

# Teacher feedback during active learning : the development and evaluation of a professional development program

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**Teacher Feedback during Active Learning:**  
The Development and Evaluation of a  
Professional Development Programme

*Linda Keuvelaar - van den Bergh*



**ico**

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**Teacher Feedback during Active Learning:  
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Professional Development Programme**

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# Chapter 1





## Chapter 1

### General introduction

Feedback is one of the most powerful tools teachers can use to enhance student learning (Hattie, 2009). However, there is little consensus about how feedback is defined (Van de Ridder, Stokking, McGaghie, & Ten Cate, 2008) and about what constitutes qualitatively good feedback (Nicol & Macfarlane-Dick, 2006). Giving feedback in order to enhance student learning appears to be a difficult task for teachers, and giving feedback during active learning appears to be even more troublesome for teachers (Bolhuis & Voeten, 2001; Sol & Stokking, 2009). During active learning, students are working in small groups on different learning goals and undertaking different learning activities at the same time. They need to achieve task-related goals as well as develop the metacognitive knowledge and skills needed for active learning. Yet, teachers often seem unable to provide the feedback that is needed during active learning, and they find it difficult to support the development of metacognitive knowledge and skills by students (Lockhorst, Van Oers, & Wubbels, 2006; Niemi, 2002; Stephen, Ellis, & Martlew, 2010).

To support teachers in improving their feedback practices, descriptions of qualitatively good feedback would be helpful. In the literature, however, many conflicting findings and inconsistent patterns of results with regard to the effects of feedback on learning have been found (Shute, 2008). The majority of feedback research has examined feedback in traditional learning contexts. The function and objectives of feedback are different in the active learning context, since the principles of active learning draw more on the constructivist learning theory which postulates that students have to construct their own knowledge through interaction with their social environment (Mory, 2003). Hence, although the literature on feedback is extensive, much of this knowledge does not seem directly applicable to teacher feedback during active learning.

Although teachers appear to need support for improving their practices, it does not appear to be easy to bring this about. Research into professional development in general has yielded disappointing results as teacher professional development activities have often been found to be ineffective in terms of changing teachers' practices (Opfer & Pedder, 2011). Review studies have shown that, when designing professional development activities for teachers, several conditions have to be taken into account to increase the chance that the activities will be helpful in enhancing teachers'

professional development (Garet, Porter, Desimone, Birman, & Yoon, 2001; Van Veen, Zwart, & Meirink, 2012). Many case studies included in these reviews have relied on teachers' self-reports of the effects of an intervention (e.g. Bakkenes, Vermunt, & Wubbels, 2010; Desimone, Porter, Garet, Yoon, & Birman, 2002), and an indication of which features which are important for efforts to enhance professional development can be deduced from these studies.

This dissertation reports on the effects of a carefully developed professional development programme (from now on abbreviated as PDP) aimed at improving teacher feedback during active learning. Teachers who have practiced active learning in the domain of environmental studies in the sixth, seventh and eighth grade of Dutch primary schools were involved in the study. Through this research, we have attempted to contribute to existing knowledge of feedback during active learning and to theoretical and practical knowledge of ways of enhancing experienced teachers' professional development. The central research question for this research project was therefore: *How can primary school teachers learn to give optimal feedback to their students during active learning?*

In this first chapter, the conceptual framework of the study will be described, followed by the general problem statement, the further research questions and the explanation of the theoretical and practical relevance of the study. This chapter ends with an overview of the empirical studies that this dissertation takes into account.

## **1.1 Conceptual framework**

### *1.1.1 Active learning*

Bonwell and Eison (1991) promoted the term 'active learning' as an alternative to the frontal transmission of knowledge. However, this is not a new form of learning. Traditional school reformers like Montessori and Freinet had already emphasized active learning in various forms. During the 1960s and 1970s, psychologists such as Rogers and Piaget renewed the interest in active learning by introducing project learning and small group activities in many schools. Active learning may vary from self-directed learning, in which students themselves control their learning process by taking decisions on the learning goals and activities, to independent learning where the goals and activities are under the teacher's control but a number of mental activities are required of students, such as figuring things out on their own and working together as a group (Van Hout-Wolters, Simons, & Volet, 2000). In order to stimulate active learning, learning environments

must be created in which students are motivated to participate actively by constructing their own knowledge on the basis of learning experiences and by experimenting and reflecting (Boekaerts, 1997).

The recent attention given to active learning seems to be derived from the speed at which new information becomes available in our knowledge society, leading to the necessity of acquiring lifelong learning skills (Bolhuis, 2003). The assumption is that by learning actively students will not only learn knowledge contents, but also learn higher-order thinking skills or the metacognitive knowledge and skills that are needed for lifelong learning (Blok, Oostdam, & Peetsma, 2006). The self-regulatory activities that students undertake before, during and after learning activities in which students 'learn to learn' are referred to as metacognitive knowledge and skills; these include orientation and planning of the task beforehand, monitoring progress during the task and evaluation and reflection afterwards (De Jager, Jansen, & Reezigt, 2005). Metacognitive knowledge and skills need to be developed during and for active learning.

Another essential component of active learning is collaboration with peers. Active learning stems from the constructivist view of learning which assumes that learning is a collaborative process in which students learn from each other by testing ideas on each other, and help each other to elaborate and refine knowledge (Grabinger & Dunlap, 1995). To be able to learn in this way, students need to be taught how they can learn in collaboration with others, and they need feedback on their social skills. For example, students need to learn to ask for information or advice from others and to have productive discussions (Bolhuis & Voeten, 2001). Therefore, to stimulate active learning, teachers need to encourage positive interdependence within small groups, provide clear instructions on how to cooperate and give feedback on the cooperative process (Johnson & Johnson, 1999).

Fostering active learning seems a very challenging and demanding task for teachers, requiring knowledge of students' learning processes and of skills in providing guidance and feedback. Teachers' conceptions of teaching and learning need to fit the active learning situation; learning is the active process of constructing knowledge, and teaching is a process of supporting the students' knowledge construction (Duffy & Cunningham, 1996). This kind of teaching may be referred to as process-oriented teaching (Vermunt, 1992); however, it does not seem easy for teachers to implement this approach. Bolhuis and Voeten (2001) concluded from their observations of process-oriented teaching that secondary school teachers scarcely paid attention to learning goals and they rarely tried to teach their students how to

learn. To apply active learning methods successfully, teachers appear to need more knowledge about active learning, learning strategies and metacognition (Niemi, 2002). Similar findings have been reported more recently for primary schools in Scotland (Stephen, Ellis, & Martlew, 2010) and in Australia (Van Deur, 2010).

In this study, active learning refers to classroom situations in which students work in small groups on different tasks at the same time. These active learning situations may vary from teacher-controlled learning situations, in which several mental activities are required of the students, to student-controlled learning situations in which students decide on the learning goals and activities.

### 1.1.2 Feedback

As has already been said, little consensus exists about how feedback can be defined and what constitutes qualitatively good feedback (Nicol & Macfarlane-Dick, 2006). Having reviewed the central elements of feedback definitions in a decade of research, Van de Ridder et al. (2008, p. 193) defined feedback as: 'Specific information about a trainee's [student's] observed performance and a standard, given with the intent to improve the trainee's [student's] performance. This definition is adopted in the present study.

Hattie and Timperley (2007) developed a theoretical framework about feedback based on their meta-analysis of the evidence for the power of feedback in improving learning. Concurrent with the definition used in this study, they stated that the purpose of feedback is to reduce the discrepancies between the students' current understanding or performance and the understanding or performance that is being aimed for. Learning goals should be clear, since feedback is essentially information about how the student's present performance relates to these goals (Nicol & Macfarlane-Dick, 2006). Hattie and Timperley (2007) further stated that, to be effective, feedback must answer three major questions: 'Where am I going?', 'How am I going?' and 'Where to next?' Students need to know what the learning goals are, how their current performance relates to these goals and what activities they can undertake to reach their learning goals.

The levels at which the feedback questions can be focused are: the task level, the process level, the self-regulation level and the level of self (Hattie & Timperley, 2007). Feedback at the *task* level includes verification: information about whether work is correct or about how well the task is being performed. It also includes directions, for example, for acquiring more or

different information. Feedback at the *process* level refers to feedback directed at the information processing and learning processes needed to understand the task. Feedback at the *self-regulation* level addresses the way students plan, monitor, direct and regulate actions to increase their skills in self-evaluation and their confidence to engage in the tasks. Feedback at the *self* level is about the student personally, and it typically expresses positive evaluations and feelings about a student. Hattie and Timperley (2007) concluded that feedback at the process and self-regulation level seem to be most powerful for enhancing student learning; this is followed by feedback at the task level, but only when information can subsequently be used by the student for improving self-regulation or strategy processing. Feedback at the self level seems least effective in enhancing learning, but it is (too) often used in classroom situations (Hattie & Timperley, 2007). As section 1.2.1 discussed, during active learning, feedback on social learning is important; the social context can be used as a learning environment in which students learn with and from each other. Therefore, cooperative learning skills and social skills provide another focus of feedback during active learning (Bolhuis & Voeten, 2001).

With regard to the nature of feedback, feedback seems most effective when the teacher provokes the student to improve his or her performance (Vermunt & Verloop, 1999). Besides confirmation of good work, feedback should also contain constructive criticism. So, the most effective feedback is thus confirmative, critical and constructive in nature (Nicol & Macfarlane-Dick, 2006).

The way in which feedback is given by the teacher may also be important in relation to the role of the teacher in active-learning situations. This role is characterized by guiding, facilitating and encouraging students to perform learning tasks in their own way (Black & Deci, 2000). Active learning appears to be negatively affected by controlling, directive instructions such as 'you must' or 'you have to', whereas facilitative instructions such as 'you can' or 'you might' positively affect learning (Wijnia, Loyens, & Derous, 2011). Although feedback clearly is an important topic, little is known of teachers' actual feedback behaviour and the problems they perceive with it.

### 1.1.3 Teachers' professional development

Changing teacher behaviour in a sustainable manner appears to be a challenging endeavour. Although the importance of teachers' professional development in improving schools and student learning has been widely acknowledged, research into professional development has yielded

disappointing results, as teacher professional development activities have often been found to be ineffective (Opfer & Pedder, 2011). Several researchers have argued that this problem can be attributed to a lack of recognition of how teacher learning is embedded in their professional practices and working conditions (Borko, 2004; Timperley & Alton-Lee, 2008). Since teaching and learning are contextually situated, professional development activities need optimally to build on teachers' knowledge and beliefs, and their classroom practices (Opfer & Pedder, 2011). This means that a PDP must not only reflect theoretical knowledge but also the concerns, behaviours, knowledge and beliefs of teachers themselves (Van Driel, Beijaard, & Verloop, 2001; Verloop et al., 2001). Furthermore, it is important to identify and address the specific problems teachers experience in their daily work (Knapp, 2003). This seems to be a condition for an effective PDP.

Besides this condition, there are several features that have to be taken into account when designing a PDP that has an increased chance of resulting in effective professional development (Garet, et al., 2001; Van Veen, et al., 2012). Three different kinds of features can be distinguished in such a programme, namely, structural features, goal-setting features and features of the professional development activities that are part of the programme. Structural features refers to the characteristics of the structure or design of the PDP, such as its form and duration. An example of a goal setting feature is the communication of clear learning goals at the start of the PDP. Learning actively and doing authentic tasks are examples of important activity features. By taking the conditions and these features into account when designing a PDP, the chances for success may be increased. It is important to obtain more insight into the ways in which these features influence the effectiveness of a PDP and just how these features affect teachers' learning processes.

## **1.2 Problem statement and research questions**

Feedback is one of the most powerful tools that teachers can use to enhance student learning (Hattie, 2009). It appears to be difficult for teachers to give their students qualitatively good feedback, especially during active learning. Teaching in this context implies a shift in the role of the teacher, from someone who transfers knowledge to students, to someone who guides and facilitates students' learning processes (Bolhuis & Voeten, 2001). A few studies regarding active learning in primary schools exist. These studies have shown that primary school teachers seem insufficiently

prepared for this role (e.g. Stephen, Ellis, & Martlew, 2010; Van Deur, 2010). However, little is known about how primary school teachers actually give feedback in this context and how this feedback can be improved to enhance students' active learning. Because feedback can have such an impact on student learning, it is an important topic for teachers' professional development. Therefore, as previously stated, the central question of this research project was: How can primary school teachers learn to give optimal feedback to their students during active learning? This central research question was broken down into the following research questions:

1. What are the characteristics of teacher feedback during active learning in the highest grades of primary schools?
2. What beliefs do primary school teachers hold with regard to feedback during active learning, and what are the main problems primary school teachers perceive with regard to feedback during active learning?
3. What are the short and long-term effects of a PDP that builds on teachers' beliefs, perceived problems and practices, and that incorporates the conditions and features that are known to be important for enhancing teachers' professional development on their beliefs, perceived problems and classroom behaviour?
4. To what extent do teachers consider the features of the PDP valuable to enhance their professional development regarding feedback during active learning?
5. How can teacher learning in the context of a PDP be characterized in terms of learning activities and their regulation of learning?

### **1.3 Context of the study**

The study was carried out in primary schools that collaborate with the teacher training institute in which the author of this dissertation was working. Schools that practise active learning in the domain of environmental studies (i.e. projects that integrate subjects such as history, geography and biology) were selected for the study. All these schools were located in the south-east of the Netherlands. Teachers of students at Grades 6, 7 and 8 (9–12 year olds) were invited to participate in the study. The domain of environmental studies was chosen because it is the domain in which active learning is most often implemented in Dutch primary schools. The schools had chosen active learning as a means of developing students' metacognitive and social skills, and to help them reach the national attainment targets for the domain of environmental studies.



In the classroom, the students typically worked on their own projects on a particular theme. For example, one class was working on the theme of 'the Middle Ages'. Within this theme, groups of two or three students were elaborating on different topics, such as fraternities, monasteries or knights. Each small group of students had to find information about their own topic and prepare a presentation to their classmates, such as a PowerPoint or a poster presentation. The teacher walked around and coached the (groups of) student(s).

#### **1.4 Relevance of the study**

The research presented in this dissertation is relevant both from a theoretical and a practical perspective. With regard to the topics of teacher feedback and active learning, this research provides a coherent description of theoretical and empirical knowledge about the important characteristics of teacher feedback that fit the active learning context. Only a limited number of studies on teachers' classroom behaviour are available, and there are even fewer studies about primary school teachers who teach in the context of active learning. This context is important, however, since attention on students' self-directed and self-regulated learning, which requires teachers who can coach and facilitate, is increasing internationally.

With regard to the topic of teachers' professional development, current conceptions of teacher learning increasingly emphasize that teachers' own practices should be taken as the starting point for professional learning. A PDP should not only cover theoretical knowledge but also the concerns and practices of teachers themselves (Borko, 2004; Opfer & Pedder, 2011; Timperley & Alton-Lee, 2008). The PDP described in this dissertation will incorporate this condition as well as several other features that have to be taken into account to increase the chance that a PDP results in effective professional development. This study will provide insight into effective methods of teacher professional development and how teachers differ in the way they learn in such a PDP.

The practical value of this dissertation is in the content and design of the professional development programme that will be developed. Knowledge of the characteristics of qualitatively good feedback will be gained by operationalizing the theoretical insights in concrete teacher behaviours. Our understanding of those aspects of feedback behaviour that are most problematic for teachers will be enlarged. Furthermore, ways in which teachers can be helped to overcome these problems and improve their

feedback behaviour during active learning will be explained. This is highly relevant for both teachers and teacher educators.

### **1.5 Overview of the dissertation**

The following chapters address the research questions in the same order as they were presented in subsection 1.3. *Chapter 2* reports on the development of a category system that was subsequently used to analyse the video observations of teachers' feedback behaviour (Research Question 1). The category system was derived from the scientific literature about feedback and active learning and it was adapted in a way that took account of the empirical data. A total of 1,465 teacher–student interactions by 32 teachers who practised active learning in the environmental studies domain in the sixth, seventh and eighth grades of 13 Dutch primary schools were videotaped and assessed using this system. Insights into the characteristics of teacher feedback were obtained and suggestions for how the feedback could be improved were deduced by comparing the results with the research literature.

*Chapter 3* reports on the knowledge and beliefs teachers hold about the provision of feedback during active learning, and on the problems these teachers perceive (Research Question 2). A writing task was used to elicit teachers' knowledge and beliefs. Open interviews were used to find out what problems teachers perceived in their classrooms. The sample of primary school teachers who participated in this study was the same as that for Chapter 2. How the results can help improve our understanding of teachers' practices is discussed.

*Chapter 4* reports on the development, implementation and evaluation of a PDP that aimed to improve teachers' feedback during active learning. The goals and content of the PDP were based on the literature reviews and the results of the studies presented in Chapters 2 and 3. The design of the PDP was based on the extant literature about the relevant conditions and features which are considered to be important for PDPs, including structural features, goal setting and activity features. The effects of this PDP on 16 primary schoolteachers' knowledge, beliefs, perceived problems and classroom behaviour were examined via observations, a written task and a questionnaire. These instruments were used to perform measurements on three occasions; that is, one pre-test and two post-tests measurements to examine the short-term as well as the long-term effects of the PDP (Research Question 3).

*Chapter 5* reports on the extent to which teachers attributed the success of the PDP to each of the purposefully implemented features (Research Question 4). The 16 teachers who participated in the PDP described in Chapter 4 completed a questionnaire about how much each feature had contributed to their professional development. Additionally, four focus group interviews were conducted in order to gain more detailed information. The results were used to illustrate and specify the theoretical knowledge of the features that appeared to be effective in PDPs.

*Chapter 6* reports on an in-depth case study of the learning processes of two teachers who participated in the PDP. Videotaped observations of classroom behaviours as well as videotaped observations of the video interaction training meetings were analysed in terms of learning activities and regulation activities. Interpretations were validated using teachers' self-reports of what was learned during (parts of) the PDP. By relating the learning processes of these two teachers to the literature on teacher learning, a rich understanding of just how the teachers learned in the context of a PDP was established (Research Question 5).

*Chapter 7* summarizes and discusses the main results of the different studies, followed by an explanation of some limitations of the study, suggestions for future research and implications for practice. Figure 1.1 shows a graphical overview of the research project reported in this dissertation.

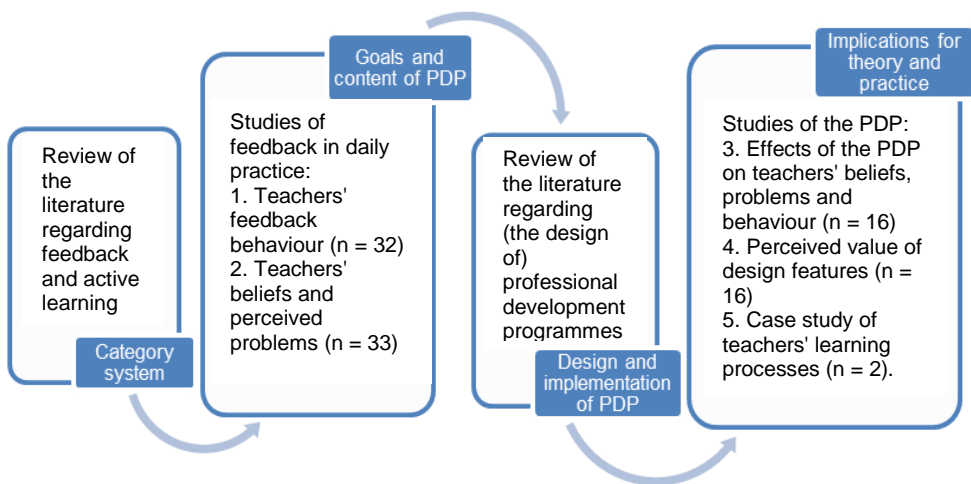


Figure 1.1 Graphical overview of the study.

The chapters of this dissertation are written as separate articles in such a way that they can be read independently. Consequently, there is overlap in some sections of the different chapters.



# Chapter 2



## Chapter 2

### Teacher Feedback during Active Learning: Current Practices in Primary Schools

#### Abstract

Feedback is one of the most powerful tools which teachers can use to enhance student learning. It appears difficult for teachers to give qualitatively good feedback, especially during active learning. In this context, teachers should provide facilitative feedback that is focused on the development of metacognition and social learning. The purpose of the present study was to contribute to the existing knowledge about feedback and to give directions to improve teacher feedback in the context of active learning. The participants comprised 32 teachers who practised active learning in the domain of environmental studies in the sixth, seventh or eighth grade of 13 Dutch primary schools. A total of 1465 teacher-student interactions were examined. Video observations were made of active learning lessons in the domain of environmental studies. A category system was developed based on the literature and empirical data. Teacher-student interactions were assessed using this system. About half of the teacher-student interactions contained feedback. This feedback was usually focused on the tasks that were being performed by the students and on the ways in which these tasks were processed. Only 5% of the feedback was explicitly related to a learning goal. In their feedback, the teachers were directing (rather than facilitating) the learning processes. During active learning, feedback on metacognition and social learning is important. Feedback should be explicitly related to learning goals. In practice, these kinds of feedback appear to be scarce. Therefore, giving feedback during active learning seems to be an important topic for teachers' professional development.

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## 2.1 Introduction

Feedback is one of the most powerful tools teachers can use to enhance student learning (Hattie, 2009). Among researchers, however, little consensus exists about how feedback is defined (Van de Ridder, Stokking, McGaghie, & Ten Cate, 2008) and what constitutes qualitatively good feedback (Nicol & Macfarlane-Dick, 2006). As yet, qualitatively good feedback has not been defined conclusively. The Dutch Inspectorate of Education (2006) concluded from classroom observations that it is difficult for Dutch teachers to give their students good feedback in order to stimulate students' learning process and developmental progress. Giving feedback during active learning may be even more troublesome for teachers. During active learning, students are working in small groups on different learning goals and undertake different learning activities at the same time. They need to achieve task-related goals as well as to develop the metacognitive knowledge and skills that are needed for active learning. Yet, teachers often seem unable to provide the feedback that is needed and they do not know how to support the development of metacognitive knowledge and skills (Lockhorst, Van Oers, & Wubbels, 2006).

To support teachers in improving their feedback practices, and to understand these – potentially powerful – interaction processes between teacher and student(s), descriptions of qualitatively good feedback would be helpful. In the literature, however, many conflicting findings and inconsistent patterns of results have been found with regard to the relation between feedback and student learning (Shute, 2008). The majority of feedback research has examined feedback in traditional learning context, often associated with learning theory paradigms of behaviourism and information processing. The main purpose of feedback in these learning contexts was to confirm or change a student's knowledge as represented by answers to practice or test questions (Mory, 2003). The use, objectives and function of feedback are different for the active learning context, since the principles of active learning draw more on the constructivist learning theory which postulates that students have to construct their own knowledge in interaction with the social and authentic learning environment. Hence, although the literature on feedback is extensive, much of this knowledge seems not directly applicable to teacher feedback during active learning. The same is true for literature on other concepts that refer to classroom practices similar to what we call feedback during active learning, such as formative assessment and scaffolding. The theoretical basis for formative practices and the link between work on formative assessment and self-regulated

learning is still in its infancy (Black & Wiliam, 2009) and in scaffolding research the development of a measurement instrument to classify teacher-student interactions is also a main challenge (Van de Pol, Volman, & Beishuizen, 2010).

The purpose of the present study is to contribute to our knowledge of feedback during active learning. The kinds and characteristics of feedback that are important during active learning will be determined by combining the findings of the literature on feedback and active learning. Through an examination of teacher-student interactions, feedback practices during active learning will be assessed. By comparing this assessment with the literature, we aim to obtain directions to improve teacher feedback in the context of active learning. We will describe the teacher-student interactions in the highest grades of primary schools using a newly developed category system, with a focus on the different kinds and characteristics of teacher feedback present in these interactions. Before presenting the study, we will first elaborate on active learning as the context for teacher feedback, and then discuss several foci and characteristics of teacher feedback.

## **2.2 Theoretical background**

### *2.2.1 Active learning*

Bonwell and Eison (1991) promoted the term 'active learning' as an alternative to the frontal transmission of knowledge. It is not a new form of learning, however (Lorenzen, 2001; Grabinger & Dunlap, 1995). Traditional school reformers like Montessori and Freinet had already emphasised active learning in various forms. During the 1960s and 1970s, psychologists such as Rogers and Piaget renewed the interest in active learning by introducing project learning and small group activities in many schools. Active learning may vary from self-directed learning in which students themselves control their learning process by taking decisions on the learning goals and activities, to independent learning in which the goals and activities are under the teacher's control but several mental activities are required of the students, such as figuring things out on their own, and working together as a group. The distinction relates to requiring actions from the students in the execution of the task itself or requiring active execution of the planning, the regulation and the maintenance of the task (Van Hout-Wolters, Simons, & Volet, 2000).

During active learning, teachers emphasize the development of student skills more than the transmission of information (Bonwell & Eison, 1991). In order to stimulate active learning, learning environments must be

created in which students are motivated to participate actively by constructing their own knowledge on the basis of learning experiences and by experimenting and reflecting (Boekaerts, 1997). In practice, during active learning students are engaged in activities such as working on a topic in pairs, debating with each other, searching for information on the internet, or producing a short paper or presentation.

The recent attention given to active learning seems to derive from the speed at which new information becomes available in our knowledge society, leading to the necessity of lifelong learning skills (Bolhuis, 2003). The assumption is that by learning actively students will not only learn knowledge contents, but also learn higher order thinking skills or metacognitive knowledge and skills that are needed for lifelong learning (Blok, Oostdam, & Peetsma, 2006; Bonwell & Eison, 1991). When students become more responsible for their own learning they need to know how to regulate their own learning processes (Elshout, 2000; Simons, Van der Linden, & Duffy, 2000). The self-regulatory activities that students undertake before, during, and after learning activities by which students 'learn to learn' are referred to as metacognitive knowledge and skills, such as orientation and planning on the task beforehand, monitoring progress during the task and evaluation and reflection afterwards (De Jager, Jansen, & Reezigt, 2005). Metacognitive knowledge and skills need to be developed during and for active learning. Although clear evidence for the assumption that active learning leads to the development of metacognitive knowledge and skills is lacking, there are indications that metacognition can be stimulated by asking the students to perform activities, such as verbalizing, discovering things by themselves and comparing their own working methods with those of classmates (Elshout-Mohr & Van Hout-Wolters, 1995). These are the kinds of activities that teachers require from students during active learning. Stimulating students' metacognition is effective in enhancing learning (e.g. Lonka & Ahola, 1995; Hattie, Biggs, & Purdie, 1996).

Another essential component of active learning is collaboration with peers. Active learning stems from the constructivist view of learning which assumes that learning is a collaborative process in which students learn from each other by testing ideas on each other, and helping each other to elaborate and refine knowledge (Grabinger & Dunlap, 1995). To be able to learn in such a way, students need to be taught how they can learn in collaboration with others, and they need feedback on their social skills. For example, students need to learn to ask for information or advice from others and to have productive discussions (Bolhuis & Voeten, 2001). Therefore, to

stimulate active learning, teachers should encourage positive interdependence within small groups, give clear instructions on how to cooperate and give feedback on the cooperative process (Johnson & Johnson, 1999).

Students need qualitatively good feedback from their teacher to achieve their learning goals. As in all learning, achieving task-related goals and goals regarding the processing of the task is essential. During active learning, however, the development of metacognition and social skills are also important goals, next to task- and process-related goals. Fostering active learning seems a very challenging and demanding task for teachers, requiring knowledge of students' learning processes, and skills in providing guidance and feedback. Teachers' conceptions of teaching and learning need to fit the active learning situation; learning is an active process of constructing knowledge, and teaching is a process of supporting the students' knowledge construction (Duffy & Cunningham, 1996). This kind of teaching may be referred to as process-oriented teaching (Vermunt, 1992), which does not seem easy for teachers to implement. Bolhuis and Voeten (2001) concluded from their observations of process-oriented teaching that teachers scarcely paid attention to learning goals and gave little positive feedback on learning. They stated that a change from transmitting knowledge to activating students was needed, as well as teaching students how to learn by coaching their learning processes (Bolhuis & Voeten, 2001). Teachers appear to lack the necessary knowledge about active learning, learning strategies and metacognition to apply active learning methods successfully (Niemi, 2002). Therefore, active learning asks for specific knowledge and skills from teachers, in addition to required skills that are not specific to the active learning context, namely adapting to individual students' needs and maintaining efficient classroom management.

As early as 1900, Dewey argued that the diagnosis of a child's capacities should provide the starting-point for instruction. The type and level of support to be provided by the teacher should be based on this diagnosis. Another early example of the recognition of the importance of acquiring diagnostic information comes from Wood, Bruner, and Ross (1976), who stated that a teacher cannot generate appropriate feedback without sufficient knowledge about the task at hand and about the performance characteristics of the student. A recent study on patterns of contingent teaching in active learning situations in secondary education showed that diagnostic strategies, such as asking questions and reading student work before intervening, were scarce (Van de Pol, Volman, & Beishuizen, 2011).

Another aspect that is not only important in the context of active learning but in all classroom situations is classroom management. Classroom management refers to the actions taken by the teacher to create and maintain a learning environment in which instruction and the provision of feedback can successfully take place (Brophy, 2006). The teacher has to arrange the physical environment and maintain established rules and procedures, while students are working on their tasks and engaged in activities. Working with cooperative learning groups requires modification of recommended classroom management strategies; adhering to strict limits of student talk and movement, for example, contradicts with the aim of eliciting discussions and group investigations. Establishing clear classroom routines and teaching desirable group behaviours are, however, equally important (Emmer & Stough, 2001). In one of the few studies on classroom management in active learning situations on primary schools, Garrett (2008) found that teachers do not consciously adapt classroom management strategies to the specific situation of active learning.

In this study, classroom situations in which students work in small groups on different tasks at the same time refer to active learning. These active learning situations may vary from teacher-controlled learning situations in which several mental activities are required of the students to student-controlled learning situations in which students decide on the learning goals and activities. During active learning, teacher-student interactions will not only be focused on guidance and feedback but also on acquiring diagnostic information as well as on classroom management.

### 2.2.2 Feedback

Among researchers, little consensus exists about how feedback can be defined and what constitutes qualitatively good feedback (Nicol & Macfarlane-Dick, 2006). After having reviewed the central elements of feedback definitions in a decade of research, Van de Ridder and colleagues (2008, p. 193) defined feedback as: '*Specific information about the comparison between a trainee's observed performance and a standard, given with the intent to improve the trainee's performance*'. In the present study this definition is adopted.

Hattie and Timperley (2007) developed a theoretical framework about feedback based on their meta-analysis of the evidence for the power of feedback to improve learning. Concurrently with the definition used in this study, they state that the purpose of feedback is to reduce the discrepancies between the students' current understanding or performance and the

understanding or performance that is aimed at. Learning goals should be clear, since feedback essentially is information about how the student's present performance relates to these goals (Nicol & Macfarlane-Dick, 2006). Hattie and Timperley (2007) further state that – to be effective – feedback must answer three major questions. The first question is about the learning goals: 'Where am I going?' The second question that has to be answered is: 'How am I going?' Students need to know how the current performance relates to the learning goals. Finally, students have to know: 'Where to next?' What activities need to be undertaken to make better progress? Furthermore, feedback has to be specific and clear.

The levels on which the feedback questions can be focused are the task level, the process level, the self-regulation level and the self level (Hattie & Timperley, 2007). Feedback at the *task* level contains verification; information about whether work is correct or about how well the task is being performed. It also includes directions, for example to acquire more or different information. Feedback at the *process* level refers to feedback directed at information processing and learning processes needed to understand the task. Feedback at the *self-regulation* level addresses the way students plan, monitor, direct and regulate actions to increase skills in self-evaluation and confidence to engage in the tasks. Feedback at the *self* level is about the student personally and typically expresses positive evaluations and affect about a student, for example, 'Good boy'. Hattie and Timperley (2007) concluded that feedback at the process and self-regulation level seem most powerful to enhance student learning, followed by feedback at the task level, but only when information can subsequently be used by the student for improving self-regulation or strategy processing. Feedback at the self level seems least effective to enhance learning, but is (too) often used in classroom situations. Feedback at the self level is defined as personal feedback, unrelated to specifics of the task (Hattie & Timperley, 2007).

The four levels resemble the learning activities that were distinguished by Vermunt and Verloop (1999); cognitive, affective and metacognitive learning activities. Cognitive feedback contains information about the task or the processing of the task; about the process needed to accomplish and understand the task, for example, structuring and/or analysing information, and connecting information within the task or between tasks (Vermunt & Verloop, 1999). Metacognitive feedback stimulates the student to evaluate and reflect on his or her own proceedings, use of strategies and understanding and – if necessary – to adapt the proceeding or strategy that is used. Feedback on affective learning activities comprises

comments focused on motivation, effort, concentration and dealing with emotions. Affective feedback can only have an indirect effect on students' learning outcomes through the influence on the cognitive learning activities (Vermunt & Verloop, 1999). Affective feedback is always part of the interpersonal communication between teacher and student (Meyer & Turner, 2002). Therefore, in this study, the affective learning activities will be considered within the nature of the feedback, instead of as a separate focus of feedback.

The distinction in the different levels of learning activities described above can be recognised in the principles of process-oriented teaching. According to these principles, teachers have to give instruction and feedback about the knowledge construction, strategy use and the emotional aspects of learning. Besides, during active learning, feedback on *social* learning is important; the social context is used as a learning environment in which students learn with and from each other. As was discussed in subsection 2.1, cooperative learning skills and social skills should be another focus of feedback during active learning (Bolhuis & Voeten, 2001). Feedback on social learning should be distinguished from feedback focused on other learning activities given to a small group of students. For example, when the teacher gives feedback on the evaluation of students' planning of a task, of which the division of tasks between group members was part, this would be feedback focused on the students' metacognition. Only feedback that is specifically focused on cooperative learning skills and social skills is regarded as feedback on social learning in the present study.

With regard to the nature of feedback, feedback seems most effective when the teacher provokes the student to improve his or her performance (Vermunt & Verloop, 1999). Besides confirmation of good work, feedback has to contain constructive criticism (Nicol & Macfarlane-Dick, 2006). Criticism needs to be distinguished from feedback that is destructive in nature. Destructive feedback attributes poor performance to internal factors of the student, causing negative feelings such as lower self-esteem or lower self-efficacy (London, 1995). Destructive feedback seems the least effective nature of feedback to enhance learning; the most effective feedback is thus confirmative, critical, as well as constructive in nature.

The way in which feedback is given by the teacher (i.e. directive or facilitative) also seems to be important in relation to the teacher role that fits active learning situations. As was discussed, the kind of teaching that fits the active learning context may be referred to as process-oriented teaching, which involves guiding and facilitating students' learning processes.

(Vermunt, 1992). Other terms referring to the facilitative way of teaching are autonomy-supportive or student-centred. These types of learning environments are also characterized by teachers guiding and encouraging students to perform learning tasks in their own way (Black & Deci, 2000). The type of language a teacher uses influences the amount of autonomy-support students experience and how students learn. Deep learning and performance are negatively affected by controlling instructions such as ‘you must’, or ‘you have to’, whereas instructions such as ‘you can’ or ‘you might’ positively affect learning (Wijnia, Loyens, & Derous, 2011). Hertz-Lazarowitz and Shachar (1990) developed categories of teachers’ verbal behaviours during cooperative learning. The categories related to feedback are; questioning (to elicit an expected response), mediating (prompts, scaffolds, tentative open questions), encouraging (praise for working efforts), control (instructing, lecturing), and maintenance (help, facilitation of learning). In the present study, we regarded questioning and control as more directive ways of giving feedback, and mediating and maintenance as more facilitative ways of giving feedback. Encouraging is regarded as a separate way of giving feedback, which is not specifically directive or facilitative.

Table 2.1 shows a summary of the literature on feedback that is discussed above, and includes the features that will be examined in this study. With regard to the focus of feedback, descriptions of Hattie and Timperley’s (2007) feedback levels and Vermunt and Verloop’s (1999) learning activities have been combined and the aspect of social learning has been added. During active learning, feedback which is focused on metacognition and social learning seems to be particularly important. The question of whether feedback is goal-directed will be studied, as feedback is essentially information about how a student’s present performance relates to these goals (Hattie & Timperley, 2007; Nicol & Macfarlane-Dick, 2006). With regard to the nature of feedback, a combination of confirmation and constructive criticism would be optimal (Nicol & Macfarlane-Dick, 2006), and a facilitative way of giving feedback fits the active learning context best.\*

\* Timing of feedback also appears to be an important feedback feature; the sooner feedback is given, the better (Shute, 2008). Because teachers are being observed while they are helping their students during active learning, all feedback is regarded as being direct in this study. Therefore, the timing of feedback has not been considered.



*Table 2.1 Features of teacher feedback from the literature.*

Teacher Feedback			
Focus	Goal-directedness	Nature	Way
Task	Yes	Confirmative	Facilitative
Process	No	Criticism	Directive
Metacognitive		Constructive	Encouraging
Social		Destructive	
Self/Non-specific			

### 2.2.3 *The present study*

The practices of primary school teachers giving feedback to their students in the context of active learning are not yet fully understood, and neither has the quality of feedback been described. The purpose of the present study is therefore to contribute to the existing knowledge of feedback during active learning via an examination of teacher-student interactions. The following research question guided this study: What are the characteristics of teacher feedback during active learning in the highest grades of primary schools?

In order to characterise teacher feedback during active learning in primary schools, we examined the focus of the feedback, as well its nature and whether it was goal-directed. As the active learning context requires more facilitative ways of giving feedback, instead of more directive or controlling methods, we also examined the extent to which teachers are indeed facilitators during active learning.

Besides teacher feedback, other aspects that are also important subjects of teacher-student interactions during active learning were studied, too: namely classroom management issues and the acquisition of diagnostic information as a starting-point for feedback.

## 2.3 Method

### 2.3.1 *Participants and context*

The participants were 32 teachers (27 female and 5 male) who worked in the sixth, seventh or eighth grade (9–12 year old students) at 13 primary schools in the south-east of the Netherlands. Their average teaching experience was 12.38 years ( $SD= 12.07$ ), while their average experience with active learning was 4.02 years ( $SD= 4.17$ ).

All of the teachers involved practised the concept of active learning when teaching environmental studies (i.e. projects that integrate subjects such as history, geography and biology). The domain of environmental

studies was chosen because it is the domain in which active learning is most often implemented in Dutch primary schools. Schools have chosen active learning as a means to develop students' metacognitive and social skills, in addition to reaching the national attainment targets for the domain of environmental studies. These attainment targets are set by the Dutch government for all primary schools and state what students should have learned at the end of their primary education. One example of such an attainment target is: '*The pupils learn to handle the environment with care*' (Ministry of Education, Culture and Science, 2006, p.6). Since the attainment targets are set for the long term, the teacher and/or the students themselves should formulate specific learning goals for each lesson and/or theme.

In 30 classrooms, the students worked on their own projects on a particular theme. For example, one whole class was working within the theme 'the Middle Ages'. Within this theme, groups of two or three students were elaborating on different topics, such as fraternities, monasteries or knights. Each small group of students had to find information about their own topic and prepare a presentation for their classmates, such as a PowerPoint or a poster presentation. At the moment of the observations, the phase of the project varied across classrooms from the first lesson, in which students searched for information, to the final lesson in which the presentation was prepared. In two classrooms, the students worked through different tasks from the textbook, for which they did their own weekly planning and were allowed to consult classmates. In all of the classrooms, the teacher walked around and helped the students. Most interactions were initiated by the students who indicated to the teacher that they had a question. Sometimes, the teacher started an interaction by inviting the students to tell them about what they were doing, how they were proceeding or what information they had found. The classroom observations were conducted between April and June 2009.

### 2.3.2 Procedure

We sent emails to principals of the 47 primary schools that collaborate with a teacher training institute in the south-east of the Netherlands. The email included the description of active learning (i.e. classroom situations in which students work in small groups on different tasks in the domain of environmental studies at the same time, varying from teacher-controlled learning situations in which several activities are required of the students to student-controlled learning situations in which students decide on the

learning goals and activities). Principals were asked to indicate whether or not they practised this concept of active learning and if yes, whether they were interested in participating in the study.

Responses of 45 principals were received; 23 indicating that they did practice active learning and 22 indicating that they did not practice active learning in the domain of environmental studies. Of those 23 schools indicating that they did practice active learning, three principals were not interested in participation in the study, one because of recent changes in the management staff leading to turbulence in the team and two because the team already participated in another research project. A random sample of 15 schools drawn from those 20 schools that answered positively to both questions was contacted with more detailed information about the study. All these schools were located in the south-east of the Netherlands in areas which ranged from urban to rural. School sizes ranged from 81 students to 736 students.

Teachers of grade 6, 7, and 8 were asked to participate in the study. Since participation involved being videotaped in the classroom, teachers at two of the selected schools refused to participate. At all of the other schools, one or more teachers agreed to participate in the study. An appointment for the classroom observation was made with each teacher personally.

Interactions between the teacher and his or her students during an 'active-learning lesson' were videotaped. An external microphone was attached to the teacher's clothes, allowing the observer to keep a distance during the observation. The duration of the lessons varied from 45 minutes to two hours, each teacher was videotaped for half an hour.

Afterwards, the teachers were asked how many years they had worked as a teacher and how long their experience with active learning was.

### 2.3.3 *Category system*

A category system to examine the practices of teachers giving feedback in the context of active learning was developed in the following four steps.

Step 1: Observation categories were derived from the literature on active learning and feedback. The feedback categories can be found in Table 2.1, their definitions or descriptions were discussed in section 2.2.

Step 2: Categories were added for the interactions that did not contain feedback, based on the literature on active learning (i.e. acquiring information and classroom management, see section 2.1). A category for 'remaining' teacher-student interactions was also added; these interactions

were not related to the active learning lesson. Definitions of these categories and the feedback categories were described in more concrete teacher behaviours and some examples from practice were added to illustrate each category and characteristic. Transcriptions of teacher–student interactions were used to develop these definitions and examples. See Figure 2.1 for the category system, see appendix A for definitions and examples of each feedback category and appendix B for definitions and examples of each feedback characteristic.

Step 3: From the videotapes, teacher–student interactions were distinguished and used as the units of analysis. An interaction started when the teacher was talking with a (group of) student(s). When the teacher started an interaction with another (group of) student(s), a new unit started. Also, when another subcategory could be coded in an interaction with the same student(s), this was the start of a new unit. Finally, when another topic was addressed within the same subcategory with a certain (group of) student(s) (e.g. subcategory 2.1, first cities in Thailand and then 2.1: Bangkok palace), a new unit was distinguished. Thus, each unit of analysis contained an interaction with only one (group of) student(s), was only about one subcategory and about only one topic. A second observer was asked to divide 15 per cent of the data into units of analysis. The inter-rater agreement for the selection of units was 84%.

Step 4: Parts of five classroom observations, each with a duration of twenty minutes, were transcribed and divided into units of analysis. The first author and a second observer, employing the category system that was developed, scored these units. The units were scored while watching the videos simultaneously so that nonverbal behaviour and contextual information could also be considered. Each teacher–student interaction was first classified in one of the main categories: 1. guidance and feedback; 2. acquiring information; 3. classroom management; or 4. remaining. Cohen's Kappa for the coding of the main category, based on 12% of the data was .93. Units in the main categories 1, 2 and 3 were then further classified in one of the complementary subcategories 1.1 to 3.2 (see Figure 2.1). Cohen's Kappa for the coding of the subcategory based on 12% of the data was .91. Of units that were classified within main category 1, the following characteristics were additionally scored: whether or not there was a relation to a learning goal, what the nature of the feedback was, and in what way the

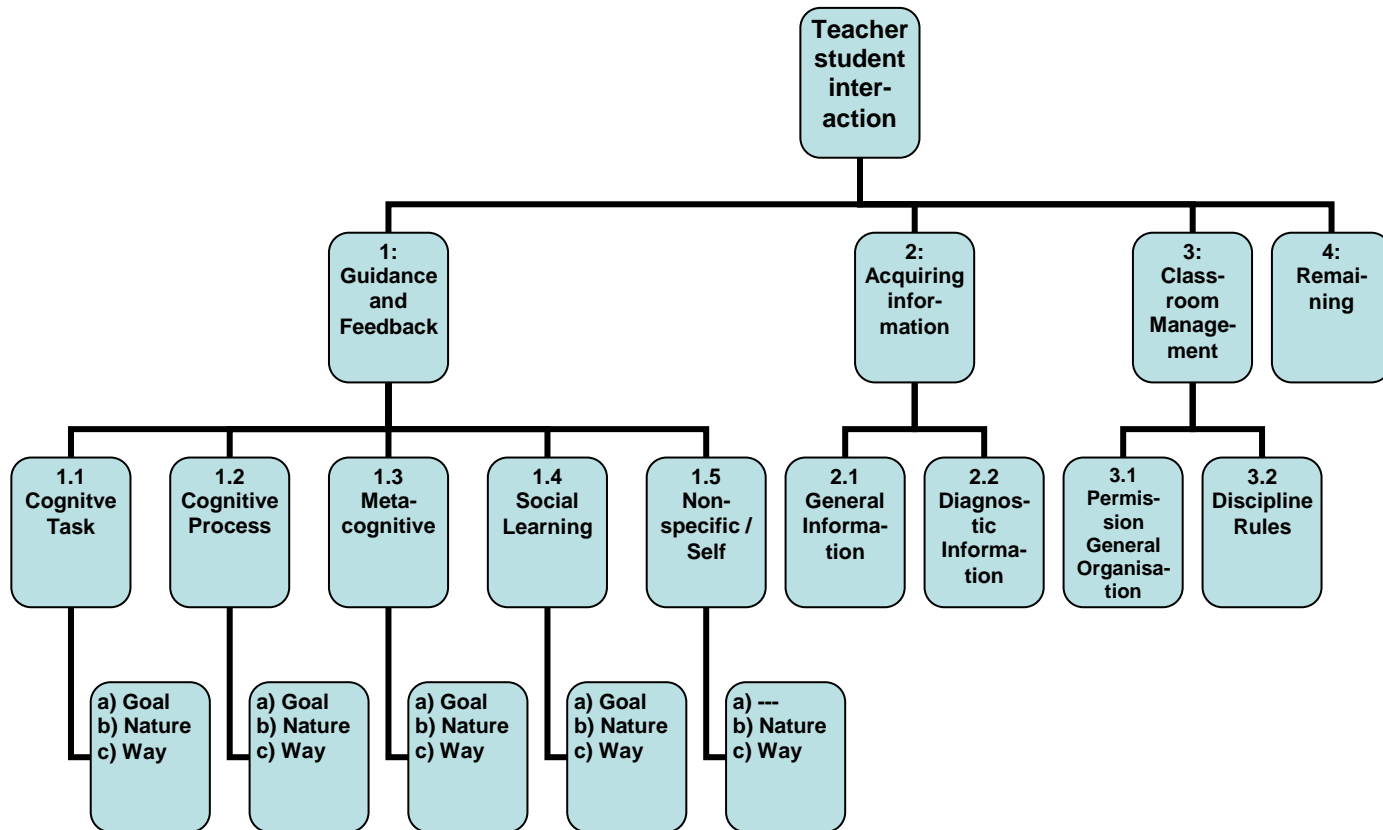


Figure 2.1. Category system used to examine teacher feedback during active learning

feedback was given. For units within category 1.5 only the characteristics 'nature' and 'way' were scored, since the absence of a learning goal was inherent in the definition of this subcategory.

The mean Cohen's Kappa for the coding of these characteristics, based on 12% of the data within main category 1, was .72. Scoring examples can be found in result section 4.2.

#### 2.3.4 Data analysis

Teacher-student interactions during 20 minutes of the videotaped lesson in which students were actively engaged in their learning activities were analysed, since this time proved to give a representative picture of the teachers' feedback behaviour. Those classroom observations that were transcribed for piloting the category system were not used for the analyses. The start and end time of each unit was recorded. For each unit, the main category and the subcategory were scored. Additionally, for each guidance and feedback interaction, the characteristics were scored. A total of 1465 teacher-student interactions were distinguished, with a mean duration of 23.09 ( $SD = 29.78$ ) seconds. Teachers had a mean of 45.78 ( $SD = 12.21$ ) units of interaction during those 20 minutes of active learning that were analysed. All data were imported into SPSS and then aggregated to the teacher level to make it possible to analyse the classroom practices of the different teachers. Data were analysed by examining the descriptive statistics. To illustrate the findings, we selected examples of feedback interactions that were characteristic of the subcategories that we distinguished. We selected four examples in line with one or more recommendations that were discussed in the theoretical background. These examples were transcribed verbatim.

## 2.4 Results

### 2.4.1 Categories and characteristics of teacher-student interactions

All teachers indicated that the observed lesson was representative of the active learning lessons that they normally teach. Most teachers could not report specific learning goal(s) for the observed lesson; they reported broad or vague goals, such as 'good collaboration' or 'finding a lot of information', instead. Six teachers reported that the students set their own learning goals, mostly in the form of learning questions.

Descriptive statistics on how often, relatively, each main category occurred in the classrooms can be found in Table 2.2; the descriptive statistics on how often, relatively, each subcategory of feedback occurred in the classrooms can be found in Table 2.3.

*Table 2.2. Descriptive statistics for the main categories of teacher-student interactions (N=32 teachers)*

Category	Mean %	Standard deviation
1. Guidance and feedback	49.89	13.50
2. Acquiring information	19.72	9.11
3. Classroom management	26.77	13.86
4. Remaining	3.63	3.67

On average, in about half of the teacher–student interactions, students receive guidance and feedback from their teacher. These interactions are most often focused on the concrete tasks on which the students are working, or on the processing of these tasks. Little guidance and feedback is focused on students’ metacognition or on social learning. Very few interactions contain non-specific feedback or feedback that was focused on students personally.

Of the teacher–student interactions, about a quarter consist of remarks concerning classroom management. Most of these remarks pertain to the general organization of active learning. Less than 8% of the interactions contain comments on student behaviour or on classroom rules.

In almost 20% of the teacher–student interactions, the teacher is acquiring information for him/herself. The information that is gathered by the teacher is often diagnostic, and subsequently used as a basis for the feedback. General information to enable the teacher to keep an overview on what everyone is doing is asked in 5% of the interactions.

*Table 2.3. Descriptive statistics for the subcategories of teacher-student interactions (N=32 teachers)*

Category	Mean %	Standard deviation
1. Guidance and feedback		
1.1 Cognitive; Task	25.18	10.78
1.2 Cognitive; Process	20.86	7.67
1.3 Metacognitive	0.99	2.14
1.4 Social Learning	2.56	3.17
1.5 Non-specific / Self	0.30	0.94
2. Acquiring information		
2.1 General information	4.91	4.25
2.2 Diagnostic information	14.81	8.56
3. Classroom management		
3.1 Permission, General	18.92	10.81
3.2 Discipline, Rules	7.85	6.24
4. Remaining	3.63	3.67

A total of 713 guidance and feedback interactions were observed. The descriptive statistics on the characteristics of these units of information are presented in Table 2.4.

Of all the teacher–student interactions focused on guidance and feedback, with regard to the task, process, metacognition or social learning, more than 95% was not explicitly related to a learning goal.

With regard to the nature of feedback, teachers are most often constructive, neutral or confirmative in their feedback interactions. Also, combinations of different natures were observed. Very few interactions contained confirmation, criticism as well as a constructive remark. Teachers appeared to give their students little critiques and almost no destructive feedback.



*Table 2.4. Descriptive statistics for the characteristics of the feedback interactions (N=32 teachers)*

Characteristic	Mean %	Standard deviation
Related to goal		
Yes	4.24	5.62
No	95.76	5.62
Nature		
Confirmative	22.52	13.01
Critical	5.88	5.81
Constructive	30.69	15.20
Destructive	0.78	3.10
Neutral	24.41	12.16
Confirm-Criticism-Construct	1.13	3.24
Other combinations	14.59	8.20
Way		
Facilitative	27.54	16.37
Directive	48.31	20.80
Encouraging	15.07	11.86
Neutral	6.60	6.51

Teachers' way of giving feedback can be characterised as directive in almost half of the interactions. A directive way of giving feedback was observed nearly twice as often as a facilitative way of giving feedback. In about 15% of the teacher–student interactions, teachers were encouraging their students.

#### *2.4.2 Examples of teacher-student feedback interactions*

Four examples that were in line with one or more recommendations in the literature on feedback and active learning were selected. One example for each subcategory of feedback was chosen, except for subcategory 1.5 (i.e. non-specific feedback), because this kind of feedback seems least effective in enhancing learning (Hattie & Timperley, 2007). An example of a feedback interaction focused on the task is given below. This interaction was selected because the nature of the feedback is confirmative, critical as well as constructive, and the method of giving feedback is facilitative. The feedback is not related to an explicitly stated learning goal.

Example 1:

Teacher: *'Enemies, characteristics of the giraffe...You have got a lot of different topics, that's nice. But I am looking at the order of these topics ... why did you start with the enemies of the giraffe?'*

Students: *'Well, we discussed the topics that we wanted to write about, and then we searched for information. This was the information that we found first.'*

Teacher: *'You thought about many relevant topics and then you found information about all these topics. You did this very well, but I think the order of the topics is not logical.'*

Students: (look at their paper, at each other and then at the teacher.)

Teacher: *'Maybe the next time you write a paper, you will have to think about this first. What do we write in the introduction, which topics do we write about in the main paragraphs and how do we end?'*

Students: (nodding their heads) *'Yes... Maybe we had better begin with the places giraffes live in the wild!'*

Teacher: *'Very good. Maybe you can end with enemies of the giraffe and how people threaten giraffes. Do you think that would be a good end?'*

Students: (Look at the teacher and smile) *'We will think about that...'*

The following example is a feedback interaction focused on the processing of the task. This interaction was selected because the teacher explicitly states the learning goal (i.e. the topics she wants the students to learn about) and the nature of the feedback is confirmative, critical as well as constructive. The way of giving feedback is directive.

Example 2:

Teacher: *'What do you want to elaborate now?'*

Student: *'What the different people in the Middle Ages did.'*

Teacher: *'Yes, well, you already know what the vendor did. Good!'*

Student: *'Yes, and we also know what beggars did.'*

Teacher: *'And you know a lot about knights. So, do you really have to elaborate on that?'*

Student: *'Hmm, yes, I think so.'*

Teacher: *'No, you don't. You already have a lot of information. When you keep searching for extra information like you do now, you will not be finished in time. So what you do need to elaborate on now, is this. (Points to the student's paper.) Amusement in the Middle Ages.'*

Student: *'Oh yes, acrobats, they were there too'.*

Teacher: *'Yes. I also want to know from you two what kinds of amusement there were in the Middle Ages and how this was organized. Do you know where you can find this information?'*

Student: *'Maybe there is some information in that book about knights?'*

Teacher: *'Yes, you can look that up and you may also search on the internet.'*

Student: *'Okay'.*

Example 3 is an example of a feedback interaction focused on students' metacognition. This interaction was selected because the teacher explicitly refers to the students' learning goal (i.e. their own learning question). Furthermore, the teacher supports the development of students' evaluation skills in a facilitative way.

Example 3:

Student: *'We cannot find anything more about polders'.*

Teacher: *'I remember that you had already found that map of Holland and that you indicated where the polders are, right?'*

Students: *'Yes'.*

Teacher: *'What extra information do you want to find now? What do you think is missing?'*

Student: *'Well, we just want to add something'.*

Teacher: *'Oh, okay, do you think that the quantity of your information is not enough?'*

Student: *'Yes'.*

Teacher: *'But did you answer the learning question that you posed at the beginning of the lessons?'*

Student: *'I think so, our first question was: "Where in Holland are polders?"'*

Teacher: *'And did you answer this question with the information you have already found?'*

Student: *'Yes... actually, I think we have... Take a look at the work again. We know where in Holland the polders are. And we show this on the map'.*

Teacher: *'Yes, indeed. The map is clear and you have clearly indicated where the polders are. So, I think the other students can look at this and learn where the polders are'.*

Students: *'This question is actually already answered properly then. We do not need more information'.*

- Teacher: *'Indeed! It is not the quantity of your information that is important, it is about clearly answering your learning question'.*
- Students: *'Yes! We did that. Okay. Then we move on to our next learning question'.*

The last example is a feedback interaction focused on social learning. This interaction was selected because the teacher refers to a learning goal (i.e. collaboration; responsibility for each other) and the nature of the feedback is both critical and constructive.

Example 4.

- Student: *'I don't know what I have to do, I don't understand this'.*
- Teacher: (Attracts the attention of the students Luuk is working with.)  
*'Why does Luuk not know what he has to do?'*
- Student: *'Sarah can help him, because she is not doing anything anyway'.*
- Teacher: *'No, no... this is not how we work collaboratively. You are a group, a team! You all have the responsibility to help each other. I do not see you taking the responsibility for your team member Luuk now. What are you going to do about it?'*
- Student: *'Luuk missed part of the lesson when he went to the doctor'.*
- Teacher: *'Maybe one of you can explain to Luuk what you have done and how you proceeded then?'*
- Student: *'Oh, okay, I can do that and then the others can continue to search for information about the landscape of Australia'.*
- Teacher: *'Okay'.*

## 2.5 Discussion and conclusions

### 2.5.1 Characteristics of teacher feedback during active learning

In the present study, we tried to answer this question: what are the characteristics of teacher feedback during active learning in the highest grades of primary schools? A category system was developed in order to describe the feedback practices of 32 teachers in grades six, seven and eight of 13 primary schools where the concept of active learning was practised in environmental studies lessons. The category system was based on both the research literature on feedback and active learning, and the teachers' feedback behaviour during active learning in practice. We can conclude that about half of the teacher-student interactions contain guidance and feedback. These interactions are mainly focused on the task or the processing of the task and only sometimes on social learning or students'

metacognition. Most feedback interactions can be characterized as unrelated to an explicitly stated learning goal and are constructive, confirmative or neutral in nature. Feedback during active learning is mainly given in a directive way, and less frequently in a facilitative or encouraging way.

Although the research question was descriptive in nature, suggestions for how feedback can be improved during active learning can be deduced from comparing the results with the research literature. Feedback is one of the most powerful tools which teachers can use in order to enhance student learning (Hattie, 2009). Although qualitatively good feedback has not yet been conclusively defined, it is clear that teachers are often unable to provide the feedback that is needed to support their students adequately during active learning (Bolhuis & Voeten, 2001; Niemi, 2002). Therefore, suggestions for improvement are necessary and will be welcomed by teachers in schools and by teacher training colleges. The present study can provide some suggestions for improving feedback during active learning. These suggestions should be treated with caution, however, as there are no established criteria or standards with which to evaluate the behaviour that was recorded.

One significant difference that emerged between theory and practice was the fact that feedback that was explicitly related to a standard or a learning goal appeared to be rather uncommon in the classrooms. The relatedness of feedback to a learning goal comprises a crucial element of the definition of feedback. In practice, however, the teachers explicitly related the students' performance to a learning goal in less than 5% of the teacher-student interactions. As was discussed, active learning may vary from independent work in which the teacher decides on the learning goals and activities to self-directed learning in which the students themselves decide on the goals and activities. While talking to the teachers after the observation was conducted, we found that, in most cases, neither the teacher nor the students explicitly set specific learning goals for the lesson. Ax (1985) showed that teachers often only set implicit goals when planning their lessons; they use routine planning in which making choices and deciding on the content of the lesson are not common. Themes and topics for the lessons observed in this study were related to the national attainment targets for environmental studies (Ministry of Education, Culture and Science, 2006). These attainment targets prescribe what students should have learned at the end of their primary education. These long-term goals are not specific enough to guide the content of a specific lesson or to use as a framework for feedback. Over 1000 studies in the field of behavioural sciences have shown

that specific goals effectively and significantly increase individuals' performances; setting clear goals leads to better performances than vague goals or no goal at all (Latham & Locke, 2006). Goals assigned by a teacher can be as effective as self-set goals, as long as the teacher explains why it is important to attain these goals. Goals can create constructive discontent with the present performance, leading to increased effort or a change in strategy in order to achieve the goal (Latham & Locke, 2006). In addition to the fact that clear goals can promote the students' commitment, goal-directed actions and personal effectiveness, goals can also be helpful in focusing the content of teacher feedback (Hattie & Timperley, 2007). Therefore, in order to enhance student learning and to improve teacher feedback, it is important that teachers set specific learning goals, communicate these goals to the students and explicitly relate the students' performance to these goals in their feedback.

In almost half of the teacher-student interactions that were observed, the teacher provided guidance and feedback to the students. A great deal of the information that the teachers provided appeared to be related to the specific task in hand or to the process that was needed to accomplish the task. From their literature review, Hattie and Timperley (2007) concluded that feedback at the process level seems to be more powerful in terms of enhancing student learning than feedback at the task level. Information about a specific task often cannot be generalised to other tasks. Feedback at the task level can be effective when it is combined with feedback on task processing and the use of strategies; it can then help to give students the self-confidence they need to use new strategies (Earley, Northcraft, Lee, & Lituchy, 1990).

In addition to the effectiveness of feedback at the process level, Hattie and Timperley (2007) showed that feedback that is focused on students' metacognition is effective in improving student learning. Although metacognition seems to be both an objective of active learning and a means by which to learn in an active way (Bonwell & Eison, 1991; Simons et al., 2000), feedback on the students' metacognition was given in just 1% of all teacher-student interactions. Even though a clear standard is lacking, based on these results, it is reasonable to state that teachers should pay more attention to the development of their students' metacognitive knowledge and skills during active learning. In order to enhance students' metacognition, it is important to set learning goals, as learning goals facilitate purposeful cognition which involves planning, monitoring and evaluating students' progress towards achieving their goal (Latham & Locke, 2006).

Another aspect of active learning that may require more attention in classrooms is social learning. On average, the teachers gave little feedback on social learning. Students were all working in pairs or in small groups, so they automatically practised their social skills. To enhance students' social learning capacities effectively, practising alone is not enough; students need instruction and feedback on their cooperative learning skills and social skills (Bolhuis & Voeten, 2001).

In contrast to what was described in the research literature on feedback at the self-level (Hattie & Timperley, 2007), personal and non-specific feedback was rare in the active learning situations which were observed. As this type of feedback is not effective in enhancing learning, this was quite a positive finding. With regard to the nature of feedback, the results show that teachers give very little destructive feedback, which is another positive finding, because destructive feedback has a detrimental effect on students' self-esteem and/or motivation. Feedback containing criticism, however, was also rarely observed. Feedback that is critical directs the student's attention to the things that need to be improved or elaborated upon. The teachers mostly gave constructive or confirmatory feedback, or gave neutral information. However, feedback has to contain constructive criticism and advice for improving the weaker parts of the work (Nicol & Macfarlane-Dick, 2006). A combination of confirmative, critical and constructive feedback would be optimal. Only 1.3% of the interactions consisted of this combination. Teachers could improve their feedback by combining all three different aspects in their feedback more often.

Finally, in half of the teacher-student interactions, the teachers gave feedback in a directive way. This may relate to the shift in the role of the teacher that comes with active learning, from someone who transfers knowledge, to someone who guides and facilitates pupils' learning processes through process-oriented teaching (Bolhuis & Voeten, 2001). It appears that teachers are still usually in control of the learning process, while active learning situations appear to require teachers to act as coaches who give facilitative feedback. Teachers may be insufficiently prepared for this role as a facilitator of active learning.

### *2.5.2 Limitations and directions*

We have selected schools from a diverse set of primary schools, ranging from urban to rural and from very small to very large. Due to the relatively small sample of schools in the south-east of the Netherlands, the findings of this study cannot be generalised to all primary school teachers

who practise the concept of active learning, due to the possibility of sample selection bias. Some teachers at the randomly selected schools did not want to participate in the study, because they did not want their students to be videotaped or did not want to be videotaped themselves. A comparison of the classroom practices of teachers at schools in which only one teacher participated with the classroom practices of teachers in which all grade six, seven and eight teachers participated, however, revealed no differences that could be ascribed to this selection process.'

The focus of this study was on teacher-student interactions and, more specifically, on the teachers' feedback behaviour. The results have been discussed in relation to the quality and effectiveness of feedback in enhancing student learning. It can be argued that the effectiveness of feedback cannot be discussed without considering variables on the student level. With regard to the effectiveness of feedback, how it is perceived by the student may be as important as how it is given by the teacher. However, students' perceptions of teacher feedback were beyond the scope of this study. By identifying and examining the different features and characteristics of feedback that have been described in the literature and are present in classroom practices, we attempted to form some recommendations that will be useful in improving the practice of giving feedback in a more general sense. The effects of these recommendations for different groups of students would be an interesting topic for future research.

Due to the focus that was chosen, the interaction between student and teacher behaviour was also not addressed in the present study. The question under which conditions, and in reaction to which kind of student behaviours, teachers should provide which types of feedback cannot be answered based on the analyses that were conducted in the present study. Analysing patterns of interactions between students and teachers would be an interesting and valuable direction for future research.

Another direction for future research would be using the recommendations derived from this study to constitute the content of an intervention that could be implemented and evaluated. The conclusions and recommendations for teachers that formed the results of this study can then be verified and expanded. The current conceptions of teacher learning increasingly emphasise that teachers' own practices and knowledge of these practices should be taken as the starting point for professional learning, in such a way that an intervention programme will not only reflect theoretical knowledge but also the concerns, behaviours and beliefs of teachers themselves. This seems to be a prerequisite for teachers to develop a sense



of ownership of the content of learning and their learning processes (Day, 1999). The present study provides a category system that is based on theory and practice, as well as a thorough description of teachers' practices. Teachers' knowledge, concerns and beliefs with regard to the feedback they give during active learning may be studied in future research.

# Chapter 3



### Chapter 3

## Feedback during Active Learning: Primary School Teachers' Beliefs and Perceived Problems\*

#### Abstract

Giving feedback during active learning is an important, though difficult, task for teachers. In the present study, the problems primary school teachers perceive and the beliefs they hold regarding this task were investigated. It appeared that teachers believe conditional teacher skills, especially time management, hinder them most from giving good feedback. The most widely held belief was that 'feedback should be positive'. Teachers also believed that it is important to adopt a facilitative way of giving feedback, but they found this difficult to implement. Only some teachers believed goal-directedness and a focus on student metacognition were important during active learning and teachers did not perceive problems regarding these aspects. It was discussed whether teachers' feedback behaviour was in line with these perceived problems and beliefs. The results give directions for the professional development of teachers to improve their feedback during active learning.

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### 3.1 Introduction

Feedback is one of the most powerful tools teachers can use to enhance student learning and achievement (Hattie, 2009). Giving feedback in an active learning context, however, is a difficult task for teachers. In active learning environments learning is an active process of constructing knowledge. Teaching is a process of supporting the students' knowledge construction, referred to as process-oriented teaching (Duffy & Cunningham, 1996). Bolhuis and Voeten (2001) concluded from their observations of process-oriented teaching that teachers give little positive feedback on learning and scarcely pay attention to learning goals. Sol and Stokking (2009) found that teachers give little feedback to promote self-directed learning, but instead answer students' questions. The observation study that preceded the present study revealed similar problems: primary school teachers rarely relate their feedback explicitly to learning goals, give very little feedback that is focused on enhancing students' metacognition or social learning and they control rather than facilitate student learning (Chapter 2). It is not known what problems teachers themselves perceive or what they believe to be important when giving feedback during active learning. It is known, however, that beliefs strongly influence teachers' perceptions and subsequently affect their behaviour (Pajares, 1992). Therefore it seems important to know the beliefs teachers hold regarding feedback during active learning, and the problems they perceive.

The aim of the present study was to advance our understanding of teacher feedback during active learning. For this purpose, teachers' beliefs about (giving) feedback during active learning- and the problems teachers perceive- in the highest grades of primary schools were investigated. The findings are discussed in relation to teachers' feedback behaviour that was observed in the preceding study of teachers' feedback practices. Before presenting the study we will first elaborate on teacher feedback in the context of active learning and how beliefs and perceived problems may relate to teachers' feedback behaviour.

### 3.2 Theoretical Background

#### 3.2.1 *Teacher Feedback during Active Learning*

Feedback is defined as specific information about the comparison between a student's observed performance and a standard, given with the intent to improve the student's performance (Van de Ridder, Stokking, McGaghie, & Ten Cate, 2008). The standard to which a student's performance is compared is formulated in the learning goals, which should

be clear, since feedback is essentially information about how the student's present performance relates to them (Nicol & Macfarlane-Dick, 2006). Hattie and Timperley (2007) concur with this definition. They state that to improve student learning, feedback must answer three questions; 'Where am I going?', 'How am I going?', and 'Where to next?'. Students should know the learning goals, how their current performance relates to these goals and how to proceed. So, the *goal-directedness* of feedback appears to be an important facet of feedback.

The *focus* of feedback can pertain to different levels: the task level, the process level, the self-regulation level and the self level (Hattie & Timperley, 2007). Feedback focused at the task level contains information about how well the task is being performed. Feedback focused at the process level is about information processing and the learning processes needed to understand the task. Feedback that is focused at the self-regulation or metacognitive level refers to feedback regarding the self-regulatory activities by which students 'learn to learn', such as orientation and planning of the task, monitoring progress during the task and evaluation and reflection afterwards (De Jager, Jansen, & Reezigt, 2005). Finally, feedback focused at the self level is defined as personal feedback, unrelated to specifics of the task (Hattie & Timperley, 2007).

Of these four foci of feedback, feedback at the self-regulation level seems especially important in the context of active learning. Active learning may range from self-directed learning in which students take decisions on goals and activities, to independent learning in which the goals and activities are decided on by the teacher, but several mental activities are required of the students, such as figuring things out on their own (Van Hout-Wolters, Simons, & Volet, 2000). In either case, developing students' metacognition is an objective of active learning as well as a means for them to learn actively (Bonwell & Eison, 1991; Simons, Linden, & Duffy, 2000).

Another important focus of feedback during active learning is social learning. The principles of active learning draw on the social constructivist learning theory which postulates that students have to construct their own knowledge in interaction with the social learning environment. Students learn actively with their peers in small groups and thus need instruction and feedback on cooperative learning skills and social skills (Bolhuis & Voeten, 2001). In the context of active learning, social learning therefore comprises an additional level at which feedback can be focused.

With regard to the *nature* of feedback, teachers emphasize the idea that feedback has to be positive; teachers hardly discuss the parts of

students' work that are poor (Sol & Stokking, 2009). Besides confirmation of good work, however, feedback has to contain constructive criticism; it should contain hints for improving the weaker parts of the work (Nicol & Macfarlane-Dick, 2006).

The way in which feedback is given by the teacher can be directive or facilitative. Directive feedback tells the student what needs to be revised and how, while facilitative feedback provides the student with suggestions that students can use in their own revision of their work (Black & Wiliam, 1998). The active learning context asks for facilitative feedback, since it is the teachers' task to support the students' knowledge construction (Duffy & Cunningham, 1996).

Regardless of the focus, nature and way of (giving) feedback, it has to be *adaptive* to the needs of the individual student. As early as 1976, Wood, Bruner and Ross stated that a teacher cannot generate appropriate feedback without sufficient knowledge about the task at hand and about the performance characteristics of the student. Based upon this information about the learner combined with the desired outcomes, teachers can formulate adaptive feedback (Shute, 2008).

Finally, to be able to provide students with feedback during active learning, some *teacher skills* are *conditional*. To create the conditions for active learning, the teachers needs classroom management skills. Classroom management refers to the actions taken by the teacher to create and maintain a learning environment in which instruction and the provision of feedback can successfully take place (Brophy, 2006). The teacher has to arrange the learning environment and maintain established rules and procedures.

To summarize, the *focus*, the *goal-directedness*, and the *nature* of feedback, the *way* of giving feedback, the *adaptiveness* of feedback, and the *conditional teacher skills* for giving feedback in an active learning environment seem important facets of teacher feedback during active learning. Teacher behaviours were observed and related to these six facets in a preceding observation study (Chapter 2). A clarification of each of the six facets, and the main findings are summarized in Table 3.1.

When comparing teachers' feedback behaviour to the notions in the literature on feedback and active learning, it appears that teachers' feedback behaviour is not optimal for supporting students' active learning. The reasons for these suboptimal feedback practices are not yet clear. It is known that beliefs strongly influence teachers' perceptions and that these subsequently affect their behaviour (Pajares, 1992). Therefore the beliefs

teachers hold regarding feedback during active learning, and the problems they perceive, are the focus of the present study.

*Table 3.1. Facets of teacher feedback during active learning, and findings regarding teachers' feedback behaviour (Chapter 2).*

Facet	Clarification	Teachers' feedback behaviour
Focus	The level at which feedback is focused; task, process, metacognition, social learning or self /non-specific.	The feedback interactions were most often focused on the task or process and seldom on metacognition or social learning.
Goal-directedness	Whether or not feedback is related to a learning goal.	About 5 per cent of the feedback interactions were explicitly related to a learning goal.
Nature	The nature of feedback: confirmative, critical and/or constructive.	The nature was most often constructive, neutral or confirmative.
Way	The way of giving feedback: directive or facilitative.	The way of giving feedback was most often directive.
Adaptiveness	Acquiring the diagnostic information to base the feedback on.	In about 15 per cent of the interactions teachers acquired diagnostic information.
Conditional teacher skills	Classroom management skills; arranging materials, maintaining rules and procedures	About one third of the interactions were related to the conditions for active learning.

### *3.2.2 Teachers' beliefs and perceived problems*

All teachers hold beliefs about their work, their roles and their responsibilities. Beliefs are often seen as the filters through which knowledge is acquired (Borko & Putnam, 1996;). Beliefs are formed throughout teachers' lives, schooling and careers and strongly influence perception and, in turn, behaviour (Pajares, 1992). In the context of primary education, this relationship between beliefs and behaviour was shown in a study on computer use. Primary school teachers' beliefs were shown to have a significant effect on the use of computers in the classroom. Teachers who adopted more constructivist beliefs appeared to use more computers in the classroom compared to teachers who held more traditional beliefs. (Hermans, Tondeur, van Braak, & Valcke, 2008). Presumably, the beliefs



about (giving) feedback during active learning will also influence the feedback practices of primary school teachers.

Teachers' beliefs about giving feedback in the context of active learning need to fit the active learning situation. Teachers should emphasize the development of student skills more than they stress the transmission of information (Bonwell & Eison, 1991). Teachers should motivate students to construct their own knowledge on the basis of learning experiences, such as experimenting and reflecting (Boekaerts, 1997). From observations and interviews, Niemi (2002) concluded that secondary school teachers perceive active learning as harder and requiring much more work than traditional teaching. Teachers appear to lack the necessary knowledge about active learning to implement it successfully. This lack of knowledge, as well as the problems teachers perceived, led to the observation that few teachers implement active learning environments that really require students' own planning, elaboration and self-evaluation (Niemi, 2002). Similar findings are more recently reported for primary schools in Scotland (Stephen, Ellis, & Martlew, 2010) and in Australia (Van Deur, 2010). So, investigating teachers' beliefs and perceived problems seems useful in order to understand their classroom practices.

### 3.2.3 *The present study*

The purpose of the present study was to contribute to the knowledge of teacher feedback in the context of active learning via an examination of primary school teachers' beliefs and of the problems they perceive. The following research questions guided this study:

1. What beliefs do primary school teachers hold with regard to feedback during active learning?
2. What are the main problems primary school teachers perceive with regard to feedback during active learning?

To frame teachers' beliefs and perceived problems, we distinguished six facets that were prominent in the literature about teacher feedback and active learning. These facets are: the focus of feedback, the goal-directedness of feedback, the nature of feedback, the way of giving feedback, the adaptiveness of feedback, and the conditional teacher skills (see Table 3.1). Results of the present study will be discussed in relation to the findings concerning teachers' feedback behaviour with regard to these six facets (Chapter 2).

### 3.3 Method

#### 3.3.1 Participants

The participants were 33 teachers (28 female and 5 male) who worked in the sixth, seventh or eighth grade at 13 primary schools in the south-east of the Netherlands. All teachers practised the concept of active learning when teaching environmental studies (i.e. projects that integrate subjects such as history, geography and biology). Their average teaching experience was 12.18 years ( $SD = 11.93$ ), their average experience with active learning was 3.98 years ( $SD = 4.10$ ). All teachers also participated in the observation study (Chapter 2).

During active learning, students worked on their own projects on a particular theme. For example, on the theme 'The Middle Ages' groups of two or three students elaborated on different topics, such as fraternities or knights, by searching for information and preparing a presentation for their classmates. The teachers walked around to help the students.

#### 3.3.2 Procedure

We sent emails to principals of primary schools asking them to indicate whether the concept of active learning in the domain of environmental studies was practised in their schools and, if so, whether (some of) the teachers of grades 6, 7 or 8 were interested in participating in the study. Those principals who answered positively were contacted. For the teachers who agreed to participate, email addresses were requested, and an appointment to administer a writing task and an interview was made.

#### 3.3.3 Measures

*Teacher beliefs* were assessed using a writing task. Teachers were given a white sheet with the word 'Feedback' in the middle. The following instruction was given: 'Write down all the things you think about regarding the questions: "What is feedback?" and "What do you find important when giving feedback?" Only think about situations where students learn actively in the domain of environmental studies.' Subsequently, teachers gave a verbal explanation. Clarification and elaboration were elicited by questions such as: 'What do you mean by...?'. These verbal explanations were recorded using a voice recorder.

*Perceived problems* were investigated in an open interview that was initiated by the question: 'What do you find difficult about giving feedback during an environmental studies lesson in which students learn actively?' Such an open question allowed the teachers to answer from their own frame

of reference. Elaborations were elicited by asking questions such as: ‘Can you explain that?’, or ‘Can you give an example?’. The interviews were recorded using a voice recorder.

### 3.3.4 Data analysis

*Beliefs.* The concepts that teachers wrote down were inserted as variables in SPSS. Concepts that shared meaning were grouped: for example ‘coaching’ and ‘guiding’ were merged. This yielded a set of 30 beliefs that were scored as ‘not mentioned’ (0) or ‘mentioned’ (1). The verbal explanations teachers gave were transcribed. The correctness of the scores was checked using these transcriptions. Cohen’s Kappa for the coding of these 30 beliefs, based on 18 per cent of the data, was .89. Interrater agreement for relating the beliefs to the six facets of giving feedback during active learning was 91%.

*Perceived problems.* The interviews were transcribed. All problems that were mentioned were inserted as variables in SPSS. This yielded a set of 16 problems that were scored as ‘not mentioned’ (0) or ‘mentioned’ (1). Cohen’s Kappa for the coding of the perceived problems, based on 18 per cent of the data, was .88. Full interrater agreement was reached for relating the problems to the six facets of giving feedback during active learning.

## 3.4 Results

### 3.4.1 Teachers’ beliefs about feedback during active learning

On average, teachers revealed 8.24 (a minimum of 5, and a maximum of 13) different beliefs. Beliefs mentioned by more than three teachers, and the number of teachers who expressed them can be found in Table 3.2.

The belief that was held most widely by these teachers is related to *the nature of feedback*: feedback should be positive. Also, criticism should be given in a positive way. The second most held belief was related to the *way of giving feedback*: teachers thought that feedback should activate and stimulate students’ work and thinking. Teachers believed it is important to provide students with hints and suggestions that stimulate and challenge them without telling them the answers. About half of the teachers believed that feedback should contain clear directions, and one third believed that teachers should answer questions and give information. About a quarter of the teachers believed feedback should be *goal-directed*.

Table 3.2. Teachers' beliefs about Feedback during Active Learning (N=33 teachers)

Beliefs related to the six facets	Frequency
<b>Focus of feedback</b>	
Feedback can be focused on the task	12
Feedback can be focused on social learning	11
Teachers should prompt evaluation and reflection by students	8
Feedback can be focused on task processing	7
Feedback should be specific and clear	7
Feedback can be focused on student planning	4
<b>Goal-directedness</b>	
Feedback should be goal-directed	8
<b>Nature of feedback</b>	
Feedback should be positive	21
Criticism should be given positively	10
Feedback should contain criticism	7
Feedback should enhance student self-confidence	4
<b>Way of giving feedback</b>	
Students should be activated to work and think	20
Feedback should contain clear directions	17
Feedback should contain hints or suggestions	14
Teachers should answer questions and give information	11
Teachers should not tell the answers	10
Feedback should stimulate and challenge students	10
Teachers should ask questions	10
Feedback should contain an appraisal	8
Teachers should provide assistance, search for solutions	7
Teachers should coach and guide students	6
<b>Adaptive feedback</b>	
Feedback should be tuned to individual students	11
Teachers should assess student prior knowledge and needs first	6
<b>Conditional teacher skills</b>	
Teachers should check student work	8
For giving feedback, a good relationship is important	6
Feedback can be focused on keeping order and rules	4
Teachers should make sure students can proceed	4

Regarding the *focus of feedback*, teachers believed that feedback should be specific and clear and can have several foci; the content of the task, students' social learning skills, processing of the task, and metacognition. One third of the teachers expressed the belief that feedback should be *adaptive*. Regarding the *conditional teacher skills*, teachers believed that they should check student work, and they should establish good relationships with their students.

### 3.4.2 Problems teachers perceive with giving feedback during active learning

On average, teachers mentioned 4.09 (a minimum of 1, and a maximum of 10) different problems. Problems mentioned by more than three teachers, and the number of teachers who mentioned each problem can be found in Table 3.3.

*Table 3.3. Teachers' Perceived Problems with Giving Feedback during Active Learning (N=33 teachers)*

Problem	Frequency
Focus of feedback	
Lack of students' conditional knowledge and skills	8
Goal-directedness of feedback	
Balancing compulsory subject matter and student initiatives is difficult	6
Nature of feedback	
Criticizing student work is difficult	4
Way of giving feedback	
Asking the right questions to promote learning is difficult	12
Balancing directive and facilitative feedback is difficult	12
Being inclined to tell answers or to give straight directions	11
It is difficult to activate student thinking	6
Adaptive feedback	
Tuning feedback to individual students is difficult	9
Conditional teacher skills	
Lack of time	18
Classroom organization of active learning is hard	16
Lack of content knowledge	10
Keeping the overview is difficult	9

The main problems teachers perceived with giving feedback during active learning were related to the *conditional teacher skills*. More than half of the teachers felt they did not have enough time to give good feedback. One teacher said: *"When I take time for one pair of students, the others will have to wait. They get impatient and so do I."* Another teacher said: *"You should give students time to think about your feedback, but there is too little time. It is very hard to organize it in a way that you can sit and discuss with them."*

General classroom organization of active learning was perceived to be problematic by almost half of the teachers. As one teacher put it:

*“Everyone wants to work on a computer and that is not possible. I have too little computers.”* Another teacher stated that: *“The classroom has to be well organized, if the students cannot work independently, you cannot give good feedback. However, I find this quite difficult.”* Keeping the overview of what everyone is doing was perceived as problematic for over a quarter of the teachers: *“Students work in the classroom, in the corridor and in the documentation centre; it is difficult to keep an overview over all these places.”* Another problem one third of the teachers perceived with regard to the conditional teacher skills was their own lack of content knowledge to ask the right questions and to give adequate feedback: *“Sometimes I do not have enough background knowledge of the topic. Then, I have to search for information together with the students, instead of being able to provide hints and suggestions in the right direction.”*

Teachers also experienced problems with regard to the way of giving feedback. They did not want to be too directive and tell the students the answers, but rather to facilitate student learning by asking questions and by activating student thinking. Teachers found this way of giving feedback difficult: *“My first reaction is answering the students’ question. I know I should ask questions that stimulate them to think. Still, I often give straight directions.”*

About a quarter of the teachers perceived problems with regard to the provision of *adaptive feedback*. Teachers who mentioned this problem all worked at a school in which students of different classrooms were mixed during active learning, so these teachers did not teach their own students. A teacher who was working in such a situation stated: *“Adapting feedback to the needs of individual students is difficult, because every four weeks I teach different students. It is hard to know, for example, who needs a more directive approach and who does not.”* None of the teachers who taught their own students during active learning perceived problems regarding the adaptiveness of feedback.

With regard to the *focus of feedback*, a problem that was perceived by a quarter of the teachers was the lack of conditional knowledge and skills on the part of the students. Feedback has to be focused on these conditional student skills, leaving less time for feedback that is focused on the actual learning task: *“Excerpting information or writing it down in their own words is difficult for some students, but it is a conditional skill for this kind of work. Giving feedback on these kinds of thing prevents me from giving feedback on the actual subject matter.”*

With regard to the *goal-directedness of feedback*, the only problem some teachers perceived was on the balance between compulsory subject matter and student initiatives: “*As a teacher, you have to teach all the compulsory subject matter, but how do you make sure students learn all this, without abolishing their own questions they want to answer in their projects?*”

Finally, few teachers experienced problems with regard to *the nature of feedback*. The only problem here was criticizing student work: “*It’s hard to criticize student work in a positive, constructive way, so they do not feel it as negative feedback.*”

### 3.5 Discussion

#### 3.5.1 Teacher feedback during active learning

In a previous study, we observed and described primary school teachers’ feedback practices during active learning (Chapter 2). Suboptimal feedback behaviours were identified. In the present study, we sought explanations for these behaviours by comparing teachers’ beliefs, the problems they perceive, and their classroom behaviours. The belief that feedback should be positive was held most strongly and teachers thought that feedback should activate and stimulate students’ work and thinking. Most problems with giving feedback during active learning mentioned by the teachers themselves are not related to feedback itself, but rather to the conditional teacher skills needed for active learning.

Problems such as time management, classroom organization and keeping an overview over all students were reported as hindering teachers from providing feedback during active learning. Teachers reported few beliefs regarding the conditional teacher skills, but the problems teachers perceived may explain their feedback behaviour. About one third of the teacher–student interactions consisted of teachers’ remarks concerning general classroom organization, such as telling students where material or other equipment could be found. These organizational issues kept teachers from giving feedback. It is known that working with cooperative groups requires specific classroom management strategies from the teacher, in addition to general classroom management skills (Emmer & Stough, 2001). For example, besides establishing classroom routines, monitoring of students’ group behaviours is also necessary.

Problems directly related to giving feedback were mostly problems with the way feedback was given. Sixty per cent of the teachers held the belief that it is important that feedback activates students and stimulates their work and thinking. The beliefs and the perceived problems match up

with the classroom behaviour. Teachers find themselves giving feedback in a rather directive way, although they do not want to be too directive. They want to facilitate student learning by asking questions and by activating student thinking. Whereas difficulty with asking questions can stem from limited content knowledge (Neale, Smith, & Johnson, 1990), teachers also indicated that lack of time is a reason for them just to answer students' questions and directly solve their problems. This problem may be partly related to the conditional time management skills. Additionally, this problem may relate to the shift in the teacher role that comes with active learning; from transmission of knowledge to guiding and coaching pupils' learning processes (Bolhuis & Voeten, 2001). Teachers have much less control over learning in active learning environments than in traditional classroom situations (Boekaerts & Cascallar, 2006). Teachers need to adapt their level of control to the degree of pupils' self-regulation of learning (Vermunt & Verloop, 1999). Teachers seem insufficiently prepared for this role. Until recently, curricula of teacher education were more focused on the technical and instrumental skills of teaching and less on knowledge about pupil learning (Lidstone & Ammon, 2002). The provision of process-oriented feedback is very different from the kind of feedback that teachers are trusted with. Learning to support active learning was not part of the educational programme many teachers received, and suitable refresher courses are not often available (Van Hout-Wolters et al., 2000). A lack of knowledge about learning processes and the role of the teacher in creating conditions that facilitate learning can leave teachers ill-equipped to make thoughtful, professional judgments about innovations in practice and how to realize their role (Stephen et al., 2010). Therefore many teachers will lack sufficient knowledge and skills to guide their students in active learning, although teachers do indicate that they believe these new skills are important.

Another facet of feedback for which teachers' beliefs and perceived problems may explain their classroom behaviour is the nature of feedback. The belief that feedback should be positive was most prominent and teachers believe that when criticism has to be given, this should occur in a positive way. Teachers do find it difficult to criticize student work. They find it hard to address the weaker parts of student work, because they do not want the student to feel discouraged or insecure. Teachers appeared to give little criticism in their feedback behaviour. Very few interactions contained confirmation, criticism and a constructive remark, although this is the most favourable type of feedback for stimulating student learning (Nicol & Macfarlane-Dick, 2006).



A facet of feedback during active learning that is neither believed to be important nor perceived as problematic is the goal-directedness of feedback. Just a quarter of the teachers expressed the belief that feedback had to be goal-directed and the only problem some teachers perceived was balancing between compulsory subject matter and student initiatives. Consequently, less than 5 per cent of the observed feedback interactions were explicitly related to a learning goal, although this comprises a crucial element of the definition of feedback (e.g. Hattie & Timperley, 2007; Nicol & Macfarlane-Dick, 2006). Over a thousand studies in the behavioural sciences have shown that specific high goals effectively and significantly increase individuals' performance (Latham & Locke, 2006). Although most teachers do not mention goals as being important and they do not experience problems regarding goal-setting, the lack of goal-directed feedback in the classroom is problematic. When teachers want to improve their feedback behaviour, they should set clear learning goals, communicate these goals to their students and provide their students with feedback that explicitly relates their performance to these goals.

The belief that feedback can have several different foci was expressed by some teachers. The only problem with regard to the focus of feedback that teachers perceived was the need to focus on conditional knowledge and skills that students lack, instead of on the actual learning tasks. Although teachers do not perceive problems with regard to focusing feedback on student metacognition and on social learning, the fact that they provide their students with very little feedback on these two foci in their classrooms is problematic according to the literature on active learning. Metacognition is both an objective of active learning and a means to learn actively (Bonwell & Eison, 1991; Simons et al., 2000), and Hattie and Timperley (2007) showed that feedback that is focused on students' metacognition is effective at improving student learning. Therefore teachers should focus more feedback on student metacognition, as well as on social learning.

### *3.5.2 Limitations and directions*

Limitations of the present study may include the method we have used to measure teacher beliefs. Often teacher beliefs are measured using a validated questionnaire (e.g. Jenkins, 2009). We aimed to identify what teachers think feedback is and what they find most important when giving feedback during active learning. We think we have achieved this by using the writing task and the additional explanation.

Despite this limitation, the present study shows that it is important to address teachers' own concerns and beliefs when studying an educational topic. For example, perceived problems with giving feedback during active learning were mainly related to conditional teacher skills. When studying the literature on feedback, researchers could overlook the importance of these conditions. On the other hand, the importance of clear learning goals is emphasized in the literature far more than in the classroom.

Since feedback is such a powerful tool to enhance student learning, it is important that teachers are able to give qualitatively good feedback. In the context of active learning it is clear that giving feedback should be an important aspect of teachers' professional development. Current conceptions of teacher learning increasingly emphasize that teachers' own practice and knowledge of their practice should be taken as the starting point for professional learning. This seems a prerequisite in order for teachers to develop ownership of the content of learning and their learning processes (Day, 1999). The present study provides clear indications for the development of a professional development programme aimed at improving feedback during active learning. This would incorporate realizing the conditions for active learning, setting clear learning goals, focusing the feedback on the development of students' metacognition and social learning skills and adopting a more facilitative way of giving feedback.



# Chapter 4



## Chapter 4

### Improving Teacher Feedback during Active Learning: Effects of a Professional Development Programme

#### Abstract

This study focuses on improving teacher feedback during active learning. Changing teachers' behavior sustainably, however, is very difficult. Several conditions should be taken into account and programs should build on teachers' cognitions and practices. Effects of a specifically designed professional development programme on 16 elementary schoolteachers' knowledge, beliefs, perceived problems and classroom behavior were examined via observations, a writing task and a questionnaire prior and twice after the programme was implemented. Results show that several aspects of feedback during active learning were improved, both in the short and in the long term. It is concluded that the professional development of teachers can be effective and sustainable, if certain conditions are met.

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## 4.1 Introduction

Fostering active learning in the classroom remains a challenging and demanding task for teachers. The development of students' metacognition and social skills is an important goal of active learning, as is the progress made toward task- and process-related goals (Grabinger & Dunlap, 1995; Simons, Van der Linden, & Duffy, 2000). To achieve these goals, students must receive feedback from their teachers. It is clear that feedback can be one of the most powerful tools teachers can use to enhance students' learning (Hattie, 2009). Feedback given in a coaching or facilitative way, fits the active learning context, since teaching in an active learning context is primarily a process of supporting the students' knowledge construction (Duffy & Cunningham, 1996). Hattie and Timperley (2007) have stated that, in order to be effective, feedback must address three questions: 'Where am I going?', 'How am I going?' and, 'Where to next?' Students need to know what the learning goals are, how their current performance relates to these goals and what activities they can undertake to reach their learning goals.

Observation studies on feedback, as well as observations of active learning, unfortunately have shown that teachers scarcely pay attention to learning goals, giving little feedback which promotes students' metacognition and control rather than facilitate student learning (Chapter 2, Bolhuis & Voeten, 2001; Sol & Stokking, 2009). Since feedback can be a powerful tool for enhancing student learning, it is important that teachers develop their knowledge and skills in order to give their students qualitatively good feedback. In the present study, we therefore aimed to improve teachers' feedback practices during active learning by implementing a specifically designed professional development programme (PDP).

Changing teacher behaviour in a sustainable manner is a challenging endeavor. Although the importance of teachers' professional development in improving schools and student learning has been widely acknowledged, research into professional development has yielded disappointing results, as teacher professional development activities have often been found to be ineffective (Opfer & Pedder, 2011). Several researchers have argued that this problem can be attributed to a lack of recognition of how teacher learning is embedded in their professional practices and working conditions (Borko, 2004; Timperley & Alton-Lee, 2008). Since teaching and learning are contextually situated, professional development activities optimally build on teachers' knowledge and beliefs, perceived problems and classroom practices (Knapp, 2003; Opfer & Pedder, 2011). Furthermore, review studies have shown that, when designing

professional development activities, several other conditions have to be taken into account to increase the chance that the activities will prove effective at enhancing teachers' professional development (Garet, Porter, Desimone, Birman, & Yoon, 2001; Van Veen, Zwart, & Meirink, 2012). There are, for instance, specific requirements regarding the form and duration of such activities, and the collective participation of teachers is considered preferable.

Although changing teachers' beliefs and classroom behaviour would appear to be a difficult undertaking, it seems necessary to improve teacher feedback in order to support students' active learning. In the present study, a PDP was developed that complies with the requirements for an effective professional development intervention. Preliminary investigations were necessary to ensure that the PDP was designed in a manner which built upon teachers' existing beliefs and current practices. In previous studies (Chapter 2; Chapter 3), we had examined primary schoolteachers' feedback practices in the classroom, and their knowledge and beliefs and perceived problems regarding feedback during active learning. In these studies, active learning is characterized by classroom situations in which students worked in small groups on different tasks at the same time. These active learning situations varied from teacher-controlled learning situations in which several mental activities were required of the students to student-controlled learning situations in which students themselves decided on the learning goals and activities. The aim of the present study was to investigate the extent to which teachers' feedback during active learning can be improved. Toward this end, this study has evaluated the effects of a carefully designed PDP which was aimed at improving teacher feedback during active learning in the highest grades of primary education. The central research question that guided this study was: 'What are the effects of a PDP that builds on teachers' beliefs, perceived problems and practices, and that incorporates the conditions that are known to be important for enhancing teachers' professional development on their beliefs, perceived problems and classroom behaviour?' A pre-test of teachers' knowledge and beliefs, perceived problems and behaviour was compared to two post-tests: one which investigated the short-term effects of the PDP and one which determined the long-term effects of the PDP.

Before presenting the study, we will first elaborate on the features of PDPs that are important for the effect they have on teachers' knowledge and beliefs and classroom behaviour and the ways in which these features can be incorporated in a PDP. Subsequently, we will elaborate on teacher



feedback in the context of active learning and aspects of this feedback which could be improved upon.

## **4.2 Theoretical background**

### *4.2.1 Teachers' professional development*

Current conceptions of teacher learning have increasingly emphasized that teachers' own practices, and their knowledge and beliefs regarding these practices, should be taken as the starting point for professional learning, such that a PDP will not only reflect theoretical knowledge or new information but also the concerns, behaviours, knowledge and beliefs of teachers themselves (Van Driel, Beijaard, & Verloop, 2001; Verloop, Van Driel, & Meijer, 2001). This seems to be a prerequisite for teachers to develop a sense of ownership of the content of learning and their learning processes (Day, 1999; Opfer & Pedder, 2011). In his thorough examination of the literature on teacher beliefs, Pajares (1992) pointed out the difficulty in distinguishing knowledge from beliefs. Although there is no agreement on the distinction between knowledge and beliefs in the existing research on teaching and teachers, beliefs are often seen as the filters through which new information or experiences are interpreted (Borko & Putnam, 1996). Beliefs are formed throughout teachers' lives, schooling and careers, and strongly influence perception and, in turn, behaviour (Pajares, 1992). Since teachers' knowledge and beliefs originated over several years and teachers may not be aware of how these factors have influenced their behaviour, it is not easy to change these cognitions (Kagan, 1992; Pajares, 1992). For any intervention to be successful, however, it is important that teacher educators build on teachers' own practices, knowledge and beliefs (Verloop et al., 2001). In addition to building on teachers' knowledge and beliefs, it seems important to identify and address the specific problems teachers experience in their daily work (Knapp, 2003). Teachers enter PDPs hoping to gain concrete, practical ideas that are directly related to their day-to-day practice in the classroom and which will enhance their effectiveness with students (Fullan & Miles, 1992).

In addition to starting from a thorough understanding of teachers' knowledge, beliefs, perceived problems and practices, there are other features which seem important in a professional development-focused context. Review studies have shown that, when certain conditions are taken into account, professional development activities can be effective for enhancing teachers' professional development (Garet et al, 2001; Van Veen et al., 2012). Many studies included in these reviews, however, have relied

on teachers' self-reporting (e.g. Bakkenes, Vermunt, & Wubbels, 2010; Desimone, Porter, Garet, Yoon, & Birman, 2002). Such an approach has succeeded only in measuring perceptions of possible effects, and not in measuring the more objective effects via assessments or observations. Indications of those features which are important to efforts to enhance professional development, however, can be deduced from these studies. We will now discuss these features.

With regard to the structural features of a PDP, past research has shown that sustained and intensive professional development is more likely to have an impact than professional development activities that are short (Garet et al, 2001; Van Veen et al., 2012). The exact number of hours which ought to be invested is not known and is dependent on the type of activity (Van Veen et al., 2012). Although there is no clear evidence that professional development activities which take place at the school are to be recommended in favor of activities which occur outside of the school, it is clearly important that professional development activities be authentic (Garet et al., 2001; Van Veen et al., 2012). Collective participation of groups of teachers from the same school or the same grade level has also been identified as important; learning with colleagues has been demonstrated to be a critical factor in helping teachers to develop their classroom practices (Korthagen, Loughran, & Russell, 2006; Van Veen et al., 2012).

The goals of professional development activities are optimally clear from the start, and are communicated to the teachers. In their extensive review of the literature regarding goal setting, Locke and Latham (1990) found numerous studies which have shown that setting specific goals is important for increasing individuals' performances. Goals assigned by the trainer can be as effective as self-set goals, as long as teachers accept these goals as being relevant (Latham & Locke, 2006). Solving real problems and demonstrating the learning goals via a worked example seem to be favorable methods of instruction (Merrill, 2002). Furthermore, learning about teaching is enhanced when the approaches advocated in the programme are modeled by the teacher educator delivering the PDP (Korthagen et al., 2006).

With regard to the professional development activities which are incorporated into a PDP, it is known to be important to activate teachers; teachers should become actively engaged in meaningful discussion, planning and practice, and should seek to construe and analyse their own problems and solutions (Garet et al, 2001; Van Veen et al., 2012). It also seems important to activate teachers' existing knowledge and beliefs

regarding their own practices as a foundation for new knowledge. New knowledge can then be demonstrated in a way that will enable teachers to subsequently apply this new knowledge in their classrooms (Merrill, 2002; Timperley, 2008). Reflecting on these actions is important, since theory resulting from reflections on own practical problems has been linked more closely to teachers' own situations and concerns, has greater emotional significance and opens the door for on-going professional growth (Korthagen et al., 2006).

One method which has yielded positive effects on the beliefs, quality of instruction and the interaction skills of professionals is video-based learning (Fukkink, Trienekens, & Kramer, 2011; Van Es & Sherin, 2010). The use of video in a PDP allows professionals to look at themselves from a distance, and videos can capture much of the complexity of classroom interactions. It also appears to motivate and activate teachers (Seidel, Stürmer, Blomberg, Kobarg, & Schwindt, 2011). Furthermore, such an approach allows teachers the time to reflect on their interactions (Brophy, 2004; Van Es & Sherin, 2010). Video-based learning can be especially effective when teachers are well informed about the learning goals and target behaviours of the programme (Fukkink et al., 2011). Analyzing and discussing videos in a group context provides teachers' the opportunity to examine their colleagues' classrooms and facilitates the exploration of multiple perspectives on the same event (Little, 2002). There seem to be differentiated effects when watching video of oneself as opposed to watching videos of others teaching. Critical reflection based upon a teacher's own videos might be negatively impacted by self-related knowledge and by self-defense mechanisms (Fiske, 1995). When working with groups of teachers who have been shown videos of their own and others' teaching, it therefore seems important to create a safe learning environment and to establish rules for discussion in order to build trust between group members (Borko et al., 2008; Seidel et al., 2011).

These reviews provide us with useful, albeit general, guidelines for the professional development of teachers. Clarke and Hollingsworth (2002), however, have emphasized the individual nature of teacher professional development in their work to develop an interconnected model of teachers' professional growth. This model has a non-linear structure, and there may be multiple growth pathways between the domains for individual teachers. The model suggests that change occurs through the mediating processes of reflection and enactment (i.e., acting upon something a teacher knows, believes or has experienced) across four distinct domains: the personal

domain (knowledge and beliefs), the domain of practice (classroom experimentation), the domain of consequence (outcomes), and the external domain (sources of information or support). Changes may occur in any of the four domains and the type of change will reflect the domain in which it occurs. Implementing a new teaching strategy, for example, would reside in the domain of practice, while adoption of a new belief would reside in the personal domain. Change in one domain translates into change in another domain through reflection and enactment. For designing a PDP, efforts to stimulate reflection and enactment therefore appear to be important, as do efforts to address each of the four domains.

By building on the results of our previous studies on teachers' feedback practices, knowledge and beliefs and perceived problems (Chapter 2, 3) and by using the insights of the studies into teachers' professional development discussed above, we aim to determine whether teacher feedback during active learning can be improved. We will now elaborate on the concept of teacher feedback in the context of active learning.

#### *4.2.2 Teacher feedback during active learning*

Feedback is one of the most powerful tools teachers can use to improve student learning outcomes (Hattie, 2009). Feedback is defined as: 'Specific information about the comparison between a student's observed performance and a standard, given with the intent to improve the student's performance' (Van de Ridder, Stokking, McGaghie, & Ten Cate, 2008). The standard is formulated in the learning goals. To enhance student learning, it is important that the students know the learning goals and precisely how their current performance relates to those learning goals. Furthermore, they need to receive direction if they are to improve their work or understanding (Hattie & Timperley, 2007).

In the present study, feedback is examined in the context of active learning. During active learning, the development of students' metacognition and social skills are important goals, in addition to task- and process-related goals (Grabinger & Dunlap, 1995; Simons et al., 2000). Active learning situations may vary between teacher-controlled situations, in which several learning activities are required of the students, and student-controlled situations, in which students decide on the learning goals and activities. The kind of teaching that fits the active learning context may be referred to as process-oriented teaching, which involves a shift from the transmission of knowledge to efforts to guide and facilitate students' learning processes (Bolhuis & Voeten, 2001; Vermunt, 1992).

Although some characteristics of teacher feedback which fit the active learning scenario are known, there is no consensus about what constitutes qualitatively good feedback in this learning context (Nicol & Macfarlane-Dick, 2006). By reviewing the relevant literature and by observing teacher feedback practices during active learning, a model of teacher feedback during active learning in which this knowledge is coherently described was developed (Chapter 2; Chapter 3). In this model, six facets which appear to be important with regard to the quality of teacher feedback have been described: the focus of feedback, the goal-directedness of feedback, the nature of feedback, the way of giving feedback, the adaptiveness of the feedback, and the conditional teacher skills for giving feedback in an active learning environment. These six facets of feedback during active learning will be expanded upon below.

With regard to the *focus of feedback*, Hattie and Timperley (2007) have distinguished four levels: the task level, the process level, the self-regulation level and the self-level. Feedback at the task level contains information about how well the task is being performed. Feedback at the process level refers to feedback directed at information processing and the learning processes required to understand the task. Feedback at the self-regulatory — or metacognitive — level addresses the way students monitor, direct and regulate their actions in order to increase their skill in self-evaluation and their confidence in their ability to engage in said tasks. Feedback at the self-level is defined as personal feedback, unrelated to the specifics of the task (Hattie & Timperley, 2007). Another level on which feedback can be focused during active learning is social learning. Active learning stems from the constructivist view of learning, which assumes that learning is a collaborative process in which students learn from one another (Grabinger & Dunlap, 1995). To stimulate active learning, teachers will ideally encourage positive interdependence within small groups, give clear instructions as to how to collaborate and give feedback on the collaborative process (Johnson & Johnson, 1999). Students must learn how to ask for information or advice from others, for example, and how to engage in a productive discussion (Bolhuis & Voeten, 2001).

The *goal-directedness of feedback* refers to whether or not the teacher relates students' performance or understanding to the learning goals. These goals are preferably clear for both teachers and students, since feedback essentially is information about how a student's present performance relates to these goals (Nicol & Macfarlane-Dick, 2006). Clear goals can promote students' commitment, goal-directed actions and

personal effectiveness, and furthermore, goals can help focus the content of teacher feedback (Hattie & Timperley, 2007).

With regard to the *nature of feedback*, optimal feedback contains confirmation of good work and constructive criticism. Furthermore, it contains advice for improving the quality of the work (Nicol & Macfarlane-Dick, 2006). In their feedback questions, Hattie and Timperley (2007) similarly stated that optimal feedback informs students as to how their current performance relates to the learning goals, which includes addressing both the stronger and the weaker parts of student work and asserts that students should receive direction as to how to improve their work or increase their level of understanding.

The *way of giving feedback* also seems to be important in relation to the teacher role that fits active learning situations. The kind of teaching that fits the active learning context may be referred to as process-oriented teaching, which involves guiding and facilitating students' learning processes. (Vermunt, 1992). Other terms referring to the facilitative way of teaching are autonomy-supportive or student-centred (Black & Deci, 2000). The type of language a teacher uses influences the amount of autonomy-support students experience and how students learn. Deep learning and performance are negatively affected by controlling instructions such as 'you must', or 'you have to', whereas facilitative instructions such as 'you can' or 'you might' positively affect learning (Wijnia, Loyens, & Derous, 2011). Nevertheless, besides supporting students' autonomy, teachers also need to provide structure to produce positive effects on students' motivation and self-regulated learning (Jang, Reeve, & Deci, 2010; Sierens, Vansteenkiste, Goossens, Soenens, & Dochy, 2009). For the provision of structure, teachers should offer their students clear and detailed directives regarding the learning goals and expectations in addition to offering helpful guidance (Jang et al., 2010). Clearly explaining how to regulate learning activities is also critical to stimulate students' self-regulated learning (Sierens et al., 2009).

As in all learning environments, it is important that feedback during active learning be *adaptive* to the needs of the individual student. As early as 1900, Dewey had argued that the diagnosis of a student's capacities optimally provides the starting point for instruction. Based upon this information, and combined with information about the desired outcomes, teachers can then formulate adaptive feedback (Shute, 2008).

*Conditional teacher skills* refer to classroom management — the actions taken by the teacher to create and maintain a learning environment

in which instruction and the provisioning of feedback can successfully occur (Brophy, 2006). An active-learning situation requires certain classroom management strategies. Eliciting discussion and group investigation instead of adhering to strict limits of student speech and movement is an example of one such specific classroom management strategy (Emmer & Stough, 2001).

Primary school teachers' classroom behaviour was studied for each of these six facets of feedback to be provided during active learning, (Chapter 2). Additionally, teachers' beliefs and perceived problems regarding feedback during active learning were examined (Chapter 3). As was discussed, these findings may constitute the starting point for developing a PDP, (Niemi, 2002; Verloop et al., 2001). Therefore, the findings regarding each of the six facets of feedback during active learning will be discussed next.

#### 4.2.3 Directions for improving teacher feedback during active learning

With regard to the *focus of feedback*, it was striking that only a quarter of teachers believed it to be important that feedback during active learning should (also) be focused on developing student metacognition and social learning (Chapter 3). The observations showed that teachers focused very little of the feedback they provided on student metacognition and social learning (Chapter 2). Although teachers reported few problems with regard to the focus of feedback, this observation is problematic, as metacognition and social learning are both objectives of active learning as well as means by which students may actively learn (Bolhuis & Voeten, 2001; Simons et al., 2000). Niemi (2002), describing her studies in Finland, similarly concluded that teachers appear to lack the necessary knowledge about active learning and metacognition to implement the types of active learning environments that genuinely require students' own planning, elaboration and evaluation.

Only a quarter of teachers believed that the *goal-directedness of feedback* was important, and just a few teachers perceived problems regarding this important facet of feedback (Chapter 3). Less than 5 per cent of the observed feedback interactions were explicitly related to a learning goal (Chapter 2). Bolhuis and Voeten (2001), in their study of Dutch secondary schools, similarly concluded that teachers scarcely pay attention to learning goals.

Although most teachers do not report learning goals as being important and do not experience problems regarding goal setting, the lack of goal-directed feedback in the classroom is problematic. When teachers want

to improve their feedback behaviour, it is important that they set clear learning goals, communicate these goals to their students and provide their students with feedback that explicitly relates their performance or understanding to these goals (Hattie & Timperley, 2007; Nicol & Macfarlane-Dick, 2006).

With regard to the *nature of feedback*, the most widely held belief was 'feedback has to be positive'. Teachers perceived problems with criticizing students' work; they found it difficult to address the weaker parts of a student's work because they did not want the student to feel discouraged or insecure (Chapter 3). Based on the observations, we concluded that teachers gave their students little criticism and very few interactions contained confirmation and criticism as well as a constructive remark (Chapter 2). This type of feedback has a positive effect in stimulating student learning (Nicol & Macfarlane-Dick, 2006).

Teachers perceived a number of problems regarding the *way of giving feedback*. Most teachers believed it was important that feedback activates students and stimulates their work and thinking, but teachers found this goal difficult to realize in practice. In particular, they found it difficult to ask questions which promote learning and they were too inclined to tell students the answers or to give straight directions (Chapter 3). Concurrently, a directive way of giving feedback was observed nearly twice as often as a facilitative way of giving feedback (Chapter 2). Sol and Stokking (2009), writing about Dutch secondary education, similarly found that teachers did not often provide feedback which promoted self-directed learning, but rather answered students' questions. A balance between a facilitative way of giving feedback and giving clear directives regarding the goals, expectations and regulation of learning would be ideal (Jang et al., 2010; Sierens et al., 2009). Teachers seem insufficiently prepared for this role.

With regard to the *adaptiveness of feedback*, approximately one-third of teachers indicated their belief that it was important to tune feedback to the needs of individual students (Chapter 3). Teachers did not perceive that this would be difficult to do in their own classrooms. In approximately 15 per cent of teacher-student interactions, teachers requested diagnostic information on which to base their feedback (Chapter 2).

The *conditional teacher skills* for giving feedback in an active learning environment appeared to be most problematic for teachers. Problems such as time management, having sufficient materials ready and keeping an overview of all students hindered teachers' efforts to provide their students with feedback during active learning (Chapter 3). In the



observations of classroom practices, approximately one-third of teacher-student interactions consisted of teacher remarks concerning general classroom organization, such as saying where something could be found. These organizational issues kept teachers from providing feedback (Chapter 2).

To recapitulate, from a comparison between the effects of teachers' behaviours, knowledge and beliefs and perceived problems and the research literature on these topics, we can conclude that teacher feedback during active learning may be able to be improved upon. Teachers' behaviour, knowledge and beliefs could be adjusted to better suit an active learning context. Teacher feedback during active learning might be improved by:

- Setting clear learning goals and communicating these goals to students;
- Giving feedback which includes confirmation and criticism as well as constructive remarks;
- Balancing directive and facilitative ways of giving feedback;
- Giving more feedback which is focused on students' metacognition;
- Giving more feedback which is focused on students' social learning;
- Creating the conditions for active learning by establishing efficient management of the classroom.

#### 4.2.4 *The present study*

Teacher feedback during active learning appears to be suboptimal to enhance student learning. Teachers' knowledge and beliefs regarding feedback during active learning do not fit the concept of active learning and teachers perceive several problems with organizing active learning and providing their students with feedback. Particular features of PDPs are known to be important to efforts to enhance teachers' knowledge and behaviour. The purpose of the present study is to contribute to our knowledge regarding teachers' professional development with regard to their feedback behaviour in the context of active learning. To examine the extent to which teacher feedback during active learning can be improved upon, the following research questions will be addressed:

1. What are the short- and long-term effects of a PDP aimed at improving teacher feedback during active learning on primary school teachers' knowledge and beliefs?

2. What are the short- and long-term effects of a PDP aimed at improving teacher feedback during active learning on the problems primary school teachers perceive?
3. What are the short- and long-term effects of a PDP aimed at improving teacher feedback during active learning on primary school teachers' classroom behaviour?

We specifically focused on goal-directed feedback which included confirmation, criticism and constructive remarks, and which was focused on students' metacognition and social learning. The balance between directive and more facilitative ways of giving feedback was also a focal point in this study.

To answer the research questions, we conducted an effect study consisting of a pre-test of teachers' knowledge and beliefs, perceived problems and behaviour, followed by the implementation of the PDP. Two post-tests of teachers' knowledge and beliefs, perceived problems and behaviour were conducted; one directly after the PDP to investigate the short-term effects and one seven months later to determine the long-term effects.

## **4.3 Method**

### *4.3.1 Participants and context*

Primary schools which practiced the concept of active learning when teaching environmental studies (i.e., classroom situations in which students work in small groups on different tasks within projects that integrate subjects such as history, geography and biology) were selected from the 47 primary schools that collaborate with a teacher training institute located in the south-east region of the Netherlands. Twenty-three such schools indicated that they practiced active learning. Thirteen of these schools had participated in previous studies in which teachers were observed and interviewed (Chapter 2; Chapter 3). For the present effect study, two of these schools were randomly selected and invited to participate. One school was located in a small village and had a population of 319 students; the other was located in a larger village and had a population of 643 students. Students' learning results at both schools did not differ from the national average of student learning results (Inspectorate of Education, 2010).

In the Netherlands, children typically attend eight years of primary schooling. They begin the first grade when they are four years old and finish eighth grade when they are twelve years old. All teachers (N=16) working with sixth, seventh or eighth grade classes (9–12 year olds) participated in

the PDP; 14 teachers were female and two were male. In one school, seven teachers participated in the study; in the other, 9 teachers participated. The average teaching experience of these teachers was 11.59 years (SD = 8.70), while their average experience with active learning was 5.25 years (SD = 4.97). At one school, the concept of active learning had been implemented five years prior; in the other, the concept of active learning had been implemented four years prior.

During active learning, the students worked on their own projects, which were centered on a particular theme. For example, an entire class was working within the theme, 'the Middle Ages'. Within this theme, groups of two or three students were elaborating on different topics, such as fraternities, monasteries or knights. Each small group of students had to find information about their own topic and prepare a presentation for their classmates, for instance through PowerPoint or as a poster.

#### 4.3.2 *The professional development programme (PDP)*

The goals and content of the PDP were informed by a review of the literature regarding feedback and active learning, consideration of teachers' actual feedback behaviour, knowledge and beliefs, and teachers' perceived problems regarding feedback during active learning as examined in preceding studies (Chapter 2; Chapter 3).

The design of the PDP was based on the extant literature regarding those features which are considered to be important for PDPs, including structural features, goal setting and characteristics of the professional development activities that are part of the programme. Table 4.1 contains the features that are important to efforts at enhancing teachers' professional development, together with descriptions of how we operationalized these features in the PDP.

During the PDP, the following sequence of activities was carried out four times, in succession:

1. Informative meeting with the team (of 6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup> grade teachers).
2. Videotaping an active learning lesson delivered by each teacher.
3. Selection of pertinent fragments from their own videotape by each teacher.
4. Video-interaction training meeting in small groups and the researcher.

The PDP thus consisted of weekly activities carried out over four months, including four informative meetings and four video-interaction

training meetings, with videotaping in the classrooms and the selecting of video fragments occurring in between. Each activity mentioned above will be described below.

In the informative meetings (1), the researcher presented theory about feedback during active learning. This theory was processed actively by the teachers. Video fragments of teacher practices which constituted examples of application of the theory were presented and discussed. At the end of each informative meeting, the teachers were asked to note in a logbook ideas for how they could implement this new knowledge in their own classroom. In the two weeks following each informative meeting, a 20-minute videotape of an active learning lesson of each teacher was recorded by the researcher (2). In these lessons, teachers were expected to implement the new knowledge in their feedback behaviour. Teachers received their own videotape and were asked to select four fragments from this videotape which captured optimal and non-optimal teacher behaviour regarding the goals which had been the subject of the previous informative meeting (3). During the video-interaction training meeting which followed (4), these selected fragments were watched, discussed and reflected on in small groups consisting of one or two colleagues and the researcher. Each teacher had thirty minutes' time to present his or her selected fragments and to discuss any questions or concerns. During this time each teacher received personal, tailored feedback from the researcher and their colleagues (see Appendix C for examples of these small group discussions). At the conclusion of the meeting, teachers were asked to note in their logbook their reflections and ideas for further implementation of their new or adjusted practices. The next informative meeting (1) took place one week after this video-interaction training meeting, constituting the start of the next sequence of activities.

A large part of the PDP consisted of video-based learning. Videos of other (unfamiliar) teachers were used in the informative meetings and videos of own teaching and teaching by colleagues were used in the video-interaction training meetings. During the PDP, the processes of enactment and reflection took place recurrently. These processes were continuously nourished by input from different sources in the different domains that are part of the interconnected model of teacher growth (Clarke & Hollingsworth, 2002), for instance by critically discussing beliefs (personal domain), through the implementation of new knowledge in the classroom (domain of practice), by watching and discussing the effects of actions as captured on videotape (domain of consequence) and by discussing theory and receiving feedback from others (external domain). Teachers may develop through

different pathways within this model; by addressing all domains and by explicitly stimulating enactment and reflection, we tried to encourage all avenues to professional growth.

#### 4.3.3 Instrumentation

*Teacher knowledge and beliefs* were assessed using a writing task in which teachers identified concepts which they regarded as important for (giving) feedback during active learning. Since it is difficult to distinguish knowledge from beliefs and the knowledge teachers have is shaped by their beliefs (Pajares, 1992), this task was used to obtain an indication of both teachers' knowledge and beliefs. Teachers were given a white sheet in A4 format with the word 'Feedback' in the middle. The following instruction was given: 'Write down the things you know about feedback. Think about the questions: "What is feedback?" and "What is important when giving feedback?" Only think about feedback in situations where students learn actively in the domain of environmental studies.' The beliefs teachers noted were then categorized according to the six facets of feedback during active learning described above (section 2.2). Examples of beliefs include 'Feedback can be focused on social learning', and 'Feedback should be positive'. This instrument and the coding system were developed in a previous study (Chapter 3). Cohen's Kappa for the coding of the knowledge and beliefs was 0.89.

*Perceived problems* with giving feedback during active learning were measured using a 12-item scale. Items were based upon the interview data on teachers' perceived problems reported in a previous study (Chapter 3). Sample items include 'I have too little time to give my students good feedback', and 'It is hard to give critical feedback to my students'. The teachers responded to each of the 12 items using a scale which ranged from 1 (totally do not agree) to 5 (totally agree). The internal consistency of the problem scale was found to be good (Cronbach's  $\alpha = 0.85$ ).

*Feedback behaviour* was assessed using the category system which had been developed to assess teacher-student interactions during active learning in a previous study (Chapter 2). Twenty minutes of a videotaped lesson were analysed. Each unit of analysis contained an interaction with only one (group of) student(s), was about only one subcategory and only one topic.

*Table 4.1. Features to enhance teacher professional development and their operationalization in the PDP.*

Professional development features from the literature	Characteristics of the PDP
Sustainable and intensive	The PDP was sustainable because it lasted four months, plus a follow up videotape. The PDP was intensive because it entailed weekly activities including meetings, videotaping and selecting video fragments.
Collective participation	All teachers of the same grade levels within both schools participated collectively.
Clear goals that are communicated	The goals were presented and discussed in the first meeting, the relevant goals were repeated and substantiated at the start of each meeting. Target behaviors were presented on video during the meetings.
Solving real-world problems, offering worked examples	Worked examples were provided in the form of good, illustrative examples of teacher behavior for each learning goal on video. Real-world problems were solved by reflecting on own practices and by discussing possibilities for implementation of the target behaviors in teachers' own classrooms.
Modeling target behavior by the trainer	The trainer displayed the targeted feedback behaviors during the meetings and she realized the conditions for active learning, such as using activating teaching methods and creating group discussions.
Authentic, integrated activities	Videos of own practices and other teachers' practice were used as authentic learning materials. The activities for the PDP were implemented at teachers' own school, and required adapted teaching behaviors in regular lessons.
Plenty opportunities for active learning (enactment)	The informative meeting were highly interactive and activating. The use of video interaction training required teachers to adapt their feedback behavior and to analyze, select and discuss own video fragments.
Existing knowledge as a foundation for new knowledge	Existing knowledge was activated by starting with reporting and elaborating teachers' own knowledge and beliefs, and by group discussions about theory and teachers' behavior, knowledge and beliefs and problems before presenting good examples. The video interaction training meetings were always started with teachers' own reflections on his or her classroom practice.
Demonstration and application of new knowledge	New knowledge was demonstrated by watching and discussing video fragments of good examples of teacher behavior regarding each learning goal. Application of new knowledge in their own classroom was required from teachers afterward. This new behavior was then videotaped and it constituted the input for the video interaction training meetings.
Reflection on actions	Reflection on own actions was realized by asking teachers to select their own video fragments, capturing optimal and non-optimal behavior. Further reflection on actions was promoted by watching and discussing these fragments with colleagues during the video interaction training meetings.

The twenty minutes of videotape were sufficient to capture a representative picture of a teachers' feedback behaviour; the units of analysis were often very brief and this time span contained many units of analysis. Furthermore, teachers appeared to display certain routines in their feedback behaviour.

Each teacher-student interaction was first sorted into one of the four main categories: 1. Guidance and Feedback: interactions in which the teacher gives information to the student(s); 2. Acquiring diagnostic information: interactions in which the teacher asks for information to establish a starting point for feedback; 3. Classroom Management: interactions containing remarks about classroom organization; and 4. Remaining: interactions that were unrelated to the task or the lesson. Cohen's Kappa for the coding of the main categories was .93.

Units in category 1, Guidance and Feedback, were then further classified into one of the complementary subcategories. Interactions directly related to the specific task on hand (i.e., repeating or giving a task, giving information about the subject of the task or about students' work) were classified as '1.1 Task'. Interactions related to the processing of the task (i.e., giving information about how to proceed, referring to a specific information source) were classified as '1.2 Process'. Interactions in which the teacher helped students with their planning, monitoring, evaluation or reflection on their own work were classified as '1.3 Metacognition'. Interactions in which the teacher gave information about the collaboration in a group of students or about students' social skills were classified as '1.4 Social Learning'. Finally, personal feedback, or feedback in which it was not clear what the focus was, was classified as '1.5 Non-specific/self'. Cohen's Kappa for the coding of the subcategories was .91.

For units that were classified as guidance and feedback interactions, the following characteristics were scored, as well: whether or not there was a relation to a learning goal, what the nature of the feedback was, and in what way the feedback was given. The nature of feedback could be confirming, critical, constructive, a combination of these, or neutral. The way in which feedback was given could be facilitative, directive, encouraging or neutral. Only the characteristics 'nature' and 'way' were scored for units within category 1.5 (non-specific/self), as the absence of a learning goal was inherent to the definition of this subcategory. The mean Cohen's Kappa for the coding of these characteristics was .72.

#### 4.3.4 Procedure

Before the PDP began, in November 2010, all teachers were videotaped for the first time during an active learning lesson. At the beginning of the first informative meeting, in January 2011, teachers administered a writing task and perceived-problem scale for pre-test purposes, after which the PDP began. After the last video-interaction training meetings, in April 2011, all teachers were videotaped during an active learning lesson for the first post-test measurement. Evaluation meetings were held in May, 2011, in which the writing task and the perceived-problem scale were administered for the second time (i.e., the first post-test). Seven months after the PDP had been completed, in November 2011, all teachers were once again videotaped during an active learning lesson, and the writing task and problem scale were administered for a third time (i.e., the second post-test).

#### 4.3.5 Data analysis

*Teachers' knowledge and beliefs.* The concepts that teachers noted in the writing task before the PDP began were inserted as variables in the software Statistical Package for the Social Sciences (SPSS). This yielded a set of 26 concepts. Each concept represented a different belief; for example, the concept 'criticism' represented the belief that feedback should (also) contain criticism or points the student could improve upon. For each teacher these beliefs were scored as either 'not mentioned' (0) or 'mentioned' (1). This procedure was repeated directly after and 7 months after the PDP had been completed. Three beliefs which were only mentioned during the post-test measurements were subsequently added to the set of concepts in SPSS. Differences in the frequency with which each belief was mentioned by the teachers in later measurements as compared with the first measurement were counted.

*Perceived problems.* The perceived-problem scale was administered before, directly after and 7 months after the PDP had been completed. For the scale as a whole, differences between the mean scores after the PDP had been implemented were compared with the mean score of the pre-test using multivariate analysis of variance (MANOVA). Univariate ANOVAs were also conducted to examine the effects of the PDP on each item. Finally, each of the two post-tests was in turn compared to the pre-test using a simple contrast for the factor time.

*Teachers' feedback behaviour.* The videotaped teacher-student interactions were also analysed three times — before, directly after and 7



months after the PDP had been completed. Teacher-student interactions were identified from the videotapes and used as the units of analysis. An interaction began when the teacher was talking with a (group of) student(s). When the teacher began an interaction with another (group of) student(s), a new unit started. Similarly, when a separate subcategory could be coded in an interaction with the same student(s), this was the start of a new unit. Finally, when the teachers began talking about another topic within the same subcategory, a new unit was distinguished. Each unit of analysis therefore contained an interaction with only one (group of) student(s), was only about one subcategory and was only about one topic. The main category was scored for each teacher-student interaction. For interactions assigned to the main category 1, Guidance and Feedback, the subcategory was scored; the characteristics were also scored. All data were imported into SPSS and then aggregated to the teacher level to facilitate comparisons of the classroom practices of different teachers. This yielded percentages which indicated how often each category, (sub)category and characteristic occurred compared with the total number of teacher-student interactions in which each teacher had engaged. For the main category, the subcategory and each of the characteristics, differences between the mean scores after the PDP had been implemented were compared with the mean score of the pre-test using MANOVA. Univariate ANOVAs were conducted to examine the effects of the PDP on each type of teacher behaviour. Each of the two post-tests was then compared to the pre-test using a simple contrast for the factor time.

#### 4.4 Results

##### 4.4.1 *Effects of the PDP on teachers' knowledge and beliefs*

The beliefs and the number of teachers who expressed these beliefs at each of the three points of measurement can be found in Table 4.2. Beliefs that were directly related to the learning goals of the PDP are presented in *italics*.

All beliefs that were directly related to the learning goals of the PDP were noted by more teachers in the post-tests than in the pre-test. Beliefs that were noted by substantially more teachers - 10 more - at the first post-test compared with the pre-test were: feedback can be focused on social learning, feedback should be goal-directed, and feedback should be confirmative, critical and constructive. The belief that feedback should be constructive was noted by eight more teachers after the PDP as compared with before the PDP. Finally, the beliefs that feedback can be focused on student metacognition, feedback can be focused on the content of the task,

and feedback should contain criticism were observed seven additional times at the first post-test measurement.

At the second post-test, the beliefs that feedback during active learning should (also) be focused on social learning, students' metacognition and the task were again noted by substantially more teachers as compared with the pre-test. The same was true for the beliefs that feedback should be goal-directed and feedback should be confirmative, critical and constructive. These results indicate a change in the beliefs regarding these important aspects of feedback during active learning.

#### *4.4.2 Effects of the PDP on teachers' perceived problems*

Pillai's trace revealed the PDP to have had a significant effect on the extent to which teachers perceived problems during the provisioning of feedback during active learning,  $V = 0.80$ ,  $F(24, 68) = 1.88$ ,  $p < .05$ . Separate univariate ANOVAs showed significant differences in the extent to which teachers perceived specific problems after the PDP had been implemented as compared to before. The following problems were reduced: striking a balance between compulsory learning goals and student initiatives,  $F(2, 44) = 4.87$ ,  $p < .05$ ; being too busy with classroom organization  $F(2, 44) = 6.29$ ,  $p < .01$ ; dividing time among students,  $F(2, 44) = 4.17$ ,  $p < .05$ ; having too little time to provide feedback,  $F(2, 44) = 5.53$ ,  $p < .01$ , losing the overview,  $F(2, 44) = 4.34$ ,  $p < .05$ ; and, lacking guidelines  $F(2, 44) = 31.10$ ,  $p < .01$ .

Comparing both post-tests separately to the pre-test, it appears that directly after the PDP had been completed teachers perceived fewer problems with regard to the goal-directedness of feedback and aspects of the conditions for giving feedback during active learning. At the second post-test even fewer problems were perceived by teachers; problems regarding some aspects of the way of giving feedback were also diminished (see Table 4.3).

Table 4.2. Teachers' beliefs about Feedback during Active Learning (N = 16)

Beliefs	Before PDP	Directly after PDP	7 months after PDP
<i>Focus of feedback</i>			
Feedback can be focused on task processing	8	9	7
Feedback can be focused on the product students make	6	4	5
Feedback can be focused on student metacognition	3	10	10
Feedback should be specific and clear	2	1	1
Feedback can be focused on social learning	1	11	11
Feedback can be focused on the task	0	7	7
<i>Goal-directedness</i>			
Feedback should be goal-directed	3	13	10
Goals should be communicated to the students	0	3	5
<i>Nature of feedback</i>			
Feedback should be positive	13	14	10
Feedback should contain criticism	7	14	10
Feedback should be constructive	4	12	5
Criticism should be given positively	2	2	2
Feedback should be confirmative, critical and constructive	0	10	8
<i>Way of giving feedback</i>			
Students should be activated to work and think	9	10	9
Teachers should ask questions	9	11	6
Feedback should contain clear directions	7	9	3
Teachers should coach and guide students	7	7	5
Feedback should contain an appraisal	7	3	1
Feedback should contain hints or suggestions	6	3	4
Feedback should stimulate and challenge students	6	3	6
Teachers should answer questions and give information	5	1	2
Teachers should not tell the answers	3	1	1
Teachers should give directive as well as facilitative feedback	2	3	5
Feedback should warrant student autonomy	0	2	2
<i>Adaptive feedback</i>			
Feedback should be tuned to individual students	6	2	2
<i>Conditional teacher skills</i>			
For giving feedback a good relationship is important	4	0	1
Feedback can be focused on keeping order and rules	3	0	1
Teachers should make sure students can proceed	3	0	0
Teachers should create the conditions to give feedback	2	3	3
Teachers should structure their lessons	1	2	2

Table 4.3. Descriptive statistics for the perceived-problem items at the different measurement times (N = 16 teachers)

Problem	Before PDP		Directly after PDP		7 Months after PDP	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
<b>Goal-directedness</b>						
It is difficult to balance between compulsory subject matter and student initiatives.	3.13	1.20	2.44*	.81	2.13**	.81
<b>Nature of feedback</b>						
It is hard to give critical feedback to my students.	2.13	.89	1.88	.89	1.81	.83
<b>Way of giving feedback</b>						
It is difficult to ask questions that promote learning.	3.25	1.29	2.88	.83	2.53*	.76
I give my students more directive feedback than I think I should.	3.06	1.00	2.88	1.02	3.13	.59
I tend to give my students the answers or straight directions.	3.00	.97	2.50	.89	2.72	.86
It is difficult to give feedback that activates student thinking.	3.44	1.09	2.88	.97	2.60*	.71
<b>Conditional teacher skills</b>						
During active learning, I am too busy with classroom organization.	3.22	.84	2.38**	.89	2.31**	.95
It is hard to divide my time between my students during active learning.	3.19	.83	2.69	.87	2.38**	1.02
I have too little time to give my students good feedback.	3.38	1.09	2.44*	.81	2.44**	1.26
It is difficult to organize active learning efficiently.	2.31	.79	2.16	.77	1.88	.81
It is hard to keep the overview of what everyone is doing during active learning.	2.81	.98	2.19	.83	1.88**	.89
I lack guidelines for the provision of feedback during active learning.	2.88	.89	1.31**	.48	1.25**	.58

Statistical significance of the difference between post-tests and pretest: \*  $p < .05$ , \*\*  $p < .01$

#### 4.4.3 Effects of the PDP on teachers' feedback behaviour

*Observations.* Descriptive statistics on how often, relatively, interactions were classified into each main category at the first, second and third measurement event can be found in Table 4.4. In the pre-test measurement, a total of 570 teacher-student interactions were distinguished. In the first post-test measurement, a total of 675 teacher-student interactions were distinguished; in the second post-test measurement, a total of 663 teacher-student interactions were distinguished.

Pillai's trace revealed a significant effect of the PDP on the main category of teacher-student interactions during the provisioning of feedback during active learning,  $V = 0.63$ ,  $F(8, 86) = 4.95$ ,  $p < .01$ . Separate univariate ANOVAs revealed significant effects on acquiring diagnostic information,  $F(2, 45) = 26.06$ ,  $p < .01$ , and on classroom management,  $F(2, 45) = 5.95$ ,  $p < .01$ . On average, teachers devoted significantly more interactions to the acquisition of diagnostic information on which to base their feedback at the first post-test as compared with the pre-test,  $t = -14.87$ ,  $p < .01$ , and significantly fewer teacher-student interactions contained remarks regarding classroom management,  $t = 12.08$ ,  $p < .05$ . These differences remained statistically significant at the second post-test — diagnostic information  $t = -13.19$ ,  $p < .01$ , classroom management  $t = 10.59$ ,  $p < .05$ .

In the pre-test measurement, a total of 311 guidance and feedback interactions were observed. A total of 357 guidance and feedback interactions were observed in the first post-test measurement, and a total of 347 guidance and feedback interactions were observed in the second post-test measurement. The descriptive statistics relating how often, relatively, each subcategory of guidance and feedback occurred at each of the three measurements can be found in Table 4.5. The descriptive statistics on the characteristics of these guidance and feedback interactions are presented in Table 4.6.

Table 4.4. Descriptive statistics for the main categories of teacher-student interactions at the different measurements (N = 16)

Category	Preceding PDP		Directly after PDP		7 months after PDP	
	Mean %	Standard deviation	Mean %	Standard deviation	Mean %	Standard deviation
1. Guidance and feedback	55.34	12.89	53.52	9.99	52.65	10.98
2. Acquiring diagnostic information	7.88	4.89	22.75**	7.61	21.07**	6.35
3. Classroom management	34.77	12.73	22.69**	9.80	24.18**	9.56
4. Remaining	2.02	1.84	1.04	1.58	1.97	2.35

Statistical significance of the difference between post-tests and pretest: \*  $p < .05$ , \*\*  $p < .01$

Table 4.5. Descriptive statistics for the subcategories of the guidance and feedback interactions at the different measurement times (N = 16).

Subcategory	Preceding PDP		Directly after PDP		7 months after PDP	
	Mean %	Standard deviation	Mean %	Standard deviation	Mean %	Standard deviation
Task	44.91	18.48	43.03	12.57	43.31	19.27
Process	48.81	18.64	46.75	9.88	49.27	15.75
Metacognition	1.02	2.25	6.10*	5.32	4.15	6.32
Social Learning	3.24	3.81	3.79	4.90	2.32	3.77
Non-specific/Self	2.03	4.35	0.33	1.32	0.73	2.11

Statistical significance of the difference between post-tests and pretest: \*  $p < .05$

Table 4.6. Descriptive statistics for the goal-directedness and nature of the feedback interactions at the different measurement times (N = 16 teachers)

Characteristic	Preceding PDP		Directly after PDP		7 months after PDP	
	Mean %	Standard deviation	Mean %	Standard deviation	Mean %	Standard deviation
Related to goal						
Yes	13.48	12.66	27.28**	14.32	24.66*	14.06
No	86.52	12.66	72.72**	14.32	75.34*	14.06
Nature						
Confirmative	12.02	8.26	23.49*	16.00	21.04	14.74
Critical	0.52	1.42	1.24	2.26	2.65	4.46
Constructive	41.17	15.04	32.53	16.32	31.40	12.94
Neutral	13.20	9.37	3.62**	4.28	3.94**	4.84
Confirm-Criticism-Construct	3.42	5.61	5.32	5.78	6.65	5.24
Combinations of two	29.68	14.06	33.80	9.85	34.31	12.28

Statistical significance of the difference between post-tests and pretest: \*  $p < .05$ , \*\*  $p < .01$

The PDP exerted no statistically significant effect on the subcategories of guidance and feedback during active learning. Separate univariate ANOVAs did reveal, however, a significant effect on the provisioning of feedback which was focused on students' metacognition,  $F(2, 45) = 3.65, p < .05$ . Examining the results for both post-tests separately, it appeared that teachers focused a statistically significant amount more of their feedback interactions on students' metacognition directly after the PDP had been completed,  $t = -2.65, p < .05$ . They did not, however, maintain this behaviour over the longer term; at the second post-test measurement, this effect failed to reach a level of significance,  $t = -1.88, p = .07$ .

Pillai's trace showed the PDP to have had a significant effect on the goal-directedness of feedback,  $V = 0.17, F(2, 45) = 4.58, p < .05$ . On average, significantly more feedback interactions were explicitly related to a learning goal at the first post-test measurement than had been at the pre-test,  $t = -13.80, p < .01$ . This difference was still evident at the third measurement,  $t = -11.18, p < .05$ .

The PDP was also shown to have had a significant effect on the nature of feedback,  $V = 0.52, F(12, 82) = 2.43, p = .01$ . Separate univariate ANOVAs revealed significant effects on the amount of confirmative feedback,  $F(2, 45) = 3.24, p < .05$ , and on the amount of neutral feedback,  $F(2, 45) = 10.97, p < .01$ . At the first post-test measurement, significantly more feedback interactions were confirmative as compared to the pre-test,  $t = -11.48, p < .05$ . On average, significantly fewer feedback interactions were neutral at the first post-test compared to the pre-test,  $t = 9.58, p < .01$ . This was still the case at the second post-test,  $t = 9.26, p < .01$ .

The effects of the PDP with regard to the way of giving feedback were examined in more detail, because the aim of the PDP was to facilitate a more even balancing between directive and facilitative ways of giving feedback. Based on the way of giving feedback in the observations preceding the PDP, three subgroups were distinguished: teachers with an average level of directive feedback, teachers with a low level of directive feedback ( $\leq$  mean -1 standard deviation) and teachers with a high level of directive feedback ( $\geq$  mean +1 standard deviation). The effects of the PDP on the way of giving feedback for these three groups of teachers can be found in Table 4.7.



Table 4.7. Descriptive statistics regarding the way of giving feedback for teachers with a low initial level of directive feedback ( $n = 4$ ), an average initial level of directive feedback ( $n = 8$ ), and a high initial level of directive feedback ( $n = 4$ ).

Level of directive feedback	Preceding PDP		Directly after PDP		7 months after PDP	
	Mean %	Standard deviation	Mean %	Standard deviation	Mean %	Standard deviation
Low						
Directive	21.43	3.67	34.39	15.22	49.02**	12.86
Facilitative	63.50	10.11	42.88	16.15	25.39*	21.93
Encouraging	10.35	4.85	16.42	14.82	16.46	16.31
Neutral	4.73	6.20	6.31	4.99	9.13	9.35
Average						
Directive	56.34	11.23	32.99**	17.67	33.19**	14.50
Facilitative	23.51	13.23	33.99	13.07	34.69	16.46
Encouraging	8.82	6.15	19.35	12.58	24.70*	14.70
Neutral	11.35	8.47	13.67	10.40	7.42	4.82
High						
Directive	82.14	2.96	53.34**	4.95	64.69*	15.42
Facilitative	8.96	9.43	30.81*	16.43	24.04	5.29
Encouraging	6.20	5.90	6.00	6.98	6.49	10.18
Neutral	2.71	3.52	9.84	12.64	4.78	4.43

Statistical significance of the difference between post-tests and pretest: \*  $p < .05$ , \*\*  $p < .01$

For the teachers initially identified as providing a low level of directive feedback, there was no statistically significant main effect of the PDP on their way of giving feedback. Separate univariate ANOVAs, however, revealed significant effects on the amount of feedback given in a directive way,  $F(2, 9) = 5.57, p < .05$ , and on the amount of feedback given in a facilitative way,  $F(2, 9) = 5.17, p < .05$ . Only at the second post-test were these teachers seen to be providing significantly more directive feedback,  $t = -27.59, p < .01$ , and significantly less facilitative feedback,  $t = 38.10, p < .05$ , as compared to the pre-test.

There was no main effect on the way of giving feedback for teachers with an initially average level of directive feedback. A significant effect on the amount of directive feedback was revealed by a separate univariate ANOVA,  $F(2, 21) = 6.67, p < .01$  and also on the amount of feedback given in an encouraging way,  $F(2, 21) = 3.80, p < .05$ . These teachers gave significantly less directive feedback at both the first post-test,  $t = 23.35, p < .01$ , and the second post-test,  $t = 23.15, p < .01$ , as compared to the pre-test. They gave significantly more feedback in an encouraging way at the second post-test,  $t = 15.88, p < .05$ .

For the teachers with an initially high level of directive feedback, the PDP had no statistically significant main effect on their way of giving feedback. Separate univariate ANOVAs, however, again revealed significant effects on the amount of feedback given in a directive way,  $F(2, 9) = 9.32, p < .01$ . Teachers with an initially high level of directive feedback gave significantly less directive feedback,  $t = 28.80, p < .01$ , and significantly more facilitative feedback,  $t = -21.85, p < .05$ , at the first post-test as compared to the pre-test. This difference in the amount of directive feedback remained statistically significant at the second post-test,  $t = 17.45, p < .05$ . The effect on facilitative feedback failed to reach significance at the second post-test  $t = -15.08, p = .09$  as compared to the pre-test.

## 4.5 Conclusions and discussion

### 4.5.1 Effects of the PDP on teachers' feedback during active learning

In the present study we investigated the extent to which teacher feedback during active learning could be improved by implementing a PDP which incorporated the conditions and features that are known to be important for enhancing teachers' professional development. Short- and long-term effects of the PDP on teachers' knowledge and beliefs, perceived problems and feedback behaviour in the context of active learning were examined in the highest grades of primary education. Results indicated that,

with regard to several aspects of feedback during active learning, teachers' knowledge and beliefs can be changed, teachers' perceived problems can be reduced and their feedback behaviour can be improved, both in the short term and in the longer term. The conclusions of the present study regarding each of the six facets which impact the quality of teacher feedback during active learning will be described below. These conclusions will then be discussed in the light of the scientific knowledge of teachers' professional development. We will conclude by discussing the limitations of the present study and by suggesting some directions for future research.

*Focus of feedback.* Two learning goals with regard to the focus of feedback were set in the PDP: the provisioning of more feedback which focused on students' metacognition and the provisioning of more feedback which focused on social learning. The results showed that these goals were not fully achieved. In the short term, teachers gave more feedback which focused on students' metacognition. This effect disappeared in the longer term, however, and no effects were observed concerning feedback which focused on social learning. Teachers did change their beliefs regarding these two foci of feedback. In both measurements of teachers' knowledge and beliefs which were conducted after the PDP had been carried out, substantially more teachers expressed the belief that feedback during active learning should (also) be focused on social learning and students' metacognition as compared with those who stated such beliefs prior to the PDP having been implemented. Although teachers came to believe it was important to provide their students with feedback which focused on their metacognition and social learning as a result of the PDP, they have not yet been seen to have put this into practice.

*Goal-directedness of feedback.* The learning goals of the PDP regarding goal-directedness were: setting clear learning goals and communicating these goals to students. Both goals were reached. Substantially more teachers expressed the belief that feedback should be goal-directed in measurements of both teachers' knowledge and beliefs after the PDP had been carried out. More teachers also noted that it was important to communicate the learning goals to students. Teachers perceived fewer problems balancing their learning objectives between compulsory subject matter and students' own initiatives. Observations showed that teachers more often related their feedback explicitly to the learning goals, both in the short- and long-term.

*Nature of feedback.* By implementing the PDP, we aimed to lead teachers to provide their students with more feedback that includes

confirmation and criticism as well as a constructive remark. More teachers believed this was important after the PDP had been conducted, but feedback of this nature was not observed more often in the classrooms. Teachers gave less neutral feedback and less feedback that was only constructive in nature, and they confirmed the positive elements of student work more often. Critical feedback, combinations of the two and instances in which the desired nature of feedback were provided did each increase slightly, but not to a point which achieved statistical significance. Although teachers voiced the belief that feedback optimally includes confirmation and criticism as well as a constructive remark, they have not yet implemented this in their classrooms.

*Way of giving feedback.* A more even balance between directive and facilitative ways of giving feedback was the goal of the PDP as it related to this facet of feedback during active learning. There were no significant changes in teachers' knowledge and beliefs; before the PDP was implemented, teachers already believed that the facilitative way of giving feedback during active learning was important, although they found this ideal to be difficult to operationalize. Giving feedback which activates student thinking instead of giving them clear instructions was perceived as being difficult by the teachers before the PDP had been implemented. This problem was reduced both in the short- and long-term. The perceived tendency to give students the answers or straight directions, however, did not decrease. After the PDP had been carried out, the teachers still reported giving more directive feedback than they thought was appropriate. The classroom observations did nevertheless reveal a more balanced approach between directive and facilitative ways of giving feedback: teachers with an initially low level of directive feedback provided more directive feedback and teachers with an initially average level of directive feedback gave less directive feedback compared with their levels before the PDP. The subgroup of teachers with an initially high level of directive feedback gave significantly less directive feedback over both the short- and long-term. Directly after the PDP they also gave more facilitative feedback. We can therefore conclude that teachers' behaviour, knowledge and beliefs –at least partly- reflected the way of giving feedback that was aimed for, but teachers still perceived themselves as being more directive than they felt was appropriate.

*Adaptiveness of feedback.* With regard to this facet of feedback, no goal was formulated and, consequently, it was not a subject that was discussed and practiced as part of the PDP. A significant change in behaviour was observed, however, in both the short- and long-term. After the PDP had been conducted, teachers focused a significantly higher number of

interactions on acquiring diagnostic information on which to base their feedback.

*Conditional teacher skills for giving feedback during active learning.* We aimed to aid teachers in creating the conditions for active learning by establishing efficient classroom management methods. Teachers perceived several problems regarding their classroom management during active learning, such as a lack of time with which to provide students with effective feedback, being too busy organizing the classroom, and having difficulty keeping an overview of all students. Directly after the PDP had been conducted teachers perceived these problems to persist at a lesser degree, and even fewer such problems were perceived in the long term. This reduction of problems was reflected in teachers' feedback behaviour, as significantly fewer teacher-student interactions were spent on remarks regarding classroom management.

#### *4.5.2 Teachers' professional development*

As described above, different outcomes were observed for different learning goals of the PDP; for some aspects of feedback during active learning, teacher behaviour was improved; for other aspects, it was not. The same is true for teachers' knowledge and beliefs and their perceived problems. With regard to the focus on student metacognition, social learning and giving feedback that includes confirmation, criticism and a constructive remark, teachers' knowledge and beliefs changed in the desired direction. There were no (lasting) changes, however, in classroom behaviour. Teachers' knowledge and beliefs, as well as their classroom behaviour, changed with regard to the way of giving feedback, but teachers still perceived some problems with being too directive. Perceived problems were reduced and a change in behaviour was observed for the conditional teacher skills. The most favorable results were obtained with regard to the goal-directedness of feedback: there was a lasting change in knowledge and beliefs, perceived problems and classroom behaviour. These different outcomes may be explained by the interconnected model of teacher growth (Clarke & Hollingsworth, 2002) which was discussed in the theoretical framework. In our PDP, we have tried to influence all four domains (i.e., personal domain, domain of practice, domain of consequence and external domain) and to stimulate both reflection and enactment with regard to all learning goals in similar ways. Different results, however, were observed for different learning goals. It may be possible that the pathways of change are not only different for individual teachers, but also for different learning

contents. In this case, an increase in feedback focused on student metacognition, for example, might ask for more information and support or a longer period of experimentation in the classroom than would be required for another learning goal, such as an increase in the formulating and communicating of clear learning goals. The situation from which teachers started was also different for the different goals of the PDP, as was discussed in section 2.3. For example, teachers' feedback was seldom goal-directed and few teachers perceived this as a problem. Only a quarter of the teachers believed that the goal-directedness of feedback was important. With regard to the way of giving feedback, teachers gave too much directive feedback. Teachers believed it was important to give more facilitative feedback, but found this difficult to realize. These starting points are quite different from one another and it could be that this influenced the domains and types of change that might optimally have been stimulated first.

*Video-based learning.* As was discussed, it is found to be very difficult to change teacher behaviour in a sustainable manner. Reviews of professional development research have consistently pointed out the ineffectiveness of PDP's (Guskey, 2002; Opfer & Pedder, 2011). Several researchers have argued that this problem stems from a lack of recognition of how teacher learning is embedded in professional practices (e.g., Borko, 2004; Timperley & Alton-Lee, 2008). A large part of this PDP consisted of video-based learning. Teachers' professional practices were videotaped, reflected upon by teachers themselves and then discussed with colleagues. Teachers thus not only critically studied their own teaching practices, but also that of their colleagues. Furthermore, videos of unfamiliar teachers' practices were used to illustrate the theoretical knowledge. In these ways, our PDP was heavily embedded in teachers' professional practice. This study substantiates earlier findings regarding the effectiveness of video-based learning in enhancing teachers' professional development (Fukkink et al., 2011; Van Es & Sherin, 2010).

*Building on teachers' beliefs and practices* Another important notion is that professional development activities ideally build on teachers' knowledge and beliefs, perceived problems and classroom practices (Knapp, 2003; Opfer & Pedder, 2011; Verloop et al., 2001). Teachers are only motivated to change when they believe the PDP will genuinely contribute to their professional development and enhance their effectiveness with students (Guskey, 2002). From a strictly pragmatic perspective, teachers hope to gain specific concrete and practical ideas that relate directly to the day-to-day practice in their classroom (Fullan & Miles, 1992). In our PDP we

have tried to address these different issues. By examining teachers' knowledge and beliefs, perceived problems and practices beforehand, it was thus possible to build upon these aspects and to include the theoretical knowledge that was needed. Teachers did not, for example, experience any problems regarding goal setting, nor did they believe this to be important; as such, they did not give much goal-directed feedback in their classrooms. For this topic more information from the literature and another way of explaining the importance of the topic was needed than, for instance, the way of giving feedback. With regard to this way of giving feedback, teachers knew what was expected of them; they found this to be very important but experienced difficulties when attempting to implement the preferred way of giving feedback in their classrooms. Because of the discussion about the problems teachers themselves perceived, teachers were convinced that this PDP would really make a difference for them in their classroom. By showing good examples of teacher behaviour on video and by watching and discussing video fragments of colleagues, teachers were provided with very concrete and practical ideas for implementing the new knowledge in their classroom. The positive effects of our PDP support the idea that it is important to start from teachers' own concerns and practices, and to add the relevant theoretical knowledge in a way that makes it easily applicable in daily practice.

*Other design features* that have to be taken into account when designing a PDP are known from review studies (Garet et al., 2001; Van Veen et al., 2012). We have tried to implement these conditions in the PDP in a coherent manner. Collaboration with colleagues of the same grade level, for instance, was realized in the video-interaction training meetings, in which teachers watched and discussed self-selected fragments of their own classroom behaviour. These were authentic and integrated activities which facilitated ample opportunity for active learning, and the activities promoted reflection.

With regard to the sustainability of the programme, it might be that the PDP was too brief to achieve all of the stated learning goals. An exact 'tipping point' of hours needing to be invested is not yet known, since it always depends on the type of activity. Support has been found for different numbers of hours, ranging from a minimum of 14 hours to a minimum of 80 hours (Van Veen et al., 2012). Too many hours, however, can be counter-productive (Telese, 2008). It is clear that a substantial amount of time is necessary in order for a PDP to have the desired effect. Teachers had less time to experiment with — and discuss under supervision — the learning

goals that constituted the topics of the last informative meeting (i.e., focus on student metacognition and focus on social learning). Perhaps more hours were needed to allow teachers to reach the learning goals that were included in the final meetings of the PDP.

#### *4.5.3 Limitations and directions*

Given that this study has focused on identifying the effects of a newly developed PDP aimed at improving teacher feedback during active learning, the study did not devote attention to the individual nature of teacher professional development. Clarke and Hollingsworth (2002) have emphasized that multiple growth pathways between the four domains of change may exist for different teachers. In our analyses, we have examined the mean results in a group of 16 teachers. In future research, it would be valuable to examine individual differences in the developmental processes during the implementation of this PDP to obtain more insight into the ways in which this PDP was effective at enhancing teacher feedback during active learning. Furthermore, there may have been design features that were especially important for achieving specific effects. For example, collective participation may have been important for achieving changes in teachers' beliefs but less important in affecting behavioural changes. An additional investigation which sought to identify possible specific functions of the different design features would also be useful.

In addition to the limitations introduced by the chosen design of this study, some other possible limitations of the present study might be borne in mind during the interpretation of the results. First, the sample of teachers participating in the study was rather small: only 16 teachers from two primary schools participated. This was a consequence of the intensive and time-consuming nature of the PDP which was implemented. Although the intensity of the programme has likely contributed to its positive effects, since this is known to be an important feature of PDPs (Garet et al, 2001; Van Veen et al., 2012), one potential drawback was the smaller sample of teachers available to be studied. Second, the results of teachers' classroom behaviours are based upon video observations of 20 minutes each. Although this length of time seemed sufficient to have provided a representative picture of the teachers' feedback behaviour, it might be possible that the complete situation in each classroom was not captured in full. A third limitation is the fact that we have only studied teachers' feedback during active learning within the domain of environmental studies. The teachers gave feedback regarding subjects such as history, geography and biology.



Limited content knowledge on the part of the teachers can influence the quality of teachers' feedback (Neale, Smith, & Johnson, 1990). It is possible that the results would be different were we to study teachers engaged in a different subject. A final limitation might be the fact that we did not examine the contributions of the different features of the PDP in detail. The programme was evaluated as a whole, without taking the added values of the different features of the PDP into account. For future research, it would be interesting to study the extent to which teachers recognize the different features of the PDP and the extent to which they think each feature contributes to their own development.

# Chapter 5



## **Chapter 5**

### **A professional development programme for teachers: Features that teachers consider important**

#### **Abstract**

This study focuses on the value of specific features of professional development programmes, as perceived by the teachers who participated in the programme (n= 16). A programme aimed at improving teacher feedback during active learning was implemented in a previous study. This programme appeared to be effective in changing teachers' beliefs and behaviour, both in the short and longer term. Several features were purposefully included in this programme. The perceived value of each of these features was evaluated using a questionnaire and by conducting four focus group interviews. Results show that all features contributed to teachers' professional development according to the teachers themselves. The perceptions of the teachers are thus in line with what is generally perceived as important for designing professional development programmes. Illustrations of how the features contributed to the change in teachers' feedback practices according to the teachers themselves are presented.

### 5.1 Introduction

In a previous study, an effective professional development programme (hereafter PDP) aimed to improve teacher feedback during active learning in the highest grades of Dutch primary education was developed (Chapter 4). Feedback is potentially one of the most powerful tools teachers can use to enhance student learning (Hattie, 2009). Unfortunately, teachers perceive several problems when providing their students with feedback and also with the organisation of active learning in their classroom (Chapter 3; Niemi, 2002). Observation studies have shown that teacher feedback during active learning is often suboptimal for enhancing student learning; teachers scarcely pay attention to learning goals and give little feedback to promote students' metacognition. Furthermore, teachers often control rather than facilitate student learning (Chapter 2, Bolhuis & Voeten, 2001; Sol & Stokking, 2009). After the PDP was implemented, positive short- and long-term effects of the PDP on teachers' knowledge and beliefs and their feedback behaviour were observed. For example, teachers learned to believe that feedback must be goal-directed and that learning goals need to be communicated to students. In the classrooms, teachers learned to relate their feedback explicitly to the learning goals more frequently. Furthermore, the number and the extent of problems they perceived was decreased after the PDP (for more details, see Chapter 4).

The importance of teacher professional development to improve or change the teaching practice is widely acknowledged. Changing teacher behaviour sustainably, however, appears to be a challenging endeavour. Research into teachers' professional development has yielded disappointing results as professional development activities have often been found to be ineffective (Opfer & Pedder, 2011). Several researchers have argued that this problem stems from a lack of recognition of how teacher learning is embedded in their professional practices and working conditions (Borko, 2004; Timperley & Alton-Lee, 2008). Teaching and learning to teach are contextually situated; professional development activities must therefore build on teachers' own knowledge and beliefs, perceived problems and classroom practices (Knapp, 2003; Opfer & Pedder, 2011; Verloop, Van Driel, & Meijer, 2001). This seems conditional for a PDP. As well as this condition, several features that have to be taken into account to increase the chance that PDP efforts result in effective professional development have been identified in review studies (e.g. Garet, Porter, Desimone, Birman, & Yoon, 2001; Van Veen, Zwart, & Meirink, 2012). Three different kinds of

such features can be distinguished, namely structural features, goal-setting features and features of the professional development activities that are part of the programme (i.e., activity features). The structural features refer to characteristics of the structure or design of the PDP, such as the form and duration. An example of a goal setting feature is the communication of clear learning goals at the start of the PDP. Learning actively and doing authentic tasks are examples of important activity features. The PDP that we developed to improve teacher feedback during active learning incorporated these important features.

The PDP consisted of video based learning for a considerable part, since this method seemed particularly applicable to integrate many of the features that are important. For example, being videotaped while implementing new knowledge in the classroom is an authentic activity that requires active participation of the teacher. Research has shown that the use of videos can yield positive effects in the interaction skills of professionals (Fukkink, Trienekens, & Kramer, 2011). Evidence for positive effects of video based learning on teachers' beliefs and the quality of instruction has also been found (Van Es & Sherin, 2010). As was mentioned above, the PDP had positive effects on teachers' knowledge and beliefs, perceived problems and classroom behaviour. Teachers' perceptions regarding the value of the features were, however, not taken into account in the effect study. These were the topic of examination in the present study.

By enquiring about teachers' perceptions regarding the PDP, information can be gathered that is helpful in improving the design and delivery of the PDP in valid ways (Guskey, 2000). It is known that these perceptions drive teachers' choices and actions (Hardré & Burris, 2012). Through asking the teachers who have participated in the PDP, we hoped to gain insight into the features of the PDP that teachers themselves regarded important, and their reasons for this. Therefore, this study was guided by the following research question: *"To what extent did teachers consider the features of the PDP valuable to enhance their professional development regarding feedback during active learning?"* Before presenting the study, we will first elaborate on the conditions for professional development and on the features of PDPs that appear to be important for affecting teachers' knowledge, beliefs and classroom behaviour. We will then elaborate on teacher feedback in the context of active learning.

## **5.2 Theoretical background**

### *5.2.1 Conditions for professional development*

Current conceptions of teacher learning increasingly emphasise that teachers' own practices, and knowledge and beliefs regarding these practices, must be taken as the starting point for professional learning. This means that a PDP must not only reflect theoretical knowledge or new information but also the concerns, behaviours, knowledge and beliefs of teachers themselves (Van Driel, Beijaard, & Verloop, 2001; Verloop et al., 2001). Building on teachers' own knowledge, beliefs and practices seems to be a prerequisite for teachers to develop a sense of ownership of the content of learning and their learning processes (Opfer & Pedder, 2011; Verloop et al., 2001). Furthermore, it is important to identify and address the specific problems teachers experience in their daily work (Knapp, 2003). Teachers enter PDPs hoping to gain concrete, practical ideas that are directly useful in their day-to-day practice in the classroom and which will have an impact on their work with students (Fullan & Miles, 1992).

Timperley (2008) emphasised the necessity of a safe learning environment as another condition for professional development. To develop themselves professionally, teachers need to trust that their efforts to change will be supported, not belittled. The same was stressed in the literature regarding video based learning: critical and constructive reflection based upon a teacher's own videos might be negatively impacted by self-defence mechanisms (Fiske, 1995). Thus, when working with groups of teachers using videos of their own and the others' teaching, it seems very important to create a safe learning environment and to build trust between the group members (Borko, Jacobs, Eiteljorg, & Pittman, 2008; Seidel, Stürmer, Blomberg, Kobarg, & Schwindt, 2011). Besides building from a thorough understanding of teachers' knowledge, beliefs, perceived problems and their practices, we therefore created a safe learning environment in our PDP.

### 5.2.2 Important features of PDPs

Features which appear to be important can be grouped in structural features, goal-setting features and features of the professional development activities that are part of the programme. With regard to the *structural features* of a PDP, research has shown that sustained and intensive professional development is more likely to have an impact than professional development activities that are short (Garet et al., 2001; Van Veen et al., 2012). An exact "tipping point" of hours that needs to be invested in a PDP is not known. There is no clear evidence that professional development activities that take place at the school are recommended above activities that take place outside the school (Putnam & Borko, 2000; Van Veen et al.,

2012). Activities that take place during the regular school day at the teachers' own school may, however, enable a longer duration of activities and make it easier to realise collective participation of teachers from the same school (Garet et al., 2001). This collective participation of groups of teachers from the same school seems important, for example, for sharing and exchanging experiences. It has been demonstrated that learning with colleagues is a critical factor in helping individual teachers to develop or change their classroom practice (Korthagen, Loughran, & Russell, 2006; Van Veen et al., 2012).

With regard to the *goal-setting features* of a PDP, it seems important to set clear learning goals. These goals are preferably clear from the start and are communicated to the teachers. Numerous studies have shown that setting specific goals is important for increasing individuals' performances. Goals assigned by the trainer can be as effective as self-set goals, as long as it is explained why it is important to attain these goals and teachers accept these goals as being relevant for them (Latham & Locke, 2006). Demonstrating the learning goals in the form of an example is more effective than merely presenting information. Furthermore, presenting examples in addition to practice appears to be a better way to promote learning than practice alone (Merrill, 2002). Examples of target behaviours in the classroom can be given, for example, on video. Finally, learning about teaching is enhanced when the approaches that are advocated in the programme are modelled by the teacher educator who is delivering the PDP (Korthagen et al., 2006).

With regard to the *activity features* that are incorporated in a PDP, it is known that it is important to promote active learning (Garet et al., 2001; Van Veen et al., 2012). Teachers must become actively engaged in meaningful discussion, planning and practice. This is done preferably together with colleagues, since collegial interaction helps teachers to integrate new learning into existing practices (Garet et al., 2001; Timperley, 2008). Examples of opportunities for active learning together with colleagues include discussing how new teaching methods can be used in the classroom and observing colleagues, and/or being observed while teaching (Garet et al., 2001). Analysing and discussing videos of teaching in a group context can provide teachers with the opportunity to examine their colleagues' classroom behaviours and it also facilitates the exploration of multiple perspectives on the same event (Little, 2002).

Active learning is preferably applied in a variety of activities. A synthesis of the research does not reveal that any particular kind of activity is



more effective than another of itself. It is more important that the activities are designed and aligned to reach the particular learning goals (Timperley, 2008). It appears to be important to activate teachers' relevant prior knowledge and previous experiences as a foundation for new knowledge. Previous experiences can function as a mental model that can be used to organise the new knowledge (Merrill, 2002). Constructing and discussing a concept map is an example of how prior knowledge can be activated. Building from this prior knowledge and previous experiences, new knowledge can be demonstrated. It is important that the type of demonstration is consistent with the learning goal. When teaching new concepts, examples and non-examples can be given, while modelling is especially suitable for teaching new behaviours (Merill, 2002). The teacher educator who is delivering the PDP can model the target behaviours (Korthagen et al., 2006). Using videos of teachers who display the target behaviours is another possibility for modelling the new behaviours. This demonstration enables teachers to apply the new knowledge and skills in their classrooms. Application appears to be a necessary condition for effective learning (Merrill, 2002; Timperley, 2008). In video based learning, teachers are being videotaped while they are applying their new knowledge and skills. Videos can capture much of the complexity of classroom interactions (Borko et al., 2008). By seeing themselves on video, teachers are enabled to watch, reconsider and improve their teaching skills (Fukkink, et al., 2011). This allows the teachers to look at themselves from a distance, and teachers can take the time to reflect on the interactions they had with their students (Seidel et al., 2011; Van Es & Sherin, 2010). This reflection on one's own actions is important as knowledge resulting from personal reflections on practical problems seems more closely linked to teachers' own situations and concerns, and it has more emotional significance for them (Korthagen et al., 2006).

### *5.2.3 Feedback during active learning*

Feedback is defined as "specific information about the comparison between a trainee's [student's] observed performance and a standard, given with the intent to improve the trainee's [student's] performance" (Van de Ridder, Stokking, McGaghie, & Ten Cate, 2008, p. 193). The standard is formulated in the learning goals. To effectively enhance student learning, students must know the learning goals, they must know how their current performance relates to the learning goals, and they need to receive directions for improving their work or understanding.

In the present study, feedback is studied in the context of active learning. Active learning situations may vary from teacher-controlled situations in which several learning activities are required of the students, to student-controlled situations in which students decide on the learning goals and activities. During active learning, the development of students' metacognition and social skills are important goals, in addition to task- and process-related objectives (Grabinger & Dunlap, 1995; Simons, Van der Linden, & Duffy, 2000). The kind of teaching that fits the active learning context may be referred to as process-oriented teaching, which involves a shift from transmission of knowledge to guiding and facilitating students' learning processes (Bolhuis & Voeten, 2001; Vermunt, 1992). In such a teaching context, teachers should have the opportunity to guide individual students or small groups of students and give them feedback.

Our previous observation study showed that Dutch primary school teachers display suboptimal behaviours during active learning (Chapter 2). About one third of the teacher–student interactions during active learning lessons consisted of teachers' remarks concerning classroom organisation, such as telling students where material could be found. These organisational issues kept teachers from giving feedback. Most feedback interactions in the classroom could be characterised as unrelated to an explicitly stated learning goal. Feedback that contains a combination of confirmation, criticism and constructive remarks would be optimal (Nicol & Macfarlane-Dick, 2006), but this kind of feedback was scarcely observed in the classroom. Very few feedback interactions focussed on students' metacognition or social learning. Furthermore, feedback was mainly given in a directive way, and less frequently in a facilitative way (Chapter 2). Similar problems were revealed in other school levels and countries, for example, in secondary education (Bolhuis & Voeten, 2001; Sol & Stokking, 2009), in Finland (Niemi, 2002) and in Scotland (Stephen, Ellis, & Martlew, 2010). Therefore, giving feedback during active learning constitutes an important topic for teachers' professional development.

### **5.3 Method**

#### **5.3.1 Participants**

Primary schools that practiced the concept of active learning when teaching environmental studies (i.e., classroom situations in which students work in small groups on different tasks within projects that integrate subjects such as history, geography and biology) were selected from the 47 primary schools that collaborate with a teacher training institute in the south-east of

the Netherlands. Of these schools, 23 indicated that they practiced active learning. Two of these schools were randomly selected and invited to participate in the previous effect study (Chapter 4). Sixteen teachers in these schools participated in the PDP that was developed to improve teacher feedback during active learning. They all worked with 9–12 year old students. Fourteen teachers were female and two were male. Their average teaching experience was 11.59 years ( $SD = 8.70$ ), while their average experience with active learning was 5.25 years ( $SD = 4.97$ ). In one school, seven teachers participated in the PDP; in the other school, nine teachers participated. After the PDP was implemented, it was evaluated. The data for the present study were collected during the evaluation meetings.

### 5.3.2 *The professional development programme (PDP)*

The design of the PDP was based on the extant literature regarding the features which are considered to be important for PDPs, as discussed in the theoretical background. Table 5.1 contains these features, together with descriptions of how we have operationalised these features in the PDP.

The goals and content of the PDP were based upon a review of the literature regarding feedback and active learning, compared with the findings regarding teachers' feedback behaviour, their knowledge and beliefs, and the problems teachers perceived regarding feedback during active learning (Chapter 2; Chapter 3). The goals of the PDP were:

- Setting clear learning goals and communicating these goals to students;
- Giving feedback that includes confirmation and criticism as well as constructive remarks;
- Balancing directive and facilitative ways of giving feedback;
- Giving more feedback focused on students' metacognition;
- Giving more feedback focused on students' social learning;
- Creating the conditions for active learning by establishing an efficient classroom management.

By basing the goals and content on the results of these preliminary studies, the condition of building from teachers' own practices, knowledge, beliefs and problems was realised. The condition of creating a safe learning environment was achieved through the composition of small groups in which teachers felt safe for the video interaction training. The fragments of teachers' own classroom that were watched during these meetings were selected by themselves and these included optimal examples.

The PDP consisted of weekly activities over a period of four months. During the PDP, the following sequence of activities was carried out four times, in succession:

1. Informative meeting with the team (of 6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup> grade teachers).
2. Videotaping an active learning lesson delivered by each teacher.
3. Selection of pertinent fragments from their own videotape by each teacher.
4. Video-interaction training meeting in small groups, with the researcher.

Each of the activities mentioned above will now be described. In the informative meetings (1), the researcher presented theory about feedback during active learning. This theory was discussed and processed actively by the teachers. Video fragments showing teacher behaviour that constituted examples and non-examples of the application of the theory were presented and discussed. At the end of each informative meeting, the teachers were asked to note down in a logbook their ideas for how they could implement the new knowledge in their own classroom. In the two weeks after each informative meeting, a 20-minute videotape of each teacher's active learning lesson was recorded by the researcher (2). In these lessons, teachers were expected to implement the new knowledge in their feedback behaviour. Teachers received their own videotape and were asked to select four fragments from this videotape that captured both optimal and non-optimal teacher behaviour regarding the goals that were the subject of the previous informative meeting (3). During the video interaction training meeting that followed (4), these selected fragments were watched, discussed and reflected on with one or two colleagues and the researcher. Each teacher had half an hour to present their selected fragments and to discuss any questions and concerns. In this time, each teacher received personal, tailored feedback from the researcher and colleagues. At the end of the meeting, teachers were asked to note down in their logbook their reflections and ideas for further implementation of their new or adjusted practices. One week after this video interaction training meeting, the following informative meeting (1) took place, which constituted the start of the next sequence of activities.

*Table 5.1. Features that were identified as being important for teachers' professional development in the literature and their operationalisation in the PDP.*

Feature	Characteristics of the PDP
Sustainable and intensive	The PDP was sustainable because it lasted four months, plus a follow up videotape. The PDP was intensive because it entailed weekly activities including meetings, videotaping and selecting video fragments.
Collective participation	All teachers of the same grade levels within both schools participated collectively.
Clear goals that are communicated	The goals were presented and discussed in the first meeting, the relevant goals were repeated and substantiated at the start of each meeting. Target behaviors were presented on video during the meetings.
Solving real-world problems, offering worked examples	Worked examples were provided in the form of good, illustrative examples of teacher behavior for each learning goal on video. Real-world problems were solved by reflecting on own practices and by discussing possibilities for implementation of the target behaviors in teachers' own classrooms.
Modeling target behavior by the trainer	The trainer displayed the targeted feedback behaviors during the meetings and she realized the conditions for active learning, such as using activating teaching methods and creating group discussions.
Authentic, integrated activities	Videos of own practices and other teachers' practice were used as authentic learning materials. The activities for the PDP were implemented at teachers' own school, and required adapted teaching behaviors in regular lessons.
Plenty opportunities for active learning (enactment)	The informative meeting were highly interactive and activating. The use of video interaction training required teachers to adapt their feedback behavior and to analyze, select and discuss own video fragments.
Existing knowledge as a foundation for new knowledge	Existing knowledge was activated by starting with reporting and elaborating teachers' own knowledge and beliefs, and by group discussions about theory and teachers' behavior, knowledge and beliefs and problems before presenting good examples. The video interaction training meetings were always started with teachers' own reflections on his or her classroom practice.
Demonstration and application of new knowledge	New knowledge was demonstrated by watching and discussing video fragments of good examples of teacher behavior regarding each learning goal. Application of new knowledge in their own classroom was required from teachers afterward. This new behavior was then videotaped and it constituted the input for the video interaction training meetings.
Reflection on actions	Reflection on own actions was realized by asking teachers to select their own video fragments, capturing optimal and non-optimal behavior. Further reflection on actions was promoted by watching and discussing these fragments with colleagues during the video interaction training meetings.

### 5.3.3 Procedure

The PDP was implemented in the two schools in the period from January 2011 until April 2011. After the PDP ended, it was evaluated. As focus group interviews were used to evaluate the design of the PDP, teachers were divided into four groups. Each group attended one evaluation meeting. During these meetings, a questionnaire was administered individually before the focus group interview was conducted. These evaluation meetings were held in May 2011.

### 5.3.4 Instruments

*Questionnaire.* A 19-item questionnaire was constructed to measure the extent to which teachers thought the features that were purposefully incorporated in the PDP contributed to their professional development, with regard to feedback during active learning. Items were based upon the operationalisation of the features that were identified as being important for PDPs in the literature (see Table 1). Comprehensive features were specified in more than one item. For example, to measure the perceived value of the feature “reflection on actions,” the following items were formulated: “Reflecting on my own classroom behaviour using videos contributed to my professional development,” “Reflecting on each meeting by letter in the logbook contributed to my professional development” and “The attention for deliberate, adaptive feedback practices contributed to my professional development.” The teachers responded to these items using a scale that ranged from 1 (totally not agree) to 5 (totally agree). In tables 2, 3 and 4, all items are displayed.

*Focus group interview.* The perceived value of the features was investigated in more detail using four structured focus group interviews that lasted about 45 minutes each, in which the answers on the questionnaire were elucidated. Focus group interviews have been found to be appropriate to evaluate the worth of a programme, and are also suitable when the purpose is to determine factors that have influenced opinions, behaviour or motivation (Krueger & Casey, 2009). In these interviews clarifications of - and elaborations on- the answers given on the 19 items were discussed. Consensus and variation in the opinions regarding the items were explored. For example, to measure the perceived value of the feature “reflection on actions,” the following question was posed: “Can you tell me why you thought reflecting on your own classroom behaviour using the videos contributed to your professional development?” The other two items that measured this feature were asked in the same way. Teachers were

stimulated to give examples of instances in which features were valuable for them. The interviews were recorded using a voice recorder. One interview was conducted with three teachers, two interviews with four teachers and one interview with five teachers.

### 5.3.5 Data analysis

*Questionnaire.* Each item of the questionnaire was inserted as a variable in SPSS (i.e., Statistical Package for the Social Sciences). Teachers' scores were entered. Means and standard deviations were calculated using descriptive statistics.

*Focus group interviews.* For the analysis of the focus group interviews, four steps were followed. First, the interviews were transcribed verbatim. Second, for each focus group, the thoughts and opinions regarding each of the 19 items were summarised. Third, the four summaries regarding each item were compared. Fourth, a general summary was made for each item in which the trend of the teachers' perspectives and opinions was reflected. The essence of this general summary, illustrated by representative quotes, will be presented in the result section.

## 5.4 Results

The results will be presented separately for the three different kinds of features that were discussed in the theoretical background: the structural features, the goal-setting features and the activity features. First the quantitative data will be presented in a table (Tables 5.2, 5.3 and 5.4). Each item ended with the phrase "... contributed to my professional development." This phrase was removed from the items in the tables for the sake of readability. Subsequently, the results of the focus group interviews will be presented.

### 5.4.1 Structural features

With regard to the duration of the PDP and the frequency of the activities, teachers had differing opinions. Most teachers indicated that they would have liked more time and opportunities to practice the implementation of their new knowledge in the classroom. Some teachers suggested keeping the number of meetings the same, but spreading the meetings over a longer period of time. The majority of teachers would prefer to plan two video interaction training meetings after each informative meeting, instead of one.

Table 5.2. Items for measuring the perceived value of the structural features realised in the PDP.

Features and items	Perceived value	
	Mean	Standard deviation
Sustainable and intensive		
- The duration of the PDP...	3.80	.94
- The frequency of PDP activities...	3.73	1.10
Collective participation		
- Exchanging thoughts and experiences with colleagues...	4.56	.63
- Giving feedback to colleagues...	4.31	.70
- Receiving feedback from colleagues...	4.56	.63

Problems of expanding the PDP were also acknowledged: the current duration and frequency of the PDP was already quite intensive and time consuming. For part-time working teachers in particular, it was very demanding. Nevertheless, a longer period of guided practice was regarded very important by the teachers to establish and maintain the desired effects. One teacher said: *“Actually, the training might have been too short to really change your routines. But looking at the time investment, it was quite enough as it was. To really achieve all the learning goals you probably need more time, but I don’t think you would find any teachers who are willing to participate in such a time consuming programme.”*

Exchanging thoughts and experiences with colleagues was regarded important for professional development by the teachers. All teachers indicated that this is not common practice in their schools. Teachers have regular meetings where they discuss organisational matters and issues on a more general level, but they are not used to exchanging thoughts and experiences regarding their own actual teaching behaviour. Most teachers appreciated this very much in the PDP. One teacher said: *“It was just that you thought, ah, yeah, I also experienced those troubles with that kid. And thinking together about stuff, talking about what they do in certain situations. Exchanging thoughts about these things and having the time to do so was great. Normally, we just don’t take the time to discuss these things. It is really helpful, though.”* A few teachers, however, indicated that they would not easily accept new knowledge or insights from colleagues. They preferred



an authority, such as the trainer, to present knowledge and to provide them with feedback.

Giving feedback to colleagues and receiving feedback from colleagues was recognised to a lesser extent by some of the teachers because they thought the “real” feedback was mainly given by the trainer. They distinguished between “talking about the video fragments” and “feedback.” One teacher said: *“You watch the video fragments of the others very focused, you focus on how she is doing and what could be improved. I did value the remarks that were made regarding my video fragments and the tips I got from my colleagues, but I still think that most real feedback came from the trainer.”* Most teachers, however, valued the feedback they received from their colleagues. Several teachers indicated that they found it difficult to be critically constructive regarding the behaviour of a colleague. This gradually became easier, because a safe learning climate was created in the small groups. This safe small group setting was regarded conditional for effective video based learning with colleagues. Similarly to the exchange of thoughts and experiences, a few teachers indicated that they do not easily accept feedback from their colleagues because they felt that colleagues do not have the authority to “judge” their feedback behaviour. One teacher stated: *“I was a bit stubborn at some times. I have received some feedback from colleagues, but I do not trust their expertise just like that. Why would they have reached that level that I didn’t? I do accept feedback from the trainer, because she certainly knows what she is talking about.”*

#### 5.4.2 Goal-setting features

Table 5.3. Items for measuring the perceived value of the goal-setting features realised in the PDP.

Features and items	Perceived value	
	Mean	Standard deviation
Clear goals that are communicated		
- The goals of the PDP were clear from the start...	4.62	.50
Offering examples		
- The illustration of theory by examples of classroom practices on video...	4.75	.45
Modelling target behaviour by the trainer		
- The modelling of target behaviours by the trainer...	4.50	.52

Teachers all agreed that the goals of the PDP were clear from the start of the first meeting. This stimulated teachers' professional development because they were focused on achieving these particular goals. One teacher said: *"I always want to know why I am doing things. These goals were really relevant to me, so I knew that participating in this PDP was worth my time investment."* The goals were formulated based on our preliminary studies of teachers' practices, knowledge, beliefs and perceived problems in a larger group of teachers. The fact that the goals were set by the trainer beforehand was not problematic for the teachers as they all acknowledged the importance of achieving each learning goal.

The illustration of the theory using video fragments of unfamiliar teachers' classroom practices was valued highly. Both good examples and non-examples were used. Both kinds of examples were considered valuable by the teachers. The non-examples were typical and very recognisable for most teachers. The differences with the good examples were clear and showed what was expected from the teachers. One teacher said: *"It was good to see how you shouldn't give feedback. Sometimes I thought, I would do the same myself. But now we were watching those videos and it was perfectly clear why you should not do it that way. The good examples were well chosen to clarify the theoretical knowledge that was presented. This helped me to learn this new knowledge better."*

The modelling of target behaviours by the trainer was valued in two ways. First, it posed an example of how the targeted behaviour could be realised. Second, it showed the expertise of the trainer. Some teachers needed this to have trust and confidence in the trainer. One teacher said: *"Yes, the right learning goals were set and these were clear for us. We received good feedback on our feedback skills, in the same way as we were expected to give it to the students. I don't know if this was really necessary for my professional development. However, if we had a trainer who did it less well... I don't know if I had learned as much as I did now."*

#### 5.4.3 Activity features

Teachers all indicated that the learning activities fitted their classroom practices and they regarded this as very important. One teacher said: *"You didn't have to do anything extra that wasn't directly relevant for your own classroom actually. I think that was very important for me, it kept me motivated to learn as much as I could."*

Table 5.4. Items for measuring the perceived value of the activity features realised in the PDP.

Feature and items	Perceived value	
	Mean	Standard deviation
Authenticity		
- The learning activities that fitted my classroom practice...	4.50	.73
Plenty of opportunities for active learning		
- Learning from my own experiences...	4.88	.34
- The active participation that was required from me...	4.88	.34
Existing knowledge as a foundation for new knowledge		
- The activation of my existing knowledge regarding the topics...	4.06	.93
- The theoretical knowledge that was presented...	4.31	.48
Demonstration and application of new knowledge		
- Implementing new knowledge in my own classroom practice...	4.63	.50
- Videotaping as a means to enforce the implementation of new knowledge...	4.44	.73
- Noting down concrete plans for implementation in my logbook...	3.50	.97
Reflection on actions		
- Reflecting on own classroom behaviour using videos...	4.88	.34
- Reflecting on each meeting by letter in my logbook...	3.44	.81
- The attention for deliberate, adaptive feedback practices...	4.56	.51

Opportunities for active learning were valued highly. Teachers indicated that they behaved more consciously as a result of learning from their own experiences. Teachers stated that the fact that they saw –and reflected on– their own behaviour on videotape predominantly contributed to their professional development. One teacher said: *“This was very valuable, absolutely. Totally, in every respect. You see yourself and you think; did I really do that this way? For me, this is the best drive to learn.”*

In addition to being actively involved in the video interaction training, teachers appreciated the fact that they were actively involved in assignments and discussions during the informative meetings. This forced them to

process the content actively and it enabled them to make the transfer to their own classroom. One teacher said: *“Yes, you just had to be active, but you want that. That is how you learn the most. We were active in our own classroom, but also in all meetings. That was good, nobody wants to read theory or just listen at four o’clock in the afternoon. You don’t learn anything then, especially not at meetings after a day of hard work in the classroom.”*

Several teachers indicated that they hardly recognised the activation of existing knowledge before discussing a topic, but they thought they would not have learned more when their existing knowledge was activating more explicitly. Other teachers stated that their existing knowledge was activated automatically when discussing the learning goals. This was done at the beginning of each meeting. The interactivity during the meetings also activated existing knowledge automatically, according to these teachers. As one teacher explained: *“In all those informative meetings we started with an activity around a certain concept and after that the new information was presented. We did not do this by letter each time, but my existing knowledge was certainly activated in this way and I could relate the new information easily to my existing knowledge.”*

The fact that theoretical knowledge was presented during the informative meetings was appreciated, especially because this knowledge was translated into practical examples as much as possible. Several teachers indicated theoretical knowledge is only useful when the link to practice is clear. In the PDP, videotapes were used to illustrate the theoretical knowledge. Teachers stated that this worked much better and was more motivating than reading assignments. One teacher said: *“I remember new knowledge much better when you tell it to me, then when I would have to read stuff. And now I could easily understand it, because you related all the new knowledge directly to our practices.”*

The teachers regarded the implementation of new knowledge in their own practices as important. They indicated that the content of the PDP was presented in such a way that they could instantly apply this in the classroom. One teacher said: *“You are focused on your own goal each time when being videotaped. You know where you will pay extra attention to beforehand. When the goal was focusing feedback on social learning, I really concentrated on that aspect.”*

Videotaping was seen as a means to enforce implementation of new knowledge by most teachers, but there was discussion regarding whether this was enforcing or not. Some teachers thought the sound of the word “enforcing” was too negative. They did not recognise the enforcement, but

they did agree that the use of videotaping highly influenced their development in a positive way. One teacher said: *“If you had not videotaped me, I don’t know whether I had implemented the new behaviours in my classroom. Maybe I would, but now I did it very consciously. I just had to do it, because I was videotaped the next week.”* There were some teachers, however, who felt uncomfortable when being videotaped.

Teachers did not appreciate noting down concrete plans for implementation in the logbook, nor reflection on each meeting by letter in the logbook. Teachers did recognise the importance of reflection and of translating new knowledge into concrete actions for implementation, but they did not want to do this by letter. Only a few teachers really used the logbook in practice; the majority only wrote down their plans and reflections because the trainer asked them to. One teacher said: *“I did not like that, because it is not my way of learning. I wrote it down just for you, afterwards I didn’t look at it again. I had my reflections and plans for implementation in my head. Writing it down had no added value for me.”*

The teachers considered reflection on their own classroom behaviour using videos to be one of the most valuable features of the PDP. Teachers indicated that they were enabled to precisely observe what target behaviours they already displayed in the classroom and what target behaviour they had not yet implemented. Their feedback behaviour could be improved instantly, i.e., the next day in the classroom. One teacher said: *“In my first videotape, I looked like a traffic controller: Yes, it’s on the blackboard, you can sit there, you can go on the computer, no, don’t do that. That was the way I was working. Then I saw the video fragments of the others, they gave feedback sitting next to their students. I thought, ahh, I can do that too!”* Some teachers indicated that they especially liked to see the things they did well.

Finally, attention to deliberate feedback practices and making choices regarding the characteristics of the feedback was considered important. Teachers understood that there were no “feedback recipes,” but that feedback had to be adaptive to individual students’ needs. Teachers indicated that the attention to making conscious choices helped them to be more adaptive, especially with regard to the way they provided feedback. One teacher said: *“I feel less guilty when giving feedback in a directive way to particular students. Some of them just need clear instructions to get forward. First, I thought everything had to come out of the students themselves. But now I set clear goals and I guide the students to reaching these goals and when it is necessary I am more directive.”*

## 5.5 Conclusions and discussion

In the present study we tried to answer the following research question: “To what extent did teachers consider the features of a PDP aimed at improving teacher feedback during active learning valuable to enhance their professional development?” The PDP was implemented and evaluated in a preceding study (Chapter 4). The PDP contained those features that were identified to be important for teachers’ professional development in the literature. The PDP appeared to be successful in enhancing teachers’ knowledge and beliefs, reducing the problems they perceived and in improving teachers’ behaviour with regard to feedback during active learning. The extent to which teachers attributed the success of the PDP to each of the features of the PDP was examined in the present study. Results indicated that all features contributed to teachers’ professional development according to the teachers themselves, and teachers valued most features quite highly. It can be concluded that the perceptions of the teachers are in line with what is generally perceived as important for designing professional development programmes. The results of the present study can be used to illustrate the research findings with the experiences of the teachers. This will be done below.

### 5.5.1 Structural features.

Professional development interventions are preferably sustained and intensive (Garet et al., 2001; Van Veen et al., 2012). Our PDP lasted four months and the weekly activities, including the meetings, the videotaping in the classroom and selecting video fragments, made the PDP quite intensive for the teachers. Although teachers confirmed the intensity of the PDP and some stressed the increased workload, more time and opportunities for guided practice were preferred by the teachers. They thought this was essential to establish and maintain the desired effects. It appears that there was a tension between demanding enough of the teachers to reach the learning goals of the PDP, but ensuring a balance was maintained so as to avoid overloading the teachers by requiring too much from them. For this PDP, teachers were motivated to participate, but at the same time they were critical regarding the extra workload. In the end, however, they indicated that they would have liked the PDP to be continued.

From the literature we know that collective participation of groups of teachers from the same school seems very important, for example, for sharing and exchanging experiences (Korthagen, et al., 2006; Van Veen et al., 2012). This was confirmed by the teachers. During the video interaction

training meetings, they obtained an insight into each others' teaching practices. This led them to discuss thoughts and experiences regarding their actual teaching behaviours with each other. Some teachers indicated that they also discussed teaching issues more easily outside the context of the PDP, for example, during lunch breaks. These discussions of the day-to-day teaching processes were valued highly by the teachers.

### *5.5.2 Goal-setting features.*

Teachers mostly appreciated the illustration of the theory using video fragments of unfamiliar teachers' classroom practices. These video fragments served as good examples and non-examples of the target behaviours in the classroom. Merrill (2002) discussed that demonstrating the learning goals in the form of an example is more effective than only presenting information. Additionally, presenting examples besides practicing new skills appears to be better to promote learning than practice alone (Merrill, 2002). The teachers confirmed these findings: they found that the examples clarified the theory that was presented and this helped them to understand the new knowledge. Furthermore, because the classroom situations in the examples were so recognisable to the teachers, this supported the implementation of the new behaviours in their own practice. Teachers were also unanimous about the value of the non-examples on video. Watching and discussing behaviours that were not optimal supported their understanding of the way it should be. By recognising the "mistakes" they made themselves, in addition to the favourable behaviours in the other fragments, they felt supported to improve their own behaviours in the classroom.

### *5.5.3 Activity features.*

Teachers emphasised the value of learning from their own experiences, participating actively and reflecting on their own classroom behaviour. Teachers felt that examining, discussing and reflecting on their own behaviour that was videotaped contributed most to their professional development. In review studies, evidence was already found for the positive effects of the use of videos on the interaction skills of professionals, and on the beliefs and the quality of instruction of teachers (Fukkink et al., 2011; Van Es & Sherin, 2010). The results of the present study can add the favourable reactions of teachers themselves to this method. In the beginning, several teachers were worried about being videotaped. This signifies the necessity of creating a safe learning environment and building

trust between the group members, which appears conditional for video based learning and for PDPs in general (Borko et al., 2008; Seidel et al., 2011). By composing small groups in consensus with the teachers themselves, and by also attending to the positive examples of teachers' videotaped behaviour, safe conditions for learning were realised. Eventually, all teachers, including those who were most reserved in the beginning, indicated that the video interaction training contributed significantly to their professional development. Although some teachers indicated that "videotaping serving as a means to enforce implementation of new knowledge" sounded too negative, the video based learning served as a "gentle push" in the direction that was aimed for. In addition to stimulating critical reflection on their own practices, being videotaped with the knowledge that fragments of those videos would be discussed with colleagues did promote teachers to actually implement the new knowledge in their classrooms.

The value teachers attributed to the active learning from their own experiences in the classroom confirms Fullan & Miles' (1992) notion that teachers are hoping to gain concrete, practical ideas that are directly useful in their day-to-day practice. The fact that the teachers greatly appreciated the practicality and the applicability of the PDP may (partly) explain why most of them disliked writing in the logbooks. Instead of writing things down, they preferred to implement their new knowledge in the classroom.

#### *5.5.4 Limitations and directions*

When interpreting the conclusions of the present study, some limitations should be kept in mind. The first limitation was the small sample of teachers that participated in the study. This was a consequence of the intensive and time-consuming character of the PDP that was evaluated. Only the teachers that participated in the PDP could be included in this study. Another limitation is the fact that the trainer was the same person as the interviewer in the evaluation meetings. Although teachers were critical at some points, for instance, regarding the logbooks and the duration of the PDP, it is possible that the positive answers reflected some social desirability. Finally, when generalising our findings to other PDPs, the focus of this specific PDP should be kept in mind. Although teachers' knowledge and beliefs were enhanced through the PDP, the main goal was to improve teachers' behaviour with regard to a very important teacher skill: giving feedback. PDPs that focus less on teachers' skills, but more on, for instance,



knowledge development, may benefit from the inclusion of other features than those examined in this study.

The PDP that was evaluated in this study included several features. This total package of features included in a PDP that also fulfilled the conditions of building on teachers' knowledge and beliefs, perceived problems and classroom behaviour and creating a safe learning environment appeared to be effective (Chapter 4). In the present study, teachers indicated that all features contributed to their professional development. It is, however, not certain that all these features are necessary to be included in a PDP. Future research could focus on the question whether (and what) specific combinations of features are especially effective. Furthermore, there may have been features that were especially important for achieving specific effects. For example, collective participation may have been important for achieving changes in teachers' beliefs, but less important in affecting behavioural changes. Identifying possible specific functions of the different features would also be an interesting topic for future research.

# Chapter 6



## **Chapter 6**

### **Teacher learning in the context of a professional development programme: A case study**

#### **Abstract**

The purpose of this study was to gain insight into characteristics of teacher learning in the context of a successful professional development programme (PDP). An in-depth case study of the learning activities of two teachers, the problems they encountered and the way they regulated their learning was conducted. Results show that these teachers differed greatly from each other; one teacher showed a meaning directed learning pattern, while the other teachers' learning pattern was undirected. Still, positive effects of the PDP on classroom behaviour were observed for both teachers. It appeared that the trainer could compensate for a lack of self-regulation.

## 6.1. Introduction

Feedback is one of the most powerful tools teachers can use to enhance student learning (Hattie, 2009). Giving feedback in an active learning context, however, appears to be a difficult task for teachers. Studies in several different school contexts and countries have shown that teacher feedback during active learning is often suboptimal for enhancing student learning; teachers scarcely pay attention to learning goals, feedback rarely contains a combination of confirmation and constructive criticism and teachers often control rather than facilitate student learning (e.g. Authors, in press<sup>a</sup>; Niemi, 2002; Stephen, Ellis, & Martlew, 2010). A professional development programme (from now on abbreviated as PDP), aimed at improving teacher feedback during active learning, was therefore developed and implemented in the highest grades of Dutch schools for primary education (Authors, in press<sup>c</sup>). This PDP was developed in a way that it builds on teachers' own knowledge and beliefs, and classroom practices, which seems conditional for any PDP (e.g. Opfer & Pedder, 2011; Verloop, Van Driel, & Meijer, 2001). It incorporated several features that have to be taken into account to increase the chance of the PDP efforts resulting in effective professional development; the PDP was intensive and sustainable, it required collective participation of all teachers of the same grade levels in the schools and plenty opportunities for active learning were realized (e.g. Garet, Porter, Desimone, Birman, & Yoon, 2001; Van Veen, Zwart, & Meirink, 2012). The PDP consisted of video-based learning for a considerable part, since research has shown that the use of videos can yield positive effects on teachers' beliefs and on their interaction skills (Fukink, Trienekens, & Kramer, 2011; Van Es & Sherin, 2010).

Positive short- and long-term effects of the PDP on teachers' knowledge and beliefs and their feedback behaviour were observed. For example, teachers learned to believe that feedback must be goal-directed and that learning goals need to be communicated to students. In the classroom, teachers related their feedback explicitly to the learning goals more often (for more details, see Authors, in press<sup>c</sup>). Since research on professional development has mostly yielded disappointing results, as teacher professional development activities are often found to be ineffective in terms of changing teachers' practices (Opfer & Pedder, 2011), it is interesting to examine how teachers learned during the course of this PDP. This is important because answers to this question can be used for further improvement of the professional development of teachers (Beijaard, Korthagen, & Verloop, 2007). The purpose of the present study was,

therefore, to gain insight into the characteristics of teacher learning in the context of a professional development programme in terms of learning activities and teachers' regulation of learning. An in-depth case study of the learning activities of two teachers, and the way they regulated their learning, was conducted to fulfil this aim. Before describing the study in more detail, we will elaborate on the central concepts of this study: learning activities, regulation of learning and learning patterns.

### *6.1.1 Learning activities*

A small number of studies have been conducted on how teacher learning at the workplace actually takes place (e.g., Hoekstra, Brekermans, Beijaard, & Korthagen, 2009; Kwakman, 2003; Van Eekelen, Boshuizen, & Vermunt, 2005). Four kinds of overt, observable learning activities were described by these studies, namely learning by experimenting, learning in interaction, learning by using external sources and learning by reflection on one's own practices. 'Experimenting' refers to trying something out in one's own practice. 'Learning in interaction' refers to talking or sharing with others or participating in, for example, a group discussion. 'Learning by using external sources' may occur when a teacher reads something or when (s)he attends a seminar. 'Reflection' refers to consciously thinking about one's own practices.

Because all learning activities can occur individually as well as collaboratively, Bakkenes, Vermunt and Wubbels (2010) refined this classification. Furthermore, these authors added some covert or mental activities. Six kinds of learning activities were distinguished: experimenting, considering one's own practice, getting ideas from others, experiencing friction, struggling not to revert to old ways, and avoiding learning. These last three mental activities describe the more problematic aspects of teacher learning that do play a role in normal day-to-day teacher learning. In this study, these problematic aspects are not regarded as separate learning activities, but as problems with learning that can occur during each activity. Although teachers may be engaged in the same visible activities, they may use very different thinking processes that may also lead to different learning outcomes. Thinking processes that are supposed to direct the teachers' learning activities are called regulation processes (Butler, Novak Lauscher, Jarvis-Selinger, & Beckingham, 2004). We will now elaborate on these processes.

### *6.1.2 Regulation of learning*

In a recent study, Endedijk, Vermunt, Verloop and Brekelmans (2012) showed that there is a large variation in the self-regulation activities that teachers use to direct their learning activities. These authors adopted the definition of Pintrich (2000, p. 453) who defines self-regulation of learning as *'an active, constructive process whereby learners set goals for their learning and attempt to monitor, regulate, and control their cognition, motivation and behaviour, guided and constrained by their goals and contextual features in the environment'*. Self-regulation activities that need to be performed before the task are goal orientation, assessing one's own feeling of self-efficacy, and strategic planning (making decisions about how to reach the goal). During the performance of the task, the accomplishment of the goals needs to be monitored by controlling the learning strategy, and by monitoring the learning results. After finishing the task, the learner may reflect on the learning outcome, self-evaluate the learning experience and draw inferences for subsequent learning (Endedijk et al., 2012; Zimmerman, 2006).

Two dimensions of teachers' regulation of their learning were found (Endedijk et al., 2012). The first is the active-passive dimension that describes the activity of the teachers in regulating their own learning. Passive regulating teachers need external (or show a lack of) regulation, while active regulating teachers often use information from others which steers their learning. The second dimension is the prospective-retrospective dimension which describes the variation in the focus of the regulation. The prospective regulation addresses the planning and goal-setting phase, while the retrospective regulation involves the monitoring, reflection and evaluation phase of learning (Endedijk et al., 2012). Several studies of teachers' regulation of learning have focused on informal learning at the workplace (e.g. Van Eekelen et al., 2005). At their workplace, teachers' goals are usually focused on the achievement and well-being of their students, more than on their own learning. Often clear learning goals for the teachers' professional development are lacking. It is observed, however, that learning activities that begin as unplanned and non-deliberate can still involve active regulation activities, though in a retrospective way (Vermunt & Endedijk, 2011). Nevertheless, evidence has been found that organized learning environments do elicit better learning activities and outcomes than informal learning (Bakkenes et al., 2010). The PDP that formed the context of teacher learning as examined in the present study was one such organized learning context: clear and well-defined learning goals were set in each phase of the programme.

### 6.1.3 Learning patterns

Teachers' usual learning activities and regulation activities seem to be related to each other in a learning pattern. A learning pattern is defined as 'a coherent whole of learning activities that learners usually employ, their beliefs about own learning and their learning motivation, a whole that is characteristic of them in a certain period' (Vermunt & Endedijk, 2011). The conclusion of a recent review of the research on patterns in teacher learning was that teachers differ in the learning patterns they adopt (Vermunt & Endedijk, 2011). These patterns differ with regard to the quality of teacher learning and teachers' professional development in the context of educational innovations. From this review, three different learning patterns were identified; an *immediate performance directed pattern*, which refers to teachers who are mainly aiming to improve their immediate performance in the classroom; a *meaning directed pattern*, which refers to teachers who are aiming to understand underlying principles and to extend one's theory of practice; and an *undirected pattern*, which refers to teachers who experience problems with learning about teaching or with the implementation of an educational innovation, and who sometimes avoid learning (Vermunt & Endedijk, 2011). These problems may be caused by the same characteristics of this learning pattern as were consistently found in patterns of student learning: a lack of regulation, not knowing how to learn appropriately and uncertainty about their own capabilities (Vermunt & Vermetten, 2004).

Variation within the groups of teachers who display a certain learning pattern exists. There are, for example, meaning-oriented teachers who need a lot of external support, while others actively combine information from different sources to construct an integrated knowledge base by themselves (Oosterheert & Vermunt, 2001). As was mentioned before, teachers may conduct the same activities but still the thinking processes and learning outcomes may be very different for different teachers. Learning patterns are influenced by contextual factors, such as external stimulus or support at the workplace, and by personal factors, such as teachers' personality traits and their existing knowledge, beliefs and attitudes (Clarke & Hollingsworth, 2002; Vermunt & Endedijk, 2011). Another important personal factor that influences teachers' learning appears to be teachers' willingness to learn. This is considered a necessary prerequisite for workplace learning and professional development to occur. Teachers may differ with regard to their willingness to learn from not seeing the need to



learn, to those who wonder how to learn, to those who are eager to learn (Van Eekelen, Vermunt & Boshuizen, 2006).

#### 6.1.4 *The present study*

Although considerable knowledge of teacher learning has already been gathered, this research area is still in its infancy when compared to the study of student learning. Relationships between learning patterns and learning outcomes need to be investigated in more detail in order to build a solid knowledge base regarding teacher learning. The present study aims to be a small step in this direction. Teacher learning is studied within the context of participation in a PDP. To examine the characteristics of teacher learning in the context of this PDP, the following research questions will be addressed:

1. What learning activities do teachers undertake and what problematic aspects of learning do they encounter?
2. How do teachers regulate their learning?

As was explained in section 1.1, the learning activities that will be distinguished are getting ideas from others, experimenting and considering one's own practice. Problematic aspects of learning that can occur during these three activities are experiencing friction, struggling not to revert to old ways and avoiding learning (cf. Bakkenes et al., 2010). Regulation of learning is defined by the active-passive dimension and the prospective-retrospective dimension (Endedijk et al., 2012). To answer the research questions, an in-depth case study of the learning processes of two teachers was conducted. We tried to obtain a rich and comprehensive description of the teachers' learning processes by selecting two teachers who differed greatly from each other with regard to the way they learned and the extent to which they encountered problems with learning. In this way different learning activities, regulation activities and problematic aspects of learning could be described fully.

## 6.2 Method

### 6.2.1 *Participants*

Sixteen teachers from two primary schools that practised the concept of active learning when teaching environmental studies (i.e. classroom situations in which students work in small groups on different tasks within projects that integrate subjects such as history, geography and biology) participated in the PDP that was developed to improve teacher feedback during active learning (Authors, in press<sup>o</sup>). This PDP was implemented during the school year 2010-2011. Two of the participating

teachers were selected based on the pretest measurement, because we expected that teachers who differed greatly from each other with regard to their initial behaviour, beliefs and perceived problems would start their learning processes differently. We furthermore based the selection on observations of teachers' learning during the course of the PDP. Because of the intensive and small-scale nature of the PDP, the trainer gained an impression of the learning characteristics of each participating teacher. Lisa and Sara (these names are fictitious) were selected. They both worked with 9–12-year-old students in the same school in the south-east of the Netherlands. Lisa had six years of teaching experience and Sara five years, while their experience with active learning was four and five years respectively. Both teachers were informed about the analyses conducted in this case study and gave permission to use literal quotations of their verbal and written comments.

Lisa already had some knowledge and beliefs regarding feedback during active learning that were in line with the theoretical knowledge regarding this concept. For example, she acknowledged the importance of clear learning goals and she mentioned the coaching, facilitating role of the teacher in this learning context. Lisa already showed some classroom behaviours that were in accordance with the learning goals of the PDP (see Table 6.2). Lisa indicated that she perceived a number of problems, such as difficulties with asking the right questions to promote learning, difficulties with balancing 'compulsory' learning goals and student initiatives, and she found it difficult to criticize student work.

Sara reported little knowledge and beliefs regarding feedback during active learning and the beliefs she reported did reflect theoretical knowledge to a lesser extent. For example, she mentioned that giving feedback is expressing an opinion regarding a student's work and the teacher must enable the students to proceed. In the classroom, Sara gave little goal-directed feedback and the way of giving feedback was directive in nearly all feedback interactions with her students (see Table 6.2). The only problem that Sara perceived was difficulty of activating student thinking.

### *6.2.2 Professional development programme*

The PDP aimed at improving teacher feedback during active learning. Both the topic of feedback, as well as the conditions for giving feedback in an active learning context, were addressed in the PDP. For example, classroom management, offering structure and focusing on the development of students' self-regulated and cooperative learning skills were

also themes that were included. The PDP consisted of weekly activities over a period of four months. The following sequence of activities was carried out four times, in succession:

1. Receiving input during an informative meeting with the team (of 6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup> grade teachers).
2. Experimenting with the new knowledge in the classroom.
3. Reflection on own practices during video-interaction training meeting in small groups and with the researcher.

Active prospective, as well as active retrospective regulation of learning was stimulated in all activities of the PDP. Clear goals that were based on teachers' own beliefs, concerns and practices were set for the entire PDP, as well as for each separate meeting. Ways in which the goals could be reached were presented and discussed during the meetings and afterwards teachers were asked to note down their ideas for implementation. In between meetings, teachers were required to implement certain well-defined goal-directed behaviours and to reflect on these afterwards. All meetings were highly interactive and active participation of the teachers was required. Teachers were stimulated to use all the information they received actively to direct their own learning. A more detailed description of the learning activities of which the PDP consisted will be structured around these learning activities below.

*Getting ideas from others.* We regarded 'others' as external sources, in this case the trainer (i.e. not the teachers' own colleagues). Getting ideas from these external sources was facilitated in the PDP in two ways. First, the trainer presented theory about feedback during active learning during the informative meetings. Video fragments showing (unfamiliar) teachers' behaviour that constituted examples and non-examples of application of the theory were also presented and discussed. Second, the trainer provided each teacher with personal, tailored feedback during the video interaction training meetings. The kind of feedback the teacher received and her reaction to this were seen as getting ideas from others.

*Experimenting.* Teachers were expected to implement the new knowledge in their classroom during active learning lessons. They were regularly videotaped during these lessons.

*Considering one's own practice* was stimulated in different ways. At the end of each meeting, the teachers were asked to note down in a logbook what they had learned and their ideas for how they could implement the new knowledge in their own classroom. After being videotaped in the classroom, teachers received their own videotape. They were asked to select four

fragments from this videotape that captured optimal and non-optimal teacher behaviour regarding the goals that were the subject of the previous informative meeting. During the video interaction training meeting each teacher was allowed half an hour to present the selected fragments to two colleagues and the trainer and to discuss any questions and concerns.

### 6.2.3 Data collection

Multiple data collection methods were used in relation to each other in order to obtain a rich, detailed and complete description (Merriam, 1998). Three types of measurements were conducted repeatedly during the course of the PDP. The data sources were: videotaped observations of teachers' feedback behaviour in the classroom, videotaped observations of video interaction training meetings, and teachers' self-reports of what they had learned during (parts of) the PDP.

*Observations of teachers' feedback behaviour* were used to see how the teachers experimented with the new knowledge in their classrooms. After each informative meeting, 20 minutes of an active learning lesson taught by each teacher were videotaped and analysed. Guidance and feedback interactions were discerned – interactions in which the teacher gave information to the student(s). For these interactions, the following characteristics were examined: whether or not the feedback was goal-directed, what the nature of the feedback was, and in what way the feedback was given. The nature of feedback could be confirming, critical, constructive, a combination of these, or neutral. The way in which feedback was given could be facilitative, directive, encouraging or neutral. The same procedure was followed before, directly after and seven months after the PDP (for more details of the category system that was used, see Authors, in press<sup>a</sup>).

*Observations of teachers' participation in the video interaction training* were used to examine what and how the teachers learned when discussing their own video fragments with two colleagues and the trainer. During these meetings, the teachers presented the fragments they had selected for discussion. They explained why they felt these fragments contained optimal or non-optimal behaviour with regard to the learning goals. This selection with the accompanying explanation and discussion gave an indication of how well the teacher had understood and implemented the learning content. The feedback the teachers needed and the way they reacted on this feedback reflected their learning and regulation activities.

*Self-reports of what was learned* during each meeting and of the ideas for how to implement the new knowledge in the classroom were written

at the end of each meeting (i.e. both the informative and video interaction training meetings). Three questions were answered in a logbook: What did I hear and/or do?; What was important for me?; What concrete intentions can I derive from this? (cf. Korthagen, Loughran, & Russell, 2006).

#### 6.2.4 Data analysis

*Observations of teachers' feedback behaviour.* The videotaped teacher-student interactions were analysed six times. A videotape of the teachers' behaviour before, directly after and seven months after the PDP had been analysed for measuring the effects of the PDP. After the second, third and fourth informative meeting (the pretest videotape was used for the first video interaction meeting) videotapes were analysed to see how the teachers experimented with the new knowledge in their classrooms. Guidance and feedback interactions were identified from the videotapes and the feedback characteristics were scored. For each lesson of each teacher the percentages that indicated how often each characteristic occurred compared with the total number of teacher-student interactions were calculated.

*Observations of teachers' participation in the video interaction training.* All video interaction training meetings were videotaped. Those parts of the meetings in which the teachers presented their selected fragments and discussed their questions and concerns were transcribed verbatim. Each teacher got half an hour to present her selected fragments during the second, third and fourth video interaction training meeting. Not all fragments could be discussed within the available time; nine of Lisa's selected fragments were discussed and seven of Sara's. The total transcription was divided into parts that concerned the discussion of only one selected video fragment.

*Self-reports of what was learned* during each meeting and of the ideas for how to implement the new knowledge in the classroom consisted of brief fragments of text. There were eight self-reports from each teacher. Each fragment was interpreted as a whole.

Table 6.1 depicts what data source was used to describe the learning during each learning activity. First, a description of each data source in terms of both learning and regulation activities was made by relating the data to the description of problematic aspects of learning, and the regulation activities as were described in the introduction (Bakkenes et al., 2010; Endedijk et al., 2012, Zimmerman, 2006). Second, interpretations of the data in these descriptions were explicated and approved by two fellow

researchers. Third, general descriptions of the learning activities ‘getting ideas from others’ and ‘considering one’s own practice’ were made by combining the descriptions based on the two different data sources. Again, these descriptions were approved by the other two researchers. The essence of the descriptions, illustrated by representative quotes, will be presented in the results section.

*Table 6.1. The data sources that were used to analyse teacher learning during the different learning activities.*

Data source	Observations of teachers' feedback behaviour	Observations of video interaction training	Self-reports of what was learned
<b>Learning activity</b>			
Getting ideas from others		X	X self-reports informative meetings
Experimenting	X		
Considering one's own practice		X	X self-reports video interaction training

### 6.3 Results

Before presenting the results regarding the teachers' learning processes, first the learning outcomes of the PDP with regard to Lisa's and Sara's classroom behaviour will be presented. In Table 6.2 these results are compared to the results of the total group of 16 teachers. The following goals regarding the characteristics of feedback were set:

- Teachers relate their feedback to clear learning goals;
- Teachers include confirmation and criticism as well as constructive remarks;
- Teachers balance directive and facilitative ways of giving feedback.

Positive effects of the PDP on the feedback Lisa and Sara gave to their students during active learning were observed after the PDP ended. Both teachers directed more often their feedback to the learning goal.

Optimal feedback contains confirmation of good work and constructive criticism. Furthermore, it contains advice for improving the quality of the work (Nicol & Macfarlane-Dick, 2006). The nature of the feedback Lisa and Sara gave more often contained two, or all three, of these aspects.

The goal of the PDP with regard to the way of giving feedback was to facilitate a more even balance between directive and facilitative ways of giving feedback. During the observation before the PDP started, Lisa gave too little directive feedback. Most of her feedback was given in a facilitative way. Sara showed the opposite: she was very directive to her students and no facilitative feedback was observed. Although an active-learning scenario asks teachers to guide and facilitate students' learning processes, some students may need clear directions at some points. The aim was therefore to achieve a more even balance between directive and facilitative ways of giving feedback. According to this aim, Lisa learned to be more directive on some occasions, while Sara learned to give more feedback in a facilitative way. For a more extensive overview of the short- and long-term effects of the PDP, see Authors in press<sup>c</sup>. The results will be structured around the three learning activities: getting idea from others, experimenting and considering one's own practice.

*Table 6.2*

*Percentages of teacher-student interactions that contained the target feedback characteristics during the different measurement times of Lisa, Sara and the total group of teachers that participated in the PDP (n=16).*

Time	Preceding PDP			Directly after PDP		
	Lisa	Sara	Mean	Lisa	Sara	Mean
Characteristic						
Related to goal:						
Yes	17.6	3.4	13.5	47.6	38.9	27.3
Nature of feedback:						
Confirm-Criticism-Construct	0.0	3.4	3.4	9.5	11.1	5.3
Combination of two	47.1	6.9	29.7	38.1	27.8	33.8
Remaining	52.9	89.7	66.9	52.4	61.1	60.9
Way of giving feedback:						
Directive	17.7	82.8	54.1	47.6	55.6	38.7
Facilitative	70.6	0.0	29.9	38.1	33.3	35.5
Remaining	11.8	17.2	16.1	14.3	11.1	26.2

### 6.3.1 Getting ideas from others

#### 6.3.1.1 Lisa

Self-reports of what was learned during each informative meeting can be seen as retrospective regulation of learning. Lisa's self-reports revealed that she understood the essence of the information that was presented. Active regulation was visible in the ideas she noted down about how to implement the new knowledge in her classroom, since her ideas were formulated as concrete plans for action. Her self-report after the second informative meeting illustrates this: *'Important for feedback: mentioning the learning goal. Learning goals must be concrete and measurable. Success criteria must be given, so that students know what is expected from them. Remember slide 9, this is very clear! This is about the difference between formulating the learning goals versus formulating the activities that students need to perform. C-C-C stands for Confirmation, Criticism, Constructive: say what is good, what can be improved upon and give suggestions for doing so. My intention: look at the students' research questions and think about success criteria and ways to get these questions on a higher level.'*

Active regulation of learning was also recognizable during the video interaction training meetings. Lisa did not need much external regulation by the trainer. She consciously implemented the information she received regarding feedback focused on students' metacognition in the following example. Prompting questions and confirmation by the trainer were sufficient:

Lisa	<i>I think this fragment is a good example of how I focus my feedback on this student's self-regulated learning.</i>
Fragment description	A student works on the computer and asks Lisa whether or not she can print some information. In the interaction that follows, Lisa stimulates the student to think critically about her learning goal and the function of this information with regard to this goal.
Colleague	<i>When you see the reaction of that student!</i>
Lisa	<i>You know enough then, don't you?</i>
Trainer	<i>Yes, she wants to print this information without considering whether and how she is going to use it. She only started thinking when you asked her about it.</i>
Lisa	<i>Yes, and this also happened when we talked about the way she and her fellow student cooperated with each other.</i>
Trainer	<i>Why would you think this is feedback focused on students' self-regulated learning?</i>



- Lisa *I think this feedback has contributed a little to this student's learning to learn. She will probably not ask the same question again in another lesson, because now she has learned she has to monitor whether the information she found contributes to reaching the learning goals or not.*
- Trainer *Exactly, this feedback is also applicable during other lessons and on other topics.*

### 6.3.1.2 Sara

In Sara's self-reports some of the information that was presented was reflected, but it was often somewhat superficial. She noted down ideas for implementation, but these were not very concrete. Her self-report after the second informative meeting illustrates this: *'I thought C-C-C was interesting; what's good, what can be better and tips. Formulating success criteria is important; goals and sub-goals. We haven't done this yet. This is an expansion on our way of working. If we don't know the learning goals, neither will the students. I will certainly get started with this.'*

Sara needed much external regulation by the trainer because she did not regulate her own learning. She selected fragments of her videotapes, but was insufficiently guided by the learning goals during this selection. Misunderstandings regarding the goals and content of the PDP had to be frequently corrected by the trainer through repeating and explaining the information that was discussed during the informative meeting. Sara frequently struggled to understand and interpret this information. The following excerpt is an example of this:

- Trainer *And what fragment did you select?*
- Sara *Here, it started at 6.40. I thought this was not good.*
- Colleague *Not goal-directed or not C-C-C?*
- Sara *Yeah, I don't know exactly. I did select good examples and examples that were not good, but I really had trouble keeping those things apart.*
- Trainer *Okay, when you have a clear learning goal and you give feedback on that, it is indeed easier to also give confirmation, critique and some constructive advice.*
- Sara *Yes, you see! It is the same.*
- Trainer *No, these are two important characteristics of feedback: goal-directedness and C-C-C. These are different things.*
- Sara *Oh. I found this confusing. Because, in a way, it is the same. Isn't it?*

- Colleague *No, it is not the same. You can give goal-directed feedback without C-C-C.*
- Sara *Okay...*
- Trainer *And you may even give C-C-C feedback that is not goal-directed. But in that case you say what is good and what is not yet good, according to your own ideas of how it should be ,and then that's not clear for the student.*
- Sara *And that's C-C-C?*
- Trainer *Yes, but ideally you do both. Goal-directedness is about setting a clear learning goal and relating the feedback to that goal. The C-C-C is telling what the student did well, what can be improved and giving suggestions for this improvement.*
- Sara *Okay. Well, anyway, I selected 6.40 – 7.10 and I daren't say anything about what I am doing here.*

### 6.3.2 Experimenting

#### 6.3.2.1 Lisa

An active, prospective regulation of learning characterized Lisa's experimenting in her classroom. Specific goals were set by the trainer for each sequence of activities that started with the informative meeting, followed by experimenting in the classroom. Lisa actively used the information that was presented during the informative meetings to improve her feedback behaviour according to these goals. Analyses of the observations of Lisa's behaviour repeatedly showed an increase of the occurrence of those characteristics that were being specifically aimed at during that phase of the PDP. For example, during the second sequence of meetings, the focus was on relating the feedback explicitly to the students' learning goals. In 42.1% of Lisa's feedback interactions she did this, compared to 17.6% of the interactions in the first observation. Similarly, when the focus was on including confirmation and criticism as well as constructive remarks in the feedback, the feedback interactions in which Lisa did this increased from 0.0% to 15.8%. An example of this feedback is:

- Lisa *And, what was your research question?*
- Student 1 *What are hurricanes and how do these originate?*
- Lisa *How do hurricanes come into existence. And did you find an answer to this question?*
- Student 1 *Yes, we wrote that down here.*
- Lisa *Okay, you wrote it down. But do you know it yourself, can you*

*tell me?*

Student 2 *Yeah, well, we found it last week and we wrote it down in this Word document.*

Lisa *Okay. It is very good that you have already found the information and that you have noted it down there. But when you give your presentation later on, you will have to know the answer to your research question. Otherwise, you just go and read it out loud. And then that answer is still correct, but you haven't really learned it. Do you understand what I mean?*

Students *Yes.*

Lisa *So, the next step is that you make sure that you really understand the information you found and that you can explain it to others.*

Student 2 *Yes.*

Lisa *Well, how can you do this?*

Student 2 *Maybe we can both read it again and try to remember it.*

Lisa *That is possible. You might also try to read parts of the information first and then explain it to each other in your own words.*

#### 6.3.2.2 Sara

From the observations of Sara's experimenting in the classroom it became clear that Sara's behaviour was not guided by the learning goals of the PDP. Her feedback behaviour seemed to be influenced more by the organization of the lesson and by the learning materials that were used. In the third video observation, Sara displayed all the target behaviours: she frequently related her feedback to the learning goals and she regularly included confirmation, criticism as well as constructive remarks in her feedback. An increase of feedback given in a facilitative way was visible. It appeared that Sara learned a lot. In the fourth video observation, however, it seems that Sara reverted to her old ways of giving feedback; there is a large decrease in the occurrence of the target behaviours. The difference that was observed between these two lessons was the assignment Sara gave to the students. In the first lesson levels of thinking are described on the blackboard in relation to the topic 'the human body', including example questions that students can ask themselves to reach this level. This way of working appeared to support her feedback behaviour:

Sara *Okay, you say that you are almost ready. Well, you might check all these thinking levels: can you give information about the*

- muscles regarding each level? (points to the blackboard)*
- Student 1 *I think so.*
- Sara *At the describing the characteristics level, I haven't heard anything yet about the colour. You know about the size and form, you have examples of this and that is very good. But what does one muscle look like? Can you say something about that?*
- Student 1 *Yes, like this. (points to a picture in a book)*
- Sara *Like that, yes. But look at this other picture of a muscle. Can you say something about this? Here is the outside of the muscle, here is the inside, what are the different characteristics of these parts of the muscle?*
- Students *Yes...*
- Sara *Because that is the goal, that you know exactly what a muscle looks like. What you have found here are examples of muscles. That is good, you can use these to clarify the information, but first you need to describe what a muscle looks like and how it is built up. And then you can give those examples.*
- Students *Yes*
- Sara *Do you understand? So, what are you going to do now?*
- Student 1 *Well, see if we can find more information.*
- Sara *More information? What do you think Julia?*
- Student 2 *Look at this information again.*
- Sara *Look at it again, and what are you looking for then?*
- Student 2 *What a muscle looks like and also what parts of the muscle look like.*
- Sara *Exactly. And after that, you may check whether you have worked on the other levels in the same way. Good luck, ladies!*

In the other lesson, Sara wanted the students to fill in a booklet that contained several forms for determining the position of a certain animal in the animal kingdom. Several short assignments on different pages needed to be completed by the students. Several students did not understand the assignment and did not know how to work with these materials. They responded with decreased motivation and less task-orientated behaviours. Although Sara felt uncomfortable in this situation and this way of working deteriorated her feedback behaviour, she did not intervene by choosing another way of working:

- Sara *You know how it works, what you have to do?*
- Student 1 *No, I don't understand. We have to fill in our names here. And*

- we put the name of our topic there?*
- Sara *Yes. And then you colour this on the third page. The animal kingdom. Vertebrates. What have you got, a reptile or an amphibian?*
- Student 2 *A reptile.*
- Sara *Then you turn this around, reptile, reptile (points to several places on the page of the booklet). Lizards, crocodiles, turtles and snakes. Which does your animal belong to?*
- Student 1 *Crocodiles.*
- Sara *And then you have to say which species it belongs to. And if the right species is not there, you have to fill it in yourself here at the bottom of the page. Yes?*
- Student 2 *Okay.*
- Sara *After that you must look here. What did you have to do here?*
- Students *Uhm...*
- Sara *You've got to complete this one first and that is on the back side of this paper. The rest you can find in the folder that is over there. And don't forget to write today's date on each assignment.*

### 6.3.3 Considering one's own practice

#### 6.3.3.1 Lisa

From the discussions during the video interaction training meeting it was clear that Lisa understood well the learning goals that were focused on during any particular meeting. The fragments Lisa selected were always relevant with regard to the learning goals. The fragments capturing optimal behaviours that Lisa selected were indeed good examples that were illustrative of the theory that had been discussed. Lisa was quite critical in her reflections on her classroom behaviour. When selecting the video fragments she looked at her own behaviour, but also to the effects of it on students' learning. This was illustrated by minutes in her logbook where she described the reasons for selecting a certain fragment: *'I am being too directive here! This student does not agree with my ideas at all and feels that he is being pushed in my direction.'* Another example is: *'I do give goal-directed feedback here, but I am steamrolling over the students' answers. I do not feel that my feedback has helped these students.'* This indicates an active retrospective regulation of learning.

Lisa often chose to discuss the fragments of which she was not sure. She experienced friction on some occasions when implementing the

new knowledge in her classroom. She then brought in clear questions with which she was struggling before presenting the video fragments she selected. For example, after the informative meeting that contained the topic of providing structure in the form of clear goals and expectations in relation to the balance between directive and facilitative feedback, Lisa selected a fragment in which she gave feedback to students who were working on the topic 'lung capacity'. They conducted a small experiment using balloons to show that different people have different lung capacities. After discussing the students' work, Lisa gave them an additional research question that she chose for them herself, namely how can people enlarge their lung capacity? Lisa was satisfied with the effect of this intervention on the students, but at the same time she was uncertain about being too directive when giving the students such a question:

Lisa *I have been quite directive the last time actually, because I thought in my other videotape. I had a fairly passive role because I thought... well, I felt that telling the students what to do is not a good idea. But now I've given them a new research question, which is, in fact, a pity because I would prefer that they came up with their own questions. Only, sometimes I do have the idea that when you suggest a question yourself, they work on it with much more enthusiasm. When you give them a research question yourself it can help them to think on a higher level. Students are inclined to ask questions such as 'how long can I hold my breath?' Do you understand?*

Colleague *You mean you have to give more directive feedback then?*

Lisa *Not directly directive feedback, I actually mean offering them structure in the form of a clear research question. During this lesson I noticed that when I do this, and when I am clear about what I expect from them, the students come to a deeper learning.*

Colleague *Yes, but directive feedback is sometimes good, when a student needs it, isn't it?*

Trainer *Indeed, but facilitative feedback is especially suitable to stimulate active learning. Structure, however, always has to be offered for every student.*

- Lisa *Yes. The last two times I let that go a little. I really like structure, actually, but still I thought they really had to come up with their own research questions. By focusing on giving feedback that includes confirmation, criticism and constructive remarks, I tended to get as much out of the students themselves as was possible. But now I thought offering structure can provide the basis to go a step further.*
- Trainer *Yes*
- Lisa *I did this a bit more during this lesson. I notice that I communicated my expectations of the students much clearer than I did in the last two videotapes.*
- Trainer *And that is one of the goals of this training.*
- Lisa *Yes, I know. But the first time this was also the goal, but then I thought that I was being too directive. By offering them lots of structure, I thought they had too few opportunities to make their own choices. But there is indeed a difference between offering structure and being directive.*
- Trainer *You may want to consider on which aspects you want to give the students directions on. In this fragment, it is clear that you provide structure in the form of a new learning goal formulated as a research question. How they are going to find an answer to this question and how they will present this information is still open. They can make their own choices, because these can both be done in several ways.*
- Lisa *Yes, they can decide for themselves how they are going to answer this question.*
- Trainer *So you were not being directive, but you offered them structure. And within this structure there are opportunities for own choices.*
- Lisa *Yes, indeed. So it really was a good example of my teacher behaviour. Just a minute, I want to note this down.*

Another example of Lisa's active retrospective regulation of learning was the selection and discussion of a video fragment regarding the provision of goal-directed feedback that includes confirmation, criticism, as well as constructive remarks. She did also set clear learning goals for other lessons of other subjects and consciously related her feedback to these goals. Lisa experienced the advantages of doing so: *'It is easier to confirm the parts of student work or understanding that are correct, to address the weaker parts*

*and to give suggestions for how to improve.'* Furthermore, Lisa recognized that *'students know what is expected from them and they feel that they are taken seriously.'* During active learning when teaching environmental studies, however, Lisa sometimes felt uncomfortable. She was uncertain about her background knowledge of the topics. Because students could choose various topics within a particular theme such as 'the universe', Lisa did not have detailed background knowledge regarding all these topics. She therefore sometimes found it difficult to confirm or be critical at the answers students gave:

- Trainer *And did you select another fragment?*
- Lisa *Well, yeah, I really had... maybe it is good to show an example of how you really should not give feedback. This student had some time left and I asked him to think of two extra research questions, because he is a smart kid. He worked on these questions very enthusiastically and he found the answers to these questions. But look how I respond to that...*
- Fragment:
- Lisa *How do stars come into existence? That was your research question?*
- Student *Yes, and 'how warm are stars?'*
- Lisa *And did you find answers to these questions, because I see a very interesting website on your computer?*
- Student *Yes, there are big clouds of dust particles, hydrogen and gases.*
- Lisa *Yes?*
- Student *And when that comes together it is called a nebula. And yeah... that becomes a star.*
- Lisa *And that becomes a star. You have found this information quite quickly.*
- Student *And how warm they are..., they can reach ten million degrees Celsius.*
- Lisa *Wow, that is warm.*
- Trainer *Stops the video. Do you know whether this information is correct?*
- Lisa *Well, yes, most of it is correct, only at the end he says this becomes a star, but that is nonsense, because this actually is a star. I did not react to this mistake. And the temperature, I knew it was some million degrees, but I don't know whether it*



- Colleague *is exactly ten million degrees.*
- Lisa *Yes, but he said it...*
- Trainer *In a very convincing way? He does that, yes.*
- Trainer *Yes. And most of the information was correct, but you do not confirm this. You only say that he found this information very quickly.*
- Lisa *Yes, because I did not feel sure at that point.*
- Trainer *Okay.*
- Lisa *Yes, you know, I thought, is it really ten million degrees? And I was not sure, so I said 'you have found that very quickly'. In the meantime I was thinking 'where did you find that information?' I am not sure enough to confirm what he says, well that is a good answer. Do you understand?*
- Trainer *Yes, I do.*
- Lisa *I know it is some million degrees, but is it ten million? I am a bit wary of confirming that.*
- Trainer *So, you might say this, then. You could say: 'That is interesting, it sounds like a really good answer. Let me see where you have found this.'*
- Lisa *Yes, that is possible. I left it open. I could have given him a compliment and encouraged him to improve the last part of his answer, for example by re-examining that website he was looking at. Then, my feedback would contain confirmation, criticism, and constructive remarks and it would be directed to the goal this student had set for himself.*

### 6.3.3.2 Sara

With regard to the active-passive dimension of regulation, it appeared that Sara was passive in the sense that she needed a lot of external regulation by the trainer. She frequently asked the trainer whether she 'was allowed to' give feedback in a certain way. At the same time, she was involved, enthusiastic and she appeared motivated to learn. Retrospectively, Sara self-evaluated her learning experience and she drew inferences for subsequent learning. The following self-reports illustrate this: *'In the beginning I did not know whether I implemented the C-C-C correctly, but my video fragments did contain several good examples. It is important to focus on the learning goals. It works nicely and it is useful to write the goals on the blackboard. I will do that from now on. It is useful and effective. Goal-directed!'* And in the self-report after another video interaction meeting she

wrote: *'I had trouble selecting my fragments. When am I being directive? We talked about the fact that there are multiple ways to get to Rome. Rome is the destination (the goal, this is structure), but you may choose how to get there (giving choices is facilitative). It is good to remember this. It is important to discuss these things together, because you can learn a lot from each other. I really enjoy this. Sometimes you think that you are doing something wrong, but then it turns out not to be that bad.'*

Sara repeatedly experienced friction when things did not work out as she planned. She often attributed these negative experiences to external causes, such as a lack of (conditional) skills on the part of the students, or the way in which active learning was organized in the school. At one time, after the lesson with the booklet for determining the position of a certain animal in the animal kingdom, Sara avoided learning. She could not find any example of good feedback in this videotape: *'I was so frustrated that I did not want to look at the last eight minutes of this video. It was really depressing.'* By focusing on the positive behaviours that were visible and by relating these explicitly to the goals of the PDP, the trainer tried to enhance Sara's feelings of self-efficacy and her monitoring of own behaviours and learning results:

Fragment description	Students ask for the meaning of a particular word. Sara asks what they think they can do about finding it. The students come up with the idea of getting a dictionary. Sara confirms this and then there is an interaction about how to find information about the growth of a salamander.
Sara	<i>It is not good. This whole lesson was a disaster.</i>
Trainer	<i>But this clearly is an example in which you let the students think about their own working process. And about the more general skill of using a dictionary for looking up the meaning of words.</i>
Colleague	<i>And is this not also C-C-C?</i>
Trainer	<i>Yes, very clearly. You say that they have searched for this information very well, but that they haven't read it properly yet. And you suggest that they also think about using the information for their presentation. So, it is the C of confirming what they did well, the C of critique on the fact that they haven't yet read it properly, and the C of constructive about how they can use this information.</i>
Sara	<i>Yes.</i>
Trainer	<i>This, then, was a positive example of your feedback</i>

- behaviour, wasn't it?*
- Sara *Well, then this is the best example of the whole video, because I seem to do the C-C-C right.*
- Trainer *You are being very negative about this lesson as a whole, and we discussed that the materials that you used were a possible explanation for this, but do you really think you give bad feedback here?*
- Sara *No, I agree this was not too bad. It was more the feeling I had during this lesson. Nothing worked out the way that I planned and I thought this student would be picked up from school and that Mario (colleague) would come and give extra instruction but everything changed and then I really became frustrated.*
- Trainer *Well, and even in this situation you can still give good feedback.*
- Sara *(Smiles) Yeah, okay. But now I have this other fragment...*

## **6.4 Conclusions and discussion**

### *6.4.1 Similarities and differences in teachers' learning processes.*

In the present study, we aimed to obtain an insight into the characteristics of teacher learning and their regulation of learning in the context of a PDP. It is clear that there were big differences between the learning processes of the two teachers. The differences and the similarities in the teachers' learning processes may be described in terms of teachers' learning patterns. As was stated before, learning patterns are defined as 'a coherent whole of learning activities that learners usually employ, their beliefs about own learning and their learning motivation, a whole that is characteristic of them in a certain period' (Vermunt & Endedijk, 2011). Several learning activities were stimulated alternately and frequently during the course of the PDP. These activities were supposed to appeal to teachers' directedness to improve their immediate performance in the classroom, as well as to extend their knowledge of feedback and active learning. With regard to the learning activities that teachers undertook, there were similarities that were inherent to the PDP in which the teachers participated. Getting ideas from others, experimenting and considering one's own practice were activities that were embedded in the programme. Within these overt, observable activities, the more problematic aspects of learning could occur; experiencing friction, struggling not to revert to old ways and avoiding learning (cf. Bakkenes et al., 2010). Both teachers experienced

friction at times. The nature of this friction, however, was very different. Lisa understood the essence of the PDP very well, but had trouble implementing some of the target behaviours in the classroom on some occasions. For example, she felt insecure in giving confirmative feedback when she was not sure enough of her own background knowledge regarding the topic. She consciously identified these problematic aspects of giving feedback during her lessons. Furthermore, she was able to ask the right questions to the trainer and her colleagues afterwards to overcome these problems. Sara, on the other hand, experienced friction repeatedly because of misunderstandings or when things did not work out as she had planned. Sara was hindered by these misunderstandings; she repeatedly did not know what and how (and why) to implement in the classroom. She obviously struggled to learn during the PDP. In one of the lessons she reverted to her old way of giving feedback and she felt very frustrated about this, which even led her to avoid learning.

With regard to the two dimensions of regulation of learning there were also clear differences between the two teachers. Lisa actively regulated her own learning, using the information she received. She regulated her learning both prospectively and retrospectively. For example, prospectively, she was conscious of the goals of the PDP and she planned how to achieve these goals during her lessons. Retrospectively, she behaved consciously according to these goals during the lessons and she reflected critically on her own behaviour as well as on the outcomes for the students. Furthermore, she drew inferences for subsequent learning. Although active prospective and active retrospective regulation was explicitly promoted during the PDP, Sara had difficulties with regulating her learning. Setting clear goals, offering examples for how to implement new knowledge, requiring reflection on own behaviour in relation to the goals were not enough to support Sara's self-regulated learning. She needed a lot of external regulation by the trainer, for example help to evaluate her behaviours in relation to the goals of the PDP.

As said, we tried to characterize the learning behaviours of both teachers in terms of the learning patterns as identified by Vermunt and Endeldijk (2011). An 'immediate performance directed pattern' refers to teachers who are mainly aimed at improving their immediate performance in the classroom; a 'meaning directed pattern' refers to teachers who are aimed at understanding underlying principles and extending one's theory of practice; and an 'undirected pattern' refers to teachers who experience problems with learning about teaching or with the implementation of an

educational innovation, and who sometimes avoid learning (Vermunt & Endedijk, 2011). As the PDP focused directly on improving teachers' immediate performance in the classroom, this aim was reflected in the learning process of both teachers. Based on the results, it may be concluded that Lisa showed a meaning directed learning pattern, while Sara showed characteristics of an undirected pattern. Lisa aimed at understanding the underlying reasons for why things worked as they worked in the classroom and at extending her knowledge of feedback and active learning. Sara on the other hand struggled with learning and implementing the new knowledge. Besides a lack of regulation of learning, a lack of regulation of classroom processes was also observed. While she was consciously experiencing problems that resulted from her ways of organizing active learning or the use of certain materials, she held on to these suboptimal choices.

An important personal factor that influences teachers' learning patterns appears to be the teachers' willingness to learn. There exists a variation in teachers of those who do not see the need to learn, those who wonder how to learn, and those who are eager to learn (Van Eekelen et al., 2006). Both teachers clearly showed a willingness to learn. They wanted to discover new practices and they were open to experiences and to the input of the trainer and their colleagues. Lisa was eager to learn: she was proactive, questioned her own practices, and recognized and monitored her own learning processes and results. She attributed successes and non-optimal results to internal causes. Sara did not display these behaviours, it appeared that she was willing to learn, but did not know how.

Although the learning patterns were different for these two teachers, positive learning outcomes were observed for both teachers. It is known that a meaning directed learning pattern is favourable, because this leads to deeper learning (Vermunt & Endedijk, 2011; Vermunt & Vermetten, 2004). Skills in regulation of own learning are conditional for teachers' lifelong learning and for becoming an expert teacher (Endedijk et al., 2012). Based on our results, it can be expected that Lisa indeed learned more than Sara did and that Lisa will be better able to maintain her learning results. Both teachers were willing to learn, but besides their differing learning pattern, their initial situation differed greatly. Lisa already had some knowledge regarding the topic and showed reasonably favourable behaviours in the classroom, but still perceived a number of problems. Sara, on the other hand, had little knowledge, showed poor behaviour, but did not perceive problems with regard to this topic. Consequently, Sara probably needs more

follow-up support to stimulate further learning and to maintain her improved classroom behaviours.

#### *6.4.2 Limitations and directions for future research*

As a consequence of choosing an in-depth case study to describe teacher learning in the context of a PDP in detail, only two teachers were studied. We purposefully selected two teachers who differed greatly from each other in the way they learned and in the extent to which they encountered problems with learning. By doing this, we intended to describe different learning activities, regulation activities and problematic aspects of learning comprehensively. However, the results cannot be generalized to other teachers.

We used different data sources to describe teacher learning; observations in the classroom, observations of video interaction training meetings, and self-reports of what was learned during each meeting. We deduced the experience of problematic aspects of learning and teachers' regulation activities from these data sources. We did not ask teachers directly, for example in interviews, what problems they experienced while learning during the PDP or how they regulated their learning. The intensity of the PDP and the already increased workload for the teachers were the reasons for this decision. However, maybe extra insights could have been obtained by conducting additional interviews.

The PDP was implemented in the 6<sup>th</sup>, 7<sup>th</sup>, and 8<sup>th</sup> grades of two primary schools. The teachers who were studied worked at the same school. In this school, a group of nine teachers participated in the PDP. Collective participation of groups of teachers from the same school in a PDP seems a critical factor to stimulate teachers' professional development, for example by sharing and exchanging experiences (Garet et al., 2001; Korthagen et al., 2006; Van Veen et al., 2012). The influence of participating in a PDP together with colleagues on teachers' individual learning has not been examined in this study. Based on the literature, it can be expected that this had a positive influence. However, negative consequences of learning together with colleagues could also have occurred, for example group pressure on changing practices. Teachers were required to show video fragments of their own teaching to two of their colleagues. For future research, it would be interesting to look at these processes of collaborative learning on teacher (video-based) learning in more detail.

The learning pattern Sara showed can be characterized as undirected. Although this pattern is undesirable, Sara did improve her

feedback behaviour in the classroom. The structure of the PDP and the tailored guidance and feedback of the trainer seemed to compensate for this unfavourable learning pattern to some extent. The activities were highly structured and stimulated prospective and retrospective regulation during each phase of the PDP. During the video interaction training meetings, the trainer gave tailored feedback and she was able to detect and correct misunderstandings. It appeared that teachers do learn new behaviour in this way, but, ideally, teachers need to develop themselves professionally through self-regulated and meaning-oriented learning. It would be interesting to examine in more detail and on a larger scale what is needed to support such undirected teachers in their learning and the regulation of their learning.

From the results of this study, it can be concluded that besides building from teachers' own knowledge, beliefs and practices with respect to the content, a PDP also needs to include differentiated feedback for individual teachers. The trainer, or teacher educator, should be able to give tailored feedback and to adapt the PDP to the level of self-regulation a teacher employs. It would be interesting to examine in future research whether there are predictors of teachers' poor self-regulation of learning a particular topic. The initial level of knowledge, beliefs and practices regarding the topic may inform the teacher trainer regarding the kind – and amount – of support teachers need to learn in the context of a PDP.

# Chapter 7





## Chapter 7

### Conclusions and discussion

#### 7.1 Introduction

The central research question of this dissertation was: How can primary school teachers learn to give optimal feedback to their students during active learning? By investigating this question we aimed to contribute to our knowledge regarding feedback, active learning and teachers' professional development. The central research question was specified in the following related research questions:

1. What are the characteristics of teacher feedback during active learning in the highest grades of primary schools?
2. What beliefs do primary school teachers hold with regard to feedback during active learning and what are the main problems primary school teachers perceive with regard to feedback during active learning?
3. What are the short- and long-term effects of a professional development programme (PDP) that builds on teachers' beliefs, perceived problems and practices, and that incorporates the conditions and features that are known to be important for enhancing teachers' professional development on their beliefs, perceived problems and classroom behaviour?
4. To what extent did teachers consider the features of the PDP valuable to enhance their professional development regarding feedback during active learning?
5. How can teacher learning in the context of a PDP be characterized in terms of teachers' learning activities and their regulation of learning?

Quantitative and qualitative research methods were used to answer these questions. In this final chapter the main findings and conclusions regarding each of these questions are presented. We will then present and discuss our general conclusions and suggest directions for future research. The chapter concludes with some limitations and implications for practice.

#### 7.2 Main findings and conclusions

##### *7.2.1 Teacher feedback during active learning*

In chapter 2 we described the study regarding the characteristics of teacher feedback during active learning. A category system that was based on the literature and empirical data was developed in order to describe the

feedback practices of 32 teachers in grades six, seven and eight of 13 primary schools where the concept of active learning was practised in environmental studies lessons. A total of 1465 teacher-student interactions were videotaped and assessed using this system. We concluded that about half of the teacher-student interactions contained guidance and feedback. These interactions were mainly focused on the task or the processing of the task and rarely focused on social learning or on students' metacognition, although the development of students' metacognition and social learning skills is important during active learning. Most feedback interactions could be characterized as unrelated to an explicitly stated learning goal. Only few feedback interactions contained confirmation and criticism, as well as constructive remarks for how to proceed. Feedback was mainly given in a directive way, and less frequently in a facilitative way. This feedback appeared suboptimal to enhance student learning in an active learning environment.

In chapter 3 teachers' beliefs and the main problems they perceived with regard to feedback during active learning were described. A writing task was administered to examine teachers' beliefs. For identifying their perceived problems, interviews were conducted. Teachers perceived that a lack of conditional teacher skills, especially problematic time management, hindered them most from giving good feedback. The most widely held belief was that 'feedback should be positive'. Teachers also believed that it is important to adopt a more facilitative way of giving feedback, but they found this difficult to implement. Only some teachers believed goal-directedness and a focus on student metacognition were important during active learning, and teachers did not perceive problems regarding these aspects. By examining teachers' beliefs and perceived problems, we sought explanations for the suboptimal feedback behaviours that were described in chapter 2. By analysing the differences between the results presented in both chapters and the findings in the literature, suggestions for how feedback during active learning could be improved were deduced. These suggestions informed the goals of the PDP that will be described next.

### *7.2.2 A PDP aimed at improving teacher feedback during active learning*

In chapter 4 we described the effects of a PDP that built on teachers' beliefs, perceived problems and practices (Chapters 2, 3) and that incorporated specific conditions and features that are known to be important to enhance teachers' professional development. The goals of the PDP were: setting clear learning goals and communicating these goals to students;

giving feedback which includes confirmation and criticism as well as constructive remarks; balancing directive and facilitative ways of giving feedback; giving more feedback which is focused on students' metacognition; giving more feedback which is focused on students' social learning and creating the conditions for active learning by establishing efficient classroom management. The design of the PDP was based on the literature regarding the conditions and features which are considered to be important for PDPs, including structural features, goal-setting features and activity features. The effects of this PDP on 16 primary schoolteachers' knowledge, beliefs, perceived problems and classroom behaviour were examined via videotaped observations, a writing task and a questionnaire prior to and twice after the programme was implemented. The results indicated that, with regard to all the goals of the PDP, teachers' knowledge and beliefs were changed, teachers' perceived problems were reduced and/or their feedback behaviour was improved. Several effects were observed both in the short term and in the longer term. For example, teachers learned to believe that feedback must be goal-directed and that learning goals need to be communicated to students. In the classrooms, teachers more often related their feedback explicitly to the learning goals.

In chapter 5 we tried to answer the question to what features of the PDP the teachers themselves attributed the positive effects of the PDP on their professional development. The 16 teachers who participated in the PDP completed a questionnaire to indicate the extent to which teachers considered each of the features that were purposefully included in the PDP valuable. Four focus group interviews were conducted to gather qualitative data that illustrated the quantitative results and specified on what occasions each feature did or did not support teachers' professional development. The results indicated that, according to the teachers themselves, all features contributed to their professional development. Teachers value most features quite highly. Regarding the structural features, for example, teachers indicated that they valued collaborative learning with their colleagues highly. They discussed thoughts and experiences regarding their actual teaching behaviours more easily with each other and said they learned from this. With regard to the goal-setting features, teachers mostly appreciated the demonstration of the learning goals in the form of examples and non-examples of unfamiliar teachers' classroom practices on video. With regard to the activity features, teachers felt that examining, discussing and reflecting on their own videotaped behaviour contributed most to their professional development. The perceptions of the teachers confirmed the scientific

knowledge regarding the features that are effective in PDP's to a large extent. However, teachers specified this knowledge, for example the finding that reflection on own actions promotes professional development. Teachers clearly valued reflecting on their own behaviour using videos, but they did not consider written reflection in a logbook of any worth for enhancing their professional development.

In chapter 6 an in-depth case study was described that characterized two teachers' learning processes during participation in the PDP. Videotaped observations of these teachers' feedback behaviour in the classroom, videotaped observations of the video interaction training meetings and teachers' self-reports of what was learned during (parts of) the PDP were analysed and described in terms of teachers' learning activities and their regulation of learning. The results indicated that these teachers differed greatly from each other. One teacher showed characteristics of a meaning-directed learning pattern. She understood the essence of the information very well and she regulated her own learning actively in a prospective as well as retrospective way. The other teacher struggled to learn; she recurrently did not know, or misunderstood what to implement in the classroom and how. Her learning pattern was undirected; she had difficulties regulating her own learning. Much external regulation of learning was provided by the trainer. Positive effects of the PDP on classroom behaviour were observed for both teachers, however, although differences in the quality of learning and the maintenance of the learning outcomes can be expected. It appeared that, to a certain extent, the structured activities and the direct guidance by the trainer could compensate for a lack of self-regulation by the teacher who showed an undirected learning pattern.

### *7.2.3 General conclusions*

This dissertation provided a comprehensive and detailed description of the characteristics of teacher feedback in the context of active learning. From reviewing the extant literature, it could be concluded that feedback during active learning is ideally goal-directed and it includes confirmation, criticism and constructive remarks. These constructive remarks are preferably given in a facilitative way, although directives with regard to the expectations and the goals of the lesson are also needed. The feedback needs to be regularly focused on the development of students' metacognition and social learning skills. For giving this kind of feedback, an efficient classroom organisation is essential. When examining teachers' classroom practices, their beliefs and perceived problems, it appeared that,

in general, these conditions and characteristics of feedback are not optimally implemented. Feedback can be a very powerful tool for teachers to enhance student learning (Hattie, 2009), but it appears difficult for teachers to use this tool appropriately. Giving feedback during active learning requires teachers to have specific knowledge and skills and they seem insufficiently prepared for this. Teachers are, however, able to improve their knowledge and skills in a sustainable manner through participation in a PDP. A combination of important conditions and features must be realized in such a PDP. Video-based learning appears particularly applicable to integrate many important features and this method of learning was valued highly by the teachers. It appears important to include the provision of a substantial amount of tailored feedback from the trainer, because teachers enter the PDP from very different starting points and show distinct learning patterns.

### **7.3 Discussion and directions for future research**

#### **7.3.1 Teacher feedback**

As was concluded, this dissertation provided a comprehensive and detailed description of the characteristics of teacher feedback in the context of active learning. Although several important characteristics of teacher feedback were already known, little consensus existed about how feedback is defined (Van de Ridder et al., 2008) and what constitutes qualitatively good feedback (Nicol & Macfarlane-Dick, 2006). Furthermore, much of the knowledge of feedback seemed not to be directly applicable to teacher feedback during active learning (Mory, 2003). In this dissertation, we have developed a model of teacher feedback during active learning in which the existing relevant knowledge is coherently described, and we have enriched this model with empirical data. A category system including several concrete examples of feedback interactions was developed to facilitate further study of teacher feedback during active learning.

Goal-directedness is a central element of feedback, since feedback is essentially information about how the student's present performance relates to the learning goal (Hattie & Timperley, 2007; Nicol & Macfarlane-Dick, 2006). In chapter 2 it was shown that in only 2.5% of the interactions did the teacher explicitly refer to a learning goal. It may be argued that only these few interactions contain 'real' feedback according to the definition in which a comparison of the performance or behaviour to the learning goal is central (cf. Van de Ridder et al., 2008). This concurs with the statement of Hattie (1999, p.12): *'The incidence of feedback in the typical classroom is very low, usually in seconds at best per day'*. We decided to distinguish

'guidance and feedback' interactions. This category of interactions was more broadly defined: interactions that contained information for the student. Explicit goal-directedness was measured as a characteristic that could -or could not- be present in these teacher-student interactions. There may be various reasons for the lack of goal-directedness in most interactions. For example, teachers may set only implicit goals. Another explanation is that they do not believe that learning goals are important for giving feedback during active learning, as was concluded in chapter 3. Another possible reason may be that the national attainment targets for environmental studies are not specific enough for teachers to guide the goal-setting for a specific lesson or project. A lack of content knowledge as perceived by the teachers (Chapters 3, 6) may further complicate the setting of learning goals concerning the content. Still, it is clear that specific learning goals effectively and significantly increase students' performance (Latham & Locke, 2006). An interesting question would therefore be whether the lack of goal-directed feedback is related to the domain of environmental studies. It may be useful to examine whether teachers give more goal-directed feedback in a domain in which they feel more secure regarding their own knowledge and skills and for which clear, concrete, structured curricula exist, for example, in the domain of mathematics.

### *7.3.2 Feedback during active learning*

The context for this study was active learning in primary schools. Schools decided to implement active learning because of the assumption that students will not only learn knowledge contents, but also learn higher order thinking skills or metacognitive knowledge and skills that are needed for lifelong learning (Blok, Oostdam, & Peetsma, 2006; Bonwell & Eison, 1991). Furthermore, schools aim to support the development of students' social learning skills by letting them learn actively with their peers. These aims will not be reached automatically. Students need feedback on the development of their metacognitive knowledge and skills. They also need to be taught how they can learn collaboratively and they need feedback on their social skills. Already in 1989, Salomon and Globerson reported negative effects of cooperative learning when the student teams do not function properly. For example, the 'free rider' effect when students profit from the input of the best student and the 'status differential' effect when the most dominant student determines all the work. In our study, it was observed that very little feedback was focused on students' social learning skills and on the development of metacognition (Chapter 3). Only a quarter of teachers

believed that feedback during active learning should (also) be focused on developing student metacognition and social learning (Chapter 4). Although stimulating more feedback on these two foci was a goal of the PDP, no (lasting) effects on teachers' behaviour were observed. Teachers learned that it is important to give feedback on students' social learning skills and metacognition during active learning (Chapter 5), but did not succeed in bringing this into practice yet. This calls into question whether active learning is implemented in these schools successfully. It appears that teachers need much more and intensive support to realise the aims for which the school chose to implement active learning. It would be interesting to examine whether a follow-up programme that is specifically focused on enhancing students' metacognition and social skills could yield and maintain the desired effects.

### *7.3.3 Professional development programmes for teachers*

Several features that have to be taken into account to increase the chance that PDP efforts result in effective professional development have been identified (e.g., Garet et al., 2001; Van Driel et al., 2001; Van Veen et al., 2012). How these features should be operationalized in relation to each other is less clear. We used video interaction training meetings to combine several features. The teachers learned collectively during these meetings, using authentic learning materials (i.e., their own videos). Clear goals were set for each meeting, multiple examples of behaviour on video were provided, and teachers had an active role during these meetings. Reflection on their own actions was promoted by the selection of fragments that teachers had to make by themselves. During the meetings we built from teachers' own reflections on their videos. Afterwards, they reflected on what they had learned and drew inferences for further implementation. Evidence for positive effects of video-based learning on teachers' beliefs and their interaction skills has been found (Fukkink et al., 2011; Van Es & Sherin, 2010). Teachers themselves attributed the positive effects of the PDP for the most part to the use of video-based learning (Chapter 5). Active prospective, as well as active retrospective regulation of learning was explicitly promoted by this approach. Nowadays, cameras and computers are available in most schools, as is technical support if needed. It seems worthwhile to use more video-based learning in PDPs for teachers.

Feedback was not identified as an important feature of PDPs in itself. In the literature regarding effective professional development, feedback is included in other features, for example, as an ingredient of the



feature 'active participation' (Van Veen et al., 2012). As we have argued in all chapters, feedback is the most powerful tool a teacher can use to enhance student learning (Hattie, 2009). The same appears true for enhancing teachers' learning. In our PDP, teachers received a substantial amount of tailored feedback from the trainer during the video interaction training meetings. Chapter 6 illustrated how important this feedback can be to stimulate teacher learning. Some teachers are perfectly capable of regulating their own learning and primarily need informative input that they can implement by themselves. Other teachers are less able to regulate their own learning and the trainer has to compensate for this. Devoting so much time and effort to the provision of tailored feedback on the behaviours and reflections of each individual teacher may have had a significant impact on the positive effects of the PDP. This PDP succeeded in changing several aspects of teachers' behaviour, which is quite exceptional (Opfer & Pedder, 2011). Maybe the difference between this PDP and many others lies in the amount and quality of the trainer's feedback. Examining the role of the trainers' feedback in PDPs in more detail would be an interesting direction for future research.

#### **7.4 Limitations**

When interpreting the findings that are reported in this dissertation, some limitations of the studies need to be kept in mind. The first limitation refers to the multiple roles the author of this dissertation had. She was the researcher as well as the trainer. As a consequence, the observations, the training meetings and the evaluation meeting were all conducted by the same person. This may have increased the occurrence of socially desirable answers and behaviours of the teachers.

Given the exhaustive and time-consuming nature of the data collection and data analyses in the studies of feedback, we were only able to examine small samples of teachers. Due to the possibility of sample selection bias, the findings of the first studies (Chapters 2 and 3) cannot be generalised to all primary school teachers who practise the concept of active learning. Similarly, inherent in the intensive and time-consuming nature of the PDP which was implemented, only a small sample of teachers could participate. The results of the studies regarding this PDP may also not be generalizable. We hope our studies provided enough resources to validate the findings in (larger scale) replication studies.

Chapter 6 showed that teachers did not learn in a linear way. Contextual factors such as classroom organisation and the learning

materials that the teachers used in the classroom could support or hinder teachers' feedback behaviour during a particular lesson. Multiple measurements of the targeted behaviours thus seem necessary to obtain a reliable picture of the learning outcomes. We conducted two post-tests that included teachers' beliefs, their perceived problems and their classroom behaviour (Chapter 4). Because of the non-linear growth pattern, it can be argued that this may have not been sufficient to get such a reliable picture. The results may have been somewhat distorted by contextual factors. On the other hand, most other studies relied on teachers' self-reporting (e.g., Bakkenes et al., 2010; Desimone et al., 2002). The fact that we combined several data sources and that the observed effects were in the expected direction and comparable at both measurement times may strengthen the confidence in our approach.

The focus of the first two chapters of our study was on teacher-student interactions in relation to the quality of feedback for enhancing student learning. It can be argued that the quality of feedback cannot be discussed without considering the effect of the feedback on student learning. Effects of teacher feedback on students' learning were not studied directly. By reviewing the literature regarding the characteristics of feedback that are important to enhance student learning and by examining the presence of these feedback characteristics in the classrooms, we attempted to form recommendations that are useful in improving the practice of giving feedback in a more general sense.

### **7.5 Implications for practice**

This study aimed at identifying aspects of feedback that teachers give that could be improved to enhance active learning by students optimally. Furthermore, we aimed to find ways in which teachers can be helped to improve their feedback behaviour during active learning. The conclusions of the several studies that cover these two aims will be translated into concrete recommendations below.

It is recommended that teachers and teacher educators *pay more attention to feedback*. Feedback is potentially the most powerful influence on students' learning. Qualitatively good feedback is rarely observed in the classroom. In initial teacher education, but especially during the professional development of experienced teachers, this topic deserves much more attention. Even highly experienced teachers held less optimal beliefs regarding feedback and perceived several problems with the provision of feedback in the context of active learning. We could not find any refresher

courses for teachers aimed at enhancing this important teacher skill when developing this PDP. Teacher educators are welcome to use the PDP that was developed in this study.

Teachers and teacher educators are also recommended to *pay more attention to goal-setting*. Numerous studies showed that specific goals effectively and significantly increase students' performance; setting clear goals leads to better performance than vague goals or no goal at all (Latham & Locke, 2006). In many lessons that were observed during this study clear learning goals were lacking. By definition, giving feedback is not possible without a clear learning goal. Thinking about what you want your students to learn in each lesson seems a logical first step when preparing a lesson. More than one goal can be set, for example, a learning goal with regard to the content, in addition to a learning goal regarding students' social skills. The next step would be to keep these goals in mind when giving feedback.

The third recommendation for teachers and teacher educators is to *pay more attention to the organisation of active learning*. The active learning context is complex, because small groups of students perform different activities at the same time. They need to work with several resources, such as computers and encyclopaedias, they discuss with each other and often some groups work outside the classroom. Teachers have trouble keeping the overview, dividing their time among all the groups of students and maintaining procedures. These organisational issues can influence the quantity as well as the quality of the feedback the teacher gives. Ideally, teachers maintain an efficient classroom organisation, so that they have the time and serenity to respond to students in a flexible way and adapt their feedback to the needs of their students. Only a few of the observed teachers (who did not participate in the PDP) succeeded in doing this. Practical suggestions, examples on video and opportunities for implementing new routines can be offered by teacher educators or consultants at the schools.

*Attention to the development of students' metacognition* is the fourth recommendation for teachers and teacher educators. Although the development of students' metacognition is an important reason for implementing active learning, feedback on the students' metacognition was given in just 1% of all teacher-student interactions (Chapter 2). Several teachers did not know what student metacognition was, what knowledge and skills it entailed and how to support the development of such knowledge and skills. Stimulating students' metacognition is effective in enhancing learning, so it is important to teach (student) teachers the knowledge and skills that are necessary. Setting and communicating clear learning goals facilitates

metacognitive skills, such as planning, monitoring and evaluating progress towards achieving their goal (Latham & Locke, 2006).

A recommendation for teacher educators and school leaders is to *continue the support after a PDP ends*. The PDP that was developed in this study was intensive and time-consuming. In this form, it is an expensive programme for schools to implement. The second post-test showed that some effects of the PDP decreased (Chapter 4). Teachers' learning processes were non-linear and it is known that it takes time to develop new routines. Follow-ups and long-term support would be helpful to prevent reverting into old routines. In partnerships between teacher education institutes and schools, a follow-up trajectory could be arranged. The school's own personnel could also fulfil the role of the trainer, as long as the designated person has sufficient expertise regarding the topic and in coaching teachers. Furthermore, the teachers must feel confident and safe with this person.

The final recommendation for teacher educators and school leaders (or consultants) is: *be adaptive to individual teachers' learning*. Building from teachers' own beliefs, perceived problems and practices indeed helped to identify the topics that should be addressed in the PDP. Nevertheless, a PDP also needs to include differentiated feedback for individual teachers. Individual teachers differed with regard to the problems they experienced during their learning and with regard to the extent to which they regulated their own learning. Both aspects have an impact on what is required from the trainer. The trainer, or teacher educator, should be able to give tailored feedback and to adapt the PDP to the level of self-regulation a teacher employs.



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## Appendices A-C

## Appendix A. Definitions and examples of feedback categories.

<i>Category (main or sub-)</i>	<i>Description</i>	<i>Examples</i>
1. Guidance and Feedback	Teacher gives information to students, possibly formulated as (leading) questions.	
1.1. Cognitive, task	Teacher repeats or gives a task, verification while checking student work, gives information about subject or student's work.	<i>Have you found the difference between those two? Anne Frank lived during the Second World War. You have to elaborate on that part.</i>
1.2. Cognitive, process	Teacher gives information about how to proceed, what the students can do next, or refers to a specific information source.	<i>Read this part first. Find some more information and write it down in your own words. You can look at the website we discussed.</i>
1.3. Metacognitive	Teacher helps students to make a plan, to evaluate and/or reflect on the work, stimulates students to assess their own work.	<i>There are two more weeks, when will you do this subtask? How do you think you have accomplished this assignment? Is this information enough to answer your research question?</i>
1.4. Social learning	Teacher gives information about the collaboration in a group of students.	<i>Discuss who will be the leader next time. Ask your buddy that question. You are angry at her, how can you solve this conflict?</i>
1.5. Non-specific / Self	Teacher gives personal feedback or it is not clear what the focus of the feedback is.	<i>Good work. Okay, good. (without clarifying what behaviour or which part of the work is good.)</i>

2. Acquiring information	Teacher asks information to keep an overview or a starting point for feedback.	
2.1. General information	Teacher asks information about what students are doing, who are collaborating or checks whether the students can work on.	<i>What are you working on? How is it going here? Where are your buddies? So, do you think you can find the answer yourself now?</i>
2.2. Diagnostic information	Teacher asks information about what students have accomplished, about the processing of the task or about the collaboration. Checking of student work or understanding.	<i>What information have you already found? How did you proceed until now? Where is the information about the Middle Ages? Let me see what you have got so far.</i>
3. Classroom management	Teacher remarks about classroom organisation.	
3.1. Permission, general	Teacher tells where something can be found or whether the student can get / do something. Teacher tells what (s)he is going to do.	<i>The pencils are in that closet. No, you cannot use the computer now. Yes, you may type it instead of writing it. I will be with you in a minute.</i>
3.2. Discipline, rules	Teacher remarks about students' behaviour, warnings or reminders of classroom rules.	<i>Will you concentrate on your task now, yes? You cannot sit here and you know that. We do not draw on the blackboard.</i>
4. Remaining	Remarks unrelated to the task or the lesson.	<i>No, I don't watch that television show. So, you give a big birthday party! I will call your mother this afternoon, to ask if she will help us.</i>

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## Appendix B. Definitions and examples of feedback characteristics.

<i>Characteristic</i>	<i>Description</i>	<i>Example</i>
Goal-directedness		
- Yes	Teacher mentions a learning goal and relates student work to this goal.	<i>You wanted to know where polders are, does the map you have included in your paper answer this question?</i>
- No	Teacher does not mention a learning goal, and/or does not relate student work to the goal.	<i>First, find some more information and write it down in your own words.</i>
Nature of feedback		
- Confirming	Teacher confirms and/or compliments the student.	<i>That is correct. You did this very well, good!</i>
- Criticism	Teacher points to something the student not yet understands or has not yet worked out correctly.	<i>That part of the assignment has not been answered completely yet, find some more information.</i>
- Constructive	Teacher gives a hint or direction, providing clues to improve the work.	<i>Tell the information in your own words to your buddy and then try to make the summary again.</i>
- Destructive	Teacher criticises the student, harming students' self-confidence or motivation.	<i>I have explained it three times now, is it really that hard to understand?</i>
- Neutral	None of the natures above is applicable.	<i>A fraternity is a group of people having the same profession.</i>
- Confirmative-Critical-Constructive	Combination of confirming, criticism and a constructive remark.	<i>You have found the correct information, but you haven't elaborated on it yet, you may use a mind map for that.</i>

- Combination Two different natures in one unit.

*Good, you have found the capital of England, but you have not used the right colours there.*

#### Way of giving feedback

- Facilitative Teacher provides clues, suggestions or information in a non-directive way. Teacher helps the student with the student doing most things him/herself, possibly combined with encouraging.
- Directive Teacher gives instructions, repeats information or demonstrates (parts of) the task. Teacher asks closed or directive questions, possibly combined with encouraging
- Encouraging Teacher shows confidence in the student.
- Neutral None of the ways above is applicable.

*Have you already thought about that scheme we discussed lately? You could search on the internet for more information. Why don't you prepare the presentation together, I think you two would do just fine.*

*Now you have to look in that book, chapter 4. You have to know why did they call that disease the bubonic plague; what were the symptoms? Good work, and now you are going to incorporate that in your presentation.*

*Yes, that's right; I bet you can find the answer yourself.*

*I don't know what that word means. We still have 20 minutes left.*

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## Appendix C. Examples of small group discussions during the video-interaction training meetings

### Example 1

- Teacher: *Here is a fragment about CCC feedback (i.e., confirmative, critical and constructive). I wonder whether I give CCC feedback here. It is about these two students who were working at the computer.*
- Trainer: *Let's watch that fragment.*
- Teacher: ***And...? Do you already know who the Duke of Alva was?***
- Student 1: ***Yes, he was a Spanish... uh... whatsoever.***
- Teacher: ***A Spanish whatsoever? And what is a Spanish whatsoever?***
- Student 1: ***Uh, a Spanish...uh... king?***
- Teacher: ***Let's find it out, because you do have to know that. (Reads the text on the computer together with the students and points.) Yes, look here. I would use this... What could you do with this information?***
- Student 2: ***Use it in our paper.***
- Teacher: ***Yes, that is possible, but you have to use your own words then.***
- Teacher: *They do not understand a word of that text, it is much too difficult.*
- Trainer: *Do you also say this to the students?*
- Teacher: *Yes, you will see that in a minute, let's watch.*
- Teacher: ***You will have to tell us who the Duke of Alva was. Go back. You will have to find another website. Let's see... Yes, try that one.***
- Trainer: *You do refer to the learning goal, that is good. But I miss the critical information. Do you say anything about the text they are using?*
- Teacher: *They have just copied some text from a website, but they do not understand it. That text contains many difficult words.*
- Trainer: *But do you tell them that?*
- Teacher: *No, I don't.*
- Colleague 1: *No, you don't tell the kids what is wrong with the text they are using, so you do not give critical feedback then.*

- Trainer: *Indeed. The students might not know why you direct them to another website.*
- Teacher: *Oh, okay. I could better say: You have found a text that is too difficult for you, because you do not understand what is written there.*
- Trainer: *Let's watch again.*
- The video fragment was repeated.**
- Teacher: *I see. I immediately say how I would proceed and what they should change.*
- Trainer: *If you refer to the learning goal: You have to learn who the Duke of Alva was, when he lived and what he did. You say 'a Spanish whatsoever'. That is not clear. You do not understand the text you have selected from the internet.*
- Teacher: *No, they did not understand it.*
- Trainer: *That is critical feedback.*
- Teacher: *So, I could say that and subsequently say: 'So, I want you to...'*
- Trainer: *Exactly. Now you are giving them hints regarding that text they have found and we all can infer from your feedback that the text was not appropriate for them, but do the students themselves also understand that?*
- Teacher: *Maybe they don't. I do not give any critique here, actually.*
- Colleague 2: *You only say 'I would use this...', but why would you use that?*
- Trainer: *So, it is all about saying why you give them this suggestion. What is the reason you give them that suggestion?*
- Teacher: *I do say that I want them to find other information, because they must be able to tell who that Duke was, but it would be better to first say what went wrong.*
- Trainer: *Yes, exactly. They will have to tell who the Duke of Alva was. Can they? No, because the text they have selected is far too difficult.*
- Teacher: *Oh, yes. It is just a small change actually, but it does make the information more clear for my students. Why do I want them to do something differently. That would be clear then.*
- Trainer: *Exactly, because you have a reason for that. And you do not mention that reason here.*
- Teacher: *That is right. And it is not difficult to do so.*

- Colleague 1: *I notice that we want to help the students to finish the product they have to make. And you try hard to direct them to finishing this product. You easily give a lot of hints and suggestions. Me too, we just saw that in my video fragments.*
- Colleague 2: *Yes, that is right. I also have that tendency to help them forward.*
- Trainer: *Yes, indeed. And you help them to answer the questions and to prepare a nice presentation, while they learn much more on the long run when you help them develop learning strategies. In this case, for example, strategies for selecting appropriate, informative websites to find information they understand.*
- Teacher: *Yes, indeed. That is much more helpful for them, also when this project is finished. In fact, we are helping them on the short-term, to finish a certain project. I will try to really help them further instead of giving some quick hints.*

### Example 2

- Trainer: *You said you did not like your videotape?*
- Teacher: *Indeed, I didn't. I go to this group of students, because in this lesson, we focused on social learning. This boy has problems with that. So I thought, I will have to help that group first. But then I sit there for over eight minutes and I do not know what to say or do anymore. That boy does not want to work together with T., because he has already worked together with her for so many times. And that is true, but there are only 16 students in our class. I tell him that. But then I notice that I am sitting with this group for quite some time and I get irritated. And I just stop. I say: "You will have to find a solution together now." Walking away was an escape for me, do you understand?*
- Colleague 1: *Yes, yes.*
- Teacher: *I thought, I have to do something else now, because I just did not know what to do or say to that group anymore. And then I just left. That is at this point.*
- Trainer: *Let's watch this fragment.*

- Student 1:** *But I just don't like working together with T. again, I have already worked with her on that presentation back then.*
- Teacher:** *When? On which topic?*
- Student 1:** *Jungles.*
- Teacher:** *But that was 3 or 4 projects ago. We do not have that many students in our class, only 16 kids. You cannot cooperate with somebody else each time.*
- Student 1:** *But I just don't want to, because I have worked with T quite some times.*
- Student 2:** *But I have worked with T. the last time, remember?*
- Teacher:** *You see? It goes on and on and I just really do not know how to move on. Watching that fragment, I think, maybe I should have let T. tell what she thinks of it. Maybe she had a solution. But I just quit. At that moment, I did not know what else to do.*
- Trainer:** *Do you have ideas of handling this situation?*
- Colleague 1:** *I think he just has to work with T. Bad luck then. Finish the discussion and just work. You cannot make a problem out of everything.*
- Colleague 2:** *But there were four students in that group, weren't there? Maybe you can make other couples within the group.*
- Teacher:** *M. gives that suggestion. She wants to work with T. the next time. But for now they just want to stick to what they agreed on in the beginning of this project.*
- Colleague 1:** *I would have also asked why he does not want to work with T., because there might be another reason for it. Maybe something else is bothering him. I can imagine that this is the case with that student.*
- Teacher:** *Yes, that can definitely be the case. He often plays with T., normally they get along with each other quite well. That is why it surprised me and then... well... I just did not know what to do or say and I was irritated.*
- Trainer:** *What strikes me here...*
- Student 1:** *... I have already worked with her on that presentation back then.*
- Teacher:** *When? On which topic?*

- Trainer: *...is that by asking this, you step into their discussion. You just argue with them. So maybe, what was just suggested, you can ask why he does not like working with T this time. Then you do not refute his argument.*
- Teacher: *Yes, indeed. Now, I think it is because he cannot work on the computer this time. That might be the reason for his quibbling.*
- Trainer: *You might get him out of this negative reasoning by asking for the reason for this problem. When you ask him to sum up all the occasions on which he has already worked with T., he will maintain his stubbornness. What else could you do, thinking about the learning goal you had set for this lesson?*
- Teacher: *Repeat the things we have discussed about how good social learning works.*
- Trainer: *Exactly. And do this together with all four students of that group.*
- Teacher: *So, actually, trying to make sure that they take the responsibility for the cooperation in their group.*
- Trainer: *Yes, because you have discussed this beforehand and it was written on their papers. So you can easily refer to that.*
- Teacher: *That might be a way to end this useless discussion, because it went on and on and that was not what I wanted.*
- Trainer: *You can stop all four students from working and say: You are a group and we do encounter a problem here. We all know what you should do to cooperate appropriately, we have discussed that. But now this is not happening in your group. You can then ask them to work on a solution and tell them you will come back after five minutes to hear how they have solved it. Later in your video I see that you have involved all four students, but maybe you should have done this earlier.*
- Teacher: *Yes, indeed.*
- Trainer: *Let's watch the fragment again.*

***The video fragment was repeated***

- Teacher: *At this point, I could have walked away for a while. Call the group together, this is the problem, you will have to solve it, I will be right back to hear your solution. I do, in fact, not have to hear how they discuss this problem, eventually I want to*

*hear their solution, but I do not have to participate in that whole discussion.*

Trainer: *No, you don't. Point out the goals again and ask them to try to find a way to reach these goals. Do you think this would help a next time?*

Teacher: *Yes, I think so. I can certainly try this.*





## Summary

### **Teacher Feedback during Active Learning: The Development and Evaluation of a Professional Development Programme**

Feedback can be one of the most powerful tools teachers can use to enhance student learning. Giving feedback in order to enhance student learning appears to be a difficult task for teachers and giving feedback during active learning appears to be that even more. During active learning, students work in small groups on different learning goals and undertake different learning activities at the same time. They need to achieve task-related goals as well as develop metacognitive knowledge and skills needed for active learning. Teaching in this context implies a shift in the role of the teacher, from someone who transfers knowledge to students to someone who guides and facilitates students' learning processes. However, teachers often seem unable to provide the feedback that is needed during active learning.

Teachers appear to need support for improving their feedback practices during active learning. Research on professional development in general has mostly yielded disappointing results as teacher professional development activities have often been found to be ineffective in terms of changing teachers' practices. Several conditions and features have to be taken into account when designing professional development activities for teachers to increase the chance that these activities will result in enhancing teachers' professional development and changes in their daily practice. An example of a condition is that a professional development programme (PDP) optimally builds on teachers' current knowledge and beliefs, and their behaviours in the classroom.

This dissertation reports on the effects of a carefully developed PDP aimed at improving teacher feedback during active learning. Teachers who practiced active learning in the domain of environmental studies in the sixth, seventh and eighth grade of Dutch primary schools were involved in the study. The central research question for this research project was: *How can primary school teachers learn to give optimal feedback to their students during active learning?* The more specific research questions were the following:

1. What are the characteristics of teacher feedback during active learning in the highest grades of primary schools?
2. What beliefs do primary school teachers hold with regard to feedback during active learning, and what are the main problems primary school teachers perceive with regard to feedback during active learning?
3. What are the short and long-term effects of a PDP that builds on teachers' beliefs, perceived problems and practices, and that incorporates the conditions and features that are known to be important for enhancing teachers' professional development on their beliefs, perceived problems and classroom behaviour?
4. To what extent do teachers consider the features of the PDP valuable to enhance their professional development regarding feedback during active learning?
5. How can teacher learning in the context of a PDP be characterized in terms of learning activities and their regulation of learning?

The chapters 2 to 6 each answered one of these research questions, in the same order as presented above.

#### *Teacher Feedback during Active Learning*

In chapter 2 we described the study regarding the characteristics of teacher feedback during active learning. A category system that was based on the literature and empirical data was developed in order to describe the feedback practices of 32 teachers in grades six, seven and eight of 13 primary schools where the concept of active learning was practised in environmental studies lessons. A total of 1465 teacher-student interactions were video-taped and assessed using this system. We concluded that about half of the teacher-student interactions contained guidance and feedback. These interactions were mainly focused on the task or the processing of the task and rarely on social learning or students' metacognition, although the development of students' metacognition and social learning skills is important during active learning. Most feedback interactions could be characterized as unrelated to an explicitly stated learning goal. Only few feedback interactions contained confirmation and criticism as well as constructive remarks for how to proceed. Feedback was mainly given in a directive way and less frequently in a facilitative way. This feedback appeared suboptimal to enhance student learning in an active learning environment.

In chapter 3 teachers' beliefs and the main problems they perceived with regard to feedback during active learning were described. The same teachers who participated in the study described in chapter 2 also participated in this study. A writing task was administered to examine teachers' beliefs. For identifying their perceived problems, interviews were conducted. Teachers perceived that a lack of conditional teacher skills, especially problematic time management, hindered them most from giving good feedback. The most widely held belief was that 'feedback should be positive'. Teachers also believed that it is important to adopt a more facilitative way of giving feedback, but they found this difficult to implement. Only some teachers believed goal-directedness and a focus on student metacognition were important during active learning; teachers did not perceive problems regarding these aspects. By examining teachers' beliefs and perceived problems, we sought explanations for the suboptimal feedback behaviours that were described in chapter 2. By analysing the differences between the results presented in both chapters and the findings in the literature, suggestions for how feedback during active learning could be improved were deduced.

*The development and evaluation of a professional development programme*

In chapter 4 we described the effects of a PDP that built on teachers' beliefs, perceived problems and practices and that incorporated specific conditions and features that are known to be important to enhance teachers' professional development. The goals of the PDP were:

- setting clear learning goals and communicating these goals to students;
- giving feedback which includes confirmation and criticism as well as constructive remarks;
- balancing directive and facilitative ways of giving feedback;
- giving more feedback which is focused on students' metacognition;
- giving more feedback which is focused on students' social learning;
- creating the conditions for active learning by establishing efficient classroom management.

The design of the PDP was based on the literature regarding the conditions and features which are considered to be important for PDPs. We distinguished three different kinds of features, namely structural features, goal-setting features and features of the professional development activities that are part of the programme. Structural features refer to the characteristics of the structure or design of the PDP, such as its form and

duration. An example of a goal setting feature is the communication of clear learning goals at the start of the PDP. Learning actively and doing authentic tasks are examples of important activity features. We operationalized these features in a PDP that consisted of weekly activities carried out over four months, including four informative meetings and four video-interaction training meetings, with videotaping in the classrooms and the selecting of video fragments occurring in between. The effects of this PDP on 16 primary schoolteachers' knowledge, beliefs, perceived problems and classroom behaviour were examined via video-taped observations, a writing task and a questionnaire prior to and twice after the programme was implemented. The results indicated that, with regard to all the goals of the PDP, teachers' knowledge and beliefs were changed, teachers' perceived problems were reduced and/or their feedback behaviour was improved. Several effects were observed both in the short term and in the longer term. For example, teachers learned to believe that feedback must be goal-directed and that learning goals need to be communicated to students. In the classrooms, teachers more often related their feedback explicitly to the learning goals.

In chapter 5 we tried to answer the question to what features of the PDP the teachers themselves attributed the positive effects of the PDP on their professional development. The 16 teachers who participated in the PDP completed a questionnaire to indicate the extent to which they considered each of the features that were purposefully included in the PDP valuable. Four focus group interviews were conducted to gather qualitative data that illustrated the quantitative results from the questionnaire and specified on what occasions each feature did or did not support teachers' professional development. The results indicated that, according to the teachers themselves, all features contributed to their professional development. Teachers value most features quite highly. Regarding the structural features, for example, teachers indicated that they valued collaborative learning with their colleagues highly. They discussed thoughts and experiences regarding their actual teaching behaviours more easily with each other and said they learned from this. With regard to the goal-setting features, teachers mostly appreciated the demonstration of the learning goals in the form of examples and non-examples of unfamiliar teachers' classroom practices on video. With regard to the activity features, teachers felt that examining, discussing and reflecting on their own video-taped behaviour contributed most to their professional development. The perceptions of the teachers confirmed the scientific knowledge regarding the features that are effective in PDPs to a large extent. However, teachers specified or commented on this knowledge,

for example the generally accepted notion that reflection on own actions promotes professional development. Teachers clearly valued reflecting on their own behaviour using videos, but they did not consider written reflection in a logbook of any worth for enhancing their professional development.

In chapter 6 an in-depth case study was described that characterized two teachers' learning processes during participation in the PDP. Video-taped observations of these teachers' feedback behaviour in the classroom, video-taped observations of the video interaction training meetings and teachers' self-reports of what was learned during (parts of) the PDP were analysed and described in terms of teachers' learning activities and their regulation of learning. The results indicated that these teachers' learning processes differed greatly from each other. One teacher showed characteristics of a meaning-directed learning pattern. She understood the essence of the information very well and she regulated her own learning actively in a prospective as well as retrospective way. The other teacher struggled to learn; she recurrently did not know or misunderstood what to implement in the classroom and how. Her learning pattern was undirected; she had difficulties regulating her own learning. Much external regulation of learning was provided by the trainer. Nevertheless, positive effects of the PDP on classroom behaviour were observed for both teachers. It appeared that, to a certain extent, the structured activities and the direct guidance by the trainer could compensate for a lack of self-regulation by the teacher who showed an undirected learning pattern.

### *General conclusions*

This dissertation provided a comprehensive and detailed description of the characteristics of teacher feedback in the context of active learning. From reviewing the extant literature, it could be concluded that feedback during active learning is ideally goal-directed and includes confirmation, criticism and constructive remarks. These constructive remarks are preferably given in a facilitative way, although directives with regard to the expectations and the goals of the lesson are also needed. During active learning, the feedback needs to be regularly focused on the development of students' metacognition and social learning skills. For giving this kind of feedback, an efficient classroom organisation is essential. When examining teachers' classroom practices, their beliefs and perceived problems it appeared that, in general, these conditions and characteristics of feedback are not optimally implemented in primary school classrooms. Feedback can be a very powerful tool for teachers to enhance student learning, but it

appears difficult for teachers to use this tool appropriately. Teachers are, however, able to improve their knowledge and skills in a sustainable manner through participation in a PDP that builds on their beliefs, perceived problems and practices. A combination of important features must be realized in such a PDP. Video-based learning appeared particularly applicable to integrate many of these important features and this method of learning was valued highly by the teachers. In addition, it is important to include the provision of a substantial amount of tailored feedback from the trainer, because teachers enter the PDP from different starting points and show very distinct learning patterns.

#### *Discussion and directions for future research*

Goal-directedness is a central element of feedback, since feedback is essentially information about how the student's present performance relates to the learning goal. In chapter 2 it was shown that in only 2.5% of the interactions during environmental studies lessons the teachers explicitly referred to a learning goal. It may be argued that only these few interactions contain 'real' feedback according to the definition in which a comparison of the student's performance or behaviour to the learning goal is central. We decided to distinguish a category of 'guidance and feedback' interactions which was more broadly defined: interactions that contained information for the student. There may be various reasons for the lack of goal-directedness in most interactions. For example, teachers may set only implicit goals do not believe that learning goals are important (as was concluded in chapter 3), or the national attainment targets for environmental studies are not specific enough for teachers to guide the goal-setting for a specific lesson or project. Nevertheless, it is clear that specific learning goals effectively and significantly increase students' performance. An interesting question for future research would therefore be whether the lack of goal-directed feedback is also present in a domain for more structured curricula, for example in the domain of mathematics.

Another topic for discussion is the focus on developing students' metacognition. Schools decide to implement active learning because of the assumption that students will not only learn knowledge contents, but also higher-order thinking skills or metacognitive knowledge and skills that are needed for lifelong learning. This aim will not be reached automatically by implementing small group work. Students need feedback on the development of their metacognitive knowledge and skills. In our study, it was observed that very little feedback was focused on the development of

metacognition. Only a quarter of the teachers involved believed that feedback during active learning should (also) be focused on developing student metacognition. Although stimulating more feedback on this focus was a goal of the PDP, no lasting effects on teachers' behaviour were observed in this respect. Teachers learned that it is important to give feedback on students' metacognition during active learning, but did not succeed in bringing this into practice yet. The same was found for feedback focused on students' social learning skills. This calls into question whether active learning is implemented in these schools successfully. It appears that teachers need much more and intensive support to realise the aims of active learning. It would be interesting to examine whether a follow-up programme that is specifically focused on enhancing students' metacognition and social skills could yield and maintain the desired effects.

With regard to PDP's for teachers, it is clear that several features have to be taken into account to increase the chance that PDP efforts result in effective professional development. How these features should be operationalized in relation to each other is less clear. In our PDP, we used video interaction training meetings to combine several features. For example, the teachers learned collectively during these meetings, while using authentic learning materials (i.e., their own videos). Clear goals were set for each meeting and teachers participated actively. Reflection on their own actions was promoted by the selection of fragments that teachers had to make by themselves. During the meetings we built from teachers' own reflections on their videos. Afterwards, they reflected on what they had learned and drew inferences for further implementation. Evidence for positive effects of video-based learning on teachers' beliefs and their interaction skills has been found in other studies. In this study, teachers attributed the positive effects of the PDP for the most part to the use of video-based learning. It therefore seems worthwhile to use more video-based learning in PDPs for teachers.

A final topic for discussion and future research is the issue that feedback was not identified as an important feature of PDPs in itself. In the literature regarding effective professional development, feedback is included in other features, for example as an ingredient of the feature 'active participation'. As we have argued in all chapters, feedback is the most powerful tool a teacher can use to enhance student learning. The same appears true for enhancing teachers' learning. In our PDP, teachers received a substantial amount of tailored feedback from the trainer during the video interaction training meetings. Chapter 6 illustrated how important this



feedback can be to stimulate teacher learning. Some teachers are perfectly capable of regulating their own learning and primarily need informative input that they can implement by themselves. Other teachers are less able to regulate their own learning and the trainer needs to compensate for this. Devoting so much time and effort to the provision of tailored feedback on the behaviours and reflections of each individual teacher may have had a significant impact on the positive effects of the PDP. This PDP succeeded in changing several aspects of teachers' behaviour, which is quite exceptional. Maybe the difference between this PDP and many others lies in the amount and quality of the trainer's feedback. Examining the role of the trainers' feedback in PDPs in more detail would be an interesting direction for future research.

#### *Implications for practice*

Besides theoretical implications, this study aimed at identifying aspects of teacher feedback that could be improved to enhance active learning by students optimally. Furthermore, we aimed to find ways in which teachers can be helped to improve their feedback behaviour during active learning. The conclusions of the several studies that cover these two aims led to the following concrete recommendations. For teachers and teacher educators it is recommended that they:

- *Pay more attention to feedback.* Feedback is potentially the most powerful influence on students' learning. Qualitatively good feedback is rarely observed in the classroom and even highly experienced teachers held less optimal beliefs regarding feedback and they perceived several problems with the provision of feedback in the context of active learning. In initial teacher education, but especially during the professional development of experienced teachers, this topic deserves much more attention.
- *Pay more attention to goal-setting.* Numerous studies showed that specific goals effectively and significantly increase students' performance; setting clear goals leads to better performance than vague goals or no goal at all. In many lessons that were observed during this study clear learning goals were lacking. By definition, giving feedback is not possible without a clear learning goal. Thinking about what you want your students to learn in each lesson seems a logical first step when preparing a lesson. The next step would be to keep these goals in mind when giving feedback.

- *Pay more attention to the organisation of active learning.* The active learning context is complex, because small groups of students perform different activities at the same time. They need to work with several resources, they discuss with each other and often some groups work outside the classroom. Teachers have trouble keeping the overview, dividing their time among all the groups of students and maintaining procedures. These organisational issues can influence the quantity as well as the quality of the feedback the teacher gives. Practical suggestions, examples on video and opportunities for implementing new routines can be offered by teacher educators or consultants at the schools.
- *Pay attention to the development of students' metacognition.* Although the development of students' metacognition is an important reason for implementing active learning, feedback on the students' metacognition was given in just 1% of all teacher-student interactions (Chapter 2). Several teachers did not know what student metacognition was, what knowledge and skills it entailed and how to support the development of such knowledge and skills. Stimulating students' metacognition is effective in enhancing learning, so it is important to teach (student) teachers the knowledge and skills that are necessary to accomplish this.

For teacher educators and school leaders it is recommended that they:

- *Continue the support after a PDP ends.* The PDP that was developed in this study was intensive and time-consuming. Some effects of the PDP decreased seven months after training. Teachers' learning processes were non-linear and it is known that it takes time to develop new routines. Follow-ups and long-term support would be helpful to prevent teachers from reverting into old routines. In partnerships between teacher education institutes and schools, a follow-up trajectory could be arranged. The school's own personnel could also fulfil the role of the trainer, as long as the designated person has sufficient expertise regarding the topic and the coaching of teachers. Furthermore, the teachers must feel confident and safe with this person.
- *Be adaptive to individual (student) teachers' learning.* Building from teachers' own beliefs, perceived problems and practices helped to identify the topics that should be addressed in the PDP. However, this was only a first step. A PDP also needs to include differentiated

feedback for individual teachers. Individual teachers differed with regard to the extent they perceived certain problems and with regard to the extent to which they regulated their own learning. Both aspects have an impact on what is required from the trainer. The trainer, or teacher educator, should be able to give tailored feedback and to adapt the PDP to the level of self-regulation a teacher employs.

## Samenvatting

### **Feedback van de Leerkracht tijdens Actief Leren: De Ontwikkeling en Evaluatie van een Professioneel Ontwikkelingsprogramma**

Feedback is een van de meest krachtige middelen die een leerkracht kan inzetten om het leren door leerlingen te bevorderen. Feedback wordt gedefinieerd als informatie over de vergelijking van de geobserveerde prestatie van een leerling (of van een groepje leerlingen) en een doel. Deze informatie wordt gegeven met de intentie om de prestaties van de leerling(en) te verbeteren. Het geven van feedback blijkt een moeilijke taak voor leerkrachten. Nog moeilijker blijkt het geven van feedback tijdens actief leren. Actief leren houdt in dat leerlingen in kleine groepjes aan verschillende taken werken. Zij ondernemen verschillende leeractiviteiten, zoals het opzoeken van informatie en het verwerken ervan in een presentatie. Het is de bedoeling dat leerlingen niet alleen inhoudelijke leerdoelen realiseren, maar ook hun metacognitieve kennis en vaardigheden evenals hun vaardigheden in samenwerken verder ontwikkelen. Het lesgeven in de context van actief leren impliceert een verandering in de rol van de leerkracht, van iemand die voornamelijk kennis overdraagt aan leerlingen naar iemand die de leerprocessen van leerlingen begeleidt en faciliteert. Echter, leerkrachten blijken vaak nog niet in staat om hun leerlingen de feedback te geven die nodig is tijdens actief leren. Leerkrachten hebben daarom ondersteuning nodig om de feedback die ze geven tijdens actief leren te verbeteren. Onderzoek naar professionalisering van leerkrachten laat echter voornamelijk teleurstellende resultaten zien; professionaliseringsactiviteiten blijken vaak niet effectief om het gedrag in de klas daadwerkelijk te veranderen. Om de kans te vergroten dat professionaliseringsactiviteiten resulteren in professionele ontwikkeling en verbeterd leerkrachtgedrag moet bij het ontwerpen van deze activiteiten dan ook aan verschillende condities worden voldaan. Een voorbeeld van zo'n conditie is de aansluiting bij de kennis, opvattingen en het gedrag in de klas van de leerkrachten voor wie de professionaliseringsactiviteiten bedoeld zijn.

In dit proefschrift worden de effecten van een zorgvuldig ontwikkeld professionaliseringsprogramma gericht op verbetering van de feedback tijdens actief leren gerapporteerd. Deelnemers aan dit onderzoek waren leerkrachten die actief leren toepasten bij wereldoriëntatie in de groepen 6, 7

en 8 van Nederlandse basisscholen. De centrale onderzoeksvraag luidde: *Hoe kunnen basisschoolleerkrachten leren hun leerlingen optimale feedback te geven tijdens actief leren?* Deze vraag is opgesplitst in de volgende deelvragen:

1. Wat zijn de kenmerken van feedback gegeven door leerkrachten tijdens actief leren in de bovenbouw van het basisonderwijs?
2. Welke opvattingen hebben basisschoolleerkrachten over feedback tijdens actief leren en welke problemen ervaren zij bij het geven van feedback in deze context?
3. Wat zijn de korte- en lange termijn effecten van een op basis van wetenschappelijk gefundeerde criteria ontwikkeld professionaliseringsprogramma voor het verbeteren van de feedback die leerkrachten tijdens actief leren geven op de opvattingen, de ervaren problemen en het gedrag van leerkrachten?
4. In hoeverre vinden leerkrachten de kenmerken van het professionaliseringsprogramma waardevol voor hun professionele ontwikkeling wat betreft het geven van feedback tijdens actief leren?
5. Hoe kan het leren door leerkrachten in de context van een professionaliseringsprogramma gekarakteriseerd worden in termen van leeractiviteiten en de regulatie van het eigen leerproces?

In de hoofdstukken 2 tot en met 6 is steeds één van deze onderzoeksvragen beantwoord, in dezelfde volgorde als hierboven genoemd.

#### *Feedback van de leerkracht tijdens actief leren*

In hoofdstuk 2 is de studie naar de kenmerken van feedback tijdens actief leren beschreven. Een categorieënsysteem gebaseerd op een literatuurstudie en op empirische data is ontwikkeld om de feedbackpraktijken van 32 leerkrachten van de groepen 6, 7 en 8 op 13 basisscholen te beschrijven. Actief leren werd toegepast tijdens het werken aan wereldoriëntatie. In totaal werden 1465 leerkracht-leerling interacties gefilmd en geanalyseerd met behulp van het categorieënsysteem. Ongeveer de helft van de interacties bestond uit begeleiding en feedback. Deze interacties gingen voornamelijk over de taak of over de aanpak van de taak. Zelden werden de begeleiding en feedback gericht op het ontwikkelen van de metacognitie van de leerlingen of op hun samenwerkingsvaardigheden, terwijl dit wel belangrijke doelen van actief leren zijn. De meeste begeleidings- en feedbackinteracties waren niet gerelateerd aan een expliciet geformuleerd leerdoel. Weinig van deze interacties bevatten zowel bevestiging als kritiek en constructieve opmerkingen gericht op verbetering

van het werk of het gedrag van de leerling(en). De manier van het geven van begeleiding en feedback was voornamelijk sturend en veel minder vaak faciliterend. Dit geobserveerde feedbackgedrag was suboptimaal om de leerprocessen van leerlingen tijdens actief leren te bevorderen.

Hoofdstuk 3 heeft betrekking op de opvattingen van de leerkrachten over feedback tijdens actief leren en de problemen die zij hierbij ervaren. Het betrof dezelfde leerkrachten als in de studie die is beschreven in hoofdstuk 2. Opvattingen van leerkrachten werden gemeten door hen te vragen een 'woordweb' te maken. In interviews gaven de leerkrachten een toelichting op hun woordweb en is hen gevraagd naar de problemen die zij ervoeren bij het geven van feedback tijdens actief leren. De leerkrachten ervoeren met name problemen bij het realiseren (organiseren) van de condities voor actief leren. Een tekort aan tijd en moeite met het verdelen van de tijd over de leerlingen werden het vaakst genoemd als probleem. De meest genoemde opvatting was dat feedback positief moet zijn. Daarnaast vonden leerkrachten het belangrijk om meer te faciliteren en minder te sturen, maar waren tegelijkertijd van mening dat dit erg moeilijk in de praktijk is te brengen. Slechts enkele leerkrachten noemden doelgerichtheid en een focus op de ontwikkeling van de metacognitie als belangrijke aspecten van feedback tijdens actief leren en de leerkrachten ervoeren nauwelijks problemen rondom deze twee aspecten. Door het relateren van de opvattingen en de ervaren problemen van de leerkrachten aan de observaties beschreven in hoofdstuk 2, is gezocht naar verklaringen voor het suboptimale feedbackgedrag. De analyse van de verschillen tussen de uitkomsten van beide studies en de bevindingen in de literatuur over feedback en actief leren leidde tot suggesties voor de verbetering van de feedback van leerkrachten tijdens actief leren. Deze suggesties vormden de leerdoelen van het professionaliseringsprogramma dat hieronder beschreven wordt.

#### *De ontwikkeling en evaluatie van een professionaliseringsprogramma*

In hoofdstuk 4 staan de effecten van een professionaliseringsprogramma dat aansluit bij de opvattingen, de ervaren problemen en het feedbackgedrag van basisschoolleerkrachten. De doelen van dit professionaliseringsprogramma waren:

- het stellen van heldere leerdoelen en het communiceren van deze leerdoelen aan de leerlingen;
- het geven van feedback die zowel bevestiging als kritiek bevat evenals constructieve opmerkingen gericht op verbetering van het werk of het gedrag van de leerling(en);

- het realiseren van evenwicht in de sturende en de faciliterende manier van het geven van feedback;
- het geven van meer feedback gericht op de ontwikkeling van de metacognitie van de leerlingen;
- het geven van meer feedback gericht op de ontwikkeling van samenwerkingsvaardigheden;
- het realiseren van de condities voor actief leren door efficiënt klassenmanagement.

Het design van het professionaliseringsprogramma was gebaseerd op de literatuur over de condities en kenmerken die van belang zijn voor positieve effecten van programma's gericht op de professionele ontwikkeling van leerkrachten. Kenmerken hebben betrekking op de structuur, de doelen en de leeractiviteiten van het programma. Structurele kenmerken betreffen het ontwerp van het professionaliseringsprogramma, zoals de vorm en de duur ervan. Een voorbeeld van een kenmerk met betrekking tot de doelen is het communiceren van heldere leerdoelen bij de start van het programma. Actief leren en het uitvoeren van authentieke taken zijn voorbeelden van belangrijke kenmerken van leeractiviteiten tijdens het programma. Deze drie soorten kenmerken zijn geoperationaliseerd in een professionaliseringsprogramma dat bestond uit wekelijkse activiteiten gedurende een periode van vier maanden. Er waren vier cycli van een informatieve bijeenkomst en een bijeenkomst bestaande uit Video Interactie Training (VIT), waarbij er tussen deze bijeenkomsten steeds gefilmd werd in de klas. De leerkrachten selecteerden uit deze video-opnamen zelf hun fragmenten voor bespreking in de VIT-bijeenkomst. De korte- en lange termijn effecten van dit professionaliseringsprogramma op de opvattingen, ervaren problemen en het feedbackgedrag van 16 leerkrachten van de bovenbouwteams van twee basisscholen werden gemeten. Hiervoor zijn video-observaties, 'woordwebben' en vragenlijsten gebruikt op drie momenten: voor de training, direct na de training en zeven maanden na de training. De resultaten lieten zien dat er met betrekking tot alle doelen van het professionaliseringsprogramma veranderingen optraden in de opvattingen van de leerkrachten, dat er sprake was van een afname van de ervaren problemen en/of een verbetering van feedbackgedrag. Meerdere effecten werden zowel op de korte als langere termijn geobserveerd. Leerkrachten rapporteerden bijvoorbeeld na zeven maanden nog steeds veel vaker de opvatting dat feedback doelgericht moet zijn en dat het belangrijk is om deze doelen aan de leerlingen te communiceren. Tijdens de les relateerden de leerkrachten hun feedback ook daadwerkelijk veel vaker aan de leerdoelen.

Hoofdstuk 5 beschrijft het antwoord op de vraag in hoeverre leerkrachten de kenmerken van het professionaliseringsprogramma waardevol vonden voor hun professionele ontwikkeling wat betreft het geven van feedback tijdens actief leren. De 16 leerkrachten die deelnamen aan het professionaliseringsprogramma hebben een vragenlijst ingevuld om per kenmerk van het programma aan te geven hoe waardevol zij dat kenmerk vonden voor hun professionele ontwikkeling. Tevens zijn vier focusgroep interviews afgenomen bij deze leerkrachten om kwalitatieve data te verzamelen die de kwantitatieve resultaten van de vragenlijsten illustreerden en die specificeerden in welke gevallen ieder kenmerk juist wel of juist niet ondersteunend was voor de professionele ontwikkeling van de leerkrachten. De resultaten lieten zien dat de leerkrachten vrijwel alle kenmerken waardevol vonden voor hun professionele ontwikkeling. Met betrekking tot de structurele kenmerken gaven leerkrachten bijvoorbeeld aan dat zij het samen leren met hun collega's erg nuttig vonden. Gedachten en ervaringen in de klas werden tijdens het professionaliseringsprogramma meer en diepgaander met elkaar gedeeld en de leerkrachten gaven aan hiervan veel geleerd te hebben. Wat betreft de kenmerken met betrekking tot de doelen van het programma vonden de leerkrachten het vooral waardevol dat de leerdoelen gepresenteerd werden in de vorm van goede en slechte voorbeelden van leerkrachtgedrag in videobeelden van klassensituaties. Met betrekking tot de kenmerken van de leeractiviteiten vonden de leerkrachten dat het bekijken en het bediscussiëren van hun eigen feedbackgedrag op video het meest hebben bijgedragen aan hun professionele ontwikkeling. De percepties van de leerkrachten over de waarde van de verschillende kenmerken kwam grotendeels overeen met wat uit onderzoek bekend is over deze kenmerken. Er werden echter specificaties gemaakt, bijvoorbeeld met betrekking tot het belang van reflectie op het eigen handelen. De leerkrachten vonden het reflecteren op hun eigen gedrag op video heel waardevol, maar het opschrijven van reflecties in het logboek vonden zij daarentegen veel minder waardevol voor hun professionele ontwikkeling.

Hoofdstuk 6 beschrijft een dieptestudie over de leerprocessen van twee leerkrachten die deelnamen aan het professionaliseringsprogramma. Video-observaties van het gedrag in de klas en van de VIT-bijeenkomsten en zelfrapportages over wat de leerkrachten tijdens de verschillende bijeenkomsten hebben geleerd zijn geanalyseerd en beschreven in termen van leeractiviteiten en de regulatie van het eigen leerproces. De resultaten lieten zien dat de leerprocessen van deze twee leerkrachten erg verschillend waren. Eén leerkracht liet kenmerken zien van een betekenisgericht



leerpatroon. Zij begreep de essentie van de informatie goed en was in staat haar eigen leren te reguleren. De andere leerkracht vond het moeilijk om te leren; zij wist of begreep herhaaldelijk niet goed wat er van haar verwacht werd en hoe ze het beoogd gedrag kon realiseren. Zij liet een stuurloos leerpatroon zien; ze had moeite met het reguleren van haar eigen leren. De trainer bood deze leerkracht veel externe regulatie. Voor beide leerkrachten zijn positieve effecten van het professionaliseringsprogramma geobserveerd. Dit duidt er op dat, tot op zekere hoogte, de gestructureerde professionaliseringsactiviteiten en de op de individuele leerkrachten afgestemde begeleiding door de trainer konden compenseren voor een gebrek aan zelfregulatie van de leerkracht die een stuurloos leerpatroon liet zien.

### *Algemene conclusies*

Dit proefschrift bevat een omvattende en gedetailleerde beschrijving van de optimale en de feitelijk geobserveerde kenmerken van feedback tijdens actief leren. Uit de literatuurstudie bleek dat feedback in het meest ideale geval doelgericht is en bevestiging, kritiek en constructieve opmerkingen bevat. Deze constructieve opmerkingen worden bij voorkeur op een faciliterende manier gebracht, hoewel sturende instructies met betrekking tot de leerdoelen en de verwachtingen ook nodig zijn. Tijdens actief leren zou de feedback regelmatig gericht moeten zijn op het ontwikkelen van de metacognitie van de leerlingen en op de ontwikkeling van samenwerkingsvaardigheden. Om feedback te kunnen geven is een efficiënte klassenorganisatie essentieel. Uit de analyse van het feedbackgedrag, de opvattingen van leerkrachten over feedback tijdens actief leren en de problemen die zij hiermee ervaren, bleek in het algemeen dat de condities en kenmerken van optimale feedback (nog) niet geïmplementeerd zijn in de klassenpraktijk op basisscholen die actief leren toepassen bij wereldoriëntatie. Feedback kan een heel krachtig middel zijn om de leerprocessen van leerlingen te stimuleren, maar het blijkt moeilijk voor leerkrachten om dit middel op een goede manier in te zetten. Door het volgen van een professionaliseringsprogramma dat voortbouwt op het gedrag, de opvattingen en de problemen van de leerkrachten kunnen zij zichzelf hierin wel bekwamen. In een dergelijk professionaliseringsprogramma moet een combinatie van bepaalde kenmerken gerealiseerd zijn. Video-interactie-training bleek een methode die bij uitstek geschikt is om verschillende van deze kenmerken te integreren. Het werken met videobeelden werd enorm gewaardeerd door de leerkrachten, zij gaven aan

dat zij hiervan het meest hadden geleerd. Daarnaast was het belangrijk dat leerkrachten voldoende individuele feedback ontvingen van de trainer, omdat de beginsituaties en de leerpatronen van leerkrachten van elkaar verschilden.

#### *Discussie en suggesties voor vervolgonderzoek*

Doelgerichtheid is een centraal element van feedback, omdat feedback in essentie informatie is over hoe het werk of het gedrag van de leerling(en) zich op een bepaald moment verhoudt tot het leerdoel. In hoofdstuk 2 is beschreven dat leerkrachten in slechts 2,5% van de interacties die zij hadden met hun leerlingen tijdens wereldoriëntatie expliciet refereerden aan een leerdoel. Gezien de definitie van feedback waarin de relatie met het leerdoel centraal staat, zou men kunnen stellen dat alleen in deze interacties echte feedback gegeven werd. In deze studie is ervoor gekozen een iets bredere categorie van interacties te definiëren; de 'begeleidings- en feedbackinteracties'. Deze interacties bevatten informatie voor de leerling. Er kunnen verschillende redenen zijn voor het gebrek aan doelgerichtheid in de meeste interacties. Het zou kunnen zijn dat leerkrachten alleen impliciet hun doelen stellen of dat zij het stellen van leerdoelen niet belangrijk vinden voor het geven van feedback (zoals geconcludeerd werd in hoofdstuk 3). Het zou ook kunnen zijn dat leerkrachten het moeilijk vinden concrete leerdoelen op te stellen voor een bepaalde les of project. Wat de oorzaak ook is, het is bekend dat heldere doelen substantieel en effectief bijdragen aan de ontwikkeling van leerlingen. Een interessante vraag voor vervolgonderzoek zou daarom zijn of het gebrek aan doelgerichte feedback een specifiek probleem bij wereldoriëntatie is of dat dit probleem zich ook voordoet in een vakgebied waarin de leerlijnen meer gestructureerd zijn, zoals rekenen.

Een ander discussiepunt betreft de focus op de ontwikkeling van de metacognitie van de leerlingen. Scholen kiezen voor actief leren vanwege de assumptie dat leerlingen hierdoor niet alleen vakinhoudelijke kennis opdoen, maar ook hogere orde denkvaardigheden oftewel de metacognitieve kennis en vaardigheden die nodig zijn voor levenslang leren. Dit gebeurt echter niet automatisch door het organiseren van zelfstandig werken in kleine groepjes. Leerlingen hebben ook instructie en feedback nodig gericht op de ontwikkeling van hun metacognitie. Daarnaast moeten de leerdoelen helder zijn en moet de manier van feedback geven vaker faciliterend zijn dan sturend. In dit onderzoek is geobserveerd dat erg weinig begeleiding en feedback gericht was op de ontwikkeling van de metacognitie. Slechts een

kwart van de leerkrachten vond het belangrijk dat feedback tijdens actief leren regelmatig gericht wordt op de ontwikkeling van de metacognitie van leerlingen. Hoewel het geven van meer feedback gericht op de metacognitie een doel was van het professionaliseringsprogramma dat is geïmplementeerd, werden er alleen korte termijn effecten geobserveerd op dit punt. Leerkrachten hebben door het professionaliseringsprogramma –ook op de langere termijn– wel geleerd dat het geven van feedback op de ontwikkeling van metacognitie belangrijk is tijdens actief leren, maar zij vonden het moeilijk om dit in de praktijk te brengen. Gelijke resultaten werden gevonden voor feedback gericht op samenwerkingsvaardigheden. Het blijkt dat leerkrachten intensievere ondersteuning nodig hebben om de doelen waarmee scholen kiezen voor actief leren goed te realiseren. Het zou interessant zijn om te onderzoeken of een vervoltraining specifiek gericht op het verbeteren en verhogen van feedback gericht op metacognitie en samenwerking de gewenste effecten kan bewerkstelligen en behouden.

Uit onderzoek naar professionalisering van leraren is gebleken dat een professionaliseringsprogramma over bepaalde kenmerken moet beschikken om de kans te vergroten dat het programma daadwerkelijk bijdraagt aan de professionele ontwikkeling van leerkrachten. Hoe deze kenmerken geoperationaliseerd en geïntegreerd moeten worden in een programma is minder duidelijk. In het professionaliseringsprogramma dat voor dit onderzoek is ontwikkeld werd video-interactie-training gebruikt om verschillende van die kenmerken met elkaar te integreren. De leerkrachten maakten gebruik van authentieke materialen (videobeelden' van hun eigen les en leerden van elkaar en van elkaars beelden. Heldere doelen werden gesteld en gecommuniceerd voorafgaand aan iedere bijeenkomst en er werd een zeer actieve deelname van de leerkrachten verwacht. Reflectie op het eigen handelen werd gestimuleerd doordat leerkrachten hun eigen fragmenten selecteerden. Hen werd gevraagd per leerdoel een goed voorbeeld van het doelgedrag te selecteren en een voorbeeld van gedrag waarover de leerkracht een vraag had. Tijdens de bijeenkomsten werd in een klein, veilig groepje doorgepraat over deze fragmenten en de reflecties hierover. Achteraf noteerden de leerkrachten wat zij geleerd hadden tijdens de bijeenkomst en welke voornemens zij op basis hiervan hadden voor hun volgende lessen. Bewijs voor positieve effecten van video-interactie-training op de opvattingen en interactie- vaardigheden is eerder gevonden in diverse andere studies. In deze studie gaven de leerkrachten aan dat zij de positieve effecten van het professionaliseringsprogramma voor het grootste deel toeschreven aan de video-interactie-training. Het lijkt daarom aan te bevelen

om meer gebruik te gaan maken van video-interactie-training bij de professionalisering van leerkrachten.

Het laatste onderwerp voor discussie en vervolgonderzoek betreft de rol van feedback in professionaliseringsprogramma's. Feedback wordt in de literatuur over professionaliseringsprogramma's van leerkrachten niet omschreven als een apart belangrijk kenmerk van dit soort programma's. In het voor dit onderzoek ontwikkelde programma kregen de leerkrachten veel individuele feedback van de trainer tijdens de VIT-bijeenkomsten. Hoofdstuk 6 illustreert hoe belangrijk deze feedback kan zijn om het leren door een leerkracht te bevorderen. Sommige leerkrachten zijn zeer goed in staat om hun eigen leerproces te reguleren en hebben voornamelijk behoefte aan goede, bruikbare informatie die zij zelf kunnen implementeren in hun klas. Andere leerkrachten zijn minder vaardig in het reguleren van hun eigen leren en de trainer moet hiervoor dan compenseren. De tijd en inspanning die geleverd is om feedback op maat te geven op het gedrag en de reflecties van iedere individuele leerkracht heeft waarschijnlijk een aanzienlijke impact gehad op de effecten van het programma. Dit programma is er in geslaagd om verschillende aspecten van leerkrachtgedrag flink te verbeteren, wat vrij uitzonderlijk is. Wellicht zit het verschil tussen dit programma en veel andere professionaliseringsprogramma's voor een belangrijk deel in de hoeveelheid en de kwaliteit van de feedback die de trainer de leerkrachten gaf. Het meer gedetailleerd bestuderen van de rol van de feedback van de trainer is een interessante suggestie voor toekomstig onderzoek.

### *Implicaties voor de praktijk*

Naast de theoretische implicaties die dit proefschrift heeft, was het doel van dit onderzoek het identificeren van aspecten van feedback gegeven door leerkrachten die voor verbetering vatbaar zijn om het actief leren door leerlingen te bevorderen. Tevens werd gezocht naar manieren waarop leerkrachten geholpen kunnen worden om hun feedback tijdens actief leren te verbeteren. De conclusies van de verschillende deelstudies die met deze doelen zijn uitgevoerd leidden tot de volgende concrete aanbevelingen:

Voor leerkrachten en lerarenopleiders:

- *Geef meer aandacht aan feedback.* Feedback kan de meest krachtige invloed zijn op het leren door de leerling. Feedback van goede kwaliteit blijkt schaars in de klas en zelfs zeer ervaren leerkrachten hadden suboptimale opvattingen over wat belangrijk is bij het geven van feedback. Zij ervoeren ook meerdere problemen met het geven van feedback tijdens actief leren. Op de pabo's, maar

zeker ook tijdens de professionele ontwikkeling van ervaren leerkrachten, verdient dit belangrijke onderwerp veel meer aandacht.

- *Geef meer aandacht aan het stellen van doelen.* Talloze studies hebben laten zien dat het stellen van concrete en heldere leerdoelen de prestaties van lerenden effectief en significant verbeteren. In veel lessen die tijdens dit onderzoek geobserveerd zijn ontbraken (heldere) leerdoelen. Eigenlijk is het geven van feedback zonder helder leerdoel onmogelijk. Nadenken over wat je de leerlingen die les wilt leren, lijkt een logische eerste stap bij het voorbereiden van een les. De volgende stap zou moeten zijn dat tijdens de les feedback gegeven wordt waarbij expliciet aan deze doelen wordt gerefereerd.
- *Geef meer aandacht aan de organisatie van actief leren.* Actief leren gebeurt in een complexe klassensituatie, omdat kleine groepjes leerlingen aan verschillende taken werken op hetzelfde moment. De leerlingen hebben verschillende bronnen van informatie nodig, ze overleggen met elkaar en vaak werkt een deel van de leerlingen buiten het klaslokaal. Leerkrachten vinden het moeilijk om het overzicht te houden over waar iedereen mee bezig is en over wat iedereen ervan leert, om hun tijd te verdelen over alle groepjes leerlingen en om de geldende afspraken en werkwijzen te handhaven. Deze organisatorische kwesties beïnvloeden zowel de kwantiteit als de kwaliteit van de feedback die de leerkracht geeft. Praktische suggesties, voorbeelden op video en het bieden van mogelijkheden om een andere aanpak uit te proberen, kunnen geboden worden door lerarenopleiders of begeleiders binnen de scholen.
- *Geef meer aandacht aan de ontwikkeling van de metacognitie van leerlingen.* Ondanks het feit dat de ontwikkeling van metacognitie een belangrijke reden is voor het kiezen voor actief leren, werd er maar in 1% van de leerkracht-leerling interacties aandacht aan besteed (zie hoofdstuk 2). Verschillende leerkrachten wisten niet wat metacognitie is, om welke kennis en vaardigheden het hierbij gaat en hoe zij deze zouden kunnen stimuleren bij hun leerlingen. Een goed ontwikkelde metacognitie draagt bij aan de leermogelijkheden en het schoolsucces van leerlingen. Het is dus erg belangrijk om pabo-studenten en leerkrachten de kennis en vaardigheden aan te leren die nodig zijn om de ontwikkeling van de metacognitie bij hun leerlingen te stimuleren.

Voor schoolleiders gelden nog de volgende aanbevelingen:

- *Continueer de ondersteuning nadat een professionaliseringsprogramma eindigt.* Het programma dat is ontwikkeld in deze studie was intensief en tijdrovend. Enkele effecten verminderden na zeven maanden. De leerprocessen die leerkrachten doormaakten waren niet lineair en het is bekend dat het tijd kost om nieuwe gewoonten eigen te maken. Vervolgactiviteiten en lange termijn ondersteuning zouden leerkrachten kunnen helpen om niet terug te vallen in hun oude gedrag. Het eigen personeel van een school of stichting zou wellicht de rol van de trainer kunnen overnemen, mits deze persoon voldoende expertise heeft in het onderwerp van de training en in het begeleiden van leerkrachten. Daarnaast is het belangrijk dat de leerkrachten zich veilig en vertrouwd voelen bij deze persoon.
- *Stem de professionalisering af op de leerbehoeften van individuele leerkrachten.* Het voortbouwen op de opvattingen, ervaren problemen en het gedrag in de klas zorgt ervoor dat de juiste inhoud behandeld wordt in een bepaald leertraject. Dit is een erg belangrijke eerste stap. Het professionaliseringsprogramma moet daarnaast veel gedifferentieerde feedback bevatten voor individuele leerkrachten. Leerkrachten verschillen van elkaar wat betreft hun beginsituatie (opvattingen, ervaren problemen en gedrag) en in de mate waarin zij in staat waren hun eigen leerproces te sturen. Beide aspecten tezamen bepalen wat er gevraagd wordt van de trainer. De trainer moet in staat zijn om goede individuele feedback te geven en om zijn of haar inbreng aan te passen aan de mate van zelfsturing die een leerkracht laat zien.



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## Curriculum Vitae

Linda Keuvelaar – van den Bergh was born on 3 May 1978 in Oss, the Netherlands. After finishing junior general secondary education (mavo) in 1994, and higher general secondary education (havo) in 1996, she graduated in 2000 from the institute of primary teacher education (pabo) in 's-Hertogenbosch. She worked as a primary school teacher and in 2003 she completed the post-HBO study remedial teaching at Fontys School of Teacher Training for Special Educational Needs. After that, she studied orthopedagogy at the Radboud University of Nijmegen in addition to a part-time job as a remedial teacher at a primary school. After graduating cum laude from the bachelor programme in 2006, she attended the Behavioural Science Research master's programme. She graduated from this research master cum laude in 2008, on the topic of teachers' implicit prejudiced attitudes. She then started her PhD project at Fontys University of Applied Sciences and Eindhoven School of Education (Eindhoven University of Technology) of which the results are presented in this dissertation.



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