen en gedrag. Vervolgonderzoek zou zich kunnen richten op het type impliciete activiteiten dat bijdraagt aan veranderingen in opvattingen en gedrag.

Door tegelijkertijd zowel de cognitieve als de emotionele, motivationele en gedragsmatige componenten van activiteiten in ogenschouw te nemen, konden we combinaties van aspecten van activiteiten beschrijven die in de meeste leertheorieën onderbelicht zijn gebleven, zoals bijvoorbeeld emotieregulatie tijdens het oefenen van nieuw gedrag. Omdat ons onderzoek laat zien dat leren niet alleen bewust en cognitief van aard is, zijn we van mening dat het onderzoek naar het leren van docenten zich niet alleen zou moeten richten op bewuste en cognitieve aspecten, maar tevens op de emotionele, motivationele, gedragsmatige en ook de impliciete aspecten van het leren van docenten.

De resultaten van de tweede studie komen overeen met studies die laten zien dat opvattingen van docenten niet gemakkelijk veranderen. Onderzoek naar het leren van docenten is vaak gericht op veranderingen in cognities, waarbij er vaak van uitgegaan wordt dat gedragsverandering automatisch volgt op een verandering in cognities. Onze data laten zien dat dit niet vanzelfsprekend het geval is. Verder onderzoek naar het leren van docenten zou zich kunnen baseren op klinisch-psychologische principes in gedragsverandering van mensen, zoals fases in gedragsverandering, en gebruik kunnen maken van psychotherapeutische benaderingen die rekening houden met emotionele en motivationele aspecten.

Omdat voorwaarden voor leren vooral vorm krijgen in de interactie tussen de docent en anderen in de organisatie, zouden in toekomstige studies individuele en organisatiekenmerken in verband gebracht kunnen worden met de interactiepatronen die deze voorwaarden scheppen, en zou de relatie tussen deze voorwaarden en het leren van docenten verder onderzocht kunnen worden.

De onderzoeksmethoden die we in de eerste studie hebben gebruikt, laten zien dat het onderzoek naar impliciete activiteiten tijdens het lesgeven verbeterd kan worden door van meer lessen data te verzamelen en striktere selectiecriteria voor dataverzameling te hanteren. De door de docenten geschreven rapportages van hun leerervaringen bleken zeer bruikbaar voor de studie van de weloverwogen (deliberative) en reactieve activiteiten van docenten. Echter, omdat de docenten aan het begin van het jaar een instructie en extra aanwijzingen kregen, kan het gerapporteerde leren wellicht niet helemaal informeel worden genoemd. Bovendien zijn we niet helemaal zeker of en in welke mate het type activiteiten dat we in de geschreven rapportages vonden, afhangt van de bekwaamheid van docenten hun leerervaringen te verbaliseren en van het doel dat de docenten zelf hadden terwijl zij de rapportages schreven.

De opvattingenvragenlijst stelde ons in staat docentopvattingen op een gestandaardiseerde manier te meten, veranderingen in opvattingen vast te stellen en docenten qua opvattingen met elkaar te vergelijken. Een nadeel van de gebruikte vragenlijsten was dat sommige schalen wellicht een plafondeffect hadden.

Het gebruik van leerlingvragenlijsten met betrekking tot docentgedrag kostte de onderzoekers relatief weinig tijd en de data kwamen overeen met onze eigen observaties van de lessen van zes docenten. Echter, met de gehanteerde vragenlijsten konden we niet al het relevante AZL-gedrag van docenten meten. Al met al moeten we bij de interpretatie van de gegevens rekening houden met het feit dat we niet alle mogelijke leeropbrengsten met betrekking tot AZL van de docenten hebben kunnen meten.

Om informeel leren op de werkplek integraal onderdeel van het werk te laten zijn, zullen zowel docenten als de schoolleiding de docenten als lerenden moeten beschouwen. Bovendien zou niet alleen de schoolleiding maar zouden ook de docenten zelf moeten bijdragen aan het creëren van de voorwaarden die het leren van docenten mogelijk maken. Voor schoolorganisaties betekent dit dat de structuren zodanig moeten zijn dat leren ondersteund wordt, bijvoorbeeld door docenten in teams te laten samenwerken, en ruimte, tijd en middelen voor leren beschikbaar te stellen. Bovendien zou een cultuur van onderlinge steun, vertrouwen, openheid en respect geschapen moeten worden. Als leren onderdeel wordt van het werk van docenten, betekent dat ook dat docenten moeten weten *hoe* ze kunnen leren tijdens het werk. Docenten die gewoonlijk een uitgebreide variëteit aan leeractiviteiten inzetten, zouden andere docenten kunnen helpen om hun repertoire van leeractiviteiten te vergroten.

In meer formele scholingsprogramma's en projecten zouden docenten ondersteund kunnen worden in het bewustworden van hun impliciete overtuigingen, in het kritisch beschouwen daarvan en het ontwikkelen van alternatieve opvattingen. Ook zouden docenten nieuw gedrag moeten oefenen en hun gedrag loskoppelen van overtuigingen die zij lange tijd hadden, maar die overbodig zijn geworden in de nieuwe situatie. Om dit mogelijk te maken zouden begeleiders, schoolleiders en ook docenten zelf rekening moeten houden met de rol die emoties spelen in dit proces. Ten slotte zou ook de lerarenopleiding kunnen bijdragen aan het verbeteren van het informeel leren van docenten door leraren-in-opleiding te ondersteunen bij het ontwikkelen van effectieve strategieën voor het leren tijdens het werk.

Appendices

Appendix 1

Number and type of activities found in each case

	Paul	**Miranda**
Change in ASL conceptions	no change	more ASL oriented
Aspect of activity		
Focus on new materials/ ideas/ methods		
1st study		
experimenting with something new	no	yes[1]
practicing new behavior	no	yes
2nd study		
getting ideas from others	0	2
experimenting	4.5[2]	5
Focus on current teaching practices		
1st study		
deploying what works	yes	yes
becoming aware as such	yes	yes
2nd study		
struggling with behavioral tendencies	0	0
experiencing friction	1.5	4
Involving meaning-oriented mental activities		
1st study		
becoming aware and reframing	no	yes
2nd study		
number of activities involving meaning-oriented mental activities	0	6
Involving action-oriented mental activities		
1st study		
becoming aware and changing course of action	yes	yes
2nd study		
action-oriented mental activities	6	8

[1]'yes' *means that this activity was found in the data of this teacher, whereas* 'no' *means that this activity was not found*

[2]*As Paul only reported 4 instead of 6 written reports of his learning experiences, his frequencies of activities were corrected for the number of learning experience reports to be able to compare them with the frequencies of Miranda.*

Appendix 2

Case summary matrix for the data of Miranda

Condition	What is the contribution of the organization?	What is the contribution of Miranda?	Relation condition – teachers' learning
Autonomy	<u>School-level:</u> Autonomy is restrained by fixed year planning and students' marks based on tests of all three years. No encouragement nor restraint of autonomy regarding how to teach classes. <u>Department-level:</u>	Miranda feels free to experiment within the boundaries of mandatory school wide practices. Miranda contributes to joint protest with department colleagues against the measure that students' marks should be based on tests of all three	Because each department member is individually autonomous, Miranda experiences little inspiration to improve her teaching. On the other hand, Miranda does experience the freedom (both from the school level and the

	Some joint protest against the measure that students' marks should be based on tests of all three years. Specific students' writing tasks concealed that these teachers were bending the rules for testing. Department members avoid discussion on how to teach.	years. She contributes to bending the rules regarding what should and should not be tested. Miranda avoids discussion with her department colleagues on how to teach, teaches the way she wants to. Miranda regrets the lack of sharing and misses inspiration.	department level) to experiment with her own classroom teaching and to teach according to her own norms.
Collaboration	<u>School-level:</u> No time structurally allocated to collaboration. <u>Department-level:</u> in department meetings colleagues exchange ideas, discuss student assessment, divide work on making student tests, collaborate on construction the year planning. Not common to help each other.	Miranda does not collaborate much on the department level, because there is little agreement on how to teach.	Collaboration reduces work-load but hardly contributes to Miranda's learning, because collaboration does not involve any discussion about how to teach. As far as collaboration occurs it does not give Miranda the feeling that she becomes a better teacher.
Reflective dialogue	One colleague is available for sharing ideas and discussion. Opportunities for informal conversations diminished in the school.	Collaborates regularly with one colleague she likes, and discusses her teaching regularly with her life-partner.	Shared reflection, as far as it happens, triggers Miranda's enthusiasm and creativity, and gives her more energy which improves her teaching: she gets new ideas about teaching methods and materials. The lack of shared reflection diminishes Miranda's energy and enthusiasm to improve herself as a teacher.
Receiving Feedback	<u>School-level:</u> Feedback is organized in an annual evaluation discussion with the team leader who uses student-questionnaires and lesson observations as instruments for feedback. Within the school it is not common to give each other feedback. Opportunities for informal conversations have diminished in school since the time of the merger.	Miranda seeks feedback from students by asking students how they appreciate her teaching. Miranda seeks feedback from colleagues in informal conversations which only occur occasionally. Miranda does not value the feedback of the team-leader very much. Miranda does not easily deal with positive feedback because she takes a critical stance towards her own	Feedback initiated by others does not occur very often in Miranda's work and thus does not contribute much to her learning. When Miranda occasionally receives feedback, she re-enforces positively evaluated behavior and reflects on negatively evaluated behavior.

		teaching.	
Shared norms and responsi-bility	There is a school plan that describes the school policy, but it does not have any impact on daily teaching practice. Those moments that school discussion is organized about shared norms, the conversations are shaped in such general terms that it does not directly relate to teachers' own professionalism.	Miranda agrees with the plan in theory, but does not feel that norms are shared on the concrete level of how to do things in school. Miranda feels frustrated about the lack of shared norms because she feels it costs a lot of energy this way. At the same time, Miranda is becoming more and more aware that not everyone needs to teach in exactly the same way.	lack of shared norms leads to Miranda teaching according to her own norms.

Case summary matrix for the data of Paul

Condition	What is the contribution of the organization?	What does Paul do?	Relation condition – teachers' learning
Autonomy	<u>School-level</u> There is little steering from the school management in how you teach; how you teach depends on private initiative. <u>Department-level</u> Department decides on chemistry method, common planning and content of tests, and pace of teaching content. Otherwise, every teacher does his own thing.	Mainly by following external input, Paul occasionally tries out something new in his teaching practice. When the new practice is not supported in the school, Paul returns to his old way of teaching. Usually Paul takes a reactive stance towards changing his teaching.	Paul does not feel supported or encouraged by the school or the department to learn. In his teaching Paul mainly follows the textbook. He experiences the autonomy he has within the school as isolation He experiences some support from one department colleague.
Collaboration	<u>Team-level</u> Interdisciplinary team meetings focus on the test results of students of that track, and how students with poor results can be helped; students' results are assessed against shared norms. <u>Department-level</u> -experience swapping -contact with one colleague about tips and exchange of teaching materials, usually a division of work. -in one occasion help from one colleague to get	Attends weekly team meetings, and appreciates discussion on a shared approach towards these students as an anchoring point for himself. Initiates one-to-one contact with one department colleague. Regrets general students' practicum classes, because for Paul doing practicum classes with students is a rewarding part of teaching.	Collaboration with one department colleague reduces work-load, feelings of uncertainty, and stress. Paul dislikes to deviate from his private teaching practice, but by following concrete and useful tips and examples of teaching methods, he is occasionally stimulated to try something new. Paul experiences discussions about students in the general higher education track as an anchoring point; he finds it

	understanding of new national standards. <u>All science teachers</u> Planning of all students' practicum classes.		difficult to deal with these students. Paul experiences that the discussions help him better understand and deal with these students.
Reflective dialogue	Occasional informal contacts with colleagues stimulate reflection.	Paul occasionally and informally discusses student learning and teaching with one department colleague and with other science colleagues. Paul stresses that 'difficult discussions' are not his strongest quality.	Reflective dialogue hardly plays a role in Paul's learning: no meaning-oriented mental activities were found in the data of Paul.
Receiving Feedback	<u>School-level</u> In annual evaluation discussion with the team leader, Paul is assessed with regard to 4 teacher core competencies. Colleagues hardly ever provide feedback. Students are not invited to give feedback; informally students give feedback to Paul with regard to tests.	Paul interprets feedback from colleagues as getting tips. Incidentally, he experiences these tips and comments as not constructive. As a mentor of student teachers Paul gives feedback based on classroom observations, and sometimes receives feedback from student teachers by the questions they ask about his teaching.	If Paul receives feedback he experiences this positively, although he finds it scary to be criticized. *Feedback incidentally plays a role in Paul's' learning.*
Shared norms and responsi-bility	<u>School-level</u> The school norms regarding the percentage of students that should pass grades and graduate each year play a prominent role in Paul's teaching. Teachers' whose students' results are below the norm are addressed by the team leader/ school management.	Paul agrees with the school norms. Paul also values a students' development when the student does not graduate and drops out of school without a grade.	Shared norms for student learning results contribute to Paul doing his best, so that students have acceptable results and perform well. Paul feels uncertain and dissatisfied when according to his interpretation students have poor results due to his own teaching. The way in which the shared norms for student learning are dealt within the school makes Paul feel less alone in his responsibility for the achievements of his groups of students.

Curriculum Vitae

Annemarieke Hoekstra was born in Haarlem, the Netherlands on May 16th of the year 1978. After graduating with honors from secondary school, she moved to Utrecht to study Dutch linguistics and literature at the University of Utrecht. She specialized both in applied linguistics and in intercultural communication. As part of her master degree program, Annemarieke completed a research traineeship at the research center of the Faculty of Teacher Education at Hogeschool Utrecht (university of applied sciences). Her research focused on student teachers' perceptions of the multicultural classroom. Her masters' thesis on knowledge construction in math lessons in multicultural classrooms was granted the Anéla 2002 award for best master thesis in the field of applied linguistics in the Netherlands.

From 2003 to 2007 Annemarieke worked as a PhD student at IVLOS, Institute of Education at the University of Utrecht. Her research focused on experienced secondary school teachers' learning in the workplace. She has presented her research at several national and international conferences, such as the ORD, ISATT and AERA. As part of her PhD education, Annemarieke followed master classes in teaching and teacher education, construction of tests and questionnaires, reflection on educational research, qualitative analysis and the ICO summer school 2005 in Cyprus.

Annemarieke currently lives in Canada, where she works as an instructor at the JR Shaw School of Business at NAIT, in Edmonton.