

Teacher feedback in the classroom

Analyzing and developing teachers' feedback behavior

in secondary education

Lia Voerman

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Teacher feedback in the classroom

Analyzing and developing teachers' feedback behavior

in secondary education

Feedback van docenten in de klas

Het analyseren en ontwikkelen van het feedbackgedrag
van docenten in het voortgezet onderwijs

(met een samenvatting in het Nederlands)

Proefschrift

Ter verkrijging van de graad van doctor aan de Universiteit Utrecht op gezag van de rector magnificus, prof. dr. G.J. van der Zwaan, ingevolge het besluit van het college voor promoties in het openbaar te verdedigen op vrijdag 27 juni 2014 des ochtends te 10.30 uur

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Promotoren:

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Prof. dr. P.C. Meijer

*“Ik complimenteer de leerling met zijn vorderingen en gemotiveerde houding.
Hij wordt steeds ijveriger en ik word steeds enthousiaster!”*

Billy, docente verzorging.

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Chapter 1

Introduction

1.1 Research theme

This dissertation is about teacher feedback in secondary education classrooms. Providing feedback is one of the most influential means a teacher has to enhance student learning (Hattie, 2012). The first part of this dissertation focuses on what is known from research about effective (i.e. learning-enhancing) feedback, and the occurrence of learning-enhancing feedback in secondary education classrooms. As will be shown, the frequency of effective feedback provided by teachers in these classrooms is rather low. Hence, the second part of this dissertation focuses on the professional development of experienced teachers regarding learning how to provide learning-enhancing feedback. We studied the effectiveness of a professional development program for teachers in secondary education aiming to enhance effective teacher feedback. Finally we discuss what might be important in the design of such a program.

Feedback

Feedback has been the object of research for a long time. Almost a hundred years ago, in 1925, Elizabeth Hurlock, a then renowned author and a pioneer in the field of psychology, conducted a study called 'An evaluation of certain incentives used in schoolwork'. Hurlock studied the effects of what she termed praise and reproof on students in mathematics. The word feedback is not mentioned in the article, obviously because this word was not then used in the field of education. Hurlock's results showed that praise turned out to be the most effective intervention of the teachers. Reproof (or negative feedback, as we would call it nowadays) resulted in less improvement, and the group that did not receive any comments, did not show any improvement. This example illustrates that even when the word feedback was not yet in use in education, the notion was already there, and considered important enough to be object of study, although other words were used to describe the concept.

Nowadays feedback, and especially specific feedback, receives much attention. Research shows that it is very important in enhancing learning. Hattie (2012) found in his review studies that feedback is one of the most influential contributors to learning, alongside, for instance, teacher-student relationships and higher on Hattie's list than the quality of instruction, teaching strategies or self-questioning. However, despite the importance of feedback, recognized from both an academic and a practical stance, effective feedback in the classroom does not occur very often (Hattie, 1999).

Professional development

To design a professional development program aiming to influence teacher behavior in the classroom, we based ourselves on the latest research about professional development. Traditional ways of professional development, such as symposia, workshops, or training sessions, do not seem to have much effect on teacher behavior, as Guskey (2002) concluded from reviews of research on professional development. Recent studies showed, however, some promising examples of professional development that go beyond

traditional approaches of professional development. In this dissertation we will describe our experiment with the use of some of the most promising examples, such as the use of video-recordings to provide feedback to the teachers.

Also, the results of professional development have mostly been studied by teachers' self-reports on, for instance, change in knowledge or intentions, or by studying the results of students (cf. Desimone, 2009). We did not find many studies on *actual behavioral changes* of teachers after a professional development program. There are also not many studies regarding the behavioral change in teachers *during* a professional development program. In our design and evaluation of a professional development program, we aimed to study the behavioral change of teachers in the classroom (1) during and (2) after following a professional development program.

1.2 Goals and research questions

There were two main goals in our study. The first goal was to establish the state of the art regarding teachers' feedback nowadays, both on a conceptual level and in the classroom. We studied research about types of feedback that seemed to be effective or ineffective in enhancing learning and we performed a study on the actual quantity and quality of teacher feedback in the classroom. We also aimed to add to the body of knowledge about feedback by studying additional views of the cognitive perspective on learning.

Research questions related to this goal were:

- A. *What can we add to the body of knowledge of feedback, taking into account additional psychological perspectives on learning?*
- B. *Which of the feedback interventions that, according to the literature, are likely to be either effective or ineffective in enhancing learning, are actually used by teachers in the classroom? And how often are these feedback interventions employed?*

Our second goal built on the assumption that the occurrence of learning-enhancing feedback in the classroom would be low. We based this on Hattie's statement in his inaugural lecture of 1999, in which he noticed: "The incidence of feedback in the typical classroom is low, usually in seconds at best per day" (Hattie, 1999, p. 12). We aimed to support teachers in changing their feedback behavior in the classroom in such a way that they would provide more, and more effective types of feedback. For this purpose, we designed, carried out, and evaluated a professional development program, named the FeTiP program (Feedback Theory into Practice). Since the specificity of feedback (the amount of explanation a teacher gives for the feedback provided) appears to be a key variable, we focused on specific feedback to explore patterns of change in the feedback behavior during the FeTiP program.

Research questions related to the second goal were:

- C. *To what extent do teachers change their feedback behavior after following the FeTiP program?*
- D. *How does the frequency of specific feedback in classroom behavior change over time during the FeTiP program, in relation to its interventions?*
- E. *What patterns can be distinguished in the change in frequency of specific feedback given by the teachers over time? What indications for explanations can be found in the teachers' learner reports?*

1.3 Theoretical framework

We will now briefly discuss the two major concepts of this dissertation, teacher feedback behavior in the classroom and the professional development of experienced teachers.

Feedback

The word 'feedback' was first used in cybernetics, the interdisciplinary study of the structure of regulatory systems. Rosenblueth, Wiener, and Bigelow (1943) defined feedback as a mechanism, process, or signal that is looped back to control a system within itself. This formalization of the concept of feedback has had many implications for engineering, computer science, biology, philosophy, and the organization of society. Ramaprasad (1983) was the first to describe feedback for social sciences. He defined feedback as information about the gap between the actual level of performance and the reference level of a system parameter which is used to alter the gap in some way. Sadler (1989) and Black and William (1998) used this definition from Ramaprasad in the context of formative assessment and stressed the importance of teachers' and students' awareness of the teaching goals for providing and receiving feedback. In their review article, Hattie and Timperley (2007) too, described closing the gap as a goal of feedback. In addition, their definition of feedback introduced another element: the agent of feedback. They described feedback as information provided by an agent (e.g., a teacher, peer, book, parent, self, experience) regarding aspects of one's performance or understanding. In another review article, Shute (2008) regarded feedback as "information communicated to the learner that is intended to modify his or her thinking or behavior for the purpose of improving learning." She referred to several cognitive mechanisms by which feedback may be used by a learner, one of those being "[to] signal a gap between a current level of performance and some desired level of performance or goal" (Shute, 2008, p. 157). Moreover, she stated that feedback that is too elaborated may cause a cognitive overload or may direct the attention from the receiver away from the task. A salient characteristic of effective feedback seems to be the specificity of the feedback. This aspect is underscored by many authors on feedback, for example Sadler (1989), Kluger and DeNisi (1996), Black and William (1998), Hattie and Timperley, (2007), Shute (2008), and De Kleijn (2013).

In chapters 2 and 3 we describe the theoretical framework regarding feedback in more detail. We will also nuance some of the views on learning-enhancing feedback by using other views on the effectiveness or ineffectiveness of feedback, stemming from psychological perspectives on motivation and emotion and from positive psychology.

Professional development

The effectiveness of professional development has been studied thoroughly during the last decades. In her review of the literature on professional development, Borko (2004) stated that "despite recognition of its importance, the professional development currently available to teachers is woefully inadequate," and she continues: "we are only beginning to learn about exactly what and how teachers learn from professional development" (Borko, 2004, p. 3). Darling-Hammond, Chung-Wei, Andree, Richardson, and Orphanos (2009) argued that effective programs for professional development are in need of other interventions than the traditional ways of professional development such as single intervention programs consisting of workshops or seminars.

During the last couple of decades we have made some progress on how to design effective professional development. For example, Joyce and Showers (2002) stated that an

effective professional development program entails as general components: theory, demonstration, practice, and coaching. It seems remarkable that feedback was not mentioned by Joyce and Showers as one of the components of effective professional development programs. In concurrence with the importance of feedback for student learning, feedback may also be an important component in the professional development of teachers. Hence, we added feedback as another component of the FeTiP program in addition to the components Joyce and Showers described.

Operationalizing the general components of effective professional development into effective interventions is a challenge. Based on a study of the state of art of professional development in the United States, Darling-Hammond and Richardson (2009) proposed to design interventions that target at active learning opportunities. "These opportunities often involve modeling the new strategies and constructing opportunities for teachers to practice" (Darling-Hammond & Richardson, 2009, p. 48). Darling-Hammond et al. (2009) concluded from several comparative studies that teachers who receive coaching instead of participating in more traditional intervention programs, are more likely to apply new teaching practices. They also suggest that in order to be effective, coaching may need to be embedded in a broader professional development program. All of these suggestions were used in the design of the FeTiP program. In chapter 4 we will describe the interventions of the program in more detail.

Not only the components and interventions of the program are of importance in professional development. The involvement of the school leaders also seems essential. (Hargreaves & Fullan, 2012). A final influential contextual factor is the participation of a whole team or department, rather than an individual teacher or a small group of teachers (Desimone, 2009). In our research these two sets of factors will be taken into account, but will not be varied systematically.

1.4 Academic relevance

The body of knowledge on feedback is extensive, as a lot of research has been done during the last decades, culminating in review articles discussing a large number of studies. Examples of such review studies are the works of Kluger and DeNisi (1996), Black and William (1998), Hattie and Timperley (2007), and Shute (2008). To the author of this dissertation, some of the results of this research were surprising, compared with the author's experience as a teacher and a trainer-coach. This surprise was an important starting point for the search for new theoretical views on feedback. During the first stage of the search, it appeared that most studies on feedback were based on a merely cognitive view on learning. And although important, we felt that this emphasis on cognitive views might also lead to a limited understanding of the concept of feedback. Hence, we set out to contribute to the existing body of knowledge by studying feedback from a broader psychological view on learning, and attempted to nuance fundamental concepts such as praise, non-specific feedback, and feedback on the self by introducing new perspectives into the debate. A second way in which we hoped to contribute to the existing knowledge on feedback concerns our study of the occurrence of feedback in the classroom. Except for Hattie's statement in 1999 on the low frequency of feedback in the classroom, we did not find any research on what is actually going on in classrooms regarding how teachers provide feedback. Gaining knowledge about the quality and quantity of feedback in the classroom might make it easier to tune in to the actual practices of teachers when designing

professional development programs.

Regarding professional development, it has already been argued that traditional types of interventions were generally not very effective in supporting teachers in changing their behavior in the classroom (Guskey, 2002). Hence, it seems important to study the effectiveness of other types of intervening with the purpose of supporting teachers in changing their classroom behavior and to include those interventions in a multiple component professional development program. Thus, our first aim was to design and evaluate such a multiple component professional development program, based on the components Joyce and Showers (2002) distinguished, supplemented by the component feedback. The second aim was to investigate whether the interventions that are part of the program have a differential effect on the feedback behavior of the participating teachers. In particular, we explored different patterns of change. Knowledge about the differential effect of the interventions in a multiple component program for professional development and about different change patterns of the teachers may shed more light on what interventions help experienced teachers change their feedback behavior in the classroom.

Finally, since the effectiveness of professional development programs is mostly measured through teachers' self-reports, we also aimed to design and use other methods for studying the effects of professional development programs on teacher behavior, such as video-recordings of classroom behavior and coding schemes for analyzing these recordings.

1.5 Relevance for practice

As argued above, studying the quality and quantity of learning-enhancing feedback in the classroom is not only important from an academic point of view, but also from a practical stance. If Hattie's (1999) assumption that feedback in the classroom is scarce can be supported by evidence, there seems to be a serious problem for classroom practice. This asks for developing and studying approaches to enhance the level of effective feedback in the classroom. Designing and testing a multiple component professional development program for supporting teachers in improving their feedback behavior, may also lead to practical insights into the more general question of what makes programs for professional development effective and may provide clues to trainers and coaches regarding effective interventions or combinations of interventions. Because the basis of the design of the FeTiP program lies in a general theoretical framework about professional development, the question will also be raised what parts of this study can be applied to teacher learning and professional development in other areas than teacher feedback.

1.6 Structure of the dissertation

The core of this dissertation is divided into two parts. In the first part, we frame the concept of feedback theoretically and search for definitions and characteristics of learning-enhancing feedback. We also report on our study into the frequency of learning-enhancing feedback used by teachers in secondary education. The second part is focused on professional development aiming to support teachers to provide more effective feedback. We describe the design and evaluation of a multiple component professional development program focused on this goal.

Part 1: Effective and ineffective feedback and its occurrence in the classroom

Chapter 2 aims to provide an overview of the existing knowledge about feedback and subsequently add to the body of knowledge on teacher feedback by considering additional psychological perspectives on learning and discussing the consequences of these views for the use of feedback in educational practice. We discuss the influence of emotion on learning and feedback; we also challenge existing views on praise and feedback about the self and we critically reflect on the use of feedback solely for closing a gap between current performance and a goal.

Chapter 3 describes a study on the actual use of effective and ineffective feedback in secondary education classrooms. We analyzed contiguous ten-minute blocks of classroom interactions of 78 teachers. Our findings indicate that, in the course of typical classroom interactions, teachers seldom provide the types of feedback interventions identified as effective by research in enhancing learning. We examine potential explanations for this finding and discuss the consequences for teacher education and the further professional development of teachers.

Part 2: Design and evaluation of a professional development program

Chapter 4 describes an evaluation of a theory-based trajectory for professional development called the FeTiP program. Its goal is to support teachers to expand their feedback behavior in the classroom and provide more, and more effective (i.e. learning-enhancing) feedback. We first describe the foundation of the FeTiP program, with a central focus on how classroom behavior can be influenced by professional development programs, as this is often a major aim in initiatives for the professional development of teachers but also the most difficult to establish. We describe the effects of the FeTiP program on the feedback behavior of teachers and attempt to explain why these effects occurred.

Chapter 5 contains a deeper analysis of the effects of the FeTiP program as described in chapter 4. In the FeTiP program we subsequently conducted three types of interventions: (1) traditional interventions such as a training course for the whole group of teachers, (2) a 'explicit modeling and practice' intervention in the classroom, and (3) data-driven feedback interventions. We will firstly describe the differential effect of these interventions on the change in feedback behavior of the whole group of participating teachers. Next, we will describe different patterns of change among the teachers and possible explanations for the differences between these patterns, based on the themes that emerged in the learner reports. Possible consequences for the design of professional development programs will be discussed.

In *Chapter 6* we will discuss our research as a whole. We will revisit the methods and results and discuss general conclusions, as well as the academic and practical relevance. We will also present suggestions for further research. Feedback will not only be discussed as an important part of teacher behavior, but also as a major part of the professional development program the teachers participated in. The results offer promising new ways to help teachers change their classroom behavior and show the way to interesting new questions for educational research. We will conclude that our approach to designing and evaluating professional development programs may not only be valuable for studies on feedback behavior, but also for studies focused on other aspects of teacher behavior in the classroom.

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Chapter 2

Feedback revisited: Changing perspectives and the implications for teaching¹

In this article we aim to add to the body of knowledge on teacher feedback by considering *psychological perspectives on learning and discussing the consequences of these views* for the use of feedback in educational practice. We argue that emotion is a much more important issue in the discussion about feedback than the current literature implies. We differentiate between praise and feedback about the self, and challenge the oversimplification of feedback about the self, arguing that this, in contrast to the currently dominant view, can have important effects. Moreover, we discuss progress feedback as a complement to gap feedback.

¹ This chapter is based on Voerman, L., Meijer, P.C., Korthagen, F.A.J., & Simons, P.R.J. (resubmitted). *Feedback revisited: Changing perspectives and the implications for teaching*.

2.1 Introduction

Feedback is a fundamental aspect of everyday teaching. Teachers provide feedback to students all day, with the aim of contributing to the students' learning. Researchers from all over the world, for instance from New Zealand (Hattie & Timperley, 2007), the United States (Black & William, 1998), Sweden (Shute, 2008), the Netherlands (Voerman, Meijer, Korthagen, & Simons, 2012a), the United Kingdom (Hounsell, McCune, Hounsell, & Litjens, 2008), and Germany (Brand, Reimer, & Opwis, 2007) acknowledge the importance of feedback. They all discussed the importance of feedback in enhancing learning. Hattie (1999) even described feedback as one of the most influential factors in learning – as powerful, for instance, as the quality of instruction. Hence, research findings on feedback can and should have an impact on teacher feedback behavior in the classroom. Our goal in this article is to bring some nuances to the discourse on the effectiveness and ineffectiveness of teacher feedback. In our opinion, some research conclusions on effective – i.e. learning-enhancing – feedback in research need to be looked at from psychological perspectives that might be additional to the cognitive view that usually underlies studies on feedback. Nuancing these conclusions is not only important for teaching practice, but it also gives paths to pursue for new research. Hence, we would like to add to the body of knowledge on feedback by exploring additional psychological perspectives on learning and the consequences of these perspectives for teacher feedback.

The aim of feedback is generally described as being to close the gap between current performance and a goal, and effective (learning-enhancing) feedback is described as specific and goal-related (Alder, 2007; Black & William, 1998; Duijnhouwer, 2010; Hattie & Timperley, 2007; Kluger & DeNisi, 1996; Sadler, 1989; Shute, 2008). In this article, we will follow Duijnhouwer's description of feedback (2010). She described feedback as "information provided by an external agent regarding some aspect(s) of the learner's task performance, intended to modify the learner's cognition, motivation and/or behavior for the purpose of improving performance" (p. 16).

Giving learning-enhancing feedback might be more difficult than most teachers realize. The existing body of knowledge shows that over one third of all feedback interventions have a negative impact on learning (Kluger & DeNisi, 1996; Hattie & Timperley, 2007; Shute, 2008). This is a phenomenon that can be illustrated using the following example (Voerman, et al., 2010):

*Cheerful and full of positive expectations, Isabel entered her new school. After just one week, she came home crying each day... What happened?
In this first week, she got acquainted with her new teachers and fellow-students. She also received feedback from her mathematics teacher several times. Basically, although she could not reproduce the feedback literally, she understood from his messages that she was clumsy and stupid. Whether or not he really said or even meant to say this, her conclusion was clear: she was stupid. The impact was dramatic. She hated math, she felt teachers were stupid, school was awful and she wanted to go back to her primary school. And concerning mathematics she stated: "I will never learn math, it's just too difficult".*

The feedback Isabel's teacher gave her apparently did not serve its purpose: it did not make her learn better, nor did it motivate her for mathematics. On the contrary, she was ready to give up on mathematics and even on school. Boud (1995) described this phenomenon as follows: "We write and say things which can readily be taken as comments about the person

rather than their work and in doing so we link in to the doubts and uncertainties which they have of themselves and our remarks are magnified at a great cost to the self-esteem of the persons concerned” (Boud, 1995, p. 44). It seems that feedback has an impact not only on learning, but also on the emotions a person experiences, and on their view of their strengths and weaknesses. Hence, the relation between feedback and emotion is the first theme we will discuss in this article.

A second theme refers to the types of feedback that might be harmful to learning, according to three main reviews of research on teacher feedback: Hattie and Timperley (2007), Kluger and DeNisi (1969), and Shute (2008). These types are praise, and feedback about the self. The finding that praise and feedback about the self have a negative impact on learning might have an important impact on teacher feedback behavior in the classroom, since praise is the kind of feedback most often used in the classroom (Hattie & Timperley, 2007; Pauli, 2010; Voerman, et al., 2012a). Hence we discuss how praise is defined, and clarify the distinctions between the concepts of praise, specific positive feedback and feedback about the self. In doing so, we aim to help teachers in their search for learning-enhancing feedback, and to add to the body of knowledge on effective teacher feedback.

The third theme we will discuss is *progress feedback* as a complement to gap feedback. In the definitions of feedback, the emphasis lies on the function of feedback in bridging the gap between the current performance of a student and a goal. In classrooms, this might lead to teachers mainly telling students what is missing in their work, and we would like to suggest a complementary type of feedback, namely progress feedback. There is not much research on this type of feedback, but, building on the additional perspectives we discuss, we will put forward possibilities for further research on this subject.

2.2 Method

In this article, we used the themes feedback and emotion, praise and feedback about the self, and progress and discrepancy feedback as sensitizing concepts. We used keywords that were associated with these themes to look for literature, and used a search engine that combined several other search engines, the engines of primary importance being ERIC, Journal Citation Reports (JCR), Science & Social Edition, Google Scholar, PsycINFO, Scopus, and Web of Science.

For feedback and emotion, the keywords were positive and negative feedback, emotion and learning. For praise and feedback about the self, the keywords were character strengths, praise, non-specific feedback and self-efficacy. Lastly, for progress and discrepancy feedback we used progress feedback, gap feedback, feedback and goals as keywords. From the articles we found based on these keywords, we analyzed the abstract and the conclusion. Articles that had the theme as an object of analysis were selected. Consequently, we used the “snowball method” to expand the number of articles forming the basis for our research. To make a further selection we used as criteria (1) whether the article was cited more than once, and (2) whether the conclusions found in the article were also found in other articles.

2.3. Findings

Theme 1: Emotion, learning, and feedback

Emotion and learning

From various descriptions and definitions of learning, the importance of emotion in learning has become clear. Emotion is increasingly seen as an inseparable part of learning (e.g., Hoekstra, 2007; Korthagen 2010; Meriam, 2008). According to Dirx (2008), it is remarkable that, in education, emotion has often been seen as hindering the learning process. As a result, educators try to keep emotions out of the classroom and, at best, attempt to cope with them as quickly as possible, in order to focus on the subject matter. Dirx described emotion as “a neurophysiological response to an external or internal stimulus, occurring within and rendered meaningful through a particular sociocultural context and discourse and integral to one’s sense of self” (Dirx, 2008, p. 13). In this respect, research findings from motivational psychology, and especially from Pekrun, Goetz, and Titz (2002), are interesting. Pekrun et al. performed a large-scale research study on the influence of emotions on learning, and found differential effects of emotions on learning. In their cognitive-motivational model they distinguished between two dimensions of emotions, namely (1) positive versus negative emotions, and (2) activating versus deactivating emotions. In this way, they arrived at four types of emotions, listed in the left-hand column of Table 2.1. The right-hand column describes the effects on learning of the four types of emotions.

Table 2.1
Overall effect of emotions on learning (Pekrun et al., 2002).

Emotions	Effect on learning
Positive activating emotions (e.g., joy, hope, and pride)	Positive
Positive deactivating emotions (e.g., relaxation, relief)	Variable
Negative activating emotions (e.g., anger, anxiety, and shame)	Variable
Negative deactivating emotions (e.g., boredom, despair)	Negative

Pekrun et al.’s research (2002) showed that the influence of positive deactivating emotions and negative activating emotions depends on the characteristics of the individual and the backing from their environment. Other perspectives on learning support the view that emotions have an impact on learning. Neuroscience showed that cognition and emotion are closely related. For example, Immordino-Yang and Damasio (2007) stated that important aspects of cognition in learning (for instance, attention, memory, and decision-making) are profoundly affected by emotion: “Contrary to a long philosophical tradition in which rational thought ruled (...), we now know that emotions involve the largely automatic and often non-conscious induction of behavioral and cognitive packages, which percolate into and out of our conscious minds, influencing our decision making, our thinking, our memory, and learning” (Immordino-Yang & Damasio, 2007, p. 7).

Positive psychology, a relatively new field in psychology that emphasizes wellbeing instead of psychological deficiencies and traumas, also focused on the influence of emotion on learning and growth. Isen, Daubman, and Nowicki (1987) found that positive emotions can influence the way in which cognitive material is processed, and that they have an impact on creativity. These authors also found evidence of better performance and improved learning when people are in a positive emotional state rather than in a negative one. Bryan and Bryan (1991) stated that there is a growing body of literature indicating that positive emotions can influence thoughts, cognitive processes and social behavior. Positive emotions also broaden visual attention, as Wadlinger and Isaacowitz (2006) showed. Brand, Reimer, and Opwis (2007) referred to several studies showing the effects of a positive or a negative emotion. They concluded that positive emotions facilitate the integration of new information and the elaboration of the available information, probably due to a broadening of one's attention. Empirical research by Fredrickson (2001) showed that negative emotions tend to narrow a person's momentary thought-action repertoire, whereas positive emotions broaden it and provide the person with enduring personal resources. Hence, according to Fredrickson's so-called *broaden-and-build model*, it is important to promote people's awareness of positive meaning, and to build learning processes on this awareness (Fredrickson & Losada, 2005). The crucial factor seems to be the broadening of one's scope of attention and the promotion of creativity through positive emotions.

Feedback and emotion

Since feedback has an effect on emotion, and emotion has an impact on learning, we would like to elaborate on the influence of feedback on emotion. We will first take a closer look at the impact of positive and negative feedback on the receiver's emotions. Research articles seldom include a clear definition of positive and negative feedback. An exception is the work of Losada and Heaphy (2004). They described positive feedback as feedback that shows support, encouragement or appreciation, and negative feedback as feedback that shows disapproval. Losada and Heaphy analyzed the verbal communication among the members of 60 management teams, based on an earlier study by Losada (1999). They found that high ratios of positive to negative feedback were a crucial factor in high-performing teams, and that low ratios were characteristic of low-performing teams. They even developed optimal (between 3 and 11) and less optimal (below 3 and above 11) ratios. Although Brown, Sokal, and Friedman (2013) have recently raised serious doubts about the validity of the differential-equation model that was used to develop the positivity ratio, they did not question the idea that "a higher positivity ratio is ordinarily more desirable than a lower one" (Brown, Sokal, & Friedman, 2013, p. 31). To underscore the value of the positivity ratio, Fredrickson (2013) reviewed many recent studies on positivity and negativity between 1998 and 2013, and came to the conclusion that, for positivity, more is better, up to a point, and for negativity, less is better, up to a point. Losada and Heaphy (2004) linked the ratio of positive and negative feedback to the creation of "emotional spaces". As they put it: "Positivity and negativity interact as powerful feedback systems to generate different emotional spaces" (Losada & Heaphy, 2004, p. 744). They concluded that positive feedback generates expansive emotional spaces that open the possibilities for learning. Negative feedback, however, creates restricted emotional spaces that close the possibilities for learning. Earlier, we described similar findings by Fredrickson (2001) about the narrowing influence of negative emotions on a person's momentary thought-action repertoire.

One might think that positive feedback elicits positive emotions and negative feedback elicits negative emotions. However, this is not always the case, because whether feedback arouses positive or negative emotions is not only determined by the content of the message. First, receivers of feedback construct their own perspective of reality and thus of the feedback given, and their emotions are, as a result, activating or deactivating (Pekrun et al., 2002). For instance, a teacher might provide feedback to a group of students on the great progress they have made. This feedback may evoke in students positive activating emotions such as hope. Students may, based on this feedback, experience hope that there is a good chance that they will pass the exams if they just keep on working as they did. But the same feedback may also lead to positive deactivating emotions such as relaxation. Students may feel relaxed and decide to take some time off from work. Similarly, negative emotions triggered by feedback may be deactivating (“I give up”) or activating (“I will show that I can do it after all”). Moreover, feedback that is meant to be positive can be perceived as negative. For instance, when a teacher tells a student that the essay is better than the previous one in terms of style, the receiving student may interpret this as meaning that the style may be better, but apparently the content is inadequate.

Secondly, the context in which the feedback is provided may also influence the emotion a student experiences. For instance, a student might experience a negative deactivating emotion such as shame as a result of a teacher’s specific positive feedback on his zest in the classroom, because his peers have a negative judgment about showing zest in the classroom.

In the third place, feedback takes place within a communication process. The emotion experienced by a person receiving feedback is also influenced by his or her relationship with the person providing the feedback and by the context, as stated by social psychologists Watzlawick, Beavin, and Jackson (1967) in their well-known handbook on communication. They emphasize that all communication has a *content* and a *relationship* aspect. For instance, a student who has a good and trusting relationship with a teacher will experience negative feedback differently from a student who does not feel trusting towards the teacher. It is therefore not enough to make a distinction between positive and negative feedback from the viewpoint of the provider of feedback. The receiver of the feedback experiences emotion and constructs meaning, and this meaning can differ from the intention of the provider of the feedback. As we mentioned earlier, Boud (1995) underlined this, stating that although feedback can be directed at the task at hand, a student can conceive it as feedback on him or herself. The power of feedback to define self-perceptions is also described by Hounsell (2003). He stated that “..... feedback could also have powerful effects on students’ self-confidence, buoying up some, while leaving others ‘devastated’” (Hounsell, 2003, p. 72).

Feedback messages are not always easy to decipher and translate into action, as is stated by Higgins, Hartley, and Skelton (2001). They described feedback as complex and difficult to understand, and say that students need opportunities to construct an understanding by, for example, discussing the feedback with their peers.

Our conclusion is that it is not enough for a teacher to provide specific and goal-related feedback (as claimed in the major research reviews mentioned above). Emotions should be taken into account too. The emotions aroused by feedback do not only depend on the intentions of the teacher, but also depend on the receiver of the feedback, the context in which the feedback is provided, and the relationship between the provider and the receiver of the feedback. In order for feedback to enhance learning, it is very important that teachers consider the emotions that their feedback might evoke in their students, and how these emotions might influence the students’ learning. The feedback should preferably evoke an

activating emotion or be embedded in a context that generates expansive emotional spaces. This might be achieved by providing positive feedback more frequently than negative feedback.

Theme 2: The confusion between praise and feedback about the self

There is overwhelming evidence that, in order to enhance learning, feedback should be specific and related to a goal. In their review study based on 500 meta-analyses, involving 450,000 effect sizes from 180,000 studies, Hattie and Timperley (2007) stressed this goal-relatedness and specificity, and distinguish four levels of feedback. The levels they describe are: feedback on the task, feedback about the processing of the task, feedback about self-regulation and feedback about the “self”. Feedback on the task is information on how well a task is being accomplished or performed. Feedback on the processing of the task is information on the processes that are underlying the tasks, or on related and extended tasks. The third level of feedback is feedback about self-regulation, which addresses the way students monitor, direct and regulate their actions toward the learning goal. The fourth level is feedback about the self as a person. The results of the meta-analyses may be summarized as follows. The first three levels are types of feedback that enhance learning: feedback on the process and feedback on self-regulation seem to be the most effective forms of these three types of feedback. Hattie and Timperley described their fourth level, feedback about the self, as ineffective or even detrimental to learning. Many authors, for instance Butler (1987), Duijnhouwer (2010), Kluger and DeNisi (1996) and Shute (2008) agreed with these findings on the effect of feedback about the self on learning. The general conclusion is that feedback about the self is not beneficial to learning, because it directs attention away from the task. Another type of feedback that is described as ineffective is praise, as in “well done!” or “good girl!”. In the same way as for feedback about the self, the reason probably lies in the fact that this type of feedback directs the attention to the self and away from the task (Butler, 1987; Hattie & Timperley, 2007; Kluger & DeNisi, 1996; Shute, 2008). However, these authors did not include an explicit definition of the concepts they were using, although Hattie and Timperley (2007) gave some examples, such as “well done!” or “good girl!”. In these examples, no distinction is made between praise and feedback about the self. We find it important first to make a clear distinction between praise and feedback about the self, because we believe that this confusion of the concepts of praise and feedback about the self creates misconceptions. Secondly, distinguishing between the two concepts might also lead to a different stance on the effectiveness of these two types of feedback on learning.

Praise

Praise is one of the most frequent feedback interventions. Hattie and Timperley (2007) stated that if feedback is given, it is likely to be praise. In the few studies on frequencies of feedback, praise has been found to be the most frequent type of feedback (Bond, Smith, Baker, & Hattie, 2000; Pauli, 2010; Voerman, et al., 2012a). In order to clarify the concept of praise, we will use two other distinctions made in the discussion on feedback, namely the distinction between positive and negative feedback, and the distinction between specific and non-specific feedback. Praise can first be described as a type of positive feedback. Furthermore, as can be seen from the examples used in the literature, praise is usually non-specific. It is in our view the lack of specific information that creates the sometimes unhelpful (learning-decreasing) effect of praise found in research (Hattie & Timperley, 2007). Eisenberger and Cameron (1996), who performed a meta-analysis of more than 60 studies in which the effects of positive feedback on learning and motivation were

examined, support this view. They found that verbal positive feedback does in fact increase learning and motivation, with one exception: a detrimental effect was found for positive feedback that contains no information about performance or, in other words, that is non-specific. These findings corroborate our conception that it is important to make a distinction between praise that is *non-specific* positive feedback and praise that is *specific* positive feedback, because of the learning-enhancing effect of the latter.

The following example might illustrate this. The example gives the replies of two students in the first grade of secondary education to the question of what was the last compliment they received from their teacher (Voerman, et al., 2012b).

Interviewer: What was the last compliment you received from your teacher?
Student: "Well done" for my French assignment. We had to make a card. I can't find it now, but... (trying to find the card to show it to the interviewer)
Interviewer (reacting to the student's pleasure about the teacher's compliment): You're still glowing a bit, now that you think of the compliment!
Student: Yeah!
Interviewer: And do you know why your card was well done?
Student (sighing deeply): Um, no, not exactly what I did right.

In this case, praise such as "well done!" seems to arouse a positive feeling in the student, even when thinking about the compliment afterwards. However, this praise or non-specific feedback does not seem to be enough to enhance learning, since the student does not know what the "well done" feedback was about.

A second example of another student, who responds to the same question about the last compliment he received from a teacher:

Interviewer: What was the last compliment you received from your teacher?
Student: Very nice, that you're doing that extra assignment on biology, and also that you're doing that cooperating with other students.
Interviewer: And what happens then, what is the effect of such a compliment?
Student: I like it very much! And then I think, I want to go on working. It's good for my results if I do more, it gives me spirit, and the courage to work on (smiles broadly).
Interviewer: I can see that you're enjoying it, while you're talking!
Student (smiles even more and nods).

In this case, the feedback was specific and related to a goal (stimulating students to do extra assignments and work together in groups). The student again shows joy, but knows exactly why the compliment was paid. The chances that this specific feedback will lead to enhanced learning seem greater.

In this section we have tried to make a case that nuancing our knowledge of feedback is necessary. We have found that the lack of a proper description of praise might lead to an incorrect interpretation of the word. Researchers and teachers might confuse praise, positive feedback and specific positive feedback. To avoid confusion between the concepts of "praise" and "positive feedback", we propose to refer to praise as non-specific positive feedback and hence as something different from specific positive feedback, which does enhance learning.

Feedback about the self and character strengths

Research seems to show that feedback about the self is not very effective for enhancing learning (Black & Wiliam, 1998; Butler, 1987; Hattie & Timperley, 2007; Kluger & DeNisi, 1996; Shute 2008). The main reason for the detrimental effect on learning of feedback about the self is that the thinking that occurs is not relevant to the task: the feedback draws the attention of the learner away from the task and onto him or herself (Hattie & Timperley, 2007; Kluger & DeNisi, 1996; Shute, 2008). However, revisiting our discussion on the impact of feedback on emotion, in this respect it is interesting to take into account the emotions that feedback about the self can arouse. Pekrun et al. (2002) showed that emotions such as enjoyment and pride (emotions that could be aroused by positive feedback about the self) are negatively correlated to task-irrelevant thinking, and hence do not draw the attention of the learner away from the task. Negative emotions, however, such as anxiety, shame, boredom and hopelessness (emotions that can be aroused by negative feedback about the self) are positively related to task-irrelevant thinking. The claim that feedback about the self draws attention away from the task might be too general. Moreover, the examples of feedback about the self that are found in the literature are non-specific in nature ("good girl!"). And, as noted, there is indeed overwhelming evidence that such non-specific feedback, which is also not related to the task at hand, does not enhance performance (Black & Wiliam, 1998; Butler, 1987; Hattie & Timperley, 2007; Kluger & DeNisi, 1996; Shute, 2008) or motivation (Kluger & DeNisi, 1996; Shute, 2008). However, it is noteworthy that there is little attention given in the literature to the possibility that feedback about the self might also be specific. It would be interesting to explore whether feedback about the self, provided that it is positive and specific, can have a beneficial effect on learning. In the next section we want to put forward this alternative perspective.

Fascinating research results have been found in positive psychology. In this branch of psychology, people's personal qualities or *character strengths*, such as kindness, self-control, creativity or curiosity, are a central focus. Character strengths refer to those aspects of the personality that in various cultures are considered important moral values (Peterson & Seligman, 2004; Seligman, 2002). First of all, in a variety of empirical studies, consistent evidence has been found that promoting people's awareness of their own character strengths stimulates growth, and that this is an enduring effect even after relatively small interventions. Scales, Benson, Leffert, and Blyth (2000), for instance, conducted a study based on a sample of 6,000 young people, and found that awareness of character strengths contributed meaningfully to – among other things – success at school, physical health and an ability to overcome adversity. Park and Peterson (2009) also found that a focus on students' character strengths is associated with success at school.

Secondly, it is possible to create awareness of character strengths through feedback on character strengths. Ruit and Korthagen (2013) conducted a study in which 600 primary school students received feedback on their character strengths. After three months, more than 80% of the students still remembered the character strengths of which they became aware, and nearly 60% still consciously put forward those character strengths.

And, thirdly, character strengths can be cultivated by schooling (Park & Peterson, 2009). These authors suggested that teachers should enable students to build their self-esteem by using the strengths the students already possessed. Students can even be taught how to use these strengths to develop other less-developed strengths. The research of Dweck (2008) stresses the importance of the concept that human qualities or character strengths are dynamic and can grow. She stated that "... human qualities, such as intellectual skills, can be cultivated by effort" (Dweck, 2008, p. 4).

The fact that feedback on the self can have such important and enduring effects need not surprise us. In psychology and psychotherapy, it is commonly accepted knowledge that messages from important people have a great impact on what a person comes to believe about him or herself (e.g., Bergner & Holmes, 2000). In this respect, the concept of the *dialogical self* (Hermans & Dimaggio, 2007) is interesting: the dialogue between a person and important others tends to become an inner dialogue within the person (Akkerman & Meijer, 2011; Lewis, 2002). This can have negative effects, as the first example in our introductory section showed, but also beneficial ones. A teacher who is able to convey to a student a positive image of his or her capacities may promote a positive and supportive internal dialogue within this student. Bergner and Holmes (2000) gave some examples. They stated that when approached as someone who has a great potential for change, and so forth, a person starts to live according to this “status”. This is coherent with the theoretical notion that context and the relation with others are influential in learning, and underlines the concept that feedback about the self in the form of character strengths can be a powerful form of feedback.

In conclusion, there is evidence that teacher feedback about the self can have an important positive impact on a student’s experience of him or herself, and that feedback about the self may, potentially, enhance learning. Such a positive impact might not be restricted to short-term learning or might not even work in the short term, but it potentially has a long-term influence. The kind of feedback about the self that is needed is not the non-specific type such as “good girl!”, but is specific feedback on a student’s character strengths, with the aim of creating a positive view within the student of his or her own capacity for learning. A teacher might say, for instance: “In the last few weeks I have seen that you have made a tremendous effort to master this subject. That’s why you succeeded. You are a real go-getter!”. In this feedback the insights from positive psychology are combined with the other general guidelines that feedback should preferably be specific and related to performance or to the task at hand. We hypothesize that feedback on character strengths is even more beneficial if it is related to performance or to the task at hand.

Theme 3: Progress feedback as a complement to gap feedback

In an earlier article (Voerman, et al., 2012a), we introduced a model to describe the combination of two interesting aspects of feedback. The first aspect is about the aim of feedback being to close the gap between the current level of performance and the goal. Sadler (2010) stressed the function of feedback as closing the gap between a student’s performance and the learning goals. He explained that it is necessary for students, in order to close this gap, to: (a) possess a concept of the standard (or goal, or reference level) being aimed for, (b) compare the current level with the standard and (c) engage in an appropriate action which leads to some closure of the gap. We have called this discrepancy feedback (Voerman, et al., 2012a). Other authors too, emphasized the importance of feedback that aims to close the gap between performance and the intended learning goal (e.g., Askew, 2002; Hattie & Timperley, 2007; Nicol & Macfarlane-Dick, 2006; Shute, 2008). An example of such feedback is: “You do not know the exact conjugations of the irregular verbs yet. This is really necessary to get a good mark for your test.” Discrepancy feedback is goal-related and aims to close the gap between the current performance and a goal.

In addition to discrepancy feedback, feedback might also be provided on what students have already achieved. Schunk and Schwartz (1993) have called this *progress feedback*. They described progress feedback as confirming progress and conveying that goals are attainable. We will follow the description of Duijnhouwer (2010). She defined

progress feedback as information that performance has improved compared with the previous performance in a similar task. A teacher might, for instance, say: “This week, you already know a lot of German words, compared with last week. You have learned well!”. Duijnhouwer stated that progress feedback raises self-efficacy because it suggests that individuals are competent and can continue to learn. Progress feedback is thus an additional way to provide feedback, and it has hardly been described in the general literature on teacher feedback. We would like to suggest that the two types of feedback are complementary: on the one hand there is progress feedback, which compares the actual level of performance with the initial level, stating the improvement, and on the other there is discrepancy feedback, which compares the actual level of performance with the desired level of performance, stating what is missing or what still has to be done. Both types of feedback are important for enhancing learning. They are shown in Figure 2.1.

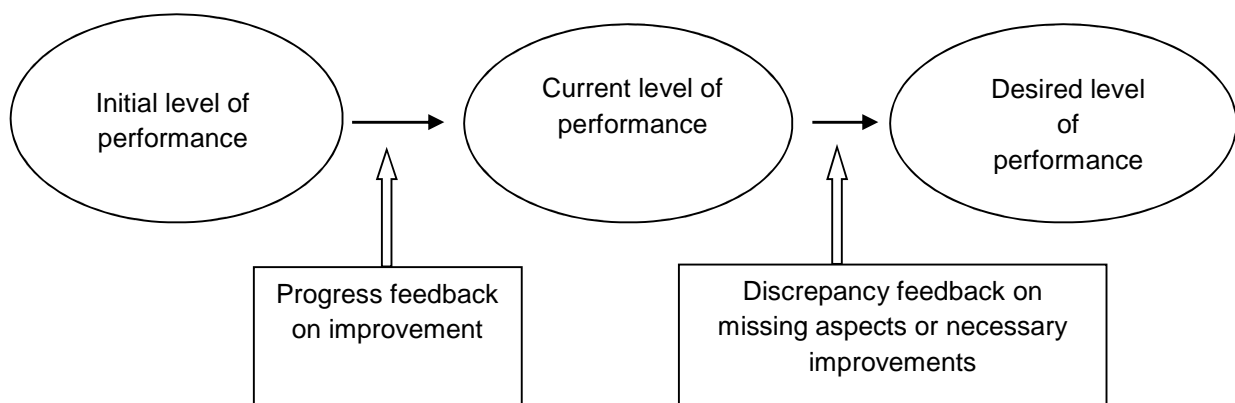


Figure 2.1 Progress feedback and discrepancy feedback (based on Voerman, Meijer, Korthagen, & Simons, 2012a).

However, teachers do not often provide these two types of feedback, as we found in an earlier study (Voerman, et al., 2012a). We found that only 6.4% of the teachers in the study provided progress feedback and 41% of them provided discrepancy feedback. All observed progress feedback was positive, and the observed discrepancy feedback was negative. This is consistent with the examples found in the work of Schunk and Schwartz (1993). In their opinion, progress feedback clarifies to the student that a goal is attainable. We hypothesize that progress feedback can have an impact on a student’s experience of the self, supports the student in believing in his or her capacity to learn, and will subsequently stimulate his or her learning.

To conclude, we propose to add to the current view on feedback that teachers should be aware of the value of providing not only discrepancy feedback but also progress feedback. In our view, teachers should find a balance between these two types of feedback. They are both necessary for students to reach their learning goals.

2.4 Conclusion and discussion

The aim of this article was to view teacher feedback from new perspectives by discussing three themes: (1) the impact of feedback on emotion and thus on learning, (2) the confusion about praise and character strengths and the over-simplification of the view of

feedback about the self, and (3) progress feedback as a complement to gap feedback. In relation to our first theme, basing our views on the influence of emotion on learning as shown by Fredrickson (2001) and Pekrun et al. (2002), we have discussed how feedback can arouse positive and negative activating and deactivating emotions. In research we should take into account that feedback creates emotional reactions that not only depend on the intentions of the giver of the feedback but also depend on the receiver of the feedback, the context in which the feedback is provided, and the relationship between the giver and the receiver of the feedback. Feedback should preferably evoke an activating emotion or be embedded in a context that generates expansive emotional spaces. This might be achieved by providing positive feedback more frequently than negative feedback.

Secondly, we made an explicit distinction between praise and feedback about the self. We described praise as non-specific feedback, which as such does not enhance learning. However, this is to be clearly distinguished from specific positive feedback, which does enhance learning. We discussed feedback on character strengths as a way of providing feedback about the self with potentially enhancing effects on learning. There is evidence that teacher feedback about the self can have an important positive impact on a student's experience of him or herself, and that feedback on the self may potentially enhance learning. The kind of feedback on the self that is needed is not the non-specific type such as "good girl!", but specific feedback on a student's character strengths with the aim of creating a positive view of his or her own capacity for learning.

As to our third theme, the main conclusion is that teachers and researchers need to give more attention to progress feedback, and that a balance between progress and discrepancy feedback might be essential.

Suggestions for further research

Some challenging issues in the discussion on feedback arise. First, feedback takes place in interaction in which relational, emotional and content meaning is constructed by the receiver of the feedback (Van der Schaaf, Baartman, Prins, Oosterbaan, & Schaap, 2011). As a consequence, research on feedback should not only be about the interventions themselves, but also about the way in which receivers construct their own interpretations of the feedback.

A second interesting issue arises in reconsidering the findings of Losada and Heaphy (2004). We would like to hypothesize that providing more positive feedback than negative feedback might be an effective tool to enhance learning, and suggest that studies to research this topic in the classroom are designed. Another interesting part of the work of Losada and Heaphy is the notion of "emotional spaces". We hypothesize that the concept of emotional space is an important aspect of classroom climate, and we suggest that research is carried out on the relation between the concepts of emotional space and classroom climate. In their observations, Losada and Heaphy (2004) seem to make no distinction between specific and non-specific positive feedback. Non-specific positive feedback and specific positive feedback both seem to influence the "emotional spaces" necessary for learning. Kluger and DeNisi (1996) and other authors (e.g., Hattie & Timperley, 2007 and Shute, 2008) all emphasize the detrimental effect of non-specific feedback. On the basis of the work of Losada and Heaphy (2004), however, we might hypothesize that non-specific feedback does influence learning through the influence it has on the emotional space that is essential for learning. It would be useful for the day-to-day practice of teachers, but also for research purposes, to go deeper into the concept of emotional spaces, and their alleged effect on learning.

Regarding the issues of progress feedback and feedback on character strengths, we hypothesize that both types of feedback can stimulate a positive view of one's capacity for learning. As a result, learners may more easily develop the idea that they are on the right track, keeping up their belief in the attainability of the learning goals and the development of their character strengths. The discussion about feedback on character strengths as a way to provide feedback on the self opens up interesting lines of research, on both short-term and long-term effects. We suggest further research about the influence of both feedback on character strengths and progress feedback on the views students have on their own capacity for learning, and about the way that those views might change as a result of this feedback. Because of the relevance of progress feedback in arousing positive activating emotions such as pride, hope and joy, we would like to suggest more research on the influence of progress feedback on these emotions, and on the balance between progress feedback and discrepancy feedback. Another question to be answered is how progress feedback and discrepancy feedback contribute to the emergence of positive emotional spaces, and whether, and in what ratio, progress and discrepancy feedback should be provided.

A limitation of our study is that most of the research on feedback that we used originates from western countries. It would be interesting and challenging to compare the views on feedback in western countries with the concepts of feedback and its use in the classroom in other parts of the world with different cultural backgrounds and classroom conditions. We might then be able to answer the question of how the effect of feedback depends on the cultural background and context of both the provider and the receiver of feedback.

Finally, it would be worthwhile to conduct research on how to teach teachers about providing feedback more often and to take into account the emotions that are evoked by feedback. This is especially true for goal-related feedback, because of the low occurrence of this type of feedback (Voerman, et al., 2012a).

Implications for teaching

There are several implications for teaching. First, teachers might be challenged to be more aware of the impact of their feedback on the emotions aroused by the feedback. Also, the context in which teachers provide feedback, and the relationship they have with their students, might influence the way feedback is perceived by the students. Teachers might increase the use of feedback that arouses the activating types of emotion, such as pride, hope and joy, and be aware that emotions evoked by feedback such as anger and anxiety can have both an activating and a deactivating effect. It might be helpful for teachers to check the impact of their feedback on their students regularly by observing and asking questions about the perception of the students of the feedback they received. Secondly, since non-specific feedback such as "well done" might influence the emotional space in a classroom, we would suggest that non-specific feedback should *not* be avoided in classrooms. Instead we propose that this type of feedback should be used sparingly, and as an addition to specific feedback. Thirdly, teachers might be stimulated to use feedback on character strengths as a type of feedback that can enhance learning. And lastly, we suggest the use of progress feedback, as a type of learning-enhancing feedback, as a complement to discrepancy feedback in the classroom.

Final remarks

Returning to our initial example of feedback that we gave at the beginning of this article, we would like to question what the discussions about feedback would mean for this.

Isabel would perhaps not have come crying home each day if the teacher had seen her zest and curiosity and had mentioned these qualities to her (feedback on character strengths). Alternatively, he could have stated the things she did right in her work (specific positive feedback on task), or the way she went about doing her assignments (processing of the task). He could also have noticed her resistance and could have said to her: "I can see that you do not like this, can I help you?" (reacting to the emotion that she clearly experienced, and combining feedback with a question).

As shown in this article, the use of additional perspectives helps us to revisit the concept of feedback, both in a theoretical sense and in terms of its practical use in classrooms. The combined attention to cognition, emotions, personal relationships and character strengths seems, in particular, to lead to a more balanced and more effective view of learning-enhancing feedback. We believe this is highly relevant for teaching, and hence also for the education of teachers.

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Chapter 3

Types and frequencies of feedback interventions in classroom interaction in secondary education²

This chapter describes a study on the actual use of effective and ineffective feedback in secondary education classrooms. We analyzed contiguous ten-minute blocks of classroom interactions of 78 teachers. Our findings indicate that, in the course of typical classroom interactions, teachers seldom provide the types of feedback interventions identified as effective by research in enhancing learning. We examine potential explanations for this finding and discuss the consequences for teacher education and the further professional development of teachers.

² This chapter is based on Voerman, L., Meijer, P.C., Korthagen, F.A.J., & Simons, P.R.J. (2012a). Types and frequencies of feedback interventions in classroom interaction in secondary education. *Teaching and Teacher Education*, 28, 1107-1115.

3.1 Introduction

In education research, feedback is generally seen as an important tool to enhance learning. For example, in his review of 196 studies of feedback in the classroom, Hattie (1999) described feedback as one of the most influential factors in learning, as powerful as the quality and quantity of instruction. Moreno (2004) regarded feedback as crucial to improving knowledge and skill acquisition (see also Kluger & DeNisi, 1996; Black & Wiliam, 1998; Hattie & Timperley, 2007; Shute, 2008). Keeping this in mind, certain conclusions regarding the application of feedback are alarming. First, Kluger and DeNisi (1996), in their review of 131 studies on the topic, found that about one-third of feedback interventions served to decrease learning. Hence, feedback has a powerful but variable influence on learning. Second, however rare research investigating the frequency of feedback in classroom interaction may be, the available research tells us that feedback in the classroom is seldom given. In his inaugural lecture at the University of Auckland, delivered in 1999, Hattie stated that the incidence of feedback in a classroom is very low, at best measurable only in seconds per day. Pauli (2010) also found a low frequency of feedback interventions. She found that teachers often ask new questions or offer further explanation without explicitly reviewing the answer or statement of the student. If feedback was present, it was in most cases non-specific and had the form of praise: “good”; or, “that’s right”. Other, more specific examples of feedback interventions were less common. Bond, Smith, Baker and Hattie (2000) carried out research on the certification system of the American National Board for Professional Teaching Standards. They found that the incidence of feedback was one of the discriminating variables differentiating between teachers who did and who did not receive verification as ‘accomplished’ teachers. The frequency of feedback, however, was very low in both groups. Like Pauli (2010), they found that the most common feedback was praise, for example, “Well done!” Owing to the importance of feedback in enhancing learning, it is particularly interesting to know which feedback interventions might enhance learning, and which are unlikely to do so. In addition, it is interesting which of the feedback interventions that are likely to enhance learning, are actually being used by teachers in interaction with their students in daily teaching practice, and how often. In the present study, we focus on the feedback teachers provide during the lessons they give in their regular day-to-day work. The main research question is:

“Which of the feedback interventions that, according to the relevant literature, are likely to be either effective or ineffective in enhancing learning, are actually used by teachers in their interaction with students? And, how often are these feedback interventions employed?”

In order to answer this question, we will first define and describe the concept of ‘feedback’. Most existing descriptions of the concept available in the existing literature emphasize the discrepancy between a current level of performance of a given student on the one hand, and a goal or desired level of performance on the other. This relationship is what is described as ‘discrepancy-feedback’. Following the published research of Schunk and Schwartz (1993), we propose that it may also be effective to compare a current level of performance with an earlier level of performance, a relationship defined as ‘progress-feedback’. Next, we will describe those features of feedback interventions that the literature has shown to probably enhance learning and those which apparently do not. The central part

of the study presented here is an empirical examination of how 78 separate teachers actually employ those feedback interventions identified as enhancing learning. The article will close with a discussion of the results as they relate to the theories governing feedback and a description of the implications for the continuing education and professional development of educators.

3.2 Theoretical framework: Feedback interventions that the literature describes as effective or not effective for enhancing learning

The concept of 'feedback'

We have based the present section on the findings from three review studies on feedback: Kluger and DeNisi (1996), Hattie and Timperley (2007), and Shute (2008). We selected these three studies because of the large number of relevant studies each took into account, and because these studies serve as reference points for many other studies on feedback. The descriptions of feedback in these review articles were quite univocal, in that each considers feedback to be information regarding one's performance or understanding, given by an agent—teacher, peer, computer, book, parent, self, experience—and, each considers the main purpose of feedback to be to reduce discrepancies between current understanding or performance and some desired level of performance or goal. This latter aspect of feedback is discussed in particular detail. Kluger and DeNisi (1996) described feedback intervention as creating a 'feedback sign', a positive or negative evaluation of one's performance relative to a goal. In their model of feedback, Hattie and Timperley (2007) state that, "The main purpose of feedback is to reduce discrepancies between current understandings and performance and a goal" (p. 86). Effective feedback should offer information about these discrepancies. Shute (2008) referred to several cognitive mechanisms through which feedback may be used by a learner, and stated that, "First it can signal a gap between a current level of performance and some desired level of performance or goal" (p. 157). Based on these descriptions, we define feedback as, *information provided by the teacher concerning the performance or understanding of the student, with reference to a goal and aimed at improving learning.*

Effective or ineffective feedback

Kluger and DeNisi (1996) performed a meta-analysis of 131 studies on feedback, the majority of which were not classroom-based. They found that, for the most part, feedback interventions improved performance, but over one-third of feedback interventions decreased performance. To explain this phenomenon, they suggested in their *Feedback Intervention Theory* that the effectiveness of feedback interventions decreases if the feedback draws attention closer to the self, and away from the task (p. 254). They claimed that feedback lacking in specificity may be seen by students to be useless, while feedback that is too elaborate may cause a cognitive overload or may again direct the receiver's attention away from the task. In addition, they found that both positive and negative feedback can enhance learning, provided the feedback contains enough information to allow the student to acknowledge what is right or wrong in their performance or understanding.

Hattie and Timperley (2007) proposed a model of feedback, derived from Hattie's (1999) synthesis of over 500 meta-analyses. They distinguished four levels of feedback, each with a differential effect on learning. These levels are: (1) feedback on the task, (2)

feedback about the processing of the task, (3) feedback about self-regulation, and (4) feedback about the self. Concurrent with Kluger and DeNisi (1996), they described feedback on the self as the least effective form of feedback. They also concluded that feedback on self-regulation and on the processing of the task served to enhance learning. Feedback on the task was effective in enhancing learning, provided the information is useful in improving either the use of strategies or self-regulation. Important in these levels of feedback was the amount of information, or the specificity, provided for in the feedback. Praise appeared to be ineffective in enhancing learning, and often had a detrimental effect on learning. Hattie and Timperley also noted that, when learners are committed to a goal, they are more likely to learn as a function of *positive* feedback, for example, “That is a thoughtful question!” When learners are forced to perform tasks, they are more likely to learn as a result of *negative* feedback, for example, “You have written this word incorrectly.” Hattie and Timperley, however, also warned researchers of the short-term effect of negative feedback interventions, making particular mention of the increased likelihood of task avoidance as a result of frequent negative feedback.

Shute (2008) completed a review of approximately 100 articles, conference proceedings, books and book chapters, all centered on feedback. She listed feedback interventions that seem either effective or ineffective in enhancing learning. She found that the feedback that is generally effective in enhancing learning is specific but not too elaborate, and is presented in manageable units. Furthermore, effective feedback focuses on the task. Feedback that is not effective in enhancing learning clearly lacks these same characteristics. In agreement with the two review articles previously discussed in this section, Shute described that feedback concerning the “self” and praise seem to be ineffective in enhancing learning.

3.3 A contribution to the discussion: A further theoretical analysis of concepts concerning feedback

In the previous section, we defined feedback effective in enhancing learning as being *specific*, in that it provides information about the learning goal with reference to the task, the processing of the task, or self-regulation, while not being overly elaborate. Feedback that is not effective in enhancing learning is either *non-specific* or takes the form of praise. Both positive and negative feedback can serve to enhance learning, as long as they provide specific information.

The concepts of specific, positive, and negative feedback are important in gaining an understanding of the type or types of feedback that enhance learning. Below, we will examine these concepts from other theoretical perspectives. In doing so, we aim to further the understanding of the effect of feedback in classroom interactions.

Specific feedback: Discrepancy and progress feedback.

Several studies have described the nature of specific feedback, or provided suggestions meant to assist in making feedback interventions more specific. Shute (2008) described specific feedback as information pertaining to the accuracy of particular responses or behaviors. Hattie and Timperley (2007) stressed the need for teachers to provide more

evaluative information in their feedback as a means of providing specific feedback. Other authors have acknowledged this as well. For instance, Sadler (1989) stated that the teacher must possess a concept of quality appropriate to the task and be able to judge the work of the student in relation to that concept. Based on a case study, Parr and Limbrick (2009) identified the impact of the explicitness of teachers' feedback on the way in which the students met goals as a hallmark of effective teaching.

As mentioned above, an important aim of feedback is the reduction of discrepancies between a current level of performance or understanding and a goal. To be specific, feedback should provide information about this discrepancy. According to both Shute (2008) and Hattie and Timperley (2007), specific feedback can be used to clarify goals and reduce or remove uncertainty in relation to how well learners are performing a task. Feedback should also be about what needs to be accomplished to attain a desired level of performance, a type of specific feedback we have labeled as *discrepancy feedback*. This is one way of using goals to provide effective feedback.

In addition to this perspective, it would also be useful to consider specific, goal-related feedback from another angle: the possibility of providing feedback on the *progress* students have made toward meeting goals. For example, Schunk and Swartz (1993) studied the influence of what they called *progress feedback* on writing achievement. They found that children who received feedback on the difference between an initial level of performance and their actual level learned strategies better and more quickly than students who received only information about the overall goal of the task. Progress feedback also had a notable impact on maintenance and generalization. This conclusion is repeated in Schunk and Ertmer (1999), where the authors demonstrate that feedback on progress, when given relative to one's initial performance, enhances both learning and motivation. This serves, also, as a way to compare one's performance to a desired level or goal, while allowing emphasis to be placed on what has already been achieved. As a result, in goal-related feedback it seems appropriate to make a distinction between progress feedback - which emphasizes what has already been achieved, and discrepancy feedback - which emphasizes what is yet to be achieved. Both progress feedback and discrepancy feedback allow teachers to be specific in the type of feedback they provide to their students. The use of both types of feedback in combination is shown in Figure 3.1.

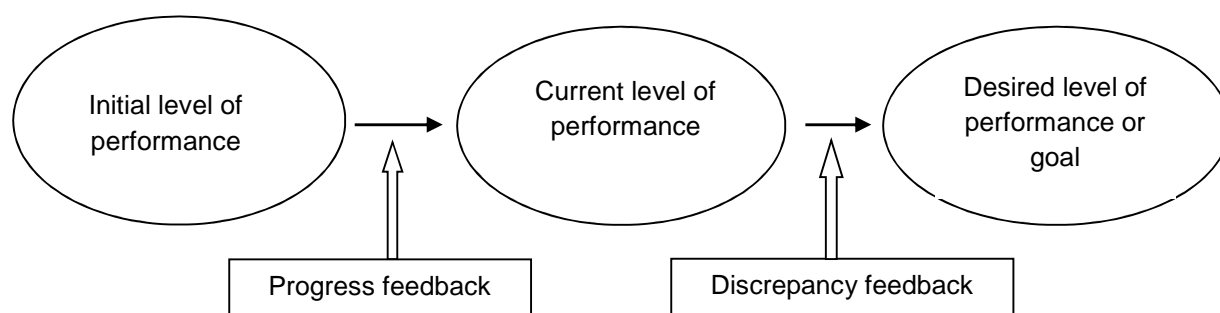


Figure 3.1 Progress feedback and discrepancy feedback (see also chapter 2, p. 31).

Positive and Negative Feedback Interventions: A ratio

Kluger and DeNisi (1996) found that both positive and negative feedback can enhance learning. In our understanding of positive and negative feedback we will follow Losada (1999), who described positive feedback as showing support, encouragement, or

appreciation, and negative feedback as showing disapproval, or even sarcasm. Table 3.1 provides examples of both positive and negative feedback.

Table 3.1

Feedback interventions and examples¹

Feedback intervention	Example
Non-specific positive feedback	Good job! All right! (examples from Pauli, 2010)
Specific positive feedback	“Well done, you have shown the way you arrived at the solution.” “You’re learning to do the steps! “, and, “You’re doing well, because you followed the steps in order”. (Schunk & Swartz, 1993) “Last week you didn’t know that many words, this week you know them all!” (<i>progress feedback</i>) “You’ve got some direct speech here, direct speech using thoughts. Excellent.” (Parr & Limbrick, 2009)
Non-specific negative feedback	“That’s incorrect.” “That doesn’t sound right.”
Specific negative feedback	“Your answer is too long. In your exam your answer needs to be short.” (<i>discrepancy feedback</i>) “You do not know the conjugations of the irregular verbs. This is really necessary to get a good mark in your test.” (<i>discrepancy feedback</i>)

¹ The examples come from multiple studies conducted on the use of feedback by teachers, including our own study.

The influence of both positive and negative feedback on learning is also underlined by Hattie and Timperley (2007), who, along with Kluger and DeNisi (1996) and Shute (2008), however have cautioned against the overuse of negative feedback, owing to the threat such an approach poses to the self-esteem and self-efficacy of the learner. In second language acquisition, the effectiveness of negative feedback has been heavily debated (e.g., el Tatawy, 2002; Kim, 2004; Van Beuningen, 2011). Negative feedback has been found to have little impact on language learning, or to be potentially harmful to learning and the motivation to learn (Kim, 2004). Other research, however, has shown that negative feedback can be effective. In van Beuningen (2011), negative feedback was found to have a positive effect on learners’ ability to write linguistically accurate texts. This relates, also, to the variability of the impact of feedback. In their study on teacher feedback and achievement in physical education, Silverman, Tyson, and Krampitz (1992) found that positive feedback was associated with increased student learning.

Positive and negative feedback do not have equal impact on learning. Baumeister and Cairns (1992) examined the manner in which an individual processes and remembers positive and negative feedback. They found that negative feedback elicited clear defensive responses, ranging from avoidance in elaborating on the feedback to negative thoughts. They also found that the highest memory scores in the experiment were achieved if positive

feedback was mixed with small amounts of negative feedback. There were no similarly high scores achieved by tempering generally negative feedback with small amounts of positive feedback. As an explanation for this phenomenon, Baumeister, Bratslavsky, Finkenauer, and Vohs (2001) have suggested that, when feedback is generally positive, people let their defenses down, whereupon small bits of negative feedback penetrate exceptionally well. According to the same authors, negative feedback has a greater impact on memory and self-esteem than does positive feedback, a conclusion which supports the findings of Kluger and DeNisi (1996), that negative feedback can have a greater impact on self-efficacy than positive feedback. The impact of negative feedback is not only on self-esteem or self-efficacy; Goodman, Hendrickx, and Wood (2004) found that increasing specific negative feedback served to reduce both exploration and explorational strategies.

Based on the difference in impact, both Losada and Heaphy (2004) and Fredrickson and Losada (2005) posited that, to overcome the impact of negative feedback, experiences of positivity may need to outnumber experiences of negativity - in other words, experiences of positive feedback need to outnumber experiences of negative feedback. Based on their research into management teams, Losada and Heaphy (2004) developed a ratio at which positive and negative feedback should occur in order for people to develop and learn. Higher performance in, for instance, management teams occurs if the ratio of positivity to negativity is higher than 3:1 - that is, if there are three instances of positive feedback for each instance of negative feedback. These authors also found, however, that in order for the feedback to be effective, this ratio should not exceed 11:1. They made no distinction between feedback levels, or between specific and non-specific types of feedback.

The question remains whether we can directly apply these findings to teaching, and more specifically, to teacher feedback. There is a general paucity of research on this issue. Classroom interaction may possess different features as compared with the interactions that occur within business management teams. More importantly, the impact of a teacher's feedback, whether said feedback is positive or negative, on a student may be determined, for example, by the degree to which the feedback either confirms or contradicts the student's own appraisal of his or her performance. If a student believes they have performed a task well, negative feedback may be perceived as confrontational and limit the potential for further learning, whereas negative feedback that confirms his own estimation may have another effect, in limiting the students motivation to learn. In sum, we believe that the issue of what constitutes an appropriate ratio of positive to negative feedback is a complicated matter, too complicated to be reduced to a simple number derived from a mathematical analysis. Still, Losada and Heaphy's ratio may give some indication of an appropriate balance. It also provides an interesting avenue for further analysis of feedback intervention in a classroom setting. We have used this ratio in our analysis of the feedback offered by the teachers included in the current study.

In our theoretical analysis, we identified several types of feedback intervention that might enhance learning. We made distinctions between specific and non-specific feedback, and noted that specific feedback can be either progress feedback or discrepancy feedback. We have also distinguished between positive and negative feedback. Combining these features produces the feedback interventions shown above, in Table 3.1.

3.4 The empirical study

Refining the Research Question

To answer our central research question, we have formulated the following related questions, based on the above theoretical analysis:

1. *What is the frequency of teachers' feedback interventions and other interventions (i.e., questions, brief instructions) during classroom interaction?*
2. *How many teachers provide each of the feedback intervention types during classroom interactions? How often do they do so?*
3. *What is the ratio of positive feedback to negative feedback (both specific and non-specific) that teachers provide?*
4. *How many teachers provide progress feedback and discrepancy feedback? And how often?*
5. *Do the answers to questions 1, 2, 3, and 4 differ based on school type (ranging from vocational education to pre-university level), school subject, grade level, gender, age, and experience?*

Design

Research participants.

78 teachers from eight different secondary education schools in the Netherlands were involved in this study. The participating schools varied from very traditional to highly innovative in their educational approach, and ranged from vocational education to pre-university level. The schools were as diverse as was possible in terms of both geography and demography. Table 3.2 lists the types of schools included in the study, the grade levels taught by the subject teachers, and the gender, age, and experience of the teachers included in the study. We sought the permission and cooperation of all teachers prior to the onset of research. We explained our research by e-mail and, regarding the issue of confidentiality, ensured all parties that the recordings would not be used for any other goal, nor would they be made public at any time. Participating teachers were filmed during a lesson of their choice. They were aware that we were carrying out a study into their communication with their students, but did not know that we were explicitly observing their feedback. We also made sure that no names of teachers or schools appear in our data. All teachers received a copy of their recording and had the opportunity to refuse their cooperation after reviewing the tape. Two teachers did withdraw their consent after doing so, and their respective data and recordings were removed from the sample.

Table 3.2
 Characteristics of the participating teachers

Characteristic	Division	Number
Type of school	Lower vocational education	26
	Higher levels of secondary education	52
Subject	Language teachers	25
	Science and math teachers	25
	Other subjects	28
Grade level	Teachers of lower grades	41
	Teachers of higher grades	37
Gender	Male	37
	Female	41
Age	Ranging from 19 to 59, with a mean of 37.1	
Experience	Ranging from 1 to 40 years, with a mean of 11.61	

Observation instrument.

We conducted a pilot study to develop an observation instrument, to be derived from the framework described in the above section reviewing current theory and the relevant literature on the topic. The instrument consists of the following categories:

1. *Non-specific positive feedback*: non-specific positive utterances, such as: "Well done!" and, "Great!"
2. *Non-specific negative feedback*: non-specific utterances, such as: "Wrong!" and, "Not quite!"
3. *Specific positive feedback*: positive feedback containing specific information about the performance or level of understanding of the student.
 - 3a. *discrepancy feedback*: positive feedback comparing the performance or level of understanding of the student with some predefined goal or desired level of achievement.
 - 3b. *progress feedback*: positive feedback comparing the performance or level of understanding of the student with their earlier performance or level of understanding.
 - 3c. *otherwise*: other specific positive feedback.
4. *Specific negative feedback*: negative feedback containing specific information about the performance or level of understanding of the student.
 - 4a. *discrepancy feedback*: negative feedback comparing the performance or level of understanding of the student with some predefined goal or desired level of achievement.
 - 4b. *progress feedback*: negative feedback comparing the performance or level of understanding of the student with their earlier performance or level of understanding.
 - 4c. *otherwise*: other specific negative feedback.
5. *Other interventions*: i.e., questions, brief instructions.

While pilot-testing the observation instrument, we made several decisions as to how to evaluate the teacher feedback interventions. In our decision making regarding specificity, we asked: Do the students know exactly what they have done right or wrong? If we could answer this question positively, we scored the feedback as specific. We recorded feedback as specific however small the specificity of the feedback. For instance, the intervention, "Well done, you have 28 good answers," was scored as specific. Another example was the exclamation, "Geburtstag, yes!" This was provided as feedback to a correct answer from a student in translating "birthday" from Dutch into German. By this same criterion, (does the

student know what is right or wrong) questions were not regarded as feedback; questions might, however, help shift students' focus toward goals.

We decided to use the intonation as well as the surrounding context (e.g., task and content of the comment) of the teacher in interpreting the feedback as positive or negative. We did not use the facial expression of the teacher. In evaluating the intonation, we observed whether it was possible to perceive either positive or negative emotions on the part of the teacher, such as joy, praise, irony, anger or cynicism. Some examples of intonation used to interpret the feedback include the following:

- An ironic remark, such as: "This is going smoothly!" When delivered to students who were not making progress, this was observed to be non-specific negative feedback. The students knew their work was not going smoothly, but gained no information that would help them improve from the feedback.
- An enthusiastic exclamation, such as the student's name. When delivered to a student who had shown keen insight, such remarks were scored as positive non-specific feedback.
- A cynical and angry remark, such as: "You really do your best, don't you!" When spoken curtly by the teacher to a student who had already received feedback on his non-working attitude. Due to the tone of voice, and the specific nature of the comment—the student is made to know they are not working hard enough—we were able to positively answer the question, "Does the student know what they have done wrong?" Hence we scored this feedback as negative and specific.

Furthermore, we chose to count feedback that was immediately repeated in a different manner or tone as being a continuation of the earlier feedback intervention.

As can be seen in the examples in Table 3.3, utterances from teachers were short sentences, or exclamations. Each teacher's interventions were scored as feedback or other interventions. Utterances of the teacher that were not related to the learning of the students were not regarded as an intervention and ignored in the observation (for example, beautiful weather today!) Because we decided only to score teachers in interaction with their students there were no long explanations by the teacher. The utterances that we coded mostly consisted of one or two sentences.

Table 3.3
Sample scoring form of one teacher

Feedback	Positive		Negative		Other interventions (tally)
	Non-specific	Specific	Non-specific	Specific	
					27
All right, that's nice	x				
Marvelous, that's how you make it more interesting and exciting.		x			
Your work is very neat		x			
You've done a fantastic job!	x				
Ah, you've taken this into account, well done!		x			

We encountered a limited number of situations - fewer than 10 - in which it was unclear as to how to score a feedback intervention. Examples include:

Situation 1:

A student is staring out the window instead of working on the assignment. The teacher approaches and says: "You're looking sleepy." Because of the teacher's angry tone of voice, this intervention was scored as an instance of negative feedback; it was also scored as non-specific, because there was no information provided on the student's level of performance or understanding.

Situation 2:

A group of students is working together on an assignment. Their teacher follows their conversation and says: "Ah, you want to develop trucks that are good for both animals and the environment." Because of his positive tone of voice and the content of the comment, this instance of feedback was scored as both positive and specific.

As can be seen in these examples, tone of voice and clarity of information were two of the key criteria mostly used in evaluating the nature of individual feedback interventions.

Two observers received training in the use of the observation instrument. After completing the training, the observers separately scored ten minutes of video, consisting of three different teachers. The observers were placed in separate rooms while performing the scoring, so as to avoid unintentional social effects on their respective interpretations. A procedure was established based on the following set of instructions:

1. Write down the feedback interventions of the teacher verbatim (put the tape on hold while writing, if necessary). Do not distinguish between feedback addressed to an individual student, a group of students or the entire class.
2. Tally all other interventions of the teacher.
3. Score the logged feedback, using the feedback categories listed on the observation schedule.

4. Categorize the specific feedback as either progress feedback or discrepancy feedback.

Cohen's Kappa, calculated to determine inter-rater agreement, was 0.82. This led us to conclude that the categories contained within the observation instrument were sufficiently clearly defined.

Procedure and analysis.

We videotaped 78 teachers in secondary education as they delivered their regular lessons, which varied in duration from 45 to 70 minutes. During a portion of these lessons, teachers interacted with their students, either as a group or individually. For each teacher, we selected one fragment of ten contiguous minutes in which there was interaction between teacher and students, to maximize the incidence of feedback interventions available to be evaluated. With the aid of the observation instrument developed in the pilot study, we thus scored 78 fragments of 10 minutes each.

In the analysis, descriptive statistics such as means and percentages of the feedback and other interventions were calculated. Next we performed a Multivariate Analysis of Variance (MANOVA), using the feedback categories as dependent variables and school subject, grade level, school type and gender as independent variables. We used these results to test for the existence of a relationship between these variables and the feedback categories. We performed Analyses of Variance (ANOVAs) to test for the existence of relationships between age and experience on the part of the teacher's on the one hand and the feedback categories on the other. In addition, we employed a Chi-Square test to examine the relationship between the different feedback interventions the teachers used. We looked, in particular, to see for instance whether teachers who provided specific positive feedback also provided specific negative feedback.

3.5 Results

What is the frequency of teachers' feedback interventions and other interventions (e.g., questions, brief instructions) on the part of teachers during normal classroom interactions?

Table 3.4 shows the mean frequency of the feedback and other interventions (e.g., questions, brief instructions), based on the analysis of each teacher in their analyzed 10 minute fragment. As Table 3.4 shows, the average number of interventions contained within a typical 10 minute lesson fragment is almost 40, of which seven are classified as feedback interventions and 33 are labeled with the generic "other" interventions.

Table 3.4
Mean frequencies and standard deviations of feedback and other interventions

Interventions	<i>M</i>	<i>SD</i> ²
Feedback interventions	6.64	4.44
Other interventions	33.13	6.24
Total	39.77	5.34

²Standard Deviation.

How many teachers provide each of the feedback intervention types during classroom interactions? How often do they do so?

Table 3.5 shows the percentage of teachers who provide each of the types of feedback interventions we have distinguished.

Table 3.5

Percentage of teachers providing each of the four types of feedback within a 10 minute block of classroom interaction, and mean frequencies and standard deviations of each of the four types of feedback intervention.

Feedback intervention	Number and percentage of teachers performing the various feedback interventions N=78				
	Not found	Performed by one or more teachers	<i>M</i>	<i>SD</i>	<i>N</i>
Non-specific positive feedback	11 (14.1%)	67 (85.9%)	3.57	2.2	67
Specific positive feedback	50 (64.1%)	28 (35.9%)	2.24	1.8	28
Non-specific negative feedback	40 (51.3%)	38 (48.7%)	1.71	1.3	38
Specific negative feedback	31 (39.7%)	46 (60.3%)	2.98	2.2	46

Table 3.5 shows that 85.9% of teachers included in the study provided non-specific positive feedback once or more, with a mean of 3.57 times per teacher. Non-specific negative feedback was given by 48.7% of teachers, with a mean of 1.71 times per teacher. 35.9% of teachers provided specific positive feedback once or more, with a mean of 2.24; approximately 60% of teachers provided specific negative feedback once or more, with a mean of 2.98. We performed a Chi-Square test to illustrate any relationships between the teachers' use of the various types of feedback, but there were no statistically significant relationships to be identified. This means that those teachers who provided specific positive feedback were not necessarily the same teachers who provided specific negative feedback.

What is the ratio of positive feedback to negative feedback (both specific and non-specific) that teachers provide?

Table 3.6 shows that 56.4% of teachers had a positive-negative ratio below the prescribed benchmark of 3:1. Conversely, 43.6% of teachers had a positive-negative ratio equal to or higher than 3:1. There were no ratios which exceeded 11:1.

Table 3.6

Ratio at which teachers provided positive and negative feedback interventions.

Positive/Negative Ratio	Percentage (N=78)
Ratio between 3:1 and 11:1	36 (43.6%)
Ratio less than 3:1	42 (56.4%)

How many teachers provided progress feedback and discrepancy feedback in classroom interactions? And how often?

Table 3.7 summarizes the results concerning progress feedback and discrepancy feedback. Not all specific feedback could be categorised as progress or discrepancy feedback, because the feedback lacked the explicit comparison with a former performance or a goal. Progress feedback was given by 6.4% of the teachers, and 41.0% of the teachers provided discrepancy feedback. Again a Chi square test showed no statistically significant relations between the cells. Hence, the teachers who provided progress feedback were not necessarily the same as the teachers who provided discrepancy feedback. We also examined the nature of progress and discrepancy feedback. Interestingly, discrepancy feedback was always negative specific feedback, whereas in all cases progress feedback was positive specific feedback.

Table 3.7

Number, percentage, mean and standard deviation of teachers providing progress feedback and discrepancy feedback interventions during normal classroom interactions.

Number and percentage of teachers performing progress feedback and discrepancy feedback interventions N=78						
Specific feedback intervention	not found	≥1	<i>M</i>	<i>SD</i>	<i>N</i>	
Progress feedback	73 (93.6%)	5 (6.4%)	1.40	0.55	5	
Discrepancy feedback	46 (59.0%)	32(41.0%)	1.94	1.11	32	

Do the answers to questions 1, 2, 3, and 4 differ based on school type (ranging from lower vocational education to pre-university level), school subject, grade level, gender, age, and experience?

We performed MANOVAs, using the feedback categories as dependent variables and school subject, grade level, school type, and gender as independent variables. No statistically significant relationships were identified in the scores on the feedback categories.

To further analyze the influence of age, we organized the teachers included in the study into the following age groups: (1) under 28; (2) 28-37; (3) 38-47; and (4) 48 years or older. For experience, we used the following groups: (1) less than 3 years of experience; (2) 3-7 years; (3) 8-18 years; and (4) more than 18 years of experience. ANOVAs performed with age and experience as independent variables showed no statistically significant differences. We therefore conclude that neither the frequency of feedback, nor the feedback intervention type, nor the positive:negative ratio differ dependent upon school type, school subject, grade level, gender, age, or experience.

3.6 Conclusions and discussion

Based on an analysis of the literature concerning feedback, combined with new perspectives based on other insights, we have studied the feedback interventions of 78 Dutch secondary-school teachers. We have found that these teachers performed, on average, seven feedback interventions in a typical 10 minute block of normal classroom

interaction. This comprised less than 20% of all observed interventions. We also found that the feedback interventions offered were mostly non-specific. About half of the teachers did not provide any specific feedback, whether positive or negative. This is consistent with findings published by Hattie (1999) and Pauli (2010), who have also shown that the occurrence of feedback is low and that most feedback interventions are non-specific. We find these outcomes to be alarming, because feedback in general, and specific feedback in particular, is one of the most important tools available to have to positively influence their students' learning (Hattie, 1999).

Concerning the ratio to which the teachers provided positive and negative feedback (be it specific or non-specific), we found that about 44% of the teachers did not produce a ratio in the appropriate range indicated by Losada and Heaphy (2004). Research in the area of organizations (e.g., Stacey, 1996) also emphasizes the importance of the interplay between positive and negative feedback for the capacity of an organization to perform. As far as we know, no research has been conducted into the effect that the ratio between positive and negative feedback in the classroom has on the enhancement of student learning. In this study there is some support for the 3:1 ratio, although there is need for more evidence to be convincing. We suggest more research in this area, because of the importance for student learning.

In their examination of feedback among team members in a business setting, Losada and Heaphy (2004) did not distinguish between specific and non-specific feedback, or between feedback levels. We would suggest further research into whether the frequent use of specific feedback influences the ratio in classrooms. Research on the feedback levels teachers employ - namely: (1) the task; (2) the processing of the task; (3) self-regulation; and, (4) feedback about the self - also carries great potential as an avenue for further research. A second such avenue would be an examination of the influence of the effectiveness of these respective levels of feedback on the ratio of positive to negative feedback.

In the discussion of whether questions constitute a type of feedback, different perspectives have contributed to different views. In the present study we chose to evaluate feedback mainly from the perspective of the provider of said feedback—in this case, on the part of the teachers. The recipient of the feedback—the student—can, however, regard questions as feedback. For instance, were a teacher to ask several questions without providing any feedback concerning the accuracy of a student's answer, this can be regarded as a form of feedback, as an attempt to lead the student to the correct conclusion. Feedback recipients might come to the conclusion that the teacher does not approve of their performance, and thus regard the persistent questioning as a form of feedback.

Another research question dealt with the relative occurrences of progress feedback and discrepancy feedback. A closer look at the incidences of each shows that approximately 41% of the teachers included in this study provided some form of discrepancy feedback. Progress feedback, on the other hand, was offered by only 7% of teachers. There were more teachers who provided discrepancy feedback more often than progress feedback. Teachers seem to place greater emphasis on what has *not yet* been learned or understood, rather than on what has already been achieved. Interestingly, we found that progress feedback, when it did occur, always took the form of specific positive feedback, while discrepancy feedback was always conveyed as specific negative feedback. It is, however, difficult to draw conclusions about this phenomenon, as the frequencies of both types of feedback were so low as to be statistically insignificant. This finding is consistent, however, with the examples

of progress feedback Schunk and Schwartz (1993) illustrated; those examples were all positive, as well.

The reason for this low frequency could, firstly, be attributed to the way in which we evaluated the feedback interventions. We decided to classify individual events as progress feedback only if there was an explicit reference to a former level of performance or understanding. In classifying discrepancy feedback, our criterion was the reference to a particular goal, however small or farfetched. Secondly, we hypothesize that, in order to provide these two types of feedback interventions, teachers must first be aware of the educational goals of each student. Many authors, such as Sadler (1989), have stated that, while teachers do possess conceptions of goals and quality, these remain largely tacit. An explanation for the difference in frequency between progress feedback and discrepancy feedback may be attributable to the fact that, in order to provide progress feedback, understanding and awareness of the goals are more important in providing progress feedback than in providing discrepancy feedback. Teachers might see what is lacking in a student's current level of performance without being consciously aware of the actual goal of a given assignment.

In his work on goal-relatedness, Martin (2006) introduced the notion of *personal bests*, described as personalized standards of excellence, as a means of goal-setting. According to Martin, students are most likely to reach their personal best performance in working toward goals that are specific, challenging, competitively self-centered, and focused on self-improvement. This notion provides researchers with at least two new perspectives on goal-related feedback. First, goal-related feedback need not be exclusively centered on the goals of the teacher, but can also center on the goals of the student. Second, if we employ this notion of personal best in evaluating feedback interventions, we can then propose the provision of feedback not only on progress or discrepancy in relation to the goals set by the teacher or school, but also as it relates to the goals set by the student.

Intervention frequencies, the various types of feedback interventions used, and the positive:negative ratio of feedback achieved did not differ for school type, school subject, grade level, or based on the gender of the teacher. Similarly, frequency, feedback type and positive:negative ratio did not differ based on the age or experience of the teacher. With respect to this latter finding, it seems that teachers do not learn to provide effective types of feedback in the appropriate ratio with age or experience. The question of why this is the case is of great interest, and we offer three hypotheses in this regard. The first hypothesis concerns the preexisting conceptions of teaching and learning possessed by teachers, and by teacher educators. It is possible that a considerable percentage of teachers at all levels, including secondary education, view teaching and learning in a fundamentally reproductive way, as demonstrated by Hamer and van Rossum (2010) in their review of teacher conceptions of learning. Teachers tend to focus on providing information, with the expectation that students will then accurately reproduce this knowledge. Relatively few teachers regard teaching as a process and try, for example, to engage students in thinking about how and why facts are as they are. We might hypothesize that teachers with a more reproduction-based conception of teaching and learning will opt for the more task-oriented feedback interventions, or provide more direction, as opposed to feedback. Hamer and van Rossum have warned against the perpetuity of the traditional reproductive way of thinking which has taken root in teacher education. If teacher educators also possess a reproductive conception of teaching and learning, they may not be ideal role models in demonstrating the effectiveness of providing feedback to their students. The second hypothesis is that teachers

as a consequence of the latter hypothesis, do not receive many good examples of or much instruction in how to provide effective specific feedback. As Russell, a teacher educator and researcher, puts it: "The image of 'teaching as telling' permeates every move we make as teachers, far more deeply than we would ever care to admit to others or ourselves" (1999, p. 222). Third, the low relative frequencies of what is considered effective feedback could be related to the assessment-driven culture of education in most current contexts. As a consequence, teachers might regard their feedback as being relatively less important, or might regard the outcomes of the assessments as being more valuable to the students.

We believe that the findings presented in this study can be generalized to Dutch teachers of various subjects in Dutch secondary education. A primary limitation of the current study is the absence of analogous information from other contexts; indeed, further research is needed to reveal whether these results also apply to other cultures and contexts. A second limitation is the fact that the vast majority of teachers included in this study were Dutch by birth. There is, however, a growing population of teachers in the Netherlands that are first- or second-generation immigrants. Their unique cultural backgrounds might influence the frequency and type of feedback they provide. Further research on progress feedback and discrepancy feedback would also be of interest, owing to the assumed impact each has on learning. The discipline in general would be helped by the conducting of additional research into how to best train teachers to provide those types of feedback which have been identified as having the greatest positive impact on learning and achievement among recipients.

It might be useful for teacher educators to take a close look at the way in which they provide feedback to their students, and to engineer situations in which they can provide feedback. They could also stimulate situations in which student teachers provide feedback to one another. In turn, teacher educators could then provide feedback on that feedback. The same holds true for the training of experienced teachers. As we may conclude from this study, an emphasis on the art of providing effective feedback seems to be a crucial factor in the continued professional development of teachers.

Finally, we would recommend teachers seek to provide feedback, especially the learning-enhancing types of feedback, more frequently. In doing so, they should attempt to provide more positive feedback than negative feedback. Moreover, the issue of feedback and its effectiveness seems to warrant increased attention from teacher educators. The findings of the present study indicate that teacher educators should not only make student teachers and experienced teachers more aware of the benefits and drawbacks of feedback interventions, but also suggest that it might be necessary to attempt to influence existing classroom habits and practices through extensive training. For this reason, we suggest that more research be carried out to allow the identification of effective approaches in initial teacher education and in in-service-training for experienced teachers, in order to promote the use of learning-enhancing types of feedback. After all, feedback seems to be a fundamental ingredient of effective teaching, but until now this fact has not been reflected in the attention given to it, whether in initial teacher education or ongoing professional development, or in research into the actual behavior of teachers.

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Chapter 4³

Promoting effective teacher-feedback: From theory to practice through a multiple component trajectory for professional development

This study describes an evaluation of a theory-based trajectory for professional development called the FeTiP program (Feedback-Theory into Practice) that aims to have an observable effect on teacher classroom behavior. The FeTiP program is a multiple component trajectory for professional development and combines several types of interventions. Its goal is to help teachers expand their feedback behavior in the classroom to provide more, and more effective (i.e. learning-enhancing), feedback. We first describe the foundation of the FeTiP program, with a central focus on how classroom behavior can be influenced by a multiple component trajectory of professional development, as this is often a major aim in initiatives for the professional development of teachers but is the most difficult to establish . We describe the effects of the FeTiP program on the feedback behavior of teachers, and attempt to explain why these effects occurred.

³ This chapter is based on Voerman, L., Meijer, P.C., Korthagen, F.A.J., & Simons, P.R.J. (In press). Promoting effective teacher-feedback: From theory to practice through a multiple component trajectory for professional development. *Teachers and Teaching: Theory and Practice*.

4.1 Introduction

There are many initiatives and trajectories available for the professional development of teachers, but empirical research about their outcomes is scarce, specifically regarding the effects on teachers' classroom behavior. Most studies show effects that are measured by means of the teachers' self-evaluations. This study describes an evaluation of a theory-based trajectory for professional development called the FeTiP program (Feedback-Theory into Practice) that aims to have an observable effect on teacher classroom behavior. The FeTiP program combines several types of interventions, and its goal is to help teachers to expand their feedback behavior in the classroom to provide more, and more effective (i.e. learning-enhancing), feedback. We describe the effects of the FeTiP program on the feedback behavior of teachers, and attempt to explain why these effects occurred. Before doing so, we first describe the foundation of the FeTiP program, with a central focus on how classroom behavior can be influenced by a multiple component trajectory of professional development, as this is often a major aim in initiatives for the professional development of teachers but is the most difficult to establish .

Problem formulation

Traditionally, the professional development of teachers has involved attending courses, workshops, training or conferences and reading professional journals. These activities for professional development are not all successful. Kwakman (2003) underlined in her theoretical framework on teacher professional development that these traditional professional development activities fall short of helping teachers change their classroom behavior. Guskey (2002) described in his model the ineffectiveness of many trajectories for professional teacher development and the lack of transfer-ability of these professional development activities to teacher practices in the classroom. He stated instead that teachers would benefit from programs for professional development that offer "specific, concrete and practical ideas, that directly relate to the day-to-day operation of their classrooms" (p. 382). Buczinsky, and Hansen (2010) studied the results of a summer course of 118 elementary school teachers. While some teachers reported that they transferred their knowledge and skills to their classrooms, others reported obstacles in implementing them because of, for instance, time restraints, lack of resources, or classroom management issues.

Most of the studies on professional development activities reported one single type of intervention for professional development. Taking another stance, Borko (2004) provided an overview of strategies and directions for extending our knowledge on the professional development of experienced teachers. She stated that we need studies that go beyond researching single type interventions and that we need to study trajectories for professional development in their full complexity, in real-life situations.

Goal of this study

In this study, we endeavor to add to the traditional ways for the professional development of experienced teachers and search for ways that would help teachers to transfer theory into actual behavior in the classroom that would go beyond a single type intervention. We aim to do this by performing a series of interventions and combining interventions at different levels of the school organization.

The content focus of our trajectory for professional development is feedback. Providing feedback is an influential teacher intervention for promoting student learning

(Hattie, 1999; Kluger & DeNisi, 1996). However, learning-enhancing feedback in the classroom seems to be rather rare (Voerman, Meijer, Korthagen, & Simons, 2012; Hattie, 1999; Pauli, 2010). In the present study, we designed and carried out a trajectory that aimed to help teachers to further develop their skills in providing the more learning-enhancing types of feedback, and to do so more frequently.

To reach this goal, we developed the FeTiP program, a trajectory that combines five components: (a) theory, (b) demonstration, (c) practice, (d) coaching, and (e) feedback. The five components of the FeTiP program were shaped into interventions inside and outside the classroom and these were aimed at three “levels” of the organization: the individual level, the collegial support-group level and the whole team level. Providing learning-enhancing feedback not only required the content and skill to be learned. The FeTiP program also contains a variety of feedback interventions as a means to enhance teacher learning and to stimulate teachers to bridge the gap between theories about providing feedback effectively, and their practice. Because the involvement of school administration is an important condition for effective trajectories (Fullan, 2009; Hargreaves & Fullan, 2012), during the FeTiP program we consulted with the management to monitor the way the trajectory was carried out.

Our research question was: *To what degree do teachers change their feedback behavior after the FeTiP program?*

4.2 Theoretical framework

Feedback

In the literature, there has been some consensus about the goal of feedback. Among other things, feedback should close the gap between a current level of understanding or performance and a goal (Hattie & Timperley, 2007; Kluger & DeNisi, 1996), and should provide the information necessary to close this gap (Duijnhouwer, 2010; Hattie & Timperley, 2007; Kluger & DeNisi, 1996; Shute, 2008). To describe the concept of “feedback,” we will follow Duijnhouwer's definition (2010) of “information provided by an external agent regarding some aspect(s) of the learner's task performance, intended to modify the learners' cognition, motivation and/or behavior for the purpose of improving performance” (p. 16).

In his review study, Hattie (1999) stated that the frequency of feedback influences learning. However, he also indicated that teachers do not seem to provide much feedback. An earlier study from Voerman et al. (2012) also showed that teachers do not provide much learning-enhancing feedback. The frequency of learning-enhancing feedback did not differ based on teaching experience, gender or age. Apparently, teachers do not learn to provide more, and more learning-enhancing feedback as they grow older or become more experienced in teaching.

Moreover, not all feedback is effective at enhancing the learning of the feedback recipient. There is evidence that in order to enhance learning, feedback should be specific and goal-related (Alder, 2007; Black & William, 1998; Duijnhouwer, 2010; Hattie & Timperley, 2007; Kluger & DeNisi, 1996; Shute, 2008). In addition, providing more positive feedback than negative feedback appears to enhance learning. In their study of 60 management teams, Losada and Heaphy (2004) analyzed the verbal communication of these teams. They found that high performing teams showed high ratios of positive to negative feedback. They

developed a positivity ratio, with optimal (between 3 and 11) and less optimal (below 3 and above 11) ratios of positive and negative feedback. Although the exactness of the ratio has recently been discussed (Brown, Sokal, & Friedman, 2013), there is no doubt that “a higher positivity ratio is ordinarily more desirable than a lower one” (Brown, Sokal, and Friedman, p. 31). Based on the review of many studies on positivity and negativity, Fredrickson (2013) concluded that when it comes to positivity ratios, within limits, higher is better. Following this, in classrooms, higher ratios of positive to negative feedback might be helpful toward enhancing learning. Non-specific feedback such as “well done” is not learning-enhancing (Hattie & Timperley, 2007), and neither is feedback on the self, although feedback on character strengths seems to be learning-enhancing (Park & Peterson, 2009; Voerman, Meijer, Korthagen, & Simons, under revision). Hence, we need to help teachers to provide more specific feedback that is more often positive than negative.

Intervening in experienced teacher learning

As we mentioned in our problem formulation, recent research has suggested that it is difficult to intervene in the learning outcomes of experienced teachers such that they are able to transfer theory into behavior in the classroom. As one cause of this difficulty, Korthagen (2010) pointed at the complexity of teaching, where the teacher has to integrate many elements such as the curriculum, the context and the reaction of individual students as well as the students as a group towards instruction. This complexity was also emphasized by Hammerness, Darling-Hammond and Bransford (2005), who described how teachers have to meet a large variety of cognitive and social goals in their classrooms. They stated that “teachers...need not only understand, but also do a wide variety of things, most of them simultaneously” (p. 359). Another cause of the difficulty for teachers to change their behavior might be the need for prompt and concrete answers to situations in the classroom that they experience on a moment-to-moment basis (Korthagen, 2010). Because of the enormous amount of decisions-in-action with not much time to think, teachers depend strongly on the routines they have developed and such routines cannot easily be changed (Eraut, 2004). In conclusion, given the complexity of teaching and the need for prompt reactions to situations, it is not surprising that teachers find it hard to translate theory into their daily practices. Hence, it is important that a trajectory for professional development takes into account the complexity of teaching and the demand for direct responses.

A combination of theory, demonstration, practice, coaching in a collegial support group and feedback

Joyce and Showers (2002) stated that, in order to be successful, a professional development trajectory should contain four learning components, namely theory, demonstration, practice and coaching. They showed that the gradual addition of information, demonstration and practice does not seem to have a notable effect on transfer into teacher behavior in the classroom. However, they found a dramatic increase in the transfer of skills into the classroom when coaching in collegial support groups was added to these training elements.

An additional important component is based on the insights on learning-enhancing feedback that were developed since the 1990s, as described in the section on feedback. These made us view feedback as a valuable and maybe even an indispensable component in a trajectory

for professional development. The value of feedback is supported by Gabelica, Van den Bossche, Segers, and Gijsselaers (2012), who conducted a review of 59 studies on the effect of the feedback provided to teachers in higher education, and stressed the importance of feedback for teacher learning. Borko (2004) also claimed that feedback given to teachers about the way they teach in their classroom is a necessary aspect of trajectories for professional development. In parallel with feedback to students, we hypothesize that learning-enhancing feedback for teachers should be specific, goal-related and provide more positive than negative feedback (Hattie & Timperley, 2007; Losada & Heaphy, 2004; Shute, 2008).

Aiming towards a whole department, including school administration

Aside from the five components of a trajectory for professional development that were described earlier (theory, demonstration, practice, coaching in collegial support groups and feedback), there are additional factors that are influential in the effectiveness of the professional development in schools. Firstly, an important factor in teacher learning was described by Fullan (2009) from the viewpoint of organizational change. He underlined the importance of a professional development program for a department as a whole, in order to develop a shared understanding of the nature of effective practice. In a report on teacher development in the United States and abroad, Darling-Hammond, Chung-Wei, Andree, Richardson, and Orphanos (2009) stated that professional development tends to be more effective when it is an integral part of school policy. They also indicated that professional development activities have little impact if the new practices are not supported or reinforced. As a further reason for a professional development program to involve a whole department, Fullan (2009) stated that when only a few teachers implement an effective new skill in their classroom, there is not much effect on student learning. He further emphasized that “teachers’ ongoing interaction and experience with one another build the trust and knowledge that they are collectively responsible and good at their work” (p. 47). Fullan described this interaction as “sharing.” By sharing, teachers “externalize” and contribute to the learning of their team or organization in a process that Simons and Ruijters (2004) described as an important aspect of teacher professional development. Meirink, Imants, Meijer and Verloop (2010) refined the concept of sharing in their comparative case study. They showed that learning frequently occurred in teams that started from (1) shared problem identification, (2) shared ideas for alternative teaching methods and (3) discussions of their experiments with these alternative methods.

As a second factor in teacher-learning from the organizational change point of view, Fullan (2009) described the commitment of the school administration to support not only the concept but also to provide practical support (i.e. time and possibilities to practice) in the implementation of new skills. This commitment is underlined by Adey (2006), who stated that the role of the school administration is crucial for professional development, since administrators are a great influence on the culture of a school and participation in professional development activities. A committed school administration can develop a culture of mutual support and learning, where teachers provide each other with support and feedback, as do the administrators (Eraut, 2007). We might conclude that an effective trajectory for professional development takes place within a school, with involvement and support from the management and teachers in goals and methods.

Interventions aiming at the individual level, the collegial support group level and the department as a whole, and carried out inside and outside the classroom

In this study, the components of a trajectory for professional development, i.e. theory, demonstration, practice, feedback and coaching, were operationalized into interventions as part of the trajectory for professional development. Through an analysis of the literature on effective interventions, we found two features of interventions that, in our opinion, are important for developing a trajectory for professional development. The first feature is that interventions can be aimed at different levels of the school organization. We have already described two levels that are important. The whole department level, as Fullan described, and the collegial support group level, as Joyce and Showers (2002) discussed, are essential. Adey (2006) described a third level, intervening at the individual level as a key level of professional development. We will elaborate on this level below by describing in more detail the combination of interventions of the FeTiP program.

A second feature of interventions is that they can be carried out inside the classroom, or outside. Recent studies have stressed the combination of learning settings for teachers inside and outside the classroom as effective for professional development (Hodkinson & Hodkinson, 2005; Tynjälä, 2008). Support for the view that intervening in teachers' own classrooms can be effective might be found in the concept of "approximation of practice," as described by Grossman, Compton, Igra, Ronfeldt, Shahan, and Williamson (2009). They view approximation of practice as one of the key concepts for teacher education, as characterized by opportunities to engage in practices that are more or less proximal to the practices of a profession. Approximation of practice provides opportunities for "deliberate practice," especially for practices that are highly challenging. Deliberate practice is defined as prolonged engagement in practice that is especially designed and intended to improve individual performance (Bronkhorst, Meijer, Koster, & Vermunt, 2011). Approximation of practice, as in intervening in the individual teachers' classrooms, might be an effective tool for addressing the complexity of teaching and the need for immediate decisions, and as such might help teachers to translate theory into practice.

In summary, we hypothesize that an effective trajectory for professional development consists of (a) a combination of components, i.e. theory, demonstrations, opportunities to practice, feedback and coaching in collegial support groups; (b) interventions aiming at the individual level, the collegial support group level and the department as a whole, and carried out inside and outside the classroom and (c) Involvement and support of the school administration.

Operationalizing components into interventions

There have been some recent studies on interventions that seem promising for helping teachers to change their behavior in the classroom. Firstly, at the collegial support group level, *video-coaching under the guidance of a trained coach* has appeared to be effective. Fukkink, Trienekens, and Kramer (2011) showed a positive effect of this kind of video-coaching, as reported by the teachers. A recent research project conducted by Thurlings (2012) on four groups of three teachers using their video-recordings for feedback showed that collegial teacher feedback was effective when performed under the guidance of a process supervisor. The supervisor acted as a chairman, modeled coaching behaviors and provided feedback on the teachers' coaching behaviors. In this way, teachers learned how to provide feedback to each other. In his review on the use of video in the professional development of teachers, Brouwer (2009) showed that they reported changes to their

teaching with the help of video-coaching that was supervised by a video-coach. The video-coach supports learning by directing the attention of the teachers, and by stimulating reflection by asking open-ended questions, with both colleagues and coach providing feedback. In their study on the influence of video analysis on teacher change, Tripp and Rich (2012) showed that teachers can reflect on their behavior with the help of video-recordings, and that this helps them to see their teaching from a new perspective as well as to monitor their progress. Hennessy and Deaney (2009) state that video-recordings help teachers capturing and revisiting classroom activity and describe video as a powerful tool for critical reflection and knowledge construction by practicing and trainee teachers.

Secondly, at the individual level, a successful intervention is one that offers a *type of in-class support*, as Adey (2006) denoted, for instance: "Coaching in teachers' own classrooms is a sine qua non of effective professional development" (p. 54). A possibility for coaching in the classroom is explicit modeling. Korthagen, Loughran and Lunenberg (2005) stated that teacher educators teach about teaching and during that process, they model teaching. Lunenberg, Korthagen, and Swennen (2007) emphasized that the way teacher educators model teaching serves as an important factor in shaping teacher behavior. We might hypothesize a correspondence between teacher education and professional development in this respect. As teacher-educators, trainers teach teachers about teaching, while teaching. We might conjecture that explicit modeling is an important factor in professional development trajectories as well.

There are several ways in which the modeling of feedback behavior can take place. Trainer-coaches might model feedback behavior during training and coaching, as teacher-educators do. However, there is another way to model feedback behavior, namely *explicit modeling feedback behavior in the teachers' own classroom*, where teachers can observe the modeling of the trainer-coach, and practice directly afterwards by copying the trainer-coach. Approximation of practice as modeling feedback behavior in teachers' own classrooms might provide teachers with the opportunity to deliberately practice the skills they want to learn. In this way, teachers might learn how to provide learning-enhancing feedback.

Another example of an intervention at the individual level in the classroom is *synchronous coaching*. In this type of coaching, direct interventions are provided to the teacher by the trainer-coach. The trainer-coach uses a microphone to provide keywords to the teacher, who wears an earplug. Keywords are discussed in a coaching session beforehand and are used to prompt the teacher during the synchronous coaching session. In his experimental study on 40 student-teachers, Hooreman (2008) showed that the knowledge of student-teachers in the synchronous condition about quality of teaching progressed more than in a more traditional type of coaching, where a lesson was observed and feedback was provided afterwards. In a study by Vuijk and Robbers (2012), synchronous coaching was combined with individual video-coaching. Interviews with the 15 participating teachers showed that they all felt more competent after the intervention. Teachers also highly valued synchronous coaching combined with video-coaching for their professional development. Complementary to the explicit modeling of feedback, through synchronous coaching, teachers might learn of opportunities in the classroom for providing learning-enhancing feedback.

In an earlier study (Voerman, Meijer, Korthagen, & Simons, 2012), we analyzed the video-recordings of seventy-eight teachers on the frequency of feedback. We found in this study that the total frequency of feedback and the frequency of learning-enhancing feedback

did not differ based on the teachers' gender, age, or experience. This result surprised us since we had expected that older, more experienced, and female teachers would provide more and better feedback than male and younger, less experienced teachers. Perhaps incidental factors were involved in the previous study, preventing the expected correlations from showing up. Hence, we decided to investigate whether gender, age, and experience perhaps do influence the increase of the frequency of learning-enhancing feedback in a trajectory for professional development.

Research studies on interventions that seem promising for helping teachers to change their classroom behavior have reported results from teachers' self-evaluation, or reflections. In the FeTiP program, we are interested in actual changed behavior in the classroom; hence, we have refined our research question into more specific feedback behavior of the teachers based on these theoretical views. Our question was:

To what degree do teachers change their feedback behavior after following the FeTiP program?

We added the following sub-questions:

- A. *To what degree do teachers change (a) the frequency of feedback, (b) the frequency of specific feedback and (c) the ratio of positive and negative feedback after following the FeTiP program, as observed in their classroom behavior?*
- B. *To what extent do the answers for (a), (b) and (c) differ according to the gender, age and/or experience of the teachers?*

4.3 Designing the FeTiP program

Management involvement

In preparing the FeTiP program, several meetings took place between two trainer-coaches and the school administrators of the participating school department. The school administrators assured that they would provide the necessary support of time and means. In the same period, the school administration had two meetings with the whole department of teachers to discuss whether the subject, i.e. providing feedback, was sufficiently interesting for their participation. They also discussed the various elements of the FeTiP program, especially the unfamiliar ways of professional development as explicit modeling in the classroom, synchronous coaching and supervised video-coaching. In an additional meeting with the whole department, the trainer-coaches demonstrated the design of the FeTiP program. Teachers were explicitly asked whether they were willing to participate in both the FeTiP program and the accompanying study.

The whole department and the school administrators all participated in the interventions that were part of the FeTiP program. In addition, trainer-coaches and school administrators had five meetings during the FeTiP program to discuss its alignment with the needs of the department. Based on these discussions, one explicit intervention was added at the request of the school administration, namely a session involving each individual teacher with both a school administrator and a trainer-coach. In these sessions, the trainer-coaches provided feedback to each teacher on his or her feedback behavior in the classroom, based on quantitative and qualitative analyses of the video-recordings of the teachers half-way through the trajectory. Little (2006) has mentioned that the systematic use of data for learning by teachers might be very effective feedback, but feedback based on data on

teacher behavior does not very often occur in schools (cf. Hattie & Timperley, 2007). Hence, the feedback conversation was included in the FeTiP program. Of course, this is also an example of the commitment of the school administration to the design of the trajectory. Fullan (2009) and Adey (2006) described this commitment as essential for trajectories for professional development. The feedback the trainer-coaches provided to the individual teachers also served as a model to the school administrators on how to provide learning-enhancing feedback to the teachers.

Interventions included in the FeTiP program

In our study, we searched for interventions that covered five components, i.e. (1) theory, (2) demonstration, (3) practice, (4) feedback and (5) coaching. We also aimed to address three levels, i.e. the whole department level, the collegial support group level and the individual level. Moreover, we searched for interventions that were carried out both outside and inside the classroom. Of all the possibilities to shape the components into interventions, we chose interventions that seemed to do most justice to the complexity of teaching that teachers experience in their classroom, and that specifically aimed to translate the theory into actual behavior in the classroom. In selecting these interventions, we based ourselves on our search of promising new interventions.

We chose the following interventions to shape the components of the FeTiP program:

1. Two training sessions.

Two training sessions were provided for the whole department on the theory of how to provide learning-enhancing feedback, with demonstrations and opportunities to practice outside the classroom, during the meeting. The theory was about learning-enhancing feedback, as described in the theoretical framework. In these training sessions, teachers also practiced providing learning-enhancing feedback. In both training sessions, we strived to utilize approximation of practice. In the first session, the teachers taught each other in small groups, using the theory on learning-enhancing feedback. Afterwards, the teachers provided feedback for each other regarding the feedback they provided while teaching. In the second session, students participated. During the training, one teacher would teach one student, while another teacher would observe. Afterwards, both the observing teacher and the student provided feedback to the teaching teacher.

2. Explicit modeling in the classroom.

The trainer-coaches went into the classroom to model feedback to students for the teachers. Teachers indicated in advance the type of feedback they wanted to observe in their own classroom. During one lesson, a trainer would model the feedback for about 10 minutes, while the teacher observed the trainers' actions. After 10 minutes, the trainer videotaped the teacher who practiced providing feedback. Box 1 shows an example of explicit modeling and the subsequent feedback provided by a teacher for a student.

*Example 1:**Explicit modeling and subsequent feedback of a teacher for a student.**[The trainer would for instance model:]**“I can see that you’re really making an effort. You have already done most of the assignment. And you’ve done it all by yourself. “**[Afterwards, you would then hear the teacher providing the following feedback:]**“I want to give you a compliment, because you are so independent. You first try for yourself and if you really do not know, then you ask questions, well done! “*

3. Synchronous coaching.

During one lesson, the teacher wore an earpiece during teaching while the trainer-coach prompted with key words. Teachers indicated in advance the feedback interventions that they wanted to provide more often. Based on the teachers’ choices, a maximum of three keywords were chosen (e.g., “feedback” or “positive”. Box 2 shows an example of a keyword and the teacher’s reaction.

*Example 2:**Example of a keyword and the teacher’s reaction after hearing the keyword.**[Teacher has told three students to sit quietly and do their work, because they were being noisy and distracted, about five minutes before the keyword.]**Trainer-coach provides keyword:**“feedback”**[Teacher approaches the students and points at each student respectively]:**“Now you’re working. You are practicing, you are practicing and you are practicing. Good job!”*

4. Supervised video – coaching in collegial support groups.

After both explicit modeling in the classroom and synchronous coaching, teachers reflected on their behavior and provided and received feedback from each other on their feedback during supervised video-coaching in collegial support groups of four or five teachers. The teachers watched their own classroom video-recordings in advance and selected two fragments: one fragment in which they were quite satisfied with the way they provided feedback, and one fragment in which they felt they needed to act differently. These fragments were watched and discussed during video-coaching. Special attention was given to the effect of feedback that the teachers provided on their students. Teachers were asked to provide specific feedback to each other and to relate their observations to the theory provided in the training sessions. They were also asked to be aware to provide more positive than negative feedback.

5. Feedback-session.

The teachers received individual feedback on their feedback behavior in a feedback conversation of 20 minutes. This feedback was provided both orally and in a written report. The trainer-coach and a school administrator participated in this feedback conversation. The feedback that the teachers received was based on the analysis of video-recordings halfway through the FeTiP program. During the session, teachers received a report on the frequency of feedback they had provided in a lesson, the specificity of their feedback and the ratio of positive to negative feedback. During this

session, the trainer-coach provided specific feedback to the teachers based on an analysis of the feedback behavior of the teachers in the classroom.

Table 4.1 shows an example of the feedback report a teacher received. The table illustrates the feedback frequencies of the teacher in absolute numbers and the mean frequency of the feedback the whole department provided.

Table 4.1
Feedback frequencies of an individual teacher and mean frequencies of the whole department.

Types of feedback	Teacher Ella (Total)	Mean of your department
Total feedback	20	12.5
Specific feedback	16	6.9
Non-specific feedback	4	16.2
Positive feedback	19	10.7
Specific positive feedback	15	5.5
Non-specific positive feedback	4	5.3
Negative feedback	1	1.9
Specific negative feedback	1	1.4
Non-specific negative feedback	0	0.5
Ratio positive – negative feedback	19	5.9

To summarize, Table 4.2 shows the interventions of the FeTiP program in the first row, while the components are described in chronological order over seven months in the second row. The columns show whether these interventions were outside or inside the classroom and whether they were aimed at individual teachers, the collegial support group level or the department as a whole.

4.4 Research method

The study we conducted was an effect study with a repeated measurement design, in which we performed a pre-test and a post-test. Both the pre-test and post-test consisted of analyzing a video-recording of one lesson of each teacher. The pre-test took place before the start of the FeTiP program. Seven months later, a week after the FeTiP program had ended, we performed the post-test. The video-recordings of both the pre-test and post-test were analyzed according to the model described in section 4.3.

Participants

This study was conducted in a school department of lower vocational education at a school in the southern part of The Netherlands. The FeTiP program took place in one school year, from November until June. The department consisted of 29 teachers. Two of the teachers also participated in the school administration. The school administration consisted of three members, i.e. the two participating teachers and a school principal.

Table 4.2
Chronological summary of the FeTiP program in components and interventions.

Interventions	Training	Explicit modeling and practice in the classroom	Feedback conversation on frequency and quality of feedback interventions	Supervised video-coaching #1	Synchronous coaching	Supervised video-coaching #2
Components	November	January	February	March	April	June
	Theory, Demonstration, Practice, Feedback	Demonstration, Practice	Feedback, Demonstration, Theory	Coaching, Feedback, Practice, Demonstration, Theory	Practice	Coaching, Feedback, Practice, Demonstration, Theory
<i>Outside the classroom</i>	<i>Department</i>	x		x		
	<i>Small collegial support group</i>				x	x
	<i>Individual</i>		x			
<i>Inside the classroom</i>	<i>Individual</i>	x			x	

Not all participating teachers were part of our sample. Two teachers fell ill at the beginning of the school year and one teacher fell ill during the year. Some teachers did not attend all meetings or activities because they worked part-time, or because they were temporarily unable to attend. In the final analysis, we only included data from 23 teachers who missed no more than one the FeTiP program intervention. Two administrators were included among these 23 teachers. Although the school principal attended as much the FeTiP program as he could, he was not a part of our sample because he missed more than one intervention. Of all the teachers, 12 were male and 11 were female. Their age varied from 22 to 63 years, with a mean of 41.3 and a standard deviation of 13.2. Their experience varied from 1 to 38 years with a mean of 15.8 and a standard deviation of 12.9.

There were two trainer-coaches who performed all of the interventions. In the training sessions that involved the whole department, the trainer-coaches worked together. In the other interventions, the trainer-coaches worked separately with a small group of teachers or with teachers individually. Both trainer-coaches were experienced and well-trained in the interventions they performed.

Instruments

The teachers were videotaped before and after the FeTiP program during one lesson of 50 minutes. From these lessons and for each teacher, we selected one fragment of ten contiguous minutes of both pre-test and post-test recordings in which there was interaction between the teacher and students to maximize the incidence of feedback interventions available for evaluation. The first analysis was quantitative: we counted the frequency of feedback. Then, we conducted a qualitative analysis using the observation scheme that we developed in an earlier study (Voerman et al., 2012). The elements of the observation instrument were:

- *Non-specific positive feedback*: non-specific positive utterances, such as “Well done!” and “Great!”

- *Non-specific negative feedback*: non-specific utterances, such as “Wrong!” and “Not quite!”
- *Specific positive feedback*: positive feedback containing specific information about the student's performance or level of understanding. “I can see that Peter and John are already applying the schedule, well done!”
- *Specific negative feedback*: negative feedback containing specific information about the student's performance or level of understanding. “I’m missing something here. You have to add step 1 to the description, not only step 2 and 3.”

The inter-rater reliability (Cohen's Kappa) was 0.82. Using this scheme, we categorized the feedback interventions as positive and negative, and specific and non-specific. We also calculated the ratio of positive to negative feedback.

Analysis

In the analysis, descriptive statistics of the feedback such as means and percentages were calculated. To answer our research question of the degree to which teachers changed their feedback behavior, being (a) the frequencies of feedback, (b) specific feedback and (c) the ratio of positive to negative feedback after the FeTiP program, we conducted a paired samples t-test. We applied the paired samples t-test to the frequency of all feedback, positive and negative feedback, specific feedback and the ratio of positive and negative feedback to establish whether the pre-test and post-test of the participating teachers differed significantly.

To answer the question, to what extent does the change of feedback behavior differ according to the gender, age and/or experience of the teachers, we first explored whether the feedback behavior of teachers at the pretest could be explained with the teacher characteristics gender, age, and years of teaching experience. We performed regression analyses with the dependent variables being the pretest scores frequency of feedback, specific feedback and the ratio of positive and negative feedback and the independent variables being gender, age and teaching experience. Second, we explored whether we could explain the teachers' feedback behavior at the posttest with the pretest measures and the teacher characteristics. We performed a second series of regression analyses, with the dependent variables being the posttest scores for frequency of feedback, specific feedback and the ratio of positive and negative feedback and the independent variables being the pretest scores for the frequency of feedback, specific feedback and the ratio of positive and negative feedback, and the teacher characteristics gender, age and experience.

4.5 Results

Regarding the research question of the degree to which the teachers changed (a) the frequency of feedback, (b) the frequency of specific feedback and (c) the ratio of positive to negative feedback after the FeTiP program, our results (Table 4.3) show that the frequency of all feedback interventions significantly increased from 11.0 (SD=6.4) in the pre-test to 18.6 (SD=6.4) in the post-test. Teachers also provided significantly more specific feedback in the post-test, with a mean of 13.4 (SD=5.8); in the pre-test, the mean was 6.5 (SD=5.3). An example of specific positive feedback in the post-test was: “I can see that you used a mind-map. That's a real good way to handle this assignment.” An example of specific negative feedback in the post-test was: “I can see that you're making a scheme for your work. You are not specific enough in the way you are going to divide your work.”

The mean number of positive feedback interventions was 6.3 (SD 4.7) in the pre-test and 14.7 (SD=5.4) in the post-test. The mean of negative feedback did not differ significantly: in the pre-test, teachers provided negative feedback at a frequency of 4.7 (SD=3.3), and in the post-test the frequency was 3.8 (SD=3.4). The mean ratio of positive and negative feedback rose from 1.6 (SD=1.4), to 6.2 (SD=4.8), which was also a significant difference.

Table 4.3

Mean and standard deviations of the feedback interventions during pre- and post-test (N=23).

Type of Feedback	Frequency in Pre-test		Frequency in Post-test		<i>t</i>	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Feedback	11.0	6.4	18.6*	6.4	4.7	0.00
Positive feedback	6.3	4.7	14.7*	5.4	7.0	0.00
Negative feedback	4.7	3.3	3.8	3.4	-1.1	0.28
Specific feedback	6.5	5.3	13.4*	5.8	4.6	0.00
Ratio positive to negative feedback	1.6	1.4	6.2*	4.8	4.5	0.00

*A paired samples t-test showed that the results of the teachers in the post-test condition differed significantly from the pre-test condition.

Figure 4.1 shows the increase in the mean of total feedback, positive feedback, negative feedback, specific feedback and ratio of feedback of the participating teachers during the pre-test and post-test.

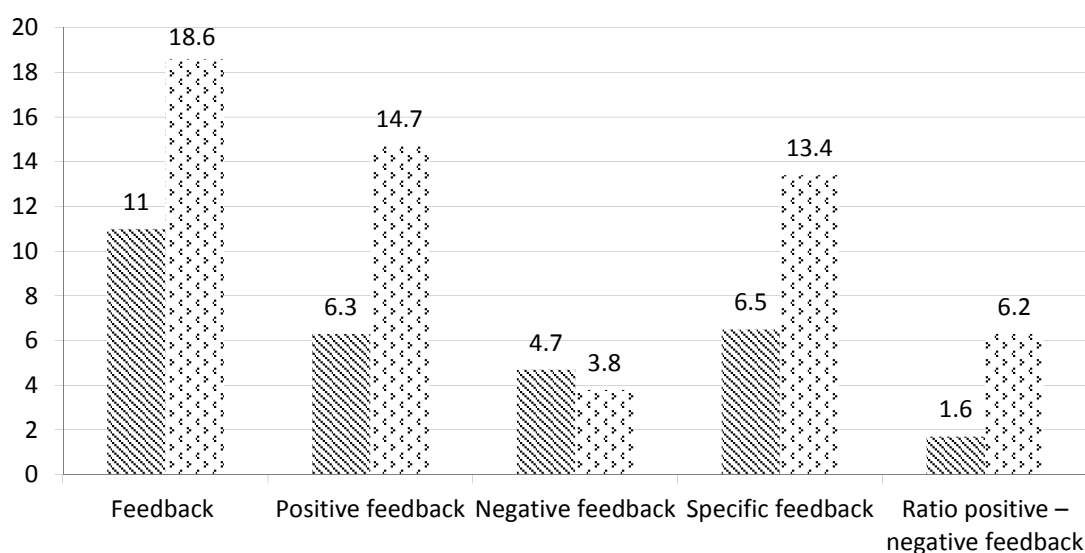


Figure 4.1

Pre-test and post-test results of the means of feedback, positive feedback, negative feedback, specific feedback and the ratio of positive to negative feedback. Pre-test in hatched lines, post-test in dots.

The next research question was: To what extent do the answers to questions (a), (b), and (c) differ for gender, age, and experience? First, we performed analyses to establish whether the results of the pre-test condition showed significant differences for these three

variables. We found that they did not, as values of p varied from .25 to .96. Then, we performed regression analyses to determine the influence of gender, age, and experience on the progress made by the teachers from pretest to posttest on the frequency of feedback, the frequency of specific feedback, and the ratio of positive to negative feedback. We found no significant differences, with p -values varying from .19 to .86. The progress of the teachers could not be explained by their age, gender, or experience.

In order to get information about the representativeness of our small experimental group, we compared the group of participating teachers to a group of 78 teachers whose feedback we analyzed in an earlier study (Voerman et al., 2012). Table 4.4 shows that the current group of participating teachers provided significantly more feedback during the pre-test than the comparison group of 78 teachers; the mean of the current group was 11.0 (SD=6.4) while the mean of the comparison group was 6.6 (SD=4.4). This was also the case for specific feedback, where teachers of the current group provided significantly more specific feedback than teachers in the comparison group during the pre-test. The mean of the current group was 6.5 (SD=5.3) and the mean of the comparison group was 2.2 (SD=.8). No significant differences were found between the two groups for the ratio of positive to negative feedback.

Table 4.4

Mean scores, standard deviations and t-test for equality of means of the current group and the comparison group for the frequency of feedback, specific feedback and the ratio of positive to negative feedback.

	Comparison group (N=78)		Current group (N=23)		T-test for equality of means ¹		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>
Frequency of feedback	6.6	4.4	11.0	6.4	3.1	99	0.00
Frequency of specific feedback	2.2	1.8	6.5	5.3	3.5	99	0.00
Ratio	2.4	2.7	1.7	1.6	-1.3	62.3	0.2

¹ We used the *t*-test for unequal variances because of the significant difference between variances on Levenes' test for equality of variances.

4.6 Conclusion and discussion

We found that teachers did indeed change their classroom behavior. They showed significant progress in the frequency of the feedback they provided after following the FeTiP program. In the post-tests, they also provided significantly more specific feedback, and their ratio of positive and negative feedback increased. We found no differences for age, gender, or experience in the total frequency of feedback, specific feedback, and the ratio of positive and negative feedback at the pretest condition. We also did not find differential effects of training with these objective variables as moderating factors.

We hypothesize from the results of our study that the FeTiP program is successful for helping teachers to expand their feedback behavior and provide more learning-enhancing feedback, and to do so more frequently. Our design was a repeated measurement design, in

which we performed a pre-test and a post-test. A comparison of the pretest of this group of teachers with the results we found with our earlier study with seventy-eight teachers did not make this a true experimental design. It only showed that during the pre-test, our current teachers already performed significantly better than the group of teachers from our earlier study (Voerman et al., 2012). The fact that the video fragments used for measuring were part of the training for the group of teachers in this study and not for the comparison group is a weakness in this study.

However, although the in this study participating group already provided more as well as more specific feedback than the group of 78 teachers, there was considerable progress between the pre-test and the post-test. Hence, we have found that it *is* possible to influence teacher feedback behavior and to help teachers transfer theory into practice. We hypothesize that involving the school administration and collegial support are fundamental features of the trajectory that we carried out. In our theoretical framework, we already endeavored to clarify this assertion. Although we do not have qualitative data from our own study that might corroborate this assertion, other research underlines the crucial role of school administration and collegial support. We might find a further basis for this assumption in the work of Newman, King, and Youngs (2000). They state that key conditions for programs for effective professional development are a professional supportive community and leadership.

The effectiveness of combining interventions at different levels is also shown by Bickmore and Bickmore (2010). They found that new teachers who took part in a combination of interventions, such as one-to-one mentoring, observations of colleagues' teaching and collaboration with other teachers in the school, exhibited improvements in their professional practice.

From our own data, we could not find clear clues for why this combination of interventions was effective in helping teachers to expand their feedback behavior in the classroom. However, we would like to propose a couple of hypotheses.

In the first place, *at the individual level*, teachers experienced the effect of learning-enhancing feedback themselves. As Boud, Cohen, and Walker (1993) stated, experience is the foundation of, and the stimulus for, learning. Teachers not only become aware of the effect of feedback on themselves, but also of the effect of their feedback on their students. Teachers become highly motivated when they see the effect of their actions on their students, as Van Eekelen (2006) found. The combination of experiencing the effect of feedback themselves and observing the effect on their students might be a powerful combination in teacher learning.

Secondly, *the involvement and participation of the school administration* in, for instance, the feedback conversations, helped the school administrators provide learning-enhancing feedback to the teachers in their role as leaders. Their feedback to the teachers may have significantly influenced the learning of the teachers. We hypothesize that through involving the whole department and management, we influenced the feedback culture in the department. In turn, this may not only have had an impact on the learning of the whole department, but also on the sustainability of the feedback behavior of the teachers in their classrooms. As Fullan (2009) argued, teacher change is not achieved by training one teacher or a small group of teachers. He stated that for teacher change to be persistent, interventions must include the whole department and the school administration. In line with this statement, we argue that the feedback culture in a school is essential for the sustainability of learning.

London and Smither (2002) described feedback culture as the organization's support for feedback. According to these authors, a strong feedback culture is "one where individuals continuously receive, solicit, and use formal and informal feedback to improve their job performance" (London & Smither, 2002, p. 84). In our study, teachers and school administration learned *at the collegial support group level* to provide effective feedback to their students, and to each other. This may have influenced the feedback culture of the department as a whole.

Losada and Heaphy (2004) found that the quantity and quality of feedback significantly influenced the performance of teams. High ratios of positive versus negative feedback were a crucial factor in high performing teams, and low ratios were characteristic of low performing teams. This ratio of positive to negative feedback is linked to the creation of "emotional spaces" (Losada & Heaphy, 2004, p. 744). These authors concluded that positive feedback generates expansive emotional spaces that open possibilities for learning. Negative feedback, however, creates restricted emotional spaces that close possibilities for learning. In this way, the feedback that the teachers received and provided in our study may have contributed to an expansive emotional space at the level of the whole department, and as a consequence, the teachers may have been able to learn better and to change their classroom behavior.

In our theoretical framework we argued that trajectories for professional development should take into account the complexity of teaching and the demand for direct responses. In the FeTiP program we endeavored doing just that by designing interventions that were carried out in teachers' own classrooms, aiming to approximate practice as much as possible. The interventions of explicit modeling and of synchronous coaching provided the teachers with an opportunity to practice in a real-life situation, with its complexity and demand for direct responses. On the basis of the data presented in this study, we cannot conclude whether these classroom interventions were more effective in helping the teachers in changing their classroom practices than the other interventions outside the classroom. We suggest more research that approximates practice as much as possible. A possible pathway could be research that combines interventions inside and outside the classroom, with repeated measurements after each intervention. Currently, we are doing just this in researching the effectiveness of the various components of the FeTiP program. We think this is a necessary step before deciding how to move forward with professional development practices.

There are several limitations to this study. First of all, the group of teachers was rather small, with 23 participants. Also, only one secondary school participated. This was a school for lower vocational education so more research is needed for other types of education. We suggest further research in several ways. First, additional research should be done on the FeTiP program by gradually dismantling the trajectory so that we can find answers to questions such as whether or not it would be possible to reach the same results if we leave out one or more intervention. Also the sequence of the interventions might be of influence on the results we have achieved, so we would like to suggest research on the influence of the sequence of the interventions. We would be interested in identifying whether all teachers benefited from all interventions or if there were differences between the teachers. Consequently, in developing effective professional development programs, future researchers might seek for differences in the way teachers change their feedback behavior in the classroom after the various interventions. Some teachers may, for instance, need help in

discovering the importance of feedback, whereas others may only need to see how one can give feedback in large classrooms. A further suggestion would be for future researchers to carry out a trajectory for professional development and also to collect data on the influence of the school administration through interviews and questionnaires. A qualitative analysis of these data might underpin our hypotheses about the involvement of school administration and address the three levels of intervening. Alternatively, school trajectories could be compared to open programs.

Further research into the sustainability of the results of the FeTiP program would also be of interest. In this study, we performed several interventions. In addition, although not often mentioned in intervention studies, the result of the intervention depends not only on the design and content of the intervention, but also on the quality and expertise of the trainer-coaches, and on the opinion of the teachers regarding this quality and expertise. Research is needed on the competencies and behavior of trainer-coaches to motivate and captivate teachers and help them to change their behavior in the classroom.

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Chapter 5⁴

Differential effects of a professional development program on teachers' feedback behavior in the classroom.

A search for change patterns of experienced teachers on a professional development program designed to provide more specific feedback

Professional development of teachers has mainly been studied as part of a search for one approach that fits all teachers. This study aims to add nuances here by describing an exploratory search for change patterns for experienced teachers who followed a multi-component professional development program for the provision of specific feedback. Before, during, and after the program, the specific feedback provided by the teachers was measured using video-recordings of their classroom teaching. Additionally, the teachers filled in teachers' learner reports after each intervention. It appeared that not all teachers learned at the same time from the same kind of intervention. There seemed to be three possible change patterns, namely 'Ongoing learning', 'Learning from explicit modeling and feedback', and 'Learning from data-driven feedback'. Our findings show that stimulating teachers' confidence through feedback, and providing opportunities to observe the effect of specific feedback on students, seem helpful in teachers' learning processes. Data-driven feedback seems to encourage teachers, particularly teachers who showed resistance, to change their classroom behavior. The final section discusses the implications, in particular with regard to the role of feedback in professional development programs.

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5.1 Introduction

This exploratory study considered a multi-component program for professional development. The program was called the the FeTiP program (Feedback Theory into Practice), and was designed to enable teachers in secondary education to improve their feedback behavior in the classroom. In the evaluation of the the FeTiP program program we looked specifically at changes in on-the-job behavior, in the classroom. In a previous study (Voerman, Meijer, Korthagen, & Simons, in press) we described the evaluation of the FeTiP program program as it was being carried out in a school for lower vocational education, with 23 teachers. The evaluation showed that the FeTiP program program was successful. On average, the teachers provided more feedback statements (from $M=11.0$ per 10 minute period before the program to $M=18.6$ after) and, in particular, the average frequency of their specific feedback statements changed from $M=6.5$ before to $M=13.4$ after the program. They also provided more positive than negative feedback. Research generally shows that the specificity of the feedback is a decisive factor in its effectiveness (e.g., Hattie & Timperley, 2007; Shute, 2008), so in this exploratory study we focused on changes in the specific feedback given by the teachers. Since this was a multi-component program with a variety of interventions, we could not conclude which interventions were essential for the effect to occur. Moreover, individual differences were hidden behind the general effects. The goal of the current article is therefore to explore the change in the feedback behavior of the teachers over time and to find clues for understanding the differences in those changes. This might help the development of effective and efficient professional development programs. In particular, we were interested in two main questions. First, we wanted to know how the frequency of specific feedback during the eight months of the FeTiP program program changed *over time* for each individual teacher, in relation to the different interventions of the learning trajectory. Secondly, we wanted to explore whether there might be different patterns of change in the frequency of specific feedback over time, and whether we could find clues for explaining the differences between the teachers' change patterns in their learner reports. The following research questions guided the present study:

- A. *How does the frequency of specific feedback in classroom behavior change over time during the FeTiP program, in relation to its interventions?*
- B. *What patterns can be distinguished in the change in frequency of specific feedback given by the teachers over time? What indications for explanations can be found in the teachers' learner reports?*

Sub-questions were:

- i. *What are themes in the teachers' learner reports on their learning process during the program?*
- ii. *How might these themes be related to the behavioral changes?*

5.2 Theoretical framework

Feedback

The content of the FeTiP program was feedback. According to studies on effective educational interventions, feedback proves to be powerful in enhancing learning

(summarized by Hattie, 2012). However, not all feedback is thought to enhance learning. Most researchers agree that feedback needs to be specific in order to enhance learning (e.g., Black & William, 1998; De Kleijn, 2013; Hattie & Timperley, 2007; Kluger & DeNisi, 1996; Sadler, 2010). Shute (2008) also stated that specific feedback is preferable, and that it should be presented in manageable units. Shute described specific feedback as information about particular responses or behavior. Feedback lacking in specificity may cause students to view it as useless, but feedback that is too elaborate may cause cognitive overload or may direct the receiver's attention away from the task (Hattie & Timperley, 2007; Kluger & DeNisi, 1996; Shute, 2008).

Specific feedback in the classroom is rarely found (Voerman, Meijer, Korthagen, & Simons, 2012; Hattie, 1999; Pauli, 2010). In his inaugural lecture at the University of Auckland in 1999, Hattie stated that, notwithstanding the importance of feedback, the incidence of feedback in a classroom is at best only measured in seconds per day. In line with Hattie's statement, we found in a previous study (Voerman, et al., 2012) that the frequency of feedback in the classroom in secondary education is low, and that the main feedback that is provided is non-specific. Hence, there seems to be a need for professional development programs that enable teachers to increase the frequency and quality of their feedback in the classroom.

Intervening in the learning of experienced teachers

In designing a trajectory for professional development, an essential choice is the components that the trajectory should contain in order to be successful. Joyce and Showers (2002) described four components of successful programs for professional development. These components are (1) theory, (2) demonstration, (3) practice, and (4) coaching. In their study, a gradual addition of information, demonstration, and practice did not seem to have a great influence on teacher behavior in the classroom, but combining these elements with coaching in collegial groups did have a large impact on teacher behavior. Feedback is generally seen as important not only for student learning, but also for teacher learning (e.g., Gabelica, Van den Bossche, Segers, & Geijselaers, 2012). Hence we added feedback as a fifth component to the four described by Joyce and Showers.

Several choices needed to be made with regard to the interventions that operationalize the five components. The interventions of a professional development program might be situated (1) *outside* the classroom, or even the school, in meetings of a whole team, or small group sessions, or (2) *inside* the classroom (Borko, 2004).

Most professional development programs have studied interventions situated outside the classroom. Much research has been carried out on the effectiveness of these interventions. The more traditional types of intervention outside the classroom, such as lectures, courses, or workshops, do not seem to be very effective (Guskey, 2002; Kwakman, 2003; Newmann, King, & Youngs, 2000). Promising results have been achieved through more innovative types of intervention outside the classroom, such as video-coaching under the guidance of a trained coach. Brouwer (2009) performed a review study on the use of videos in the professional development of teachers, and showed that, in general, teachers reported behavioral changes in their teaching after video-coaching supervised by a coach. Research on teacher learning inside the classroom (a kind of workplace learning) mainly focuses on reports from teachers about their learning activities in the classroom, such as their experiments with a new lesson format, a teaching strategy or a new approach to interacting with students (e.g., Bakkenes, Vermunt, & Wubbels, 2010; Kwakman, 2003; Van

Eekelen, 2005; Van Veen, Zwart, Meirink, & Verloop, 2010). There is little research on interventions taking place in the classroom under the guidance of a coach. An exception is the work by Hooreman, Kommers, and Jochems (2008); these authors performed an experimental study on 40 student-teachers, with synchronous coaching as the focus. Synchronous coaching is an intervention carried out in the classroom in which a teacher receives feedback in the form of keywords from a coach. The coach uses a microphone and the teacher wears an earplug. In the study by Hooreman et al. (2008), student-teachers' knowledge about the quality of teaching increased more if they received synchronous coaching than if they received a more traditional type of coaching in which a lesson was observed and feedback was provided afterwards.

Another way to arrange an intervention in the classroom is to have modeling by a trainer-coach. In teacher education, explicit modeling by the teacher educators is seen as a promising factor in shaping teacher behavior (Korthagen, Loughran, & Lunenberg, 2005; Lunenberg, Korthagen, & Swennen, 2007). Darling-Hammond, Chung Wei, Andree, Richardson, and Orphanos (2009) stated that "teachers are more likely to try classroom practices that have been modeled for them in professional development settings" (p. 10). Although research is missing, we hypothesize that explicit modeling by researchers in the classroom might also help experienced teachers.

In conclusion, a successful trajectory of professional development might have as its components theory, demonstration, practice, coaching, and feedback. Interventions may take place both inside and outside the classroom. Video-coaching under the guidance of a trained coach seems to be an effective intervention outside the classroom; explicit modeling and synchronous coaching seem to be effective interventions inside the classroom. The effectiveness of professional development programs can be tested at four levels (Kirkpatrick, 1996): (1) reaction, which is described as a measure of customer satisfaction; (2) learning, a measure of acquired knowledge or skills; (3) behavior, a measure of the extent of change in on-the-job behavior; and (4) results, a measure of, for example, better results for students in tests. In evaluating the FeTiP program we were particularly interested in the third level, the change in on-the-job behavior.

The FeTiP program

For the FeTiP program, we chose a combination of interventions, situated both inside and outside the classroom, combining the five components of theory, demonstration, practice, coaching, and feedback. We used three sets of interventions: (1) training interventions, consisting of 2 training sessions; (2) explicit modeling and practice interventions, consisting of explicit modeling in the classroom; and (3) three types of data-driven feedback interventions (feedback conversations, video-coaching and synchronous coaching). The time invested by the teachers in the FeTiP program was 12 hours for the training sessions, 1 hour for explicit modeling and practice (which was also a regular lesson), half an hour for the feedback conversation, 1 hour for synchronous coaching (also in a regular lesson), and 12 hours for the supervised video-coaching (6 hours per session, including preparation). The FeTiP program took 26.5 hours in total.

(1) *The two training sessions* included the components of theory, demonstration, practice, and feedback. Theory on specific feedback was presented, specific feedback was demonstrated, and teachers practiced in small groups of three teachers, and were asked to provide specific and mainly positive feedback to each other. Training sessions were about the concept of feedback in general. There was no data-driven feedback on the actual

feedback behavior of the teachers in their own classrooms, nor were there opportunities for teachers to practice in a situation that resembled the situation in their classrooms.

(2) During the '*explicit modeling and practice*' intervention, the trainer-coach modeled specific feedback in each teacher's classroom during regular lessons. First, the teachers observed the feedback of the trainer-coach to the students. Next, the teachers took over and tried, in their turn, to provide specific feedback, which was videotaped by the trainer-coach. The essence of this intervention in the classroom was that teachers were able to observe feedback being given by the trainer-coach to their own students within their own context, and to practice directly afterwards in their classroom with the support of the trainer-coach.

(3) *Data-driven feedback interventions*. The interventions that were part of this set of interventions had as a characteristic that the feedback the teachers received was data-driven. By data-driven feedback we mean specific feedback on the behavior of the teachers in the classroom, based on an analysis of their behavior.

(3a) During the *feedback conversations* each teacher individually received specific information from a trainer-coach about the frequency and the quality of the feedback they had provided, based on the analysis of a video-recording made half-way through the program. Of course, in these conversations, the trainer-coach explicitly modeled how to provide feedback, and also occasionally addressed theoretical concepts that were part of the theory presented during the training sessions. However, the most essential feature of this intervention was the provision of specific feedback about actual classroom behavior to the teacher.

(3b) The *supervised video-coaching* was organized in small groups. In advance, teachers selected two fragments of their own recordings: one fragment they were proud of, and one fragment with which they were not satisfied. During the meeting, teachers showed the selected fragments and received feedback from both their colleagues and the trainer-coach about the specific feedback they had provided in the classroom. In the same way as in the feedback conversations, the trainer-coach would model specific and mainly positive feedback, and, in this case, the teachers would also practice providing feedback to each other.

(3c) During *synchronous coaching*, teachers in advance chose a keyword, for example 'feedback', or 'specific'. During the teachers' interaction with the classroom, the trainer-coach provided these keywords as feedback to the teacher through an earplug, at moments the trainer-coach thought were suitable for the provision of specific feedback.

5.3. Method

Participants

The study took place in a school for secondary education in the Netherlands, in a department of vocational education. The department consisted of 29 teachers. Not all teachers were part of our sample. Three teachers fell ill during the year. Some teachers did not attend all the meetings or activities because they worked part-time, or because they were temporarily unable to attend. In the final analysis we included data from 23 teachers who missed no more than one intervention of the FeTiP program. Of these teachers, eight taught practical subjects such as crafts and drawing; there were seven language teachers and three science teachers; and five teachers taught other subjects, such as history, geography, physical education, and drama. Of the teachers, 12 were male and 11 were female. Their

age varied from 22 to 63 years, with a mean of 41.3 (SD=13.2). Their experience varied from 1 to 38 years, with a mean of 15.8 (SD=12.9). All teachers agreed to participate in both the training and the study. The FeTiP program took place from November until June, during one school year. Details of the teachers' characteristics will be given in the findings section.

Design

We collected data in two ways, (1) using video-recordings and (2) using teachers' learner reports. The video-recordings were made at four points in time: T0 before the FeTiP program, T1 after the training interventions and before the explicit modeling and practice intervention, T2 after the explicit modeling and practice intervention, and T3 one week after the classroom behavior feedback intervention (which was also the end of the FeTiP program). The teachers' learner reports were collected at six points in time, after each individual intervention. Figure 5.1 shows the sequence of interventions and the timing of the video-recordings and teachers' learner reports. The time interval between T0 and T1 was 2.5 months, T1 and T2 were videotaped during the same lesson, with an interval of 20 minutes, and the time interval between T2 and T3 was 5 months.

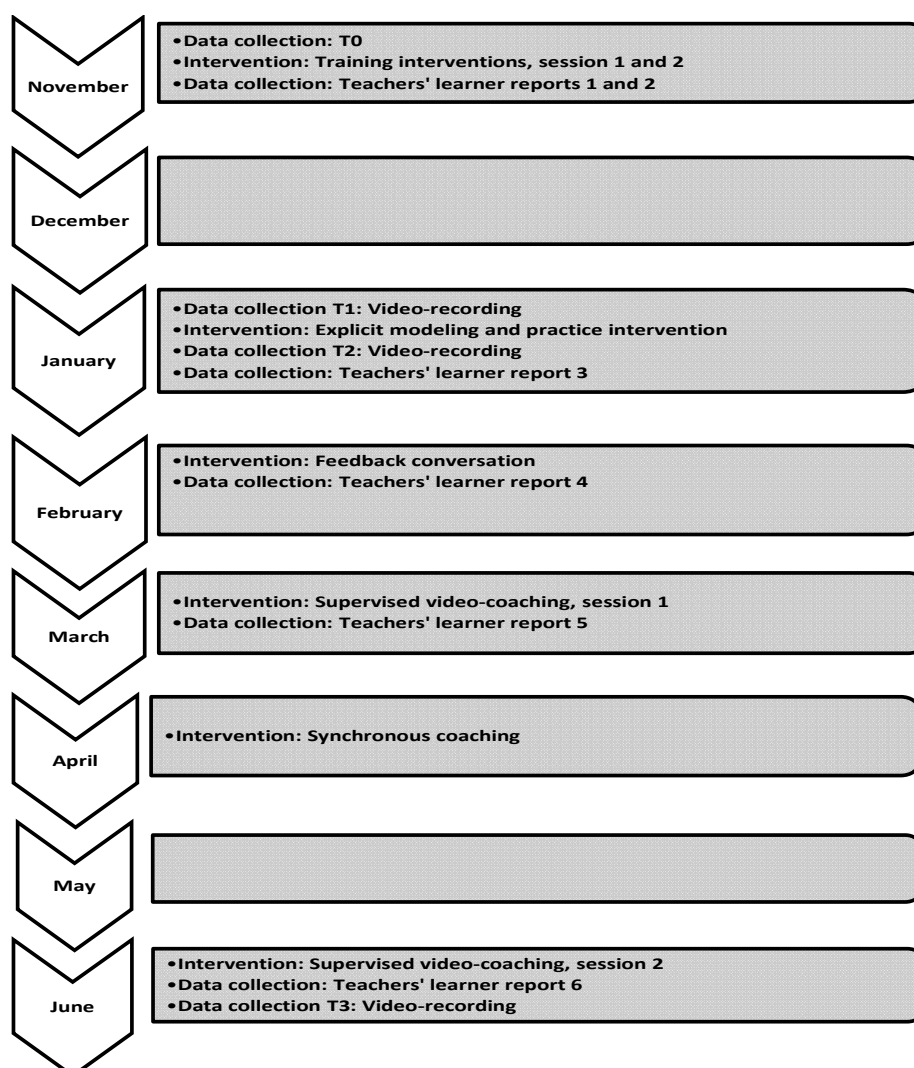


Figure 5.1. Timetable of data collection and interventions.

Data collection

Video-recordings

Before videotaping the teachers, we asked them to follow a fixed structure in the lessons that were going to be recorded. This structure is common in lessons in secondary education. It consists of a short introduction to the lesson of 10-15 minutes, followed by work by the students individually or in small groups with a maximum of four students. We asked the teachers to walk around while the students were working, and to help the students as they normally would. Because the teachers were wearing a wireless microphone, the trainer-coach could record the interaction between the teachers and the students from a distance. In this way, the normal routine in the classroom was disturbed as little as possible.

Ten minutes were analyzed from each recorded lesson. To maximize the incidence of observable feedback interventions in these ten minutes, we selected a fragment of ten contiguous minutes in which there was interaction between teacher and students, during the part of the lesson in which the teacher was walking around the classroom and helping the students with their work.

In the case of four teachers we were not able to carry out T2 after the explicit modeling and practice intervention, for various reasons. One teacher was called away because of a major problem with a student. One teacher started the lesson as arranged, but then made the students take a test. The other two teachers were struggling with their classroom management. Explicit modeling was not possible in those classes. Instead of 92 fragments, we therefore selected 88 fragments of ten minutes of teacher-student interaction, because for four teachers T2 was missing.

Teachers' learner reports

We were also interested in the teachers' self-reported experiences of what helps or hinders their learning as a result of the interventions, in order to gain an understanding of their learning processes. Directly after each intervention the teachers answered two sets of questions on their learning experiences during the intervention, in writing, in a learner report. They handed or sent in their answers within one week. In total the teachers reported their learning experiences six times, as can be seen in Figure 5.1. The first question was about what the teachers had learned, and it was followed by the question of what had helped or hindered them in their learning. We asked the teachers to be specific and to name elements of the intervention, the group, and/or themselves. Finally, we asked them what they were planning to do with the things they had learned, urging them to be as precise as possible in their answers.

The second set of questions was about the effect of the feedback teachers had received, and about what had made the feedback helpful or a hindrance in their learning processes. The first question was: "What was the feedback you received and from whom, yourself, colleagues, or others?" The second question was whether this feedback was helpful or a hindrance, and, if it was either of these, what made the feedback helpful or a hindrance. The last question was about what the teachers were planning to do with the feedback in their teaching practice. Again we asked them to be as precise as possible in their answers.

Analysis

Video-recordings

To answer our research questions, we analyzed the 88 fragments of ten minutes from the video-recordings with a coding scheme based on the one we had developed in an earlier

study (Voerman, et al., 2012). This coding scheme distinguishes between specific and non-specific feedback, and between positive and negative feedback. For the present study, we focused on the occurrence of any specific feedback, whether that feedback was positive or negative. We conceptualized specific feedback as feedback containing specific information about the student's performance or level of understanding. Examples are: "I can see that Peter and John are already applying the schedule, very well!", and "I'm missing something here. You have to add step 1 to the description, not just steps 2 and 3." Two researchers carried out the analysis independently. The inter-rater reliability (Cohen's kappa) for the total data set was .82, which is substantial.

In order to investigate whether the mean frequency of specific feedback differed between T0, T1, T2, and T3 for the whole group of teachers, we applied Paired Samples t-tests using a level of .05 for establishing statistical significance.

To find any differences and similarities in the change in specific feedback of individual teachers over time, we first drew graphs for each teacher, showing the frequency of the teachers' specific feedback over time. Then we inspected the changes and searched for possible corresponding change patterns in the frequency of the specific feedback of the teachers. This search resulted in small groups of teachers with similar change patterns. Because we had 23 teachers in our sample, the sub-groups were too small for solid statistical analyses on the similarities and differences. However, on the basis of the graphs, we tried to derive hypotheses about different change patterns among the teachers in our study.

Next, we searched for typical statements of the teachers per pattern in the teachers' learner reports – statements that might lead to possible explanations for the differences there seemed to be between the subgroups.

Teachers' learner reports

To analyze the teachers' learner reports, we clustered the teachers' learner reports into groups, corresponding with the three sets of interventions. So, we had (1) the teachers' learner reports written after the training interventions (teachers' learner reports 1 and 2), (2) the teachers' learner reports written after the explicit modeling and practice intervention (teachers' learner report 3), and (3) the teachers' learner reports written after the classroom behavior feedback interventions (teachers' learner reports 4, 5 and 6). From the 23 teachers who were part of our analysis, we received 99 teachers' learner reports out of a possible total of 138 teachers' learner reports. Some teachers' learner reports were missing, possibly because the teachers did not participate in that particular intervention or because they did not hand in their teachers' learner reports. We received 40 teachers' learner reports out of 46 after the training interventions, 20 out of 23 after the explicit modeling and practice intervention, and 39 out of 69 after the three classroom behavior feedback interventions.

A grounded theory approach was used for analyzing the teachers' learner reports. First, the two researchers, separately, read all the teachers' learner reports. The first focus was to find statements from the teachers about what helped them or hindered them in learning. The second focus was the themes that emerged in the teachers' learner reports that might explain why the teachers learned or were hindered in learning. The two researchers compared the themes they observed in the teachers' learner reports, discussed the similarities and differences and decided what themes were surfacing, based on the similarities in their analyses. Subsequently, these themes formed the basis of an independent analysis of 18 of the 99 teachers' learner reports by the two researchers, who

encoded the teachers' learner reports on the occurrence of these themes. This resulted in a Cohen's kappa of .76. As this was considered a substantial result, one of researchers finished the analysis of the remaining 81 teachers' learner reports.

5.4 Findings

How does the frequency of specific feedback in classroom behavior change over time during the FeTiP program, in relation to its interventions?

Table 5.1 shows the results of the Paired Samples T-tests, testing the progress of the whole group of teachers. It shows that the teachers as a group progressed significantly in providing specific feedback after following the FeTiP program. The mean frequency of specific feedback increased to $M=6.91$ ($SD=7.31$). It is noteworthy, regarding the change in specific feedback over time for the whole group of teachers, that the frequency of specific feedback did not increase significantly after the training interventions ($M=-1.30$; $SD=4.47$) or after the explicit modeling and practice intervention ($M=2.16$; $SD=5.15$). However, after the classroom behavior feedback interventions and at the end of the FeTiP program, the number of instances of specific feedback was significantly higher ($M=6.58$ and $SD=7.31$), compared to T2.

Table 5.1
Results of the Paired Samples T-Test for T0, T1, T2, and T3

	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>
T1 - T0	-1.30	4.47	-1.40	.18
T2 - T1	2.16	5.15	1.83	.08
T3 - T2	6.58	7.31	3.92	.00
T3 - T0	6.91	7.18	4.62	.00

The individual lines of change over time of the specific feedback of the teachers are shown in Figure 5.2. The figure shows the changes in frequency of feedback from the teachers over time, in relation to the components of the professional development program. The figure shows 23 lines from 23 teachers (t1 to t23), and a thick black line that represents the mean of the frequency of specific feedback (tM).

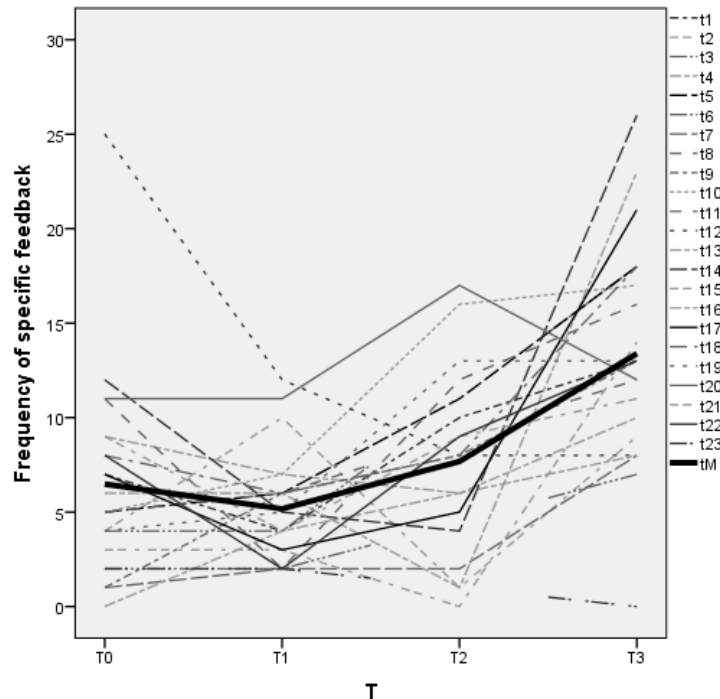


Figure 5.2. Changes in frequency of specific feedback over time during the FeTiP program for all individual teachers, in relation to the components of the FeTiP program.

What patterns can be distinguished in the change in frequency of specific feedback given by the teachers over time?

Figure 5.2 seems to show an almost chaotic diversity in the increase and decrease of the frequency of specific feedback among the teachers. Although we could not base the analysis of these data on statistical evidence because of the small sample, it is at least noteworthy that, comparing the change in specific feedback over time of all the teachers, there seem to be three quite different patterns, which we will describe below. We will also illustrate each pattern with the lines of the teachers for whom we observed that pattern.

Pattern 1

A first possible pattern, observed in six teachers, is an increase in the teacher's specific feedback after each set of interventions. Because of the ongoing gradual increase in the frequency of specific feedback, we have termed this pattern 'Ongoing learning'. The teachers in this pattern started at a low level of specific feedback at T0 ($M=2.67$), and then showed a gradual increase in the frequency of specific feedback at T1 ($M=5.00$), T2 ($M=9.33$), and T3 ($M=12.83$). We represent the data for this pattern in two ways. Figure 5.3 shows the change in specific feedback at T0, T1, T2, and T3 in a graph. The figure shows six lines representing six teachers (t5, t7, t9, t10, t13, and t19) and a thick black line representing the mean frequency of specific feedback of these teachers over time (tM1). Table 5.2 shows the gender, age, experience, and subject, and the frequency of specific feedback for pattern 1 teachers at T0, T1, T2, and T3.

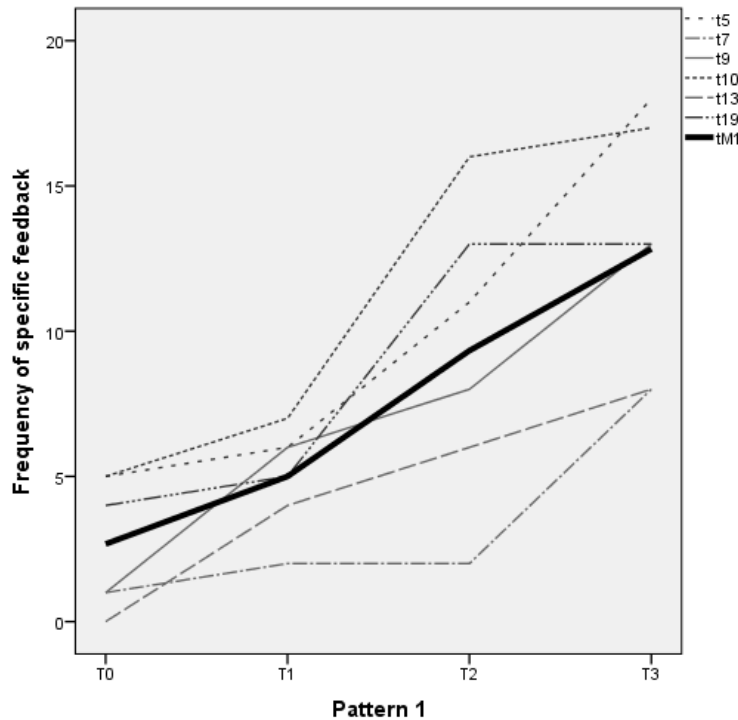


Figure 5.3. Changes in the frequency of specific feedback over time of the pattern 1 teachers.

Table 5.2 Gender, age, experience, subject, and the frequency of specific feedback for pattern 1 teachers at T0, T1, T2, and T3

Pattern 1									
Nr.	Name ⁵	Gender	Age	Experience	Subject	T0	T1	T2	T3
5	Dinah	f	22	1	S ¹	5	6	11	18
7	Nina	f	40	18	L ²	1	2	2	8
9	John	m	63	38	P ³	1	6	8	13
10	Diana	f	26	4	L	5	7	16	17
13	Paul	m	28	7	O ⁴	0	4	6	8
19	Louis	m	33	3	L	4	5	13	13

Notes. ¹ Science, ² Languages, ³ Practical subjects such as crafts and drawing, ⁴ Other subjects such as geography, history, physical education, and drama. ⁵ The names have been replaced by pseudonyms.

There seems to be no correspondence between the teachers in this pattern with respect to their gender, age, experience, or the subject they teach.

Pattern 2

The second possible pattern we discern shows a decline in the teachers' feedback at T1 (at T0 M=8.33, while at T1 M=3.50), and an increase at T2 (M=8.83) and T3 (M=15.33). We have termed this pattern 'Learning from explicit modeling and feedback'. Overall, it seemed that the six teachers showing this pattern did not change their behavior after the training intervention, that they returned to their initial level after the explicit modeling and practice intervention, and that these teachers' specific feedback increased after the data-

driven feedback interventions. We represent the data for this pattern in two ways. Figure 5.4 shows the change in specific feedback at T0, T1, T2, and T3 in a graph. The figure shows six lines from six teachers (t1, t8, t17, t18, t21, and t22) and a thick black line representing the mean frequency of specific feedback for these teachers over time (tM2).

Table 5.3 shows the gender, age, experience, subject, and the frequency of specific feedback for pattern 2 teachers at T0, T1, T2, and T3.

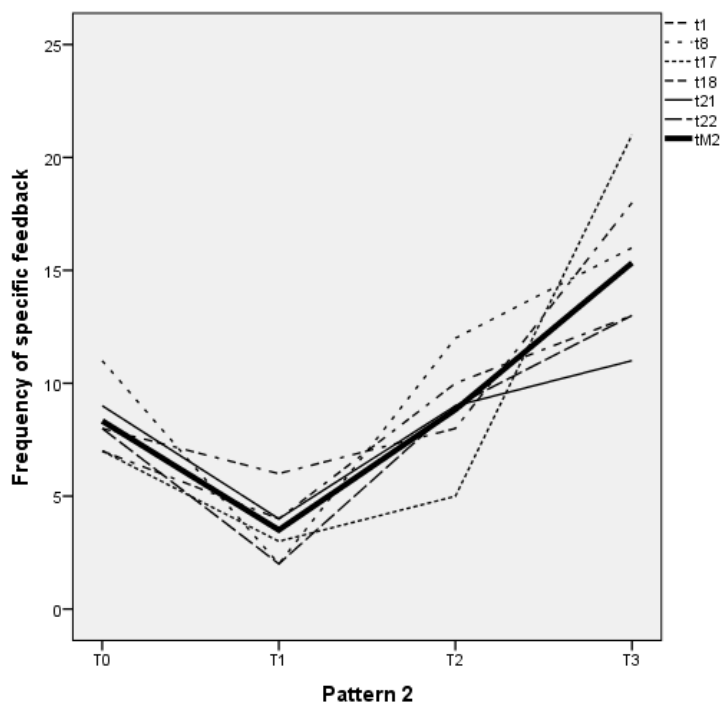


Figure 5.4. Changes in the frequency of specific feedback over time of the pattern 2 teachers.

Table 5.3 Gender, age, experience, subject, and the frequency of specific feedback for pattern 2 teachers at T0, T1, T2, and T3

Pattern 2									
Nr.	Name ⁵	Gender	Age	Experience	Subject	T0	T1	T2	T3
1	Michael	m	33	12	L ²	7	4	10	13
8	Ella	f	26	4	S ¹	11	2	12	16
17	Maria	f	48	16	O ⁴	7	3	5	21
18	Gladys	f	53	30	L	8	6	8	18
21	Billy	f	45	1	P ³	9	4	9	11
22	Miles	m	36	12	O	8	2	9	13

Notes. ¹ Science, ² Languages, ³ Practical subjects such as crafts and drawing, ⁴ Other subjects such as geography, history, physical education, and drama. ⁵ The names have been replaced by pseudonyms.

There seems to be no correspondence between the teachers in this pattern with respect to their gender, age, experience, or the subject they teach.

Pattern 3

The four teachers with pattern 3 showed a decline in their specific feedback after the training intervention (from M=7.50 at T0 to M=5.25 at T1), as well as after the explicit modeling and practice intervention (M=2.75 at T2). They showed an increase in their specific feedback at T3 (M=18.25). We have named this pattern 'Learning from data-driven feedback'. We represent the data for this pattern in two ways. Figure 5.5 shows the change in specific feedback at T0, T1, T2, and T3 in a graph. The figure shows four lines from four teachers (t4, t14, t15, t16) and a thick black line representing the mean frequency of specific feedback of these teachers over time (tM3). Table 5.4 shows the gender, age, experience, and subject and the frequency of specific feedback for pattern 3 teachers at T0, T1, T2, and T3.

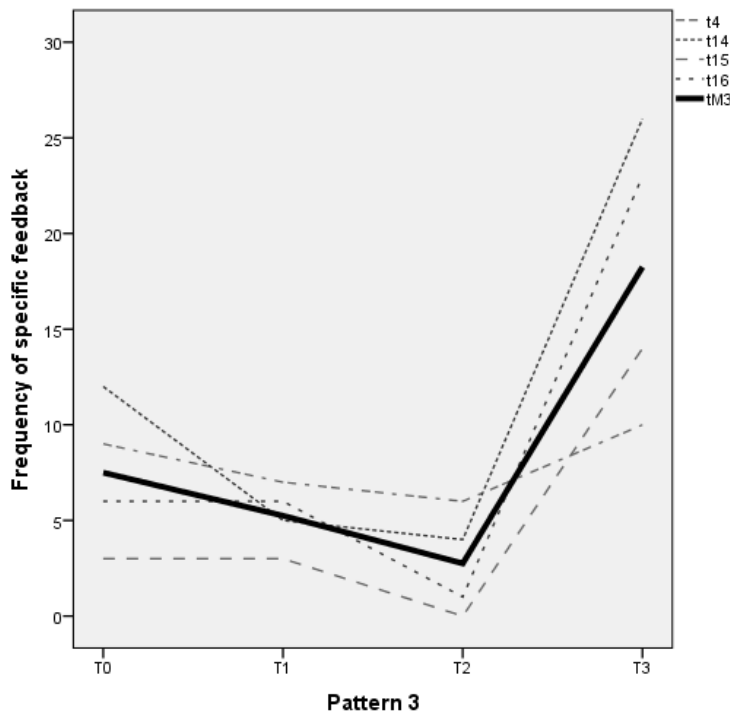


Figure 5.5. Changes in the frequency of specific feedback over time of the pattern 3 teachers.

Table 5.4

Gender, age, experience, subject, and the frequency of specific feedback for pattern 3 teachers at T0, T1, T2, and T3

Pattern 3									
Nr.	Name ⁵	Gender	Age	Experience	Subject	T0	T1	T2	T3
4	Caro	f	24	2	P ³	9	7	6	10
14	Oscar	m	57	34	P ³	12	5	4	26
15	Stevie	m	37	9	P ³	3	3	0	14
16	Barbara	f	58	37	P ³	6	6	1	23

Notes. ¹ Science, ² Languages, ³ Practical subjects such as crafts and drawing, ⁴ Other subjects such as geography, history, physical education, and drama. ⁵ The names have been replaced by pseudonyms.

It is noteworthy that the teachers following this pattern all taught practical subjects, in contrast to the other patterns for which the teachers taught different subjects.

No matching pattern found

In conclusion, there seem to be three possible patterns, which together described 16 of the 19 teachers. The three remaining teachers showed a pattern of change that was not compatible with any of the three patterns. Table 5.5 shows the characteristics and the frequency of specific feedback of these teachers at T0, T1, T2, and T3.

Table 5.5
Gender, age, experience, subject, and the frequency of specific feedback of the teachers with no clear pattern at T0, T1, T2, and T3

No pattern found									
Nr.	Name ⁵	Gender	Age	Experience	Subject	T0	T1	T2	T3
2	Jimmy	m	53	28	O ⁴	4	10	1	9
12	Ringo	m	33	15	P ³	25	12	8	8
20	Lionel	m	30	8	L ²	11	11	17	12

Notes. ¹ Science, ² Languages, ³ Practical subjects such as crafts and drawing, ⁴ Other subjects such as geography, history, physical education, and drama. ⁵ The names have been replaced by pseudonyms.

There seems to be no correspondence between the teachers with respect to their age, experience, or the subject they teach. These teachers are all male.

Summarizing, it seems that there were three patterns: (1) 'Ongoing learning', in which teachers showed a gradual change in their feedback behavior after all types of interventions; (2) 'Learning from explicit modeling and feedback', in which the teachers changed their feedback behavior after the explicit modeling and practice interventions and the data-driven feedback interventions; and (3) 'Learning from data-driven feedback', in which the teachers changed their feedback behavior after the data-driven feedback interventions. We did not find any differences between the patterns with respect to gender, age, or experience of the teachers. With regard to the subjects taught by the teachers, we found that the teachers following the 'Learning from data-driven feedback' pattern were all practical subject teachers.

What are themes in the teachers' learner reports during the FeTiP program?

As a result of the first step of the analysis, the two researchers analyzed the teachers' learner reports for the themes that emerged on what helped or hindered the teachers in their learning. The teachers reported, as helpful aspects of the interventions, the video-recordings of others or themselves, the feedback they received, the analysis of the lesson in the feedback conversation, the example provided by the researchers in the classroom, and the practice during the training sessions. The teachers indicated that some aspects of the training intervention, such as the pace at which examples were shown in video-recordings, had hindered them. They also mentioned the timing of the interventions (especially the second training session, which was held at the end of the day, after a full day of giving lessons).

Themes that might explain the underlying learning processes of the teachers were: (1) observing the effects on students and (2) gaining confidence and, as a consequence,

having an incentive to go on. We labeled a third theme as ‘resistance’; this was characterized by phrases such as “I already do/know this”, or “This is not possible in a classroom of 25 students”. In Table 5.6, examples of the three themes are shown. With each example the teacher’s name and number is shown.

Table 5.6
Themes in teachers’ learner reports, and examples.

Gaining confidence and, as a consequence, having an incentive to go on	Observing the effect on students	Resistance
[The feedback] provides confidence to grow even better (7, Nina).	[What helped in my learning was..] Because of the videos that were shown, I could see the effect of the positive feedback on the students (20, Lionel).	Providing feedback to an individual student works. Unfortunately, there are between 10 and 26 students in a classroom (15, Stevie).
[The feedback] strengthens me in what I do, hence I’ll provide positive feedback more often (19, Louis).	It helped watching the coach providing feedback. I saw on the faces from the students what happened. It made me realize what I did myself compared to the example I saw (8, Ella).	There is a big disadvantage. The focus is too much on one student. You lose control over the whole group, they start doing other things and it is much more difficult to get them to work again (3, Keith).
[The feedback] confirms that I am on the right track. It makes me want to apply this more often (10, Diana).	[What helped in my learning was...] The effect of the changes I made after the first video-coaching (22, Miles).	I already provide a lot of feedback and coaching (16, Barbara).

How might these themes be related to the behavioral changes?

Our next step was to explore these three themes in the teachers’ learner reports further, and to search for possible relationships with the patterns of change in specific feedback. Below we discuss these relationships for each of the three patterns.

Pattern 1: Ongoing learning

The first possible pattern we have distinguished is of a group of six teachers who show constant progress between T1, T2, and T3. A typical expression for this first change pattern would be “*Confirmation always works well. It strengthens me to go on and it feels good, because I feel I’m on the right track*” (9, John, after the training interventions). Other responses were “*I didn’t like watching myself on tape, but the feedback was positive and good for my self-esteem*” (5, Dinah, after the training intervention), “*It strengthens me in trusting what I do and means that I’m going to do this more often*” (10, Diana, after supervised video-coaching), “*It strengthens me in what I do, hence I’ll provide positive feedback more often*” (19, Louis, after the explicit modeling and practice intervention), and “*I*

have become more aware of what I do well and what I have to change" (13, Paul, after the supervised video-coaching). We found no statements of resistance in the learner reports of these teachers. It seems that for the teachers showing this pattern the feedback they received helped because they gained confidence and, as a consequence, they had an incentive to try even harder.

Pattern 2: Learning from explicit modeling and feedback

The six teachers showing this pattern did not seem to change their behavior after the training intervention, returned to their initial level after the explicit modeling and practice intervention, and increased their specific feedback after the data-driven feedback interventions. The teachers in this second group typically state in their teachers' learner reports that observing the effect on students is helpful. A typical expression would be: *"I compliment a student with the improvement he makes and his motivated attitude, he becomes more diligent and I become more enthusiastic"* (18, Gladys, after the general training intervention). After the explicit modeling and practice intervention, she states: *"I sat with a student to provide feedback and saw how the student reacted to the feedback"*. Another teacher with this pattern stated: *"When I was observing the reaction of the students on the feedback the coach provided, I saw them grow and show more commitment afterwards"* (1, Michael, after the practice and explicit modeling intervention). And *"The feedback I saw while videotaping the coach made me realize what I did myself and what example I saw"* (8, Ella, after the explicit modeling and practice intervention). And Miles (22) stated after the supervised video-coaching: *"It's wonderful to watch the effect of positive feedback on a student"*. Finally Billy (21) stated, after the feedback conversation: *"Watching the effect helps"*. In the same way as the teachers showing the 'Ongoing learning' pattern, teachers showing this pattern stated in their learner reports that the feedback they received helped because they gained confidence and, as a result, they had an incentive to go on. An illustrative example was: *"It's a nice confirmation. It provides confidence to do even better"* (8, Ella, after the training interventions). Teachers in this group made no statements of resistance in their teachers' learner reports.

It seems that, for the teachers with this pattern, observing the effect on students initially makes them aware of the effect of feedback on students, and then they experience the observation as an incentive to change their feedback behavior. The feedback they received also seemed to help because they gained confidence and as a consequence had an incentive to try harder.

Pattern 3: Learning from data-driven feedback

The four teachers in this pattern seemed to increase the frequency of specific feedback only after the data-driven feedback interventions. It is noteworthy that the teachers with the third pattern all teach practical subjects such as crafts or drawing. Typical statements in these teachers' learner reports, specifically after the training interventions and the explicit modeling and practice intervention, would show resistance: *"Providing feedback to an individual student works better. However, I have 25 students in my classroom"* (15, Stevie, after the training intervention). Another example would be: *"I think I already provide feedback a lot. Feedback that is as elaborate as the feedback the coach provided is impossible, since there are 25 students in my classroom"* (16, Barbara, after the explicit modeling and practice intervention). And: *"I have a good basis as a teacher and that means that I already do a lot. I have a positive climate in my classroom and I stress the qualities of*

my students" (4, Caro, after the explicit modeling and practice intervention). Interestingly, the teachers showing this pattern did not make statements that refer to gaining confidence or having an incentive to go on. We have termed this pattern '*Learning from data-driven feedback*'. For this pattern it is noteworthy that the teachers increased the frequency of their specific feedback after the data-driven feedback interventions, but they do not typically mention these interventions as being helpful in their teachers' learner reports. The increase of specific feedback after the data-driven feedback interventions is remarkable, taking into account the resistance the teachers in this group seemed to show during the FeTiP program.

5.5 Conclusion and discussion

The first research question in this exploratory study was how the frequency of specific feedback in classroom behavior changed over time during the FeTiP program for the group as a whole. First, we found that, on the whole, the group showed a significant increase in the frequency of specific feedback after the program. Second, apparently not all teachers learned at the same time and/or from the same interventions.

With regard to our second research question, we have explored possible patterns based on the differences in the changes in specific feedback over time for the individual teachers. With regard to the patterns, there seemed to be three possible patterns in the change in the frequency of specific feedback of the teachers.

For the 'Ongoing learning' pattern, it seemed that the teachers benefitted from all interventions. Interestingly, they changed their feedback behavior after the training interventions. This is in contrast to research that shows that traditional interventions such as training sessions do not have much effect on teacher behavior (Darling-Hammond et al., 2009; Guskey, 2002; Newmann, King, & Youngs, 2000). This result was typical for this pattern. Typical statements of the teachers in the teachers' learner reports throughout the FeTiP program showed that the teachers gained confidence and, as a consequence, they had an incentive to keep on trying. The teachers credited the gain in confidence to the feedback they received. We might conjecture that the teachers showing the 'Ongoing learning' pattern made use of the feedback they received and were able to use the feedback to change their classroom behavior.

For the 'Learning from explicit modeling and feedback' pattern, we found – in accordance with the findings of other research on traditional interventions (e.g., Guskey, 2002) – no progress after the traditional training intervention. An explanation for this might be that the teachers at that stage had not had enough time to practice and learn. Estimates about the investment of time required in order for professional development programs to be effective vary from 20 hours of contact (Desimone, 2009) to 30 hours (Joyce & Showers, 2002) or 80 or more hours (Darling-Hammond et al., 2009). Darling-Hammond and Richardson (2009) even stated in their study on the state of professional learning in the United States that "professional development lasting 14 or fewer hours showed no effects on learning. The largest effects were for programs offering 30 - 100 hours, spread out over 6 - 12 months" (p. 49). The time invested in the training sessions was 12 hours. After the explicit modeling and practice intervention, these teachers' feedback behavior returned to the initial level at T0, and they showed an increase in the frequency of specific feedback after the data-driven feedback interventions. Typical expressions for teachers showing the 'Learning from

explicit modeling and feedback' pattern concerned observing the effects of feedback on students. This is in accordance with the statement of Van Eekelen (2005) that observing the effect of their own actions on students is important for teachers' motivation. Perhaps an important step in the learning process of teachers is the experience that providing specific feedback has positive effects on their own students.

However, it seems that observing the effect on students might motivate teachers, but it might not be sufficient to lead to immediate behavioral change. The teachers in this pattern certainly changed their feedback behavior after the data-driven feedback interventions. The influence of these interventions might be explained by the theory of Kluger and DeNisi (1996) that feedback that directs the attention of the learner to the task augments performance. It might be that the attention of the teachers in the first sets of interventions was directed to the effect on the students, and that the data-driven feedback interventions re-directed the attention of the teachers towards their own feedback behavior.

The statements in the learner reports for the teachers showing this pattern, in common with those of the teachers showing the 'Ongoing learning' pattern, show increased confidence and, as a consequence, an incentive to try harder, as a result of the feedback the teachers received.

The teachers showing the 'Learning from data-driven feedback' pattern only showed a statistically significant progress in the frequency of their specific feedback after the third set of interventions. We hypothesize that one particular characteristic of the feedback in these interventions might have been of influence. The feedback the teachers received in these interventions was endorsed, either by a thorough analysis of their specific feedback based on a recording of their lessons, or by watching a videotape of their own lesson and receiving feedback on the specific feedback they provided. This corresponds with the views of Little (2006), who stated that the systematic use of data for learning by teachers might be very effective feedback. Hattie (2012) also proposed that teachers should gather facts about the effectiveness of their teaching by evaluating the progress of their students and determining effect sizes as another type of data-driven feedback.

Statements about gaining confidence were not typical for the teachers in this pattern. On the contrary, typical statements in these teachers' learner reports contained resistance towards change, in the sense that the teachers felt that they already provided feedback, or that feedback might be effective but not in a full classroom. For this, we might find an explanation in the Teacher Willingness to Learn Model of Van Eekelen (2005). She describes six stages of willingness to learn: (0) Zero, or immotive (1) Pre-contemplation, (2) Contemplation, (3) Preparation, (4) Action, and (5) Maintenance. The teachers showing the pattern 'Learning from data-driven feedback' might be in stage 1, Pre-contemplation. Van Eekelen describes this stage as: "The teachers in this stage are not really interested in learning about change or acquiring new information on a specific topic. It is not that they cannot see the solution; they cannot see the problem" (Van Eekelen, 2005, p. 106). Teachers in this stage might not feel that feedback builds their confidence, since they do not experience any problems. Providing data-driven feedback might make these teachers aware of the strengths and weaknesses in their teaching, which might make them aware of problems, and more willing to change their behavior.

Implications

Our finding that the teachers did not learn at the same time and from the same interventions might first imply that there have to be nuances in statements about the effectiveness or ineffectiveness of interventions for all teachers, whether these interventions are traditional, such as training sessions or workshops, or innovative, such as explicit modeling and practice in the classroom. There might not be one approach that fits all teachers. A second implication might be that not all teachers need all the interventions in a professional development program. Hence, we might attempt to design more tailor-made professional development programs.

With regard to the learning processes of the teachers, we first found that, for some teachers (those whose results followed the 'Ongoing learning' and the 'Learning from explicit modeling and feedback' patterns), feedback that provides confirmation of their teaching methods might motivate them to learn and change their behavior. The need for feedback that confirms and stimulates might seem obvious, but teachers in general do not often receive feedback on their teaching, and we might question whether the feedback they receive serves as confirmation and stimulation. The implication for designing professional development programs might be that feedback, and in particular data-driven feedback, could play an important role in teacher change, because it might influence the teachers' confidence and act as an incentive for them to change their behavior.

A second finding regarding the teachers' learning processes was that observing the effect of their actions on students seemed to motivate them to change their behavior, although this might not be the case for all teachers. Also, observing the effects on students seemed to motivate them, but did not seem to lead to immediate alterations to their feedback behavior. An implication might be that professional development programs should be designed in such a way that teachers can observe the effect of the new behavior on their students, through explicit modeling or through video-recordings of their own teaching.

Data-driven feedback specifically aimed at the actual behavior of the teacher in the classroom may support changes in the behavior not only of those teachers who do not show resistance during a professional development program, but also of those teachers who do show resistance towards change. The use of data-driven feedback in in-school professional development programs has as the advantage that all teachers participate and become aware of their own concrete classroom behavior, whether they show resistance towards change or not.

Limitations and future research

There are several limitations of this study. First, because we performed an exploratory search for change patterns with a small sample of 23 teachers, it might not be possible to draw conclusions that go beyond the group of teachers who participated in this study. However, since the group of teachers does not seem to differ much from the general population of teachers in the Netherlands, we hypothesize that our findings may be valuable to secondary education in general. To validate this hypothesis, it would be of interest to search for patterns of experienced teacher learning with a larger sample of teachers, and also to search in other countries. It might then be possible to distinguish other patterns of learning and possibly to find patterns that would fit the teachers who showed no correspondence with the three patterns that we found in this exploratory study. Such research might also yield more data on the question of whether the subject that is taught by the teacher influences his or her learning processes.

Another limitation of this study is that not all teachers participated in all the interventions. However, this is a scenario often found in long-term professional development. Generally, teachers are not able to attend all interventions for various reasons, such as part-time working or illness.

Following up on the results of our study, we would like to advocate further research on more, and more varied feedback to teachers. Providing them with more, and more data-driven, feedback might do justice to the complexity and quality of the teaching profession, and thus to the quality of teacher feedback in the classroom.

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Chapter 6

Conclusions and discussion

In this chapter, we will first summarize the main conclusions of both parts of this dissertation and the academic relevance of our research. Then, we will discuss implications, limitations, and suggestions for future research.

6.1 General conclusions and academic relevance

Part 1: Effective and ineffective feedback and its occurrence in the classroom

In this part of the study, our first aim was to contribute to the body of knowledge about feedback by considering additional psychological views on the cognitive perspective in learning, which prevails in most feedback studies nowadays. We concluded in **chapter 2** that in research on feedback we might first take into account the impact of feedback on emotion and thus on learning. Feedback should preferably evoke an activating emotion or be embedded in a context that generates emotional spaces stimulating learning. On the basis of the literature, this can be achieved by providing positive feedback more frequently than negative feedback.

Second, we described the confusion about praise and character strengths and the over-simplification of the view of feedback about the self. We described praise as non-specific feedback, which as such does not enhance learning. However, we distinguished praise from specific positive feedback, which does enhance learning. We discussed feedback on character strengths as a way of providing feedback about the self with potentially enhancing effects on learning (Korthagen, Kim, & Greene, 2013). The kind of feedback on the self that is needed is specific feedback on a student's character strengths with the aim of creating a positive view of his or her own capacity for learning. And lastly, we discussed progress feedback (a comparison of the actual level of performance with the initial level, evaluating the improvement) as a complement to gap feedback (a comparison of the actual level of performance with the desired level of performance, stating what is missing or what still has to be done). We concluded with respect to the concepts of progress feedback and discrepancy feedback that researchers and teachers need to give more attention to progress feedback. A balance between progress and discrepancy feedback might be essential to making feedback learning-enhancing.

The second aim of the first part of our dissertation was to study the actual quantity and quality of teacher feedback in the classroom. As described in **chapter 3**, we found that less than 20% of all observed interventions were feedback and the feedback interventions offered were mostly non-specific. More than half of the teachers provided a low ratio of positive and negative feedback and about half of the teachers did not provide any specific feedback, neither positive nor negative. Discrepancy feedback was provided by 41% of the teachers. Progress feedback, on the other hand, was offered by only 7% of teachers. Teachers seem to place greater emphasis on what has not yet been learned or understood, rather than on what has already been achieved. We found no differences with respect to age, experience, or subject of the teachers and concluded that teachers' age, experience or

subject does not seem to influence the degree to which they provide effective types of feedback.

The first part of this dissertation reached two conclusions, which are in addition to the research and discourse on feedback. First, the combined attention to cognition, emotion, personal relationships, and character strengths might, in particular, lead to a more balanced view of feedback. Second, with regard to the use of effective feedback in the classroom, we have further underpinned the conclusion of Hattie (1999) that feedback in the classroom is rare. Because feedback is a very important means for teachers to stimulate learning, the conclusion might be justified that the low frequency of learning-enhancing feedback in the classroom is alarming.

Part 2: Design and evaluation of a professional development program

The second part of this dissertation aimed at designing and evaluating a professional development program that supported teachers in changing their feedback behavior in the classroom, in order to provide more, and more learning-enhancing feedback. Additionally, we aimed to analyze the differential effect of the interventions in the program on individual teachers and exploring different patterns of change.

The FeTiP program was designed as an in-company professional development program, in which all the teachers of the department participated, whether they were enthusiastic about the program or not. Whereas most studies on teaching use teacher self-reports as a measure of effectiveness, we decided to use the behavioral change in the classroom as a measure for the effectiveness of the FeTiP program. In chapter 4, we first concluded that it is possible to stimulate teachers to change their feedback behavior to more effective feedback through a professional development program. Second, we argued that in general a professional development program aimed at changing teachers' classroom behavior in the classroom might be successful (1) if it incorporates the components of theory, practice, demonstration, coaching, and feedback, and (2) if it makes use of multiple interventions operationalizing these components, aimed at the whole team level, the small group level, and the individual level. An additional factor (3) might be the involvement of the school administration.

Based on a further exploration of patterns of change, we found (**chapter 5**) that not all teachers seemed to learn at the same time from the same interventions. Our exploration of possible change patterns suggested three patterns, namely, 'Ongoing learning', 'Learning from explicit modeling and feedback', and 'Learning from data-driven feedback'. With respect to the learning processes of the teachers, we found that teachers seem motivated to change their behavior as a result of (1) feedback that provides confirmation of their teaching methods and (2) observations of the effect of their actions on students. However, these motivating factors did not directly lead to altered classroom behavior. If we want teachers to change their classroom behavior, data-driven feedback specifically aimed at the actual behavior of the teacher in the classroom might be effective. Moreover, even teachers who showed resistance towards change also benefitted from these data-driven feedback interventions and changed their classroom behavior.

With respect to the second part of our study on the professional development of teachers in providing more learning-enhancing feedback, there are some implications that might be valuable for professional development programs in general. Although we need more in-depth studies with larger samples, the results of the second part of this dissertation suggest that searching for one approach fitting all teachers is fruitless and may not lead to

effective programs. It might be more effective to design multi-component programs for professional development that meet the various needs of teachers. Such multi-component programs might also offer better opportunities to design tailor-made programs.

Second, we would like to emphasize the role the feedback provided to the teachers (about the feedback they give to students) might have played in the behavioral change. The feedback provided to the teachers might play a much bigger role in professional development than previously thought (cf. Borko, 2004; Darling-Hammond, Chung Wei, Andree, Richardson, & Orphanos, 2009; Joyce & Showers, 2002; Postholm, 2012). Of special interest in this respect is the data-driven feedback on the teachers' classroom behavior. Data-driven feedback seemed effective for all teachers, including those who showed resistance in their learner reports. Data-driven feedback on classroom behavior might be a valuable addition to the feedback teachers receive through reports on student results (Hattie, 2012).

6.2 Critical reflection on the studies

Part 1: Effective and ineffective feedback and its occurrence in the classroom

When we reflect critically on the choices we made in our research, we would first like to address the choice of subject of our study. In this dissertation we chose feedback as the main subject and focused on the teacher as the provider of feedback. This yielded in-depth insights into how teachers might provide effective feedback as an element of classroom interaction, as we discussed in the previous sections. The choice to focus on a single aspect of teacher behavior might even be a necessity when aiming at changes in teachers' classroom behavior. However, in a classroom, feedback is not an isolated phenomenon. Feedback is part of the design of the lesson and of the interaction between teachers and students. Hence, teachers influence the opportunities to provide feedback in the classroom by their design of the lesson. They also create chances for providing feedback during teaching by asking questions. Moreover, they can improve the acceptance of their feedback by the students by checking whether the feedback was received as intended. In this study, we did not include attention to the preparation of the lessons or the context of the feedback. Taking these aspects of teaching into account might help teachers to provide even more effective feedback.

At the time we set out to conduct study 1, important review studies were published by Hattie and Timperley (2007) and Shute (2008). Also, older review studies by Black and Wiliam (1998), Kluger and deNisi (1996), and Sadler (1989) had a strong influence on the views of feedback. These studies were mainly based on a cognitive perspective on feedback. We chose to study other psychological views in addition to the cognitive perspective and discussed the implications of these views for the generally accepted theoretical framework on feedback as described in the review studies. We limited our choice to psychological views on emotion and positive psychology. Of course, we could also have chosen other views from, for instance, social psychology. Views based on social psychology could provide insights into the effectiveness of feedback, and thus add valuable knowledge to our understanding of how feedback works in the classroom.

In study 2, we examined the incidence of feedback in secondary education classrooms. We focused on the teacher as the agent of feedback, whereas other agents such as peers, books, or computers were not taken into account. These might be other influential agents of feedback.

Part 2: Design and evaluation of a professional development program

In study 3, our design was a repeated measurement design, in which we conducted a pre-test and a post-test. We compared the pretest of this group of teachers with the results of the teachers of study 2. Hence, this study was not a true experimental design. Comparing the teachers of study 2 with the teachers of study 3 made clear that during the pre-test, the teachers in study 3 had already performed significantly better than the group of teachers from study 2. However, despite the fact that the teachers of study 3 had already provided more feedback than the teachers in study 2, the former teachers did progress significantly after following the FeTiP program.

We carried out study 3 and 4 in one school for lower vocational education, with 23 teachers as participants. Including larger groups in our study was not possible, due to the time-consuming nature of both the program and the analyses. In study 3, we hypothesized that the behavioral change of the teachers into the direction of providing more specific feedback was due to the professional development program. We realize that there may have been other factors that influenced the feedback behavior of the teachers, such as the design of their lessons or their subjects, although we found no differences between the teachers in the frequency of specific feedback that were related to age, gender, subject, or experience. Hence, it seems that the results of study 3 were based on following the FeTiP program. However, we cannot exclude that other, unknown factors influenced the results.

A basic choice we made in study 3 and 4 was to aim at the behavioral change of the teachers. In Kirkpatrick's (1996) four-level model of evaluation, behavior is the third level, after the levels of reaction (participant satisfaction) and learning (knowledge, skills, and attitudes). Evaluating the results of students is the fourth level. Most research on the effects of professional development programs evaluates at the level of learning, mostly by teacher self-reports. In this study, we chose to study at the level of behavior using video-recording and encoding the behavior of the teachers. An important question in this regard is whether the analyzed fragments of the lessons were comparable. We endeavored to provide equal circumstances when the video-recordings were made. We asked the teachers in advance to apply a fixed structure in the lessons to be recorded, consisting of about 10 to 15 minutes of instruction, followed by at least 30 minutes of work by the students individually or in small groups, when the teacher was making instructional rounds and supporting the students with their assignments. Moreover, we made sure that the fragments we chose to analyze showed teachers in interaction with their students in those approximately 30 minutes, while the students were working on an assignment on their own or in small groups and the teacher was making instructional rounds to support them.

Study 4 was an exploration into the patterns of change in the teachers. We thought it valuable to explore different patterns of experienced teacher learning and chose an exploratory search and not statistical procedures because of the small sample. Our analyses could form the basis of more extensive search for differences in change patterns of teachers, in order to differentiate within professional development programs.

There were advantages and disadvantages to the fact that the author of this dissertation was also one of the trainer-coaches who carried out the program. An advantage was the combined knowledge of how to carry out a professional development program and how to conduct research. As a consequence, the choices that had to be made were discussed from both perspectives. An example is the addition of the feedback conversation as one of the data-driven feedback interventions in the program. Initially, the feedback conversation was not planned as part of the program. As one of the trainer-coaches, the primary researcher had regular conversations with the school administrators to discuss the

progress of the program, and their suggestions were included in the program. Adding this intervention made the school administrators more involved than they were already, which was beneficial to the program. An advantage for the research was that another, not so common, intervention could be evaluated as part of the program.

A disadvantage was the growing relationship between the primary researcher and the school administrators and teachers. As a consequence, the teachers may have tried to provide more specific feedback than they would normally do without the presence of the primary researcher in their classroom. Also, in coding the feedback, the primary researcher constantly had to be aware of her double interest: as a trainer-coach, she aimed to increase learning-enhancing feedback, and as a researcher, she sought to be as objective as possible. The researchers discussed this tension extensively in developing the coding scheme and making decisions on the encoding of the feedback interventions, before the actual encoding took place.

6.3 Relevance for practice

The practical relevance of this dissertation will now be described in terms of the classroom, teacher education and the design and implementation of professional development programs.

Classroom practice

With regard to the relevance for classroom practice, there are some issues we would like to address. The first issue refers to our framework on the relation between feedback, emotion, and learning, as described in study 1. Implications for teaching might be that this framework can help teachers to be more aware of the impact of their feedback on the emotions of their students. Teachers might increase the use of feedback that arouses the activating types of emotion, such as pride, hope, and joy, and be aware that emotions evoked by feedback, such as anger and anxiety, can have both an activating and a deactivating effect.

Second, we would like to make a point regarding the use of praise or non-specific feedback. Kluger and DeNisi (1969) were the first to show that non-specific feedback might not enhance learning or might even be detrimental to learning. Many other studies (e.g., Hattie & Timperley, 2007; Shute, 2008) that have made this claim are based on the Kluger and DeNisi study. However, the study by Kluger and DeNisi' was mostly based on tasks carried out in a laboratory setting (Sol & Stokking, 2009) and focused on, for instance, memorizing information and reacting to stimuli. The difference between laboratory and classroom settings makes it difficult to translate the results of the study by Kluger and DeNisi to classroom practices. Hence, their conclusion that non-specific feedback does not enhance learning should, in our view, be nuanced. We suggest that non-specific feedback should *not* be avoided in classrooms. Instead, we propose that this type of feedback should be used sparingly, and as an addition to specific feedback. In a later publication, Hattie (2012) supported this view and suggested that teachers should keep on providing praise as non-specific feedback, but that they should add providing specific feedback to their repertoire.

Teacher education practice

There is an important implication of our findings for teacher education. Study 2 showed that the incidence of feedback and, in particular, effective feedback is scarce. This finding seems alarming and has implications for teacher education. Teacher educators need

to make their student-teachers aware of the use of non-specific and specific feedback and the effect of feedback on emotion. Moreover, they should design ways to teach their students how to provide effective feedback. Explicit modeling effective feedback by teacher educators might help student teachers learn how to provide more and more effective feedback. The use of video-recordings of the lessons taught by student teachers as a basis for reflection on and discussion of their feedback behavior could also be helpful.

Professional development practice

There are three major implications for the practice of professional development, with respect to (1) the design of professional development programs, (2) the combination of traditional interventions and more innovative interventions, and (3) the requirements for trainer-coaches.

Design of the professional development programs

Based on the findings of study 3, we would endorse the design of multi-component professional development programs when aiming at changes in teacher behavior. Multi-component programs might also make it possible to use more tailor-made interventions. An implication of study 3 and 4 would be to make data-driven feedback an important component of the design of professional development programs. We see two main reasons for this addition. First, nowadays, teachers frequently receive feedback through the results of their students (Biesta, 2010). However, feedback based on the results of the students does not provide the teachers with feedback on their actual classroom behavior. Combining both types of feedback for teachers addresses the two most complex levels of evaluation of Kirckpatrick (1995). This combination might be fruitful for promoting changes in teachers' classroom behavior.

Second, the teachers who seemed to show resistance towards change did not change their feedback behavior after the training interventions and the 'explicit modeling and practice' intervention. However, they did change their feedback behavior after the data-driven feedback interventions. Hence, possibly, these data-driven feedback interventions were essential for the teachers in the decision to change their feedback behavior. Another influential factor might have been that the FeTiP program was designed as an in-company program. All teachers participated, whether they were enthusiastic about the program or not. Without the in-company program these teachers might not have entered workshops or training courses on providing feedback and might not have had the opportunity to learn about their own classroom behavior with regard to feedback. Hence, we hypothesize that in-company programs can be very important for teachers to experience the effect of new behavior, in particular for teachers who seem to show resistance towards changing their classroom behavior.

The combination of traditional interventions and more innovative interventions

In the FeTiP program a combination of traditional interventions and more innovative interventions was used. It might be that the combination of these interventions was a crucial factor in the effectiveness of the FeTiP program. Both kinds of interventions include the use of different paradigms of learning. A traditional intervention such as training is based on the paradigm of learning from experts through listening and reading. The 'explicit modeling and practice' intervention is based on the paradigm of master-apprenticeship, whereas the video-coaching is based on the paradigm of active learning. Perhaps tailor-made professional

development programs benefit from the combination of these paradigms, because they offer opportunities to adjust the interventions to teachers' actual needs and their ways of learning.

Requirements for trainer-coaches

The use of some uncommon, but effective interventions in the FeTiP program might also be effective in other professional development programs aiming at changing teacher behavior in the classroom. Interventions such as explicit modeling in the classroom and providing specific feedback on teacher behavior during video-coaching are highly demanding interventions for trainer-coaches to carry out, and thus require specific skills from these trainer-coaches. An advantage of carrying out these interventions could be that they contribute to the trust of the teachers in the expertise of the trainer-coaches. Ilgen, Fisher, and Taylor (1979) stated that the source of feedback is an important factor in the extent to which recipients accept the feedback. They describe as influential in the acceptance by teachers: (1) the perception of the expertise of the feedback source and (2) the recipients' trust in the source's motives. In professional development programs, where interventions that provide feedback to the teachers play a significant role, the trainer-coaches should be able to meet these requirements.

6.4 Suggestions for further research

Effective and ineffective feedback and its occurrence in the classroom

Taken together, the results of our studies and the limitations we discussed, lead to suggestions for future research. First, we suggest searching for other views on learning that broaden our understanding of the concept of feedback. For instance, social psychology could offer interesting new perspectives on feedback in the classroom, in particular through a focus on the relationships between provider and receiver of feedback. An interesting question would be what the influence of providing effective feedback is on the relationship between teachers and students.

Second, we propose studies on how teachers might create opportunities in the classroom to provide feedback. This could focus on the teacher's lesson preparation, with regard to goals and methods. Perhaps teachers who are more aware of their goals (Sadler, 1989) and choose methods accordingly, are able to provide more effective feedback.

Another focus of studies on creating opportunities for providing feedback might be the way teachers ask questions. We hypothesize that if teachers can ask questions in such a way, then providing feedback will be easier. For example, based on Bloom's taxonomy (Kratwohl, 2002), we conjecture that asking questions about factual knowledge provokes further opportunities for feedback than asking questions aimed at conceptual, procedural, or metacognitive knowledge. The answers to questions about factual knowledge may evoke types of non-specific feedback such as 'right' or 'wrong'. Questions that are likely to elicit more complicated thinking and answers might make it more possible for the teacher to provide specific feedback. This issue asks for both conceptual development and empirical studies.

We also advocate studies on the effect of the described types of teacher feedback in the classroom on student outcomes. We could then find answers to questions such as: How do discrepancy and progress feedback influence learning outcomes? Does providing more positive than negative feedback influence student learning? What is the effect of providing feedback on character strengths on the learning results of the students?

We have focused on the verbal feedback provided by the teacher. Another possibility could, for example, be to study the effects of computer feedback. We could look for answers to such questions as: What is the influence of computer feedback if the program is also designed to provide progress feedback? What effect does computer feedback have on emotion? What kind of learning tasks is better served by computer feedback and what kind by teacher feedback? We might ask similar questions about written feedback.

Design and evaluation of professional development programs

A first line of research on professional development might be to study the FeTiP program with a larger sample of schools and teachers, accompanied by a control group. Such a study could make it possible to analyze the results on the teachers' behavior in more detail and also to find more data to support the different change patterns we found or add new patterns to the ones we distinguished.

A second suggestion for future research on professional development programs is based on our hypothesis that the feedback culture in a school influences learning during professional development programs and is also influential in the sustainability of change. Studies on the dynamics of a reciprocal feedback culture between teachers and students, between the school administration and teachers and between teachers themselves, might help us understand more the sustainability of change.

A third line of future research would be to study the use of our findings for the design of professional development programs aimed at other areas of teacher behavior, such as the use of ICT, active learning, questioning, formative assessment, etc. Of particular interest is studying the use of multi-component professional development programs and the use of data-driven feedback in those programs. Considering the common findings that different types of professional development, such as workshops, incidental training, and symposia, are not very effective in supporting teachers to change their behavior in the classroom, we would encourage the study of combinations of traditional interventions with other interventions such as video-coaching and 'explicit modeling and practice' in the classroom.

Finally, we believe that one of the most interesting findings in this dissertation is the change of the frequency of specific feedback after the data-driven feedback interventions in teachers who seemed to show resistance. Since this pattern of change only occurred within a small group of four teachers, we suggest further research on the influence of data-driven feedback on the change of teachers showing resistance. Understanding why teachers resist change and, perhaps even more importantly, why they decide to change their behavior, may be important when designing professional development programs.

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Samenvatting

Deze dissertatie gaat over feedback aan leerlingen door docenten in het voortgezet onderwijs. Feedback is één van de meest effectieve middelen die leraren tot hun beschikking hebben om leren te bevorderen, effectiever dan bijvoorbeeld de kwaliteit van hun instructie. Het eerste deel van dit proefschrift gaat over wat er vanuit de wetenschap bekend is over effectieve feedback en over de mate waarin docenten in het voortgezet onderwijs zulke feedback ook daadwerkelijk geven. Volgens Hattie (1999) is de frequentie van effectieve feedback in de klas nogal laag, hetgeen door ons eigen onderzoek bevestigd werd. Het tweede gedeelte van dit proefschrift gaat daarom over de professionele ontwikkeling van leraren ten aanzien van het leren geven van feedback. We ontwierpen en evalueerden een in-company professionaliseringstraject voor docenten in het voortgezet onderwijs, bedoeld om docenten te ondersteunen bij het vergroten van de frequentie van effectieve feedback in de klas.

In **hoofdstuk 1** worden de kernbegrippen, de doelen en de onderzoeksvragen van het proefschrift beschreven. Het eerste doel van het promotieonderzoek was om te onderzoeken wat er bekend is over feedback. In reviewstudies wordt feedback veelal omschreven als het verschaffen van informatie over de prestatie of het begrip van de lerende. Feedback mag niet te uitgebreid zijn vanwege het ontstaan van cognitieve overbelasting, of omdat het de aandacht van de ontvanger van feedback afleidt van de taak. Het dichten van de kloof tussen een huidig niveau van functioneren en een gewenst niveau wordt gezien als het doel van feedback. De bron van feedback kan een leraar zijn, de computer, een boek, ouder en/of de lerende zelf. Ten slotte blijken onderzoekers het er in het algemeen over eens te zijn dat effectieve feedback specifiek is. 'Prijzen' ("goed zo!") en feedback op de persoon ('slimme jongen!') lijken vormen van feedback te zijn die niet effectief zijn. Feedback wordt in bestaande publicaties voornamelijk beschreven vanuit een cognitief-psychologische visie op leren. We wilden dan ook antwoord vinden op de vraag: *Wat kunnen we toevoegen aan de bestaande kennis over feedback wanneer we uitgaan van andere psychologische visies op leren dan een louter cognitieve?* Een tweede onderzoeksvraag was: *Welke van de typen feedback die volgens de literatuur effectief of ineffectief zijn ten aanzien van leren, worden daadwerkelijk door docenten in de klas gebruikt? En hoe vaak worden ze gebruikt?*

Het tweede doel van het promotieonderzoek was om een professionaliseringstraject te ontwerpen en te evalueren dat als doel had om leraren te steunen in het vergroten van de frequentie van hun effectieve feedback in de klas. We noemden dit traject *het FeTiP- traject*: Feedback Theory into Practice. We hadden daarbij drie onderzoeksvragen. Onze eerste was: *In hoeverre is het feedbackgedrag van de docenten veranderd na het FeTiP- traject?* Omdat specificiteit in de literatuur gezien wordt als een belangrijk kenmerk van effectieve feedback, hebben we de twee volgende onderzoeksvragen gericht op specifieke feedback. De tweede onderzoeksvraag was: *Hoe hangen de veranderingen in de frequentie van specifieke feedback in de klas gedurende het FeTiP-traject samen met de interventies ervan?* En de derde vraag was: *Welke verschillende patronen kunnen er onderscheiden worden in de veranderingen van de frequentie van specifieke feedback gedurende het FeTiP-traject? En welke aanwijzingen voor verklaringen voor die verschillen kunnen we vinden in de logboeken van de docenten?*

In **hoofdstuk 2** wordt deelstudie 1 beschreven, een theoretische studie ten aanzien van de stand van zaken in onderzoek over feedback. We gingen daarbij niet alleen uit van inzichten vanuit de cognitieve psychologie, maar we baseerden ons ook op psychologische inzichten over emotie en op de positieve psychologie. Omdat feedback ook emotie oproept bij de ontvanger, was het eerste thema dat we aan de orde stelden de invloed van emotie op leren. Positieve emoties (zoals trots, hoop en blijdschap) zijn activerende emoties, die over het algemeen een positieve invloed op leren lijken te hebben. Omdat in het algemeen positieve feedback een positieve emotie oproept, zou feedback volgens de literatuur vaker positief dan negatief moeten zijn om een goede emotionele basis voor leren te creëren.

Het tweede thema was het onderscheid tussen de concepten 'prijzen' en 'feedback op de persoon'. De voorbeelden in de literatuur lieten zien dat deze twee concepten verward worden. Van beide concepten wordt in de literatuur gezegd dat ze niet effectief zijn voor leren. 'Prijzen' hebben we omschreven als *niet-specifieke* positieve feedback, om het daarmee te onderscheiden van *specifieke* positieve feedback. Uit studies gebaseerd op inzichten vanuit de positieve psychologie bleek dat feedback op de persoon wel degelijk invloed kan hebben op leren. De vorm van feedback die dan nodig is, is specifieke feedback op de kernkwaliteiten van een leerling.

Het derde thema ging over het in de literatuur algemeen onderkende doel van feedback om de kloof te dichten tussen een huidig niveau van functioneren en een doel. We noemden deze vorm van feedback *discrepantiefedback* en voegden daaraan het concept *progressiefedback* toe. Progressiefedback is een vorm van feedback waarbij de leerling feedback krijgt over het verschil tussen een vroeger niveau van functioneren en het huidige niveau van functioneren, dus over de vooruitgang.

Als we deze uitkomsten combineren met de uitkomsten van onderzoek gebaseerd op cognitief psychologische gezichtspunten, dan lijken de kenmerken van effectieve feedback te zijn dat de feedback specifiek is en niet te uitgebreid. De specifieke feedback kan ook bestaan uit specifieke feedback op de kernkwaliteiten van een lerende. Daarbij lijkt het van belang dat de feedback vaker positief dan negatief is; de feedback kan zowel gaan over de progressie ten opzichte van een vroeger niveau van functioneren, als over de discrepantie met het gestelde doelniveau van functioneren.

In **hoofdstuk 3** wordt deelstudie 2 beschreven. Dit is een empirische studie waarin we de lessen filmde van 78 docenten in het voortgezet onderwijs en deze lessen analyseerden op het gebruik van effectieve en ineffectieve vormen van feedback. Ten behoeve van de analyse ontwikkelden we een codeerschema voor effectieve feedback met vijf categorieën: positieve specifieke en positieve niet-specifieke feedback, negatieve specifieke en negatieve niet-specifieke feedback en 'overige interventies' (bijvoorbeeld vragen en aanwijzingen). Van elke opname kozen we tien achtereenvolgende minuten waarin de leraren in interactie waren met de leerlingen en we analyseerden die met ons codeerschema. Minder dan 20% van alle geobserveerde interventies bleek feedback te zijn en de meeste van die feedbackinterventies waren niet-specifiek. Ongeveer 36% van de docenten gaf specifieke positieve feedback en ongeveer 60 % gaf specifieke negatieve feedback. Bij het verder analyseren van de feedback bleek dat 41% van de leraren discrepantiefedback gaf en slechts 7 % van de docenten progressiefedback. Ook bleek dat 44 % van de docenten weliswaar meer positieve dan negatieve feedback gaf, maar in een verhouding tussen positieve en negatieve feedback die lager was dan 3:1. Hoewel de literatuur niet eenduidig is ten aanzien van de gewenste verhouding tussen positieve en negatieve feedback, hebben we in ons onderzoek een gewenste verhouding aangehouden van positieve en negatieve

feedback van minimaal 3:1. Een ANOVA wees uit dat er geen verschillen tussen de docenten waren wat betreft de frequentie en het type van de feedback of de verhouding tussen positieve en negatieve feedback die verklaard konden worden door het geslacht van de docent, het schooltype, het schoolvak of de klas. Een MANOVA wees uit dat leeftijd en ervaring eveneens geen voorspellers waren voor de frequentie, het type en de verhouding positieve en negatieve feedback.

In **hoofdstuk 4** wordt deelstudie 3 beschreven, die betrekking had op de ontwikkeling en evaluatie van een professionaliseringstraject, genaamd het FeTiP-traject (Feedback Theory into Practice). Dit traject werd uitgevoerd in de VMBO-afdeling van een scholengemeenschap. Er participeerden 23 docenten in dit traject, dat tot doel had om docenten te ondersteunen bij het veranderen van hun feedbackgedrag in de klas. Uit de literatuur blijkt dat de meer traditionele manieren van professionalisering (zoals workshops en korte trainingen) niet erg effectief zijn. Het ontwerp van het FeTiP-traject was dan ook gebaseerd op de studie van Joyce en Showers (2002) naar componenten van effectieve professionaliseringstrajecten, nl. (1) theorie, (2) demonstratie, (3) oefenen en (4) coaching. Op basis van de invloed van de feedback op leren, hebben we feedback aan docenten aan deze lijst van componenten toegevoegd. Uit de literatuur bleek dat er nog andere voorwaarden van invloed zijn op de effectiviteit van een professionaliseringstraject, namelijk in de eerste plaats de betrokkenheid van de schoolleiding, zulks in zowel stimulerende als faciliterende zin. In de tweede plaats bleek het van belang de interventies te richten op drie niveaus in de organisatie, te weten het hele team, kleine groepen docenten en de individuele docent. Effectieve interventies kunnen zowel plaatsvinden buiten de klas als binnen de klas, dat wil zeggen tijdens het lesgeven van de docent.

Bij het samenstellen van het programma is gekozen voor een combinatie van meer traditionele en innovatieve interventies, waaronder feedback op het concrete gedrag van docenten in de klas. We noemden deze laatste vorm van interveniëren data-gestuurde feedbackinterventies.

Het FeTiP-traject bestond uit:

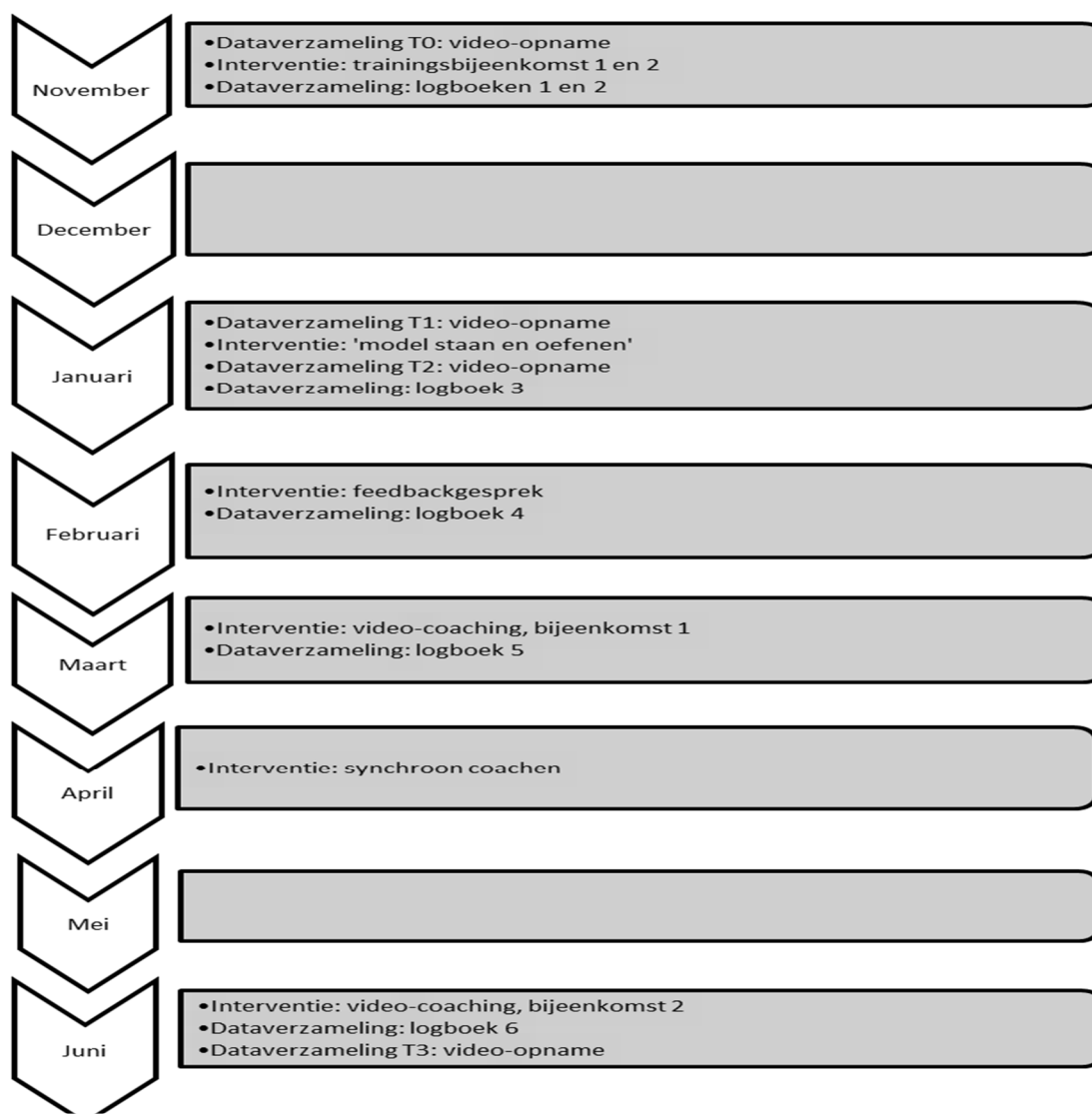
- *Twee trainingsbijeenkomsten* voor het hele team, waarin theorie werd gepresenteerd over feedback, feedback gedemonstreerd werd en de docenten konden oefenen met feedback.
- *Model staan en oefenen*. De docent oefende met het geven van feedback in zijn eigen klas, nadat de trainer-coachmodel had gestaan in het geven van feedback aan zijn leerlingen. Dit was een interventie binnen de klas, gericht op het leren van de individuele docent.
- Data-gestuurde feedback (a): *synchroon coachen*. Met behulp van afgesproken codewoorden geeft de trainer-coach met behulp van een 'oortje' feedback aan de docent tijdens het lesgeven. Synchroon coachen werd uitgevoerd tijdens één sessie in de klas, gericht op het leren van de individuele docent.
- Data-gestuurde feedback (b): *video-coaching*. In twee sessies in kleine groepen docenten (maximaal 5) vond gedurende 3 uur video-coaching plaats aan de hand van opnames van deze docenten in de klas.
- Data-gestuurde feedback (c): *feedback over feedback*. De docenten kregen in een gesprek en op papier feedback over hun feedbackgedrag in de klas, gebaseerd op een analyse van een video-opname van hun les. Deze interventie was gericht op het leren van de individuele docent.

In figuur 1 is te zien wat de volgorde van de interventies en de dataverzameling was tijdens de uitvoering van het FeTiP-traject.

We voerden een effectstudie uit met herhaalde metingen, waarbij een pre-test en een post-test in de vorm van een video-opname werden gebruikt om veranderingen in het feedbackgedrag van de docenten te meten. We maakten een kwantitatieve en kwalitatieve analyse van de feedback van de docenten in de opnames en maakten daarbij gebruik van het in deelstudie 2 ontworpen coderingsschema.

Onze analyses wezen uit dat de docenten inderdaad hun feedbackgedrag veranderden. De gemiddelde frequentie van feedback steeg significant van 11.0 (SD=6.4) in de voormeting tot 18.6 (SD=6,3) in de nameting. De gemiddelde frequentie van specifieke feedback steeg eveneens significant van 6.5 (SD=5,3) in de voormeting tot 13.4 (SD=5,8) in de nameting. De verhouding tussen positieve en negatieve feedback steeg van 1.7 (SD=1,6) tot 6.3 (SD=4,7), wat ook een significante stijging was (in alle gevallen $p < 0,01$). We vonden geen verschillen die toe te schrijven waren aan geslacht, leeftijd en/of ervaring. We concludeerden dat het FeTiP-traject inderdaad een positief effect had op het feedbackgedrag van docenten in de klas. We veronderstelden dat hierbij een aantal aspecten van belang waren: de combinatie van verschillende soorten interventies binnen en buiten de klas, die wellicht recht deden aan de verschillen tussen docenten, de interventies in kleine groepen met behulp van video-coaching en het effect van de betrokkenheid van de schoolleiding op de feedbackcultuur op de school.

In **hoofdstuk 5** wordt deelstudie 4 beschreven, waarin gezocht is naar veranderingspatronen ten aanzien van de frequentie van specifieke feedback van de docenten die deelnamen aan het FeTiP-traject. We hebben voor deze analyse op vier momenten video-opnames gemaakt van de lessen van de docenten, namelijk (T0) voorafgaand aan het traject, (T1) twee maanden later, na de twee trainingsbijeenkomsten en voorafgaand aan de interventie 'model staan en oefenen', (T2) ongeveer 20 minuten na T1, na de interventie 'model staan en oefenen' en (T3) vijf maanden later, na de feedbackinterventies (tevens na afloop van het FeTiP-traject). We gebruikten opnieuw het reeds ontwikkelde codeerschema om de beelden te analyseren op de specifieke feedback die de docenten gaven. Met behulp van deze analyse zochten we naar verschillende patronen in de veranderingen in het feedbackgedrag van de docenten. Om te zoeken naar mogelijke verklaringen voor de gevonden patronen, hebben we de docenten gevraagd om na elke interventie logboeken in te vullen. In de logboeken gaven de docenten antwoord op vragen zoals welke feedback ze gekregen hadden en hoe deze feedback hen geholpen of belemmerd had om te leren. Ook vroegen we de docenten waarvan ze zich bewust geworden waren en wat hen bij die bewustwording geholpen of belemmerd had. In figuur 1 is de volgorde te zien van de interventies en de dataverzameling.



Figuur 1

Chronologisch overzicht van interventies en dataverzameling gedurende het FeTiP-traject.

Bij het analyseren van de gemiddelde resultaten op de vier metingen, bleek dat de docenten als groep geen significante voor- of achteruitgang toonden na de trainingen en na de interventie 'model staan en oefenen'. De gemiddelde frequentie van specifieke feedback was na de data-gestuurde feedbackinterventies echter significant hoger dan die op de voormeting.

Vervolgens analyseerden we de veranderingen bij individuele docenten. Er leken drie veranderingspatronen te zijn wat betreft de frequentie van specifieke feedback. In de eerste plaats was er een groep van zes docenten die na elke interventie een stijging vertoonde van de frequentie van specifieke feedback. Dit patroon noemden we 'Gestaag leren'. Typerend voor deze groep docenten waren uitspraken in de logboeken over de bevestiging die de feedback op hun lesgeven hen bood en de stimulans die ze daardoor ervoeren om verder te gaan met oefenen.

Zes andere docenten lieten een patroon zien waarbij de frequentie van specifieke feedback daalde na de trainingsbijeenkomsten, weer op het beginniveau terugkwam na de interventie 'model staan en oefenen' en een stijging vertoonde na de data-gestuurde feedbackinterventies. We noemen dit patroon 'Leren van model staan en feedback'.

Typend voor deze groep docenten waren uitspraken waarin de docenten aangaven dat het zien van het effect op leerlingen hen had geholpen om te leren. Net als de docenten in het patroon 'Gestaag leren' gaven ze ook in hun logboeken aan dat de bevestiging die de feedback bood, hen motiveerde om verder te gaan met oefenen.

Een derde patroon was dat van vier docenten die alleen een stijging vertoonden in de frequentie van hun specifieke feedback na de interventies gebaseerd op data-gestuurde feedback. We noemden dit patroon 'Leren van data-gestuurde feedback'. Typende uitspraken van docenten met dit patroon duiden op weerstand. Opvallend was ook dat de docenten in dit patroon niet aangaven dat de feedback hen bevestigde in hun handelen, zoals de docenten in de andere twee patronen.

We concludeerden dat niet alle docenten klaarblijkelijk op dezelfde tijd leerden, of van dezelfde interventie. Sommige docenten leken gemotiveerd te worden om hun gedrag te veranderen door de bevestiging die ze kregen ten aanzien van hun feedbackgedrag, door het zien van het effect van feedback op leerlingen via video-opnames of door het voorbeeld van de trainer-coach. Dit leek echter nog niet voldoende om bij alle docenten het feedbackgedrag in de klas te veranderen. Het lijkt erop dat vooral interventies waarbij docenten data-gestuurde feedback krijgen, effectief zijn om hen te stimuleren tot gedragsverandering. Dit lijkt zelfs het geval te zijn voor docenten die weerstand lijken te vertonen tegen het veranderen van hun gedrag.

In **hoofdstuk 6** geven we antwoord op de onderzoeksvragen en bespreken we de wetenschappelijke en praktische relevantie van de verschillende studies, evenals de beperkingen ervan en suggesties voor verder onderzoek.

Ten aanzien van het eerste deel van deze dissertatie, effectieve en ineffectieve feedback en het vóórkomen ervan in de klas, vatten we nu de belangrijkste conclusies nog eens samen. In de eerste plaats hielp het denken vanuit andere psychologische perspectieven dan het louter cognitieve ons om het concept feedback in breder verband te beschrijven. De gecombineerde aandacht voor cognitie, emotie en kernkwaliteiten lijkt te leiden tot een evenwichtiger visie op effectieve feedback, die zowel van belang is voor de wetenschap als voor de praktijk. Aan de al geformuleerde kenmerken van effectieve feedback, zoals de specificiteit en de beknoptheid van de feedback, voegden we toe dat het ook van belang is om meer positieve dan negatieve feedback te geven en het geven van niet-specifieke feedback niet te vermijden, maar die aan te vullen met specifieke feedback. We beschreven feedback op kernkwaliteiten als een mogelijke vorm van feedback op de persoon die wel effectief is. Bovendien maakten we onderscheid tussen progressiefeedback en discrepantiefeedback, en gaven we aan dat een balans tussen deze twee typen feedback van belang kan zijn om leren te bevorderen. Uit de studie naar het gebruik van effectieve feedback in de klas bleek dat leraren niet veel feedback geven en dat van de wel geobserveerde feedback de frequentie van effectieve feedback laag is, evenals de verhouding tussen positieve en negatieve feedback. Progressiefeedback bleek zeldzaam te zijn in de klas.

Het tweede gedeelte van deze dissertatie ging over het ontwerp en de evaluatie van een professionaliseringstraject dat tot doel had om docenten te leren meer, en meer effectieve feedback te geven. We concludeerden dat de docenten inderdaad meer, en meer effectieve feedback gingen geven na het volgen van het FeTiP-traject. Bij het analyseren van de verandering van het feedbackgedrag van de docenten gedurende het traject bleek dat de docenten in onze studie drie verschillende veranderingspatronen lieten zien, 'Gestaag leren', 'Leren van model staan en feedback' en 'Leren van data-gestuurde feedback'.

De belangrijkste beperking van het eerste gedeelte van dit onderzoek was dat we ons alleen hebben gericht op psychologische inzichten op het gebied van emotie en leren, en op inzichten uit de positieve psychologie. We lieten bijvoorbeeld inzichten uit de sociale psychologie buiten beschouwing. In vervolgonderzoek zou het interessant zijn ook de sociale aspecten van feedback in de klas te betrekken.

In het tweede deel van onze studie was de belangrijkste beperking dat we de effectiviteit van het FeTiP-traject onderzocht hebben op slechts één school, met 23 docenten, zonder controlegroep, vanwege de arbeidsintensieve opzet van zowel de professionalisering als de analyses. Het zou interessant zijn om in het onderzoek meer scholen te betrekken met meer docenten. Hierdoor zou bijvoorbeeld nog duidelijker kunnen blijken wat de invloed is van de verschillende soorten interventies op de verandering in het gedrag van de docenten. Ook zou daarmee het analyseren van patronen van verandering, wat nu beperkt bleef tot een eerste exploratie, kunnen leiden tot het vinden van meer en/of andere patronen. In het bijzonder zou het interessant zijn verder onderzoek te doen naar de invloed van interventies gebaseerd op data-gestuurde feedback op veranderingen in het gedrag van docenten die weerstand vertonen ten opzichte van gedragsverandering. Daarnaast zou onderzoek naar de feedbackcultuur op scholen en de lange-termijneffecten van die cultuur op veranderingen informatie op kunnen leveren over de wijze waarop we duurzame gedragsveranderingen bij docenten kunnen bewerkstelligen.

De uitkomsten van ons onderzoek zouden van belang kunnen zijn voor onderzoek naar andere professionaliseringsprogramma's die tot doel hebben leraren te ondersteunen om hun gedrag in de klas te veranderen, bijvoorbeeld ten aanzien van klassenmanagement, het gebruik van ICT of het stellen van vragen. We concludeerden dat het zoeken naar één manier van professionaliseren die voor alle docenten helpt, nutteloos lijkt. Zeker als het doel van het traject is om te komen tot gedragsverandering in de klas, lijkt het effectiever om in-company trajecten te ontwerpen en te evalueren waarbij de schoolleiding betrokken is, en die verschillende interventies omvatten, namelijk zowel binnen als buiten de klas en gericht op verschillende niveaus in de school (het hele team, kleine groepen docenten en de individuele docent). Zulke trajecten geven mogelijk ook meer mogelijkheden voor maatwerk. Een wederzijdse feedbackcultuur (van leerlingen en docenten, van docenten onderling en van schoolleiders en docenten) zou van invloed kunnen zijn op de duurzaamheid van de verandering.

In de tweede plaats veronderstelden we dat feedback een grotere rol speelt in effectieve professionaliseringsprogramma's dan blijkt uit de literatuur over de kenmerken van effectieve programma's. In het bijzonder lijkt het gebruik van data-gestuurde feedback van invloed te zijn op veranderingen in het gedrag van docenten in de klas, ook bij leraren die in eerste instantie weerstand vertonen tegen verandering.

Dankwoord

Het schrijven van dit proefschrift was voor mij een onstuimige, prachtige tijd. Niet alleen vanwege de ups en downs die nu eenmaal bij een dergelijk proces horen, maar ook vanwege de stroom emoties, die het doen van onderzoek bij mij losmaakte: verwondering om de wonderbaarlijke wereld waarin ik terecht kwam waarin zoveel te weten was wat ik nog niet wist, bewondering voor al die onderzoekers en hun niet aflatende passie om te weten en te begrijpen. Maar ook verbazing, om alles wat wetenschappers al weten, maar de leraar voor de klas nog niet. De relatie tussen wetenschap en praktijk werd tijdens het overleg met mijn begeleiders een constant thema. In de eerste plaats wil ik daarom mijn begeleiders bedanken voor hun geduld om een trainer-consultant te steunen in het leren doen van onderzoek. We waren met zijn vieren een fantastisch team met aanvullende kwaliteiten. Onze gesprekken waren vaak zinderend van enthousiasme en bevologenheid. Dank jullie voor jullie uithoudingsvermogen en gedeelde passie.

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Het is af!

Lia Voerman,

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Peer-reviewed publications

- Voerman, L., Meijer, P.C., Korthagen, F.A.J., & Simons, P.R.J. (in press). Promoting effective teacher- feedback: From theory to practice through a multiple component trajectory for professional development. *Teachers and Teaching: Theory and Practice*.
- Voerman, L., Meijer, P.C., Korthagen, F.A.J. & Simons, P.R.J. (2012). Types and frequencies of feedback interventions in classroom interaction in secondary education. *Teaching and Teacher Education, 28*(8), 1107-1115.

Papers in progress

- Voerman, L., Meijer, P.C., Korthagen, F.A.J., & Simons, P.R.J. (resubmitted. Feedback revisited: Changing perspectives and the implications for teaching.
- Voerman, L., Meijer, P.C., Korthagen, F.A.J., De Kleijn, R.A.M., & Simons, P.R.J. (submitted). Differential effects of a professional development program on teachers' feedback behavior in the classroom: A search for change patterns of experienced teachers on a professional development program designed to provide more specific feedback.

Conference papers

- Voerman, L., Meijer, P.C., Korthagen, F.A.J. & Simons, R.J. (2013). *Teachers learning to provide learning-enhancing feedback: A pluriform professionalization trajectory*. Paper presented at the biennial meeting of the European Association of Research on Learning and Instruction (EARLI), Munich, Germany.
- Voerman, L., Meijer, P.C., Korthagen, F.A.J. & Simons, P.R.J. (2013). From theory to practice: A multiple component trajectory for professional development of experienced teachers on how to provide effective feedback. Paper presented at the Conference: Social psychology in the classroom, Auckland, New Zealand.
- Voerman, L., Meijer, P.C., Korthagen, F.A.J. & Simons, P.R.J. (2013). *An analysis and reframing of the theory and practice of feedback in education*. Paper presented in the symposium 'Teacher and student roles during feedback in interaction' at the SIG 1 meeting of the European Association of Research on Learning and Instruction (EARLI), Brussels, Belgium.
- Voerman, L., Meijer, P.C., Korthagen, F.A.J. & Simons, P.R.J. (2012). *Aanzetten tot verdere discussie over feedback door leraren*. [Some issues for further discussion on teacher feedback.] Paper presented in the symposium "De rol van docenten en studenten tijdens feedback in interactie' at the Onderwijs Research Dagen (ORD), Wageningen, the Netherlands.

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- Voerman, L., Korthagen, F., Meijer, P.C. & Simons, R.J. (2010). *Teachers providing feedback: The state of the art in classrooms*. Paper presented at the Joint Conference of SIG's 10 and 21: 'Moving through cultures of learning' of the European Association of research on Learning and Instruction (EARLI), Utrecht, the Netherlands.

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- Voerman, L. & Faber, F. (2010). "Goed zo!" is onvoldoende. ["Well done!" is not enough] *Van 12 tot 18* (3), 52-55.
- Voerman, L., & Bos, W. (2010). "Goed zo" is onvoldoende ... Wat wel? ["Well done!" is not enough.... What else?] *Van 12 tot 18*(4), 46-47.
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- Voerman, L. (2005). Het leren van docenten: ideeën, ervaringen en uitgangspunten. [Teacher learning: Ideas, experiences, and perspectives] In F. Adriaensen (Ed.), *Parallele processen*. Wisselwerk, 15, 83-89. Antwerpen/Apeldoorn: Garant.
- Voerman, L., & Faber, F. (2004). Perspectieven. [Perspectives] In A.J. Zwarteveen & L. Voerman (Eds.), *Werken (aan)leren. Acht jaar Kag-AI in de praktijk (1996-2004)*. VMBO-serie Wisselwerk, 14, 59-81. Antwerpen/Apeldoorn: Garant.
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Curriculum vitae

Lia Voerman is geboren op 18 augustus 1955 in Zwolle. Na het gymnasium studeerde zij orthopedagogiek met als specialisatie leerstoornissen en schoolontwikkeling aan de Universiteit van Utrecht.

Al voor ze afgestudeerd was, begon ze in 1979 te werken op een school voor Leerweg Ondersteunend Onderwijs (LWOO), 'De Bron', een zwarte school in Utrecht met alleen technisch onderwijs. In eerste instantie was haar taak het opzetten en uitvoeren van remedial teaching, maar al snel werd ze coördinator van een onderwijsstimuleringsproject en gaf ze leiding aan de ontwikkeling van beter onderwijs op vijf scholen voor VMBO.

Vervolgens stond ze aan de wieg van een project voor vroegtijdig schoolverlaters, TOV (Tijdelijke Opvang Vroegtijdig Schoolverlaters) in Utrecht. Omdat ze het gemis aan lesgevende ervaring steeds meer voelde, ging ze ook lesgeven, op De Bron. Niet volgens haar bevoegdheid in maatschappijleer, maar in Nederlands (vanwege de ervaring met remedial teaching) en in Informatica, wat in die periode een nieuw vak was, waarin gepioneerd kon worden. Naast deze activiteiten had ze een eigen praktijk in het diagnosticeren en begeleiden van leerlingen met leerproblemen, het geven van workshops en trainingen.

Een volgende periode in haar carrière kenmerkte zich door de stap naar het professionaliseren van docenten, gecombineerd met schoolontwikkeling. Ze werkte vanaf 1987 achtereenvolgens bij het SAC (School Advies Centrum Utrecht), het Christelijk Pedagogisch Studiecentrum (CPS), en de hogescholen Fontys en Windesheim. Ze ontwikkelde opleidingen (de opleiding voor remedial teachers, voor de Opleidingen Speciale Onderwijszorg) en trainingen voor docenten in het voortgezet onderwijs en voerde deze uit. De trainingen waren gericht op het vormgeven en ondersteunen van vernieuwingen, en op het handelen van docenten in de klas. Schoolontwikkeling was bij de trainingen altijd een belangrijk aspect. Werken met een stuurgroep om de vernieuwing in de school te implementeren en het begeleiden van de schoolleiding maakte standaard deel uit van haar werkwijze.

Tijdens het werken bij Fontys startte ze met KAG-AL (Kennis als Gereedschap - Actief Leren). Dit project werd gerealiseerd naar aanleiding van de invoering van het studiehuis in het HAVO-VWO, maar was specifiek gericht op het VMBO en gebaseerd op de overtuiging dat een 'theezakjesmodel' (wat bedacht is voor het HAVO-VWO, wordt in een afgezwakte versie in het VMBO ingevoerd) niet werkt. KAG-AL was een groot landelijk vernieuwingsproject in het kader van de invoering van activerende didactiek, samenwerkend leren en collegiale consultatie in scholen voor Praktijkonderwijs, LWOO, VMBO. Ook tijdens haar aanstelling bij Windesheim heeft ze leiding gegeven aan dit project, waar uiteindelijk zo'n 40 scholen en drie hogescholen (Fontys, Windesheim en STOAS) aan mee hebben gedaan.

In 1999 werd ze bij Windesheim uitgenodigd om teamleider te worden van het team consultants voor Voortgezet Onderwijs en MBO. In die hoedanigheid kreeg ze de verantwoordelijkheid voor beleid en financiën van een groeiend team consultants, en werd ze lid van het managementteam van de Afdeling Educatie van de hogeschool. Haar team en haar taken in het management groeiden en ze stond voor de keus: doorgroeien in de lijn van de organisatie en de inhoud verliezen, of zoeken naar een mogelijkheid om beide te combineren.

Vanaf 2002 werd ze teamleider van het team Training en Advies (T&A) op het toenmalige IVLOS van de Universiteit Utrecht, waar een combinatie van leiding geven en zelf inhoudelijk bezig zijn mogelijk en wenselijk was. Haar taak was een team dat nog in ontwikkeling was tot een actief, inspirerend en financieel gezond team te smeden. Het team groeide en bestond uiteindelijk uit T&A, het Scholennetwerk en het team Opleiden voor Opleiders en ze werd bovendien lid van het managementteam. Tijdens deze periode werd ze door Prof. dr. Fred Korthagen opgeleid tot trainer kernreflectie. Vanuit het IVLOS werd ze in de periode van 2006-2009 één dag in de week gedetacheerd bij Via Nova en UNIC, twee vernieuwingsscholen in Utrecht, waar ze de directie adviseerde bij het ontwikkelen van het onderwijsconcept en teamleiders en docenten trainde en coachte. Ook startte ze in 2006 met haar echtgenoot een eigen bedrijf in trainen en coachen van leraren, nu ook in het basisonderwijs. Ze werkte vanaf dat moment één dag per week in het eigen bedrijf, waarin het opleiden van beeldcoaches een belangrijk onderdeel is.

Een nieuwe uitdaging diende zich in 2008 aan in de vorm van dit promotietraject. In het werk op de scholen was haar belangstelling in de laatste jaren vooral uitgegaan naar het geven van feedback door docenten aan leerlingen, en hoe docenten dat zo zouden kunnen doen dat die leerlingen er echt iets aan hadden. Een ervaring met haar dochter in het voortgezet onderwijs leidde tot het ontwikkelen van 'Didactisch Coachen', waarin het geven van leerbevorderende feedback een belangrijke rol speelt. Prof. dr. Robert-Jan Simons vond deze ontwikkeling veelbelovend en gaf haar de kans om te promoveren op het onderwerp 'feedback', een kans die ze met beide handen aangreep. Zij werd in dit traject begeleid door Prof. dr. Robert-Jan Simons, Prof. dr. Fred Korthagen en Prof. dr. Paulien Meijer. Tijdens haar carrière heeft ze diverse vervolgopleidingen gevolgd, variërend van een studie Egyptologie tot opleidingen gericht op leren programmeren, projectmanagement, consultancy en (beeld)-coaching.