



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

在持续专业发展计划背景下的教师学习：案例研究



Linda van den Bergh^{a,*}, Anje Ros^b, Douwe Beijaard^c

^a Fontys School of Teacher Training for Special Educational Needs, The Netherlands

^b Fontys Teacher Training School for Primary Education, The Netherlands

^c Eindhoven University of Technology, Eindhoven School of Education, The Netherlands

HIGHLIGHTS

- The learning- and self-regulation activities of two teachers were examined in-depth.
- Teachers' learning patterns during a PDP differed greatly from each other.
- Although one teacher's learning pattern was undirected, she still learnt from the PDP.
- The trainer's feedback seemed to compensate for a lack of teachers' self-regulation to a certain extent.

ARTICLE INFO

Article history:

Received 10 March 2014

Received in revised form

22 November 2014

Accepted 2 January 2015

Available online 17 January 2015

Keywords:

Teacher learning

Continuing professional development

Case study

Learning activities

Self-regulation

ABSTRACT

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

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本研究的目的是了解CPD项目下的教师学习的特征。对两位老师的学习活动进行了深入的案例研究，他们遇到的困难和管理学习的方式被分析。结果显示这些教师很大不同：一个老师显示有定向的学习模式，而另老师的学习模式无方向性的。不过，PDP对教师课堂行为的积极影响也被观察。它出现，训练员可以弥补缺乏自律。

1. Introduction

The importance of continuing professional development (CPD) for teachers to improve or change their teaching practice is widely acknowledged. Kelchtermans (2004) defines CPD as *“a learning process resulting from meaningful interaction with the context (both in time and space) and eventually leading to changes in teachers' professional practice (actions) and in their thinking about that practice”* (p. 220). Although meaningful interaction with the context takes time, under certain conditions relatively short CPD programmes can have long-term impact on those involved (Van den Bergh, Ros, & Beijaard, 2014; Lydon & King, 2009). Several

review studies have been conducted in order to identify the features that increase the chance of CPD programmes for teachers resulting in effective professional development (e.g. Garet, Porter, Desimone, Birman, & Yoon, 2001; Van Veen, Zwart, & Meirink, 2012). Important features include integrating new knowledge, teachers develop in their classroom practice, learning together with colleagues, and being actively engaged in meaningful discussion. Although knowledge of such features is very helpful for developing CPD programmes, and even though some positive results of well-structured CPD programmes have been found (Van den Bergh et al., 2014; Lydon & King, 2009), research on teachers' professional development generally yields disappointing results. Professional development activities have often been found to be ineffective or to be perceived as irrelevant by teachers (Lieberman & Pointer Mace, 2008; Opfer & Pedder, 2011). Especially changing teachers classroom behaviour sustainably remains a challenging endeavour, while this is the intended learning outcome of most CPD plans. It is particularly challenging to change teachers' classroom teaching behaviour sustainably, and this is the intended learning outcome of most CPD plans.

* Corresponding author. Goossenslaan 1, 5022 DM, Tilburg, The Netherlands. Tel.: +31 651112140.

E-mail address: LvandenBergh@fontys.nl (L. van den Bergh).

CPD programmes. Several researchers have argued that many CPD programmes lack recognition of the need to embed teacher learning in teachers' own professional practices and working conditions (e.g. Borko, 2004; Timperley & Alton-Lee, 2008). Teaching and learning to teach are contextually situated. Professional development activities must therefore build on teachers' own knowledge and beliefs, perceived problems, and classroom practices (Opfer & Pedder, 2011). Mansour, Heba, Alshamrani and Aldahmash (2014) emphasise the significance of teachers' reflection on and assessment of their own professional needs and of their views of a CPD programme.

Several learning activities that teachers can undertake at their workplace have been described, including problematic aspects of teacher learning that can play a role in teacher learning (Bakkenes, Vermunt, & Wubbels, 2010). In a recent study, Endedijk, Vermunt, Verloop, and Brekelmans (2012) describe self-regulation activities that teachers use to direct their learning activities. These authors have shown that there is a large variation in these self-regulation activities among teachers. Different teachers may furthermore need different amounts and types of guidance, because of differences in the learning patterns they prefer and adopt (Vermunt & Endedijk, 2011). So, teachers' learning processes within the context of a CPD programme may vary considerably.

Relations between teachers' learning activities, their regulation of learning, and learning outcomes have not yet been studied extensively, while insight in these relations can be helpful to enhance the effectiveness of CPD programmes. Differentiation between teachers who participate in a certain CPD programme seems important to enhance each teacher's learning process and learning outcomes, just as it is for students. An in-depth case study of two teachers who participated in a well-structured CPD programme, was conducted to investigate these relations and to examine the effects of differentiation between teachers by the trainer. Before describing the study in more detail, we will elaborate on the central concepts of this study: learning activities, regulation of learning, and learning patterns.

1.1. Learning activities

In the literature on teachers' workplace learning, several overt, observable learning activities that teachers undertake have been described (e.g. Van Eekelen, Boshuizen, & Vermunt, 2005). These are learning by experimenting, interaction, using external sources, and reflection on one's own practices. 'Experimenting' refers to trying something new in one's practice. 'Learning by interaction' refers to talking or sharing with others or participating in, for example, a group discussion. 'Learning by using external sources' may occur when a teacher reads something or when (s)he attends a seminar. 'Reflection' refers to consciously thinking about the strengths and weaknesses of one's practices.

As all learning activities can occur individually as well as collaboratively, Bakkenes et al. (2010) have refined this classification. Furthermore, these authors add covert or mental activities. Six kinds of learning activities are distinguished by them: experimenting, considering one's practice, getting ideas from others, experiencing friction, struggling not to revert to old ways, and avoiding learning. In this study, these last three mental activities are regarded as problematic aspects of teacher learning that can occur during each of the learning activities. Although teachers may be engaged in the same visible activities, they may use different thinking processes that may also lead to different learning outcomes. Thinking processes that are supposed to direct the teachers' learning activities are called regulation processes (Butler, Novak Lauscher, Jarvis-Selinger, & Beckingham, 2004). Below, we will elaborate on these processes.

思维过程，引导教师学习活动，被称为调节过程

1.2. Regulation of learning

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

Two dimensions of teachers' regulation of their learning are found (Endedijk et al., 2012). The first is the active–passive dimension, which describes the activity of the teachers in regulating their own learning. Passive regulating teachers show a lack of self-regulation and need external regulation, while active regulating teachers actively search for information with which they can steer their learning. The second dimension is the prospective–retrospective dimension, which describes the variation in the focus of the regulation. Prospective regulation addresses the planning and goal-setting phase, while retrospective regulation involves the monitoring, reflection and evaluation phases of learning. Several studies on teachers' regulation of their learning have focused on informal learning in the workplace (e.g. Van Eekelen et al., 2005). In the workplace, however, teachers' goals are usually more focused on the achievement and well-being of their students than on their own learning. Clear learning goals for the teachers' professional development are often lacking. Although learning activities that begin as unplanned and non-deliberate activities can still involve active regulation activities, albeit in a retrospective way, evidence has been found that organised learning environments do elicit better learning activities and outcomes than informal learning (Bakkenes et al., 2010; Hoekstra & Korthagen, 2011). The CPD programme that formed the context of the teacher learning examined in the present study was one such organised learning context: well-defined learning goals were set in each phase of the programme, several specific learning activities were organised, and the trainer provided the participating teachers with extensive feedback. Because of the variation in problems with learning that can occur and in the regulation of learning, the learning processes of individual teachers who learnt within this context varied. These learning processes influence the quality of teacher learning and teachers' learning outcomes (Brownell et al., 2014).

组织的学習環境引起更好的學習活動和成果相比非正式學習

1.3. Learning patterns

Teachers' learning and regulation activities relate to each other in a learning pattern, which can be defined as "a coherent whole of learning activities that learners usually employ, their beliefs about own learning and their learning motivation, a whole that is characteristic of them in a certain period" (Vermunt & Endedijk, 2011, p. 295). Three different learning patterns are identified: an *immediate performance directed pattern*, which refers to teachers who are mainly aiming to improve their immediate performance in the classroom, a *meaning directed pattern*, which refers to teachers who are aiming to understand underlying principles and to extend their knowledge of practice, and an *undirected pattern*, which refers to

teachers who experience problems with learning about teaching or with the implementation of educational innovation, and who sometimes avoid learning (Vermunt & Endedijk, 2011). The problems of teachers who employ an undirected learning pattern may be caused by the same characteristics as those consistently found in patterns of student learning: a lack of regulation, not knowing how to learn appropriately, and uncertainty about their own capabilities (Donche & Van Petegem, 2011).

Learning patterns are influenced by contextual factors, such as an external stimulus or support in the workplace, and by personal factors, such as teachers' personality traits and their existing knowledge, beliefs and attitudes (Clarke & Hollingsworth, 2002; Van Petegem, Donche, & Vanhoof, 2005). Another important personal factor that influences teachers' learning appears to be teachers' willingness to learn. This is considered a necessary prerequisite if workplace learning and professional development are to occur. Teachers may differ with regard to their willingness to learn; some teachers do not see the need to learn, other teachers wonder how to learn, and there are teachers who are eager to learn (Van Eekelen, Vermunt, & Boshuizen, 2006).

1.4. The present study

This study is part of a larger research project concerning teacher feedback during active learning (Van den Bergh, Ros, & Beijaard, 2013a, 2013b, 2014). The research took place in primary schools in the Netherlands. Feedback is defined as specific information about a student's observed performance measured against a certain standard and given with the intent to improve the student's performance (Van de Ridder, Stokking, McGaghie, & Ten Cate, 2008). Active learning refers to classroom situations in which students work in small groups on different tasks at the same time. This type of learning was used in environmental studies' classes (i.e. projects that integrate subjects such as history, geography, and biology). In earlier studies, we described teachers' feedback behaviour, their beliefs and perceived problems regarding feedback during active learning, and, based on this knowledge, we developed and implemented a CPD programme aimed at improving feedback during active learning. The principles of active learning that draw on social-constructivist learning theory characterised students' learning in the classroom, but also teachers' learning in the CPD programme. The central idea was that learners have to construct their own knowledge in interaction with the social and authentic learning environment they learn in. Positive short- and long-term effects of this CPD programme on teachers' knowledge and beliefs and their feedback behaviour were observed. Two teachers who participated in the CPD programme were selected for the present case study, which aimed to answer the following research questions:

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

1.5. Context

The CPD programme in which the teachers participated was aimed at improving feedback during active learning. Feedback is one of the most powerful tools teachers can use to enhance student learning and achievement (Hattie, 2009). Giving feedback in an active learning context, however, is a difficult task for teachers. In active learning environments, learning is an active process of knowledge construction supported by teachers. Teachers all over the world experience difficulties in implementing this kind of

teaching successfully (e.g., in Finland: Niemi, 2002; in Scotland: Stephen, Ellis, & Martlew, 2010; in Australia: Van Deur, 2010). The CPD programme was built on teachers' knowledge and beliefs, and their classroom practices, which seems conditional for any CPD programme (e.g. Opfer & Pedder, 2011). The following goals regarding the teachers' feedback behaviour were set: 1) teachers relate their feedback to clear learning goals, 2) teachers include confirmation and criticism as well as constructive remarks, and 3) teachers balance directive and facilitative ways of giving feedback.

The CPD programme incorporated several features that have been identified as being effective to enhance teachers' professional development in review studies (e.g. Garet et al., 2001; Van Veen et al., 2012). For example, the CPD programme was intensive and sustainable; it consisted of weekly recurring learning activities over a period of four months. The CPD programme required the collective participation of all teachers who taught in the same grade at the schools, and there were plenty of opportunities to engage in active learning sessions. The trainer provided the teachers with extensive feedback, because learning about teaching is enhanced when the approaches that are advocated in the CPD programme are modelled by the teacher educator who is delivering the CPD programme (Korthagen, Loughran, & Russell, 2006). A considerable part of the CPD programme consisted of video-based learning, since research has shown that the use of videos can yield positive effects on teachers' beliefs and on their interaction skills (Fukkink, Trienekens, & Kramer, 2011; Van Es & Sherin, 2010).

The school in which both teachers worked was located in a larger village in the south-east region of the Netherlands and had a population of 643 students. Students' learning results did not differ from the national average of student learning results (Inspectorate of Education, 2010). Active learning in the domain of environmental studies was organised in workshops. There were four different workshops: 'space', 'time', 'nature', and 'technology'. Students from the highest grades chose one of these workshops to work in for a period of four weeks, three hours per week. Both teachers each taught one of the four workshop to a heterogeneous group of students from the 6th, 7th, and 8th grades (9–12-year-old students). Students formulated their own learning questions about the topic of the workshop. An example of a learning question in the 'nature' workshop was: 'How can deers survive in the Netherlands?'

2. Method

2.1. Participants

Two teachers who participated in the CPD programme and differed greatly from each other with regard to their assessment of their professional needs and with regard to their initial feedback behaviour and beliefs were selected; Lisa and Sara (fictitious names). Lisa had six and Sara had five years of teaching experience; they had four and five years' experience with active learning, respectively. To indicate their professional needs, teachers' behaviour was examined and their beliefs and perceived problems were discussed before the CPD programme started.

Lisa already had some knowledge and beliefs concerning feedback during active learning that were in line with the theoretical knowledge about this concept. For example, she acknowledged the importance of clear learning goals and she mentioned the coaching role of the teacher in this learning context. Lisa also showed some classroom behaviours that were in accordance with the learning goals of the CPD programme, for example, at times she related her feedback explicitly to the learning goal(s) and she gave her students feedback mostly in a facilitative way. Lisa indicated that she perceived a number of problems, such as difficulties with asking the right questions to promote learning, difficulties with balancing

“compulsory” learning goals and student initiatives, and she found it difficult to criticise student work. Sometimes, Lisa also found it difficult to adapt her teaching to the needs of individual students, because she did not teach her own students during the workshops. She thought it is important to give positive feedback to all students, but tries to adapt her teaching to the self-confidence of students, their cognitive level and their interests.

Sara reported little knowledge and beliefs concerning feedback during active learning and the beliefs she reported did reflect theoretical knowledge to a small extent. For example, she mentioned that giving feedback is expressing an opinion regarding a student's work and the teacher must enable the students to proceed with the task at hand. In the classroom, Sara gave little goal-directed feedback and the way feedback was given was directive in nearly all feedback interactions with her students. The only problem that Sara perceived was difficulty activating student thinking. Sara indicated that she automatically adapts her teaching to individual students' needs and that she tries to adapt her teaching to the social-emotional development and to the cognitive level of the students.

Both teachers were informed about the analyses being conducted in this case study and gave permission for us to use literal quotations of their verbal and written comments.

2.2. Professional development programme

The following sequence of activities was carried out four times during the CPD programme:

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

Active prospective, as well as active retrospective regulation of learning (Endedijk et al., 2012) was stimulated in all the activities. Clear goals that were based on teachers' own beliefs, concerns and practices were set for the entire CPD programme as well as for each separate meeting. Ways in which the goals could be reached were discussed during the meetings and afterwards teachers were asked to note down their ideas for implementation. In the periods between meetings, teachers were required to implement certain well-defined goal-directed behaviours and to reflect on these afterwards. All meetings were highly interactive; active participation of the teachers was required. As was explained in Section 1.1, the learning activities that will be distinguished are: getting ideas from others, experimenting, and considering one's practice (Bakkenes et al., 2010). Problematic aspects of learning that can occur during these three activities are experiencing friction, struggling not to revert to old ways and avoiding learning (Bakkenes et al., 2010). A more detailed description of the learning activities is given below.

Getting ideas from others. Getting ideas from external sources was facilitated in the CPD programme in two ways. First, the trainer presented theory about feedback during active learning during the

informative meetings. Video fragments showing (unfamiliar) teachers' behaviour that constituted examples and non-examples of application of the theory were also presented and discussed. Second, the trainer provided feedback that was tailored to the concerns and practices of each individual teacher during the video interaction training.

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

Considering one's own practice was stimulated in different ways. At the end of each meeting, the teachers were asked to note down in a logbook what they had learnt and their ideas for implementing the new knowledge in the classroom. After being videotaped, teachers received their own videotape. They were asked to select four fragments from this videotape that captured optimal and non-optimal teacher behaviour with regard to the goals that were the subject of the previous informative meeting. During the VIT meeting each teacher presented the selected fragments to two colleagues and the trainer and discussed any questions and concerns within roughly half an hour.

2.3. Data collection

Three types of data were collected repeatedly during the course of the CPD programme. The data sources were: videotaped observations of teachers' feedback behaviour in the classroom, videotaped observations of VIT meetings, and teachers' written self-reports of what they had learnt during (parts of) the CPD programme.

Videotaped observations of teachers' feedback behaviour. After each informative meeting, 20 min of an active learning lesson taught by each teacher were videotaped and analysed. These observations were used to see how the teachers experimented with the new knowledge in their classrooms and to indicate the learning outcomes with regard to the teachers' feedback behaviour. Teachers also used the videotapes to consider their own practices and to select fragments to discuss during the VIT meetings. Feedback interactions were discerned; interactions in which the teacher gave information to the student(s). For these interactions, the following characteristics were examined: whether or not the feedback was goal-directed, what the nature of the feedback was, and in what way the feedback was given.

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

Table 1

The data sources that were used to analyse teacher learning during the different learning activities. 用于分析的数据来源老师学习在不同的学习活动。

Data source	Videotaped observations of teachers' feedback behaviour	Videotaped observations of teachers' participation in the VIT meetings	Written self-reports of what was learnt
Learning activity			
Getting ideas from others		X	X self-reports after informative meetings
Experimenting	X		
Considering one's own practice		X	X self-reports after video interaction training

Written self-reports of what was learnt during both the informative and VIT meetings, and ideas for how the new knowledge could be implemented in the classroom, were written at the end of each meeting. Three questions were answered in a logbook: What did I hear and/or do? What was important for me? What concrete intentions can I derive from this? (cf. Korthagen et al., 2006). Self-reports of what was learnt during each informative meeting can be seen as **retrospective regulation of learning**, which involves monitoring, reflection and evaluation. The concrete intentions teachers make show their **prospective regulation of learning**, which involves planning and goal-setting. Table 1 depicts what data source was used to describe the learning during each learning activity.

2.4. Data analysis

Videotaped observations of teachers' feedback behaviour. For each teacher, six videotapes of teacher–student interactions were analysed. Feedback interactions were identified: each feedback interaction contained an interaction with only one (group of) student(s) and was about only one topic. The characteristics of the feedback in each feedback interaction were scored for: (1) being or not being related to a goal, (2) its nature which could be confirming, critical, constructive, a combination of these, or neutral, and the way in which feedback was given which could be facilitative, directive, encouraging or neutral (for more details, see Van den Bergh et al., 2013a).

Videotaped observations of teachers' participation in the VIT meetings. All VIT meetings were videotaped. Those parts of the meetings in which the teachers presented their selected fragments and discussed their questions and concerns were **transcribed verbatim**. Each transcription concerned the discussion of only one selected fragment; there were nine fragments of Lisa and seven of Sara. The content of each transcription was summarised and the observed characteristics of the teachers' learning processes were noted. These summaries were interpreted in terms of problematic aspects of learning and the regulation activities as described in the introduction (Bakkenes et al., 2010; Endedijk et al., 2012; Zimmerman, 2006). These interpretations were explicated and approved by two fellow researchers.

Written self-reports of what was learnt during each meeting and ideas for how to implement the new knowledge in the classroom consisted of brief fragments of text. There were eight self-reports from each teacher. The content of each fragment was interpreted as a whole. Following a similar method to the analysis of the VIT meetings' videotaped observations, descriptions of the teachers' learning and regulation activities were interpreted in terms of the problematic aspects of learning, and the regulation activities from the literature (Bakkenes et al., 2010; Endedijk et al., 2012; Zimmerman, 2006). Two fellow researchers approved the interpretations of the data in these descriptions.

To describe the learning activity 'experimenting', the videotaped observations of teachers' feedback behaviour were used. Descriptions of the learning activities 'getting ideas from others' and 'considering one's own practice' were made by combining the descriptions based on the two different data sources (see Table 1). Again, these descriptions were approved by the other two researchers. The essence of the descriptions, illustrated by representative quotes, will be presented in the results section.

3. Results

3.1. Teachers' feedback behaviour

Positive effects of the CPD programme on the feedback Lisa and Sara gave to their students during active learning were observed

after the CPD programme ended. Both teachers more often directed their feedback to the learning goal. Optimal feedback contains confirmation of good work, constructive criticism and advice for improving the quality of the work (Nicol & Macfarlane-Dick, 2006). The nature of the feedback Lisa and Sara gave more often contained two, or all three, of these aspects.

The goal of the CPD programme pertaining to the way feedback was given was to facilitate a more even balance between directive and facilitative ways of giving feedback. During the observation before the CPD programme started, **Lisa gave little directive feedback. Most of her feedback was given in a facilitative way.** Sara showed the opposite: she was very directive to her students and no facilitative feedback was observed. During the CPD programme Lisa learnt to be more directive on some occasions, while Sara learnt to give more feedback in a facilitative way.

3.2. Getting ideas from others

3.2.1. Lisa

Lisa's self-reports revealed that she understood the essence of the information that was presented. Active prospective regulation of learning was visible in the intentions she noted down for implementing the new knowledge in her classroom; her ideas were formulated as concrete plans for action. Her self-report after the second informative meeting illustrates this: "Important for feedback: mentioning the learning goal. Learning goals must be concrete and measurable. Success criteria must be given, so that students know what is expected from them. ... C–C–C stands for Confirmation, Criticism, Constructive: say what is good, what can be improved upon and give suggestions for doing so. My intentions: look at the students' research questions and think about success criteria and ways to get these questions to a higher level."

Active regulation of learning by getting from ideas of others was also recognisable during the VIT meetings. Lisa did not need much external regulation by the trainer. Prompting questions and confirmation by the trainer were sufficient for Lisa to learn. The following example comes from the discussion of a lesson in which Lisa consciously implemented her new knowledge:

Lisa: I think this fragment is a good example of how I focus my feedback on this student's self-regulated learning.自我调节学习

Trainer: Why would you think this is feedback focused on students' self-regulated learning?

Lisa: I think this feedback has contributed a little to this student's learning to learn. She will probably not ask the same question again in another lesson, because now she has learnt she has to monitor whether the information she found contributes to reaching the learning goals or not.

3.2.2. Sara

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

During the VIT meetings, Sara needed a lot of external regulation by the trainer. She selected fragments of her videotapes, but was insufficiently guided by the learning goals during this selection. Misunderstandings about the goals and content of the CPD programme had to be corrected recurrently by the trainer through

repeating and further explaining the information. Sara frequently struggled to understand and interpret this information. The following excerpt is an example of this:

Trainer: *And what fragment did you select?*

Sara: *Here, it started at 6.40. I thought this was not good.*

Colleague: *Not goal-directed or not C–C–C?*

Sara: *Yeah, I don't know exactly. I did select good examples and examples that were not good, but I really had trouble keeping those things apart.*

Trainer: *These are two important characteristics of feedback: goal-directedness and C–C–C. These are different things.*

Sara: *Oh. I found this confusing. Because, in a way, it is the same. Isn't it?*

Colleague: *No, it is not the same.*

Trainer: *Ideally you do both. Goal-directedness is about setting a clear learning goal and relating the feedback to that goal. The C–C–C is saying what the student did well, what can be improved and giving suggestions for this improvement.*

Sara: *Okay. Well, anyway, I selected 6.40–7.10 and I daren't say anything about what I am doing here.*

3.3. Experimenting

3.3.1. Lisa

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

Lisa: *Did you find an answer to your question?*

Student 1: *Yes, we wrote that down here.*

Lisa: *Okay, you wrote it down. But do you know it yourself, can you tell me?*

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

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

Students: *Yes.*

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

Student 2: *Yes.*

Lisa: *Well, how can you do this?*

3.3.2. Sara

From the observations of Sara's experimenting in the classroom it became clear that Sara's behaviour was not explicitly guided by

the learning goals of the CPD programme. Her feedback behaviour seemed to be influenced more by the organisation of the lesson and by the learning materials that were used. In the third video observation, Sara displayed all the target behaviours: she frequently related her feedback to the learning goals and she regularly included confirmation, criticism as well as constructive remarks in her feedback. An increase in feedback given in a facilitative way was visible. It appeared that Sara learnt a lot. In the fourth video observation, however, it seems that Sara had reverted to her old ways of giving feedback. The difference that was observed between these two lessons was the assignment Sara gave to the students. In the first lesson levels of thinking were described on the whiteboard in relation to the topic 'the human body', including example questions that students could ask themselves to reach this level. This way of working appeared to support her feedback behaviour in her classroom:

Sara: *Okay, you say that you are almost ready. Well, you might check the thinking levels: can you give information about the muscles about each level? (points to the whiteboard)*

Student 1: *I think so.*

Sara: *At the describing the characteristics level, I haven't heard anything yet about the colour. [Critical] You know about the size and form, you have examples of this and that is very good. [Confirmative] But what does one muscle look like?*

Student 1: *Yes, like this. (points to a picture in a book)*

Sara: *Like that, yes. But look at this other picture of a muscle. What are the different characteristics of these parts of the muscle? [Constructive]*

Students: *Yes...*

Sara: *Because that is the goal, that you know exactly what a muscle looks like. [Goal directed] What you have found here are examples of muscles. That is good, you can use these to clarify the information [Confirmative], but first you need to describe what a muscle looks like and how it is built up. And then you can give those examples. [Constructive]*

Students: *Yes*

Sara: *Do you understand? So, what are you going to do now?*

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

Student 1: *I don't understand this. We have to fill in our names and topic here?*

Sara: *Yes. And then you colour this on the third page. The animal kingdom. Vertebrates. What have you got, a reptile or an amphibian?*

Student 2: *A reptile.*

Sara: *Then you turn this around, reptile, reptile (points to several places on the page of the booklet). Lizards, crocodiles, turtles and snakes. Which does your animal belong to?*

3.4. Considering one's own practice

3.4.1. Lisa

Lisa showed an active retrospective regulation of learning when she considered her own practice. The fragments Lisa selected were

always relevant in terms of the learning goals and the selected fragments capturing optimal behaviours were indeed good examples of this targeted behaviour. Lisa reflected on her classroom behaviour quite critically. She considered her own behaviour, but also to the effects of it on students' learning. Examples of explanations of why she selected a certain fragment are: "I am being too directive here. This student does not agree with my ideas at all and feels that he is being pushed in my direction." Another example is: "I do give goal-directed feedback here, but I am steamrolling over the students' answers. I do not feel that my feedback has helped these students."

Lisa often chose to discuss the fragments of which she was not sure. On some occasions, she experienced friction when implementing the new knowledge in her classroom. She then brought in clear questions with which she was struggling before presenting the video fragments she selected. For example, after the informative meeting in which we discussed the difference between being directive and providing structure:

Lisa: I was quite directive the last time actually, because I thought earlier I had a fairly passive role. I felt that telling the students what to do was not a good idea. But now I've given them a new research question, although I would prefer that they come up with their own questions. Only, sometimes I do have the idea that when you suggest a question yourself, they work on it with much more enthusiasm and it can help them to think on a higher level.

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

Lisa: Not directly directive feedback, I actually mean offering them structure by giving them a clear research question. During this lesson I noticed that when I do this, and when I am clear about what I expect from them, the students show deeper learning.

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

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

Lisa: Yes. The last two times I let that go a little. I thought they really had to come up with their own research questions. But now I think offering structure can provide the basis to go a step further. Just a minute, I want to note this down.

3.4.2. Sara

When considering her own practice, it appeared that Sara passively regulated her learning in the sense that she needed a lot of external regulation by the trainer. She frequently asked the trainer whether she 'was allowed to' give feedback in a certain way. At the same time, she was involved, enthusiastic and she appeared motivated to learn. Retrospectively, Sara evaluated her learning experience and she drew inferences for subsequent learning. In the following self-report of learning during a VIT meeting, she wrote: "I had trouble selecting my fragments. When am I being directive? We talked about the fact that there are multiple ways to get to Rome. Rome is the destination (the goal, this is structure), but students may choose how to get there (giving choices). It is important to discuss these things together, because you can learn a lot from each other. I really enjoy this. Sometimes I think that I am doing something wrong, but then it turns out not to be that bad."

Sara repeatedly experienced friction when things did not work out as she planned. She often attributed these negative experiences to external causes, such as a lack of (conditional) skills on the part of the students, or the way in which active learning was organised in the school. At one time Sara avoided learning. She could not find any example of good feedback in this videotape: "I was so frustrated

that I did not want to look at the last 8 min of this video. It was really depressing." By focusing on her positive behaviours and by relating these explicitly to the goals of the CPD programme, the trainer tried to enhance Sara's feelings of self-efficacy and her monitoring of her own behaviours and learning results:

Sara: This fragment is not good. This whole lesson was a disaster.

Trainer: But this clearly is an example in which you let the students think about their own working process. And about the more general skill of using a dictionary for looking up the meaning of words.

Colleague: And is this not also C–C–C?

Trainer: Yes, very clearly. You say that these students have searched for this information very well, but that they haven't read it properly yet. And you suggest that they can also think about using the information for their presentation. So, it is the C of confirming what they did well, the C of critique of the fact that they haven't yet read it properly, and the C of constructive about how they can use this information.

Sara: Yes.

Trainer: This, then, was a positive example of your feedback behaviour, wasn't it?

Sara: Well, then this is the best example of the whole video, because I seem to do the C–C–C right.

4. Discussion

4.1. Similarities and differences in teachers' learning processes

In the present study, we aimed to obtain insight into the relations between teachers' learning activities, teachers' regulation of learning and their learning outcomes within the context of a CPD programme. Two teachers who differed greatly from each other with regard to their assessment of their professional needs (Mansour et al., 2014) and with regard to their initial feedback behaviour and beliefs (e.g. Borko, 2004; Timperley & Alton-Lee, 2008) were selected in order to describe a range of different learning activities, regulation activities, and problematic aspects of learning. In this way a range of different learning activities, regulation activities and problematic aspects of learning could be described fully.

Both teachers clearly showed a willingness to learn. They wanted to discover new practices and they were open to experiences and to the input of their colleagues and the trainer. Lisa appeared eager to learn: she was proactive, questioned her own practices, and recognised and monitored her own learning processes and results. Sara did not display these behaviours, it appeared that she was willing to learn, but did not know how. Although clear differences in these two teachers' learning were observed, positive learning outcomes were obtained by both teachers. The differences between the two teachers will now be discussed in more detail.

During the course of the CPD programme, several learning activities were stimulated alternately and frequently. The learning activities getting ideas from others, experimenting and considering one's practice were embedded in the programme. These activities were supposed to appeal to teachers' directedness to extend their knowledge of feedback and active learning and to integrate this new knowledge in their feedback behaviour in the classroom. During the execution of these learning activities, problematic aspects of learning could occur; experiencing friction, struggling not to revert to old ways and avoiding learning (cf. Bakkenes, Vermunt, & Wubbels, 2010). Both teachers experienced friction at times. The nature of this friction, however, was very different. Lisa understood the essence of the CPD programme very well, but had trouble implementing some of the target behaviours in the classroom on

some occasions. She consciously identified these problematic aspects of giving feedback during her lessons and she was able to ask the trainer and her colleagues relevant questions afterwards to overcome these problems. Sara, on the other hand, experienced friction repeatedly because of misunderstandings concerning the content of the CPD programme or when things did not work out as she had planned. Sara was hindered by these misunderstandings; she repeatedly did not know which feedback behaviours were targeted or how (and why) she could implement these in her classroom. She obviously struggled to learn during the CPD programme. In one of the lessons, she reverted to her old way of giving feedback and she felt very frustrated about this, which even led her to avoid learning at that moment.

With regard to the two dimensions of regulation of learning Vermunt and Endedijk (2011) distinguished, differences between the two teachers were also observed. Lisa regulated her learning actively both prospectively and retrospectively. For example, she was conscious of the goals of the CPD programme and she planned how to achieve these goals during her lessons. Retrospectively, she reflected critically on her own behaviour as well as on the effect of her behaviour on the students and she drew inferences for subsequent learning. Although active prospective and active retrospective regulation was explicitly promoted during the CPD programme, Sara had difficulties with regulating her learning. She needed a lot of external regulation by the trainer, for example to help evaluate her behaviours in relation to the goals of the CPD programme.

The learning processes of both teachers can be characterised in terms of the learning patterns as identified by Vermunt and Endedijk (2011): an immediate performance directed pattern, a meaning directed pattern, or an undirected pattern. As the CPD programme focused directly on improving teachers' immediate performance in the classroom by implementing the new knowledge that they built, this aim was reflected in the learning process of both teachers. Lisa showed a meaning directed learning pattern, as she aimed at understanding the underlying reasons for why things worked as they worked in the classroom and at extending her knowledge of feedback and active learning. Sara on the other hand showed characteristics of an undirected pattern. She struggled with learning and implementing the new knowledge. A lack of regulation of learning was observed, as well as a lack of regulation of classroom processes.

It is known that a meaning directed learning pattern is favourable, because this leads to deeper learning and skills (Endedijk, Vermunt, Verloop, & Brekelmans, 2012). Although an undirected pattern is undesirable, Sara did improve her feedback behaviour in the classroom. The structure of the CPD programme and the tailored feedback of the trainer seemed to compensate for this unfavourable learning pattern to some extent. The activities were highly structured and explicitly stimulated prospective and retrospective regulation during each phase of the CPD programme. During the VIT meetings, the trainer gave tailored feedback to each individual teacher and she was able to detect and correct misunderstandings. This appeared to help Sara to learn, despite of her undirected learning pattern. Similar findings were reported by Hoekstra and Korthagen (2011) about a teacher who was willing to learn but not successful in changing her practice so that she tended to revert to old routines. However, when she received some structural support through feedback from others she had little trouble making big steps forward. Based on a review study of the effects of structural and process features of eighty CPD programmes on teachers' knowledge, practice and efficacy, Ingvarson, Meiers and Beavis (2005) also highlighted that timely and insightful feedback on what one is doing is crucial for reflection on one's practices and the development of understanding. One of the most

significant findings in this study was how rarely designers built in opportunities for feedback and coaching in the workplace. In the CPD programme we developed, many opportunities for feedback were included, both from the trainer and from the teachers' colleagues. The trainer consciously modelled the feedback behaviour that was advocated in the CPD programme, which is an important feature of effective programmes (Korthagen, Loughran, & Russell, 2006). This central role of feedback may have compensated for Sara's undirected learning pattern to some extent.

4.2. Limitations and directions for future research

We used different data sources to describe teacher learning; videotaped observations in the classroom, videotaped observations of VIT meetings, and written self-reports of what was learnt during each meeting. We deduced experience of problematic aspects of learning and teachers' regulation activities from these data sources. Because one of the starting points of the CPD programme was reacting to the teachers' experiences in their classroom, the discussion of problematic aspects was interwoven in the CPD programme. Especially in the VIT sessions, the teachers' thoughts about their work and their interactions with different (small groups of) students were elaborated extensively. Individual problems with the teachers' learning processes were, however, not directly investigated. The intensity of the CPD programme and the already increased workload for the teachers were the reasons for this decision. In future research, a direct assessment of the problems teachers experience during learning may, however, be valuable, as further insights could be obtained. For example, additional (stimulated recall) interviews could be conducted or teachers could be asked to write self-reports about the frictions they experienced during the course of a CPD programme.

The CPD programme was implemented in the 6th, 7th, and 8th grades of two primary schools. The teachers who were studied worked at the same school. In this school, a group of nine teachers participated in the CPD programme. The collective participation of groups of teachers from the same school in a CPD programme seems to be a critical factor for stimulating teachers' professional development, for example by sharing and exchanging experiences (Meirink, Meijer, & Verloop, 2007; Van Veen et al., 2012). The influence which participating in a CPD programme together with colleagues has on teachers' individual learning has not been examined in this study, as we have only focused on the parts of the VIT meetings in which the two selected teachers brought in the video fragments they selected. Based on the literature, it can be expected that this had a positive influence. However, negative consequences of learning together with colleagues could also have occurred, for example through group pressure on changing practices. For future research, it would be interesting to look at these processes of collaborative learning on teacher learning in more detail. More interactions between colleagues during informative meetings and during VIT meetings could be analysed and teachers could be asked about interactions regarding the relevant topics in other contexts, for example during lunch breaks or regular team meetings.

Finally, the support which teachers who show an undirected learning pattern need to improve their learning and the regulation of their learning could be examined in more detail in future research. This is relevant with regard to the learning outcomes that are targeted in a CPD programme, but, more importantly, it is clear that skills in self-regulation of learning can support teachers' lifelong learning (Endedijk et al., 2012). Feedback that is specifically focused on the learners' self-regulation appears to be the most effective in enhancing learning (Hattie & Timperley, 2007). Feedback focused on developing teachers' self-regulation in the context

of CPD programmes would therefore be an interesting topic for future research.

4.3. Conclusion

Although the ability to draw firm conclusions from our study is limited as we only studied the learning of two teachers in depth, our findings support previous research on teacher learning, demonstrating the differences between teachers in a CPD programme that is characterised by a complex interaction between the teacher, the content to be learnt, and his/her environment (Brownell et al., 2014; Vermunt & Endedijk, 2011). Through this complex interaction, teachers learn differently and have different learning needs, which must be taken into account in a CPD programme. The study illustrated that, besides building from teachers' own knowledge, beliefs and practices with respect to the content, differentiated feedback for individual teachers is important for the professional development of teachers, especially for those showing undirected learning. In reviews of research on the effectiveness of teacher learning in professional development interventions, opportunities for (and the quality of) feedback of the trainer is not identified as an important feature of interventions in itself. It is rather regarded as an element of other features, such as active learning or collaborative learning (Garet et al., 2001; Van Veen et al., 2012). Ingvarson et al. already highlighted this problem in 2005. This study illustrated that, in order to adapt the CPD programme to the level of self-regulation of individual teachers, the role of the trainer is essential: he or she should be able to give feedback that is tailored to the concerns, practices and learning characteristics of each individual teacher.

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