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Capturing mentor teachers' reflective moments during mentoring dialogues

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The main goal of the current study is to ascertain empirically different levels of consciousness in mentor teachers' use and acquisition of supervisory skills during mentoring dialogues as indicated by differential frequencies of mentor teachers' reflective moments. For each of the 30 participants, two mentoring dialogues were analyzed: one before and one after they were trained in supervisory skills. To capture the frequency of reflective moments, the stimulated recall technique and a specially developed push-button device were combined in a two-method approach. The data of the study suggest the existence of different levels of consciousness in acquiring and using supervisory skills, the possibility of measuring reflectivity using concurrent and retrospective methods simultaneously, and the potential of such measurements to inform and improve professional development opportunities for mentor teachers.

Keywords: cognition; mentor teacher; supervisory skills; assessment; reflection

1. Introduction

Today, increasing emphasis is placed on the significance of school practice as a learning environment for student teachers (Brouwer, 2007; Mantle-Bromley, 2003; Smith, 2003). As a consequence, the importance of field experience as a proportion of the overall time invested in initial teacher education has increased in the past several years in both North America and Europe (Wilson, Floden, & Ferrini-Mundy, 2002). This development can be attributed to increasing evidence and recognition of the value of learning in the workplace (Eraut, 2000; Garrick, 1998), the criticism of the practical relevance of theory in teacher education programs (Darling-Hammond, 2000; Korthagen, 2001), the teacher shortages many countries are faced with (Buchberger, Campos, Kallos, & Stephenson, 2000; Villani, 2002), and the idea that teacher education is less expensive if it is done in the workplace (Caldwell & Carter, 1993).

The move towards school-based teacher education has made the role of the mentor teacher – a classroom teacher with the additional responsibility of supervising student teachers – more important than ever before (Wang, Odell, & Schwille, 2008). Through

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their dialogues with student teachers, mentor teachers have a considerable influence on how and what student teachers learn (Edwards & Protheroe, 2004; Feiman-Nemser, 2000; Glickman & Bey, 1990). An essential condition for good mentoring is a balance of support in the interpersonal relationship in conjunction with adequate opportunities for challenging student teachers to learn new things (Daloz, 1986; Rajuan, Bijaard, & Verloop, 2007; Tang, 2003). To match the different needs and learning styles of student teachers (Bullough & Draper, 2004; Furlong & Maynard, 1995; Kagan, 1992; Oosterheert & Vermunt, 2001), it is important that mentor teachers are able to vary their supervisory approach (Hennissen, Crasborn, Brouwer, Korthagen, & Bergen, 2008). A disparity between the mentoring style and the learning needs of individual student teachers may lead to the withdrawal of a student teacher from initial teacher education. Additionally, such a disparity may limit chances for student teachers to reach their best possible level of competence (Williams et al., 1998).

Despite the call for flexibility in the mentoring approach, most mentor teachers hardly vary their supervisory behavior in response to the changing needs of student teachers and, either consciously or subconsciously, stick to a certain supervisory approach (Wang, Odell, & Strong, 2006; Williams et al., 1998). Developing versatility in mentor teachers' supervisory skills repertoire appears to be an important challenge. Hence, many teacher education institutions and schools are addressing this challenge by providing mentor teachers with professional development aimed at enhancing their supervisory skills during mentoring dialogues (Strong & Baron, 2004). After all, for a mentor teacher, the ultimate goal is to serve the learning of each individual student teacher.

Research shows that development of mentor teachers' use of supervisory skills can be observed in terms of changes in supervisory behavior (Evertson & Smithey, 2001; Harrison, Lawson, & Wortley, 2005; Timperley, 2001; Veenman & Denessen, 2001). Studies of expertise in any domain indicate that professional growth is reflected not only in overt behavior but also in changes in those cognitions that guide and 'mediate' behavior (Berliner, 2001; Chi, Glaser, & Farr, 1988; Sakai & Nasserbahkt, 1997). The relationship between cognitions and a person's own actions is reciprocal, interactive, and cyclic (Clark & Hollingsworth, 2002). Cognitions related to a person's behavior can occur either consciously or subconsciously (Dixon, 1981; Greenwald, 1992). After cognitions are processed consciously, changes to new and maneuverable behaviors can come about (Bonke, Jelici, & Bonebakker, 1994; Lombardi, Higgins, & Bargh, 1987). Models of expertise development depict stages in which the degree to which knowledge and skills are internalized into the personal working style is used as a criterion (e.g., Benner, 1984; Dreyfus & Dreyfus, 1986; Feldon, 2007; Stoltenberg, McNeil, & Crethan, 1994; Sweller, 1994; Vrolijk, 1991).

In this study, we define cognitions as mental representations and constructs present in the mind of the mentor teacher at a specific moment. We assume that levels of consciousness (Eraut, 2004; Korthagen & Lagerwerf, 2001) can be indicated by different frequencies of 'reflective moments,' that is, specific episodes during mentoring dialogues in which mentor teachers' cognitions related to the use of supervisory skills are manifested consciously. The aim of this study is twofold. First, to ascertain empirically different levels of consciousness in acquiring and using specific supervisory skills during mentoring dialogues as indicated by differential frequencies of mentor teachers' reflective moments. Second, we explore methods for registering mentor teachers' reflective moments in mentoring dialogues. The outcome of such investigations can add to our knowledge about relations between mentor teachers' thinking and doing during mentoring dialogues and provide clues for designing training programs for mentor teachers.

1.1. Levels of consciousness in learning

Related to the degree to which behavior and learning results from conscious or subconscious processes in the context of learning in the workplace, Eraut (2004) introduced a typology of learning based on three levels of consciousness: 'implicit learning,' 'reactive learning,' and 'deliberative learning.' In the context of teacher learning, analogous to Eraut's typology, Korthagen and Lagerwerf (2001) elaborated a 'three-level theory' that describes three interrelated consecutive levels of learning: 'Gestalt formation,' 'schematization,' and 'theory building.' Both Eraut's and Korthagen and Lagerwerf's theories (see Figure 1) describe processes of informal learning that can be defined as learning in and from involvement in work activities, thus, as learning that is not overtly organized by external actors. As theoretical frameworks guiding this study, we have looked to both theories to help us interpret the data we have gathered regarding mentor teachers' levels of consciousness in learning.

1.1.1. First level

In both theories, the first level of learning is characterized by low consciousness. Eraut (2004) describes the subconscious process of acquiring new knowledge and skills without recognizing what has been learned as 'implicit learning.' Behavior in this type of learning is guided by an 'instant-reflex' mode of cognition, in which there is no time for conscious considerations (Eraut, 2000). Acquisition of knowledge and skills takes place for the most part independently of conscious attempts to learn and in the absence of explicit knowledge acquired earlier. Knowledge used on this level of learning cannot easily be articulated and is called 'tacit knowledge' (Polanyi, 1967). However, it might not only be tacit knowledge that is stored in memory, but also emotional and motivational ways of knowing (Miltenburg & Singer, 1999).

Korthagen and Lagerwerf (2001) describe the first level of learning as 'Gestalt formation,' based on principles of Gestalt psychology (Koehler, 1947) which is defined in ways comparable with Eraut's 'implicit learning.' At this level, subconscious learning processes taking place including not only (tacit) knowledge rudiments,

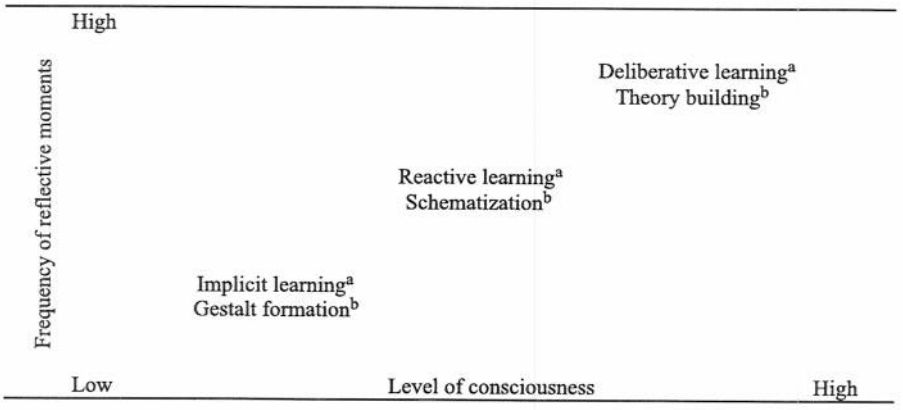

Figure 1. Frequency of reflective moments indicating levels of consciousness in learning.
[a]Typology of informal learning (Eraut, 2004).
[b]Three-level theory (Korthagen & Lagerwerf, 2001).

but also feelings, similar past experiences, values, role conceptions, and needs or concerns. They form a conglomerate called 'Gestalt,' which comes to operate automatically in situations similar to the situation in which it was acquired. Routines may play a large role. For example, if a mentor teacher experiences disappointment during mentoring dialogues with student teachers who constantly are asking for feedback and advice, the mentor teacher may acquire a tacit belief that students are not willing to reflect on their actions. This understanding may be accompanied by an automatic trigger of disappointment and a behavioral tendency to approach student teachers in mentoring dialogues in a reproachful way and/or respond to questions from student teachers by giving direct advice. On this (first) level of learning, mentor teachers' interventions in mentoring dialogues are automatic and remain at an extremely low level of consciousness. Hence, the frequency of reflective moments in this type of learning is (almost) zero.

1.1.2. Second level

In many situations, however, 'implicit learning' or 'Gestalt formation' is not the only learning process that occurs. Eraut (2004) uses the term 'reactive learning' to characterize behavior and learning on a higher level of consciousness than 'implicit learning.' 'Reactive learning' involves near-spontaneous reflection on past experience, noting facts, maybe asking questions, and observing the effects of actions. At this level, a person's actions are guided by a 'rapid-intuitive' mode of cognition, indicating a greater consciousness of what one is doing and often characterized by rapid decision-making during semi-routine action (Eraut, 2000). Schön (1983) refers to this process as 'reflection-in-action,' which is immediately bound up with action, and has a critical function of questioning the structure of tacit knowledge.

The process towards a more conscious and maneuverable use of specific knowledge and skills often occurs through the recognition that a situation in which action is called for is, in some respects, unusual. Korthagen and Lagerwerf (2001) refer to this type of thinking as 'schematization.' A person examines elements of his or her understanding of a situation on a higher level of consciousness than in the process of Gestalt formation. During the schematization process, a mental structure (schema) is formed consisting of elements and relations between the rudiments. The resulting 'schema' describes the Gestalt in more detail and in a more generalized way, that is, more separate from the concrete experiences that elicited it. For example, a mentor teacher realizes during a mentoring dialogue that (s)he is worried that student teachers don't manage the class of pupils effectively and as a result will not cover essential curriculum contents thoroughly. The mentor teacher realizes that his or her behavioral tendency is to give feedback and advice instead of asking questions and that this tendency is triggering passive student teacher responses. Along with the increased level of consciousness during 'reactive learning' or 'schematization,' we assume that frequencies of reflective moments are also likely to increase.

After some time, the schematized knowledge accompanying action can become self-evident and the schema can be used in a less conscious, intuitive way. This is called 'level reduction,' meaning that the schema starts to function as a Gestalt (Korthagen & Lagerwerf, 2001). The result is that intentional behavior evolves into automatic behavior, and the level of consciousness and the frequency of reflective moments accompanying action are expected to decrease.

1.1.3. Third level

In everyday mentoring situations, 'reactive learning' or even 'implicit learning' are generally sufficient to guide and mediate (supervisory) behavior. But when, for example, mentor teachers want to become proficient in supervising student teachers, they are likely to feel a need to better understand the impact of specific supervisory skills on student teachers' learning. Hence, implicit and reactive learning processes have to be extended and deepened. In order of apprehension, this involves discussion and review of past actions and experiences, engagement in decision-making, and problem-solving. Eraut (2004) terms this third type of learning as 'deliberative learning.' It requires a type of learning on a relatively high level of consciousness and refers to situations in which there is a clear work-based goal with learning as a by-product. Schön (1983) calls this process 'reflection-on-action,' that is, the process of making sense of an action after it has occurred and possibly learning something from the experience that extends one's knowledge base. Deliberative learning or reflection-on-action may influence future action but cannot have an effect on the action being reflected upon because the time of action and the action itself have already passed.

The parallel (third) level of learning in Korthagen and Lagerwerf's (2001) three-level theory is described by them as 'theory building.' The term 'theory' refers to a logical and consistent network of axioms and definitions that lead to certain consequences, for example, regarding the use of specific supervisory skills in mentoring dialogues to encourage student teachers to reflect on their experiences in school practice. On this level of learning, a transition is made from schemata to theory. Connections between the schemata become more established. Relations developed in earlier networks become the nodes of new ones.

Both 'deliberative learning' and 'theory building' require a relatively high level of consciousness. A difference between both concepts seems to be that knowledge construction as a result of 'theory building' is more detached from concrete situations and experiences than knowledge creation as a result of 'deliberative learning.' It could be hypothesized that to reach the level of 'theory building' as a prerequisite, 'deliberative' learning has to be set in motion. This distinction, notwithstanding, we may expect that both involve a relatively high level of conscious use of (prior) knowledge, which might be indicated by a high frequency of reflective moments.

Taken together, Eraut's types of learning and analogous levels of learning described by Korthagen and Lagerwerf (2001) portray three levels of consciousness in learning and lead us to assume that during mentoring dialogues, frequencies of mentor teachers' reflective moments can indicate a specific level of consciousness during the acquisition and use of supervisory skills (Figure 1). Hence, we also assume that shifts, a neutral term used in this study to describe changes in behavior and cognition that do not necessarily indicate an improvement in terms of educational norms, in the use of distinct supervisory skills may go hand in hand with shifts in the frequency of reflective moments or vice versa.

1.2. Methods for capturing the frequencies of reflective moments

An important methodological question is what methods might 'capture' reflective moments during authentic mentoring dialogues. To achieve a genuine and valid record of what happens, registering the frequency of reflective moments in authentic settings requires, on the one hand, not disrupting the ongoing mentoring dialogue, and, on the

other hand, 'capturing' reflective moments on the spot, at the specific moments when they occur.

1.2.1. Overview of existing methods

In other research contexts, various instruments and procedures have been developed, which can be used to 'capture' the frequencies of mentor teachers' reflective moments. Veenman (2005) distinguishes 'prospective,' 'concurrent,' and 'retrospective' methods to register cognitions. Prospective and retrospective methods are designed to record cognitions before or after the task or activity. Concurrent methods are designed to record during a task. Before or after a mentoring dialogue, paper-and-pencil questionnaires (Thomas, 2003; Van Hout-Wolters, 2000) can be used to gain insight into mentor teachers' cognitions during dialogues with student teachers. Another possibility is to use oral methods. The first is free recall (Kahana, 1996), where after a dialogue, the mentor teacher is asked to describe explicitly what and when he or she was thinking during a dialogue. The second method is the post-hoc explanation, in which the mentor teacher is asked after the dialogue to explain why he or she chose a particular approach and to elaborate on what happened during the dialogue. A third oral method is stimulated recall (Kagan, Krathwohl, & Miller, 1963), originally used by Bloom (1954). This technique consists of replaying a videotape of an episode of action to enable the viewer to recollect and report on his or her thoughts and decisions. It is assumed that when a video of a mentoring dialogue is shown, mentor teachers are able to recall their experience accurately and to describe in retrospect what they thought during a specific action (Calderhead, 1981; Kagan & Kagan, 1991). A fourth oral method is the use of a thinking-aloud protocol (Clark & Peterson, 1986; Fang, 1996), which implies measuring during the activity. Applying this method means that the mentor teacher is stopped during particular parts of the dialogue and is asked to describe his or her thoughts.

1.2.2. Inventory of limitations

Considered from a validity point of view, each method listed above has one or more limitations (see Table 1). When answering questionnaires, respondents tend to know or do more (or less) than they are able or willing to fully describe (Dominowski, 1998; Garner & Alexander, 1989; Nisbett & Wilson, 1977). Moreover, in answering questions about cognitive activities after the action, it is difficult to be completely clear about what one was thinking at the specific moments of their occurrence (Van Hout-Wolters, 2000). Thus, as Veenman (2005) has noted, self-report questionnaires could be read as assessing participants' opinions concerning the occurrence of cognitive activities.

Oral methods also have weaknesses. When using free recall, for example, it is not exactly clear when thoughts occur. In addition, there is the possibility that mentor teachers will only recall reflective moments that occurred at the end of dialogues and will not recall earlier experiences (McLennan, Twigg, & Bezant, 1993). A disadvantage of post-hoc explanation is that it focuses on arguments for choosing an approach instead of describing frequencies and types of cognitions and thought processes as they actually occur during dialogue. Concerning the stimulated recall method, Calderhead (1981) and Yinger (1986) have noted that it is difficult to check to what degree the recall is an accurate description of what actually

Table 1. Inventory of limitations of existing methods.

	Prospective Retrospective	Retrospective	Retrospective	Retrospective	Concurrent
	Written	Oral	Oral	Oral	Oral
	Questionnaire	Free recall	Post-hoc explanation	Stimulated recall	Thinking aloud
It is not exactly evident when cognitions occur during action(s).	x	x	x		
Often only cognitions or actions right before the interruption are remembered.	x	x	x		x
The natural flow of the action(s) is disturbed and this influences original subsequent behaviour.					x
There is no necessity to consider the next action. Hence, after the action more reflections can occur than during the action.	x	x	x	x	
Arguments or general cognitions arise instead of descriptions of specific cognitions occurring during action.	x	x	x	x	

Note: A limitation applying to a method is marked with x.

happened. The presentation of a video to encourage recall may not lead to recall of the original situation but to the production of a renewed version, containing elements of the original situation but lacking the need for any action. Subjects are often inclined to talk in more general terms about their cognitions or train of thought, as there is no longer the necessity of considering specifically what the next step should be. For this reason, reflective moments may be reported more frequently than would normally occur in the original situation. The thinking-aloud method also has some disadvantages. It affects the mentoring dialogue by breaking up its natural flow. The mentor teacher can be influenced to change his or her subsequent behavior due to the thinking aloud about his or her performance. As in the case of the free recall method, thinking aloud also leaves open the possibility that the mentor teacher will only recall reflective moments occurring immediately before the interruption.

1.2.3. Desirability of a two-method approach

Because existing methods all have there strengths and weaknesses, several authors suggest a multi-method approach for measuring cognitions (Kagan, 1990; Van Hout-Wolters, 2000; Veenman, 2005). A look at Table 1 suggests that stimulated recall seems to be the most adequate method to register mentor teachers' reflective moments during mentoring dialogues. The authenticity of the dialogues can be assured because the ongoing dialogue is not disrupted and replaying the video of the dialogue helps the mentor teacher more than other methods to recollect the instances in which reflective moments are manifested. Despite these advantages, stimulated recall remains a retrospective method (Veenman, 2005) because it relies on the respondents' ability to recognize the reflective moments after the event, and it does not register these moments 'on the spot.' Thus, in the best of all possible worlds, it would be desirable to combine the major advantage of stimulated recall, that is, not disrupting the authentic dialogue, with registering reflective moments accompanying the use of supervisory skills 'on the spot.' To achieve this balanced approach, a complementary method is needed, one that enables mentor teachers to simply acknowledge the presence of reflective moments. We figured this could be done by asking the respondent to push a button registering a sound signal at the very instances when reflective moments emerge. The possibility of using a push button was pointed out by Hilgard (1980) in research on human consciousness. Once in a blue moon, the push-button technique was applied in other research contexts, for example, in studies for measuring cognitive effort while subjects are studying texts (e.g. Van Hout-Wolters, 1990).

1.3. Research questions

As discussed earlier, we have theorized that differential frequencies of mentor teachers' reflective moments during mentoring dialogues may indicate different levels of consciousness in the acquisition and use of supervisory skills. As a consequence, we have posited that shifts in the use of supervisory skills may go hand in hand with shifts in frequencies of reflective moments during mentoring dialogues. Proceeding from the theoretical background outlined earlier and to empirically assess the assumptions underlying this study, a two-method approach was chosen, in which stimulated recall and a push-button technique complement each other. The research questions are as follows:

(1) What is the frequency of reflective moments experienced by mentor teachers during mentoring dialogues before and after training in supervisory skills?
(2) If shifts in the frequency of mentor teachers' reflective moments during mentoring dialogues occur, are they related to shifts in the use of supervisory skills?
(3) Does concurrent application of stimulated recall and a push-button technique produce evidence relevant for questioning and/or refining results generated by each method separately?

2. Method

2.1. Context of the study

This study was carried out in the context of the implementation of a training program for mentor teachers (Crasborn, Hennissen, Brouwer, Korthagen, & Bergen, 2008) entitled Supervision Skills for Mentor teachers to Activate Reflection in Teachers

(SMART). The program was developed in 1999 in cooperation with partner primary and secondary schools and, since then, has been in steady use in the Department of Teacher Education of Fontys University of Applied Sciences in the Netherlands. The SMART training is situated within the reflective-developmental paradigm (Pajak, 1993) and focuses on the development of the following supervisory skills that, according to Korthagen (2001), encourage reflection in student teachers: 'asking an open starting question,' 'asking for concreteness,' 'summarizing feeling (showing empathy),' 'summarizing content,' 'confronting (giving feedback, summarizing inconsistencies, utilizing the here and now),' 'generalizing (asking for similar situations),' 'helping in making things explicit,' and 'helping in finding and choosing alternatives.' These skills can be used to encourage a cyclical sequence of five steps (ALACT model) that together constitute a complete reflection process: (1) action, (2) looking back on the action, (3) becoming aware of essential aspects, (4) creating alternative methods of action, and (5) engaging in a new trial. The last step of one cycle is the first step of the following cycle (Korthagen, 2001).

The SMART program consists of three main components: training, peer consultation, and personal coaching. In total, the training consists of nine sessions of half a day each, spread over a period of almost three months. The pedagogy used in the SMART program was derived from two sources. The first source is the work of Koster and Korthagen (2001) who put forward the following principles of 'realistic teacher education': a connection should be established between the training program and participants' individual learning needs and questions. Using experiences from the participants' own practice, trainers can make sure that the program's contents and exercises deal with real problems. When these problems are linked with theory, analyzing them can encourage participants to develop effective interventions. In this way, the contents of the exercises become relevant for all participants. Having the participants practice the skills in between training sessions helps to produce an alternation between contributing practical experiences, reflecting on them, connecting them to relevant theory, and applying them to new situations. The same applies to systematically having participants record their own progress. Creating a safe learning environment will help participants not to be afraid of experimenting with different behaviors, both in and outside the training sessions. In this respect, mentor teacher trainers fulfill a modeling function, for example, by seeing to it that in the beginning, positive feedback is given both by themselves and by the participants among each other. The application of these principles helps in promoting constant and self-directed professional development.

The second source is Ivey's (1971) micro-training principles. Micro-training is a model of instruction that subdivides complex interpersonal human behavior into discrete behavioral units. According to this approach, skills can be learned when the following sequence of activities is used: a verbal or visual model giving instruction and information about a skill, practice with the aim of achieving the greatest possible similarity with the target behavior associated with the particular skill (as described in the instruction phase), and feedback providing information and suggestions from trainer(s) on the basis of observations (in training and in authentic situations).

2.2. Participants

Mentor teachers who took part in the SMART training also participated in the research project. A total of 30 mentor teachers from primary education were involved: 13

participants in the spring of 2002 and 17 participants in the spring of 2003. The whole group of participants included 18 women and 12 men. In combination with their primary teaching tasks, all mentor teachers guided and supported a student teacher in their final year of teacher education. During their involvement in the SMART training, they were all given half a day release time per week. The participants' ages ranged from 25 to 54 with an average age of 44. On average, each participant had almost 20 years of teaching experience. None of them had been trained in supervisory skills before, and they each had an average of almost 10 years experience in mentoring student teachers.

2.3. Instrumentation

To capture mentor teachers' reflective moments without disrupting the ongoing dialogue and at the moment they occur, that is, complementary to the 'retrospective' stimulated recall method, a new 'concurrent' method was developed by using a push-button device. Figure 2 shows the device: a microphone (left), the push button (above right), both connected with the mini-disk recorder. Figure 3 shows a mentor teacher (left) using the black button to mark reflective moments during a mentoring dialogue with a student teacher (right).

The purpose of the push-button method is to have mentor teachers acknowledge the presence of reflective moments by pushing 'on the spot' a black button to indicate their occurrence. The mentoring dialogues are recorded on a mini-disk recorder. To ensure a flawless recording, an additional, highly sensitive microphone is attached to the recorder. Whenever the mentor teacher presses the black button, the recorder registers not only his or her speech but also a short beep, which is inaudible to the interlocutors. Only when the recording of a dialogue is played back afterwards can the beeps be heard.

2.4. Data collection

Audio and video recordings were made of 60 mentoring dialogues which 30 participating mentor teachers carried out in authentic settings with the student teachers under their guidance. Two recordings were made of each mentor teacher: the first, one month before the SMART training; the second, one month after training. The mentor teachers were asked to discuss during the mentoring dialogue a student teacher's

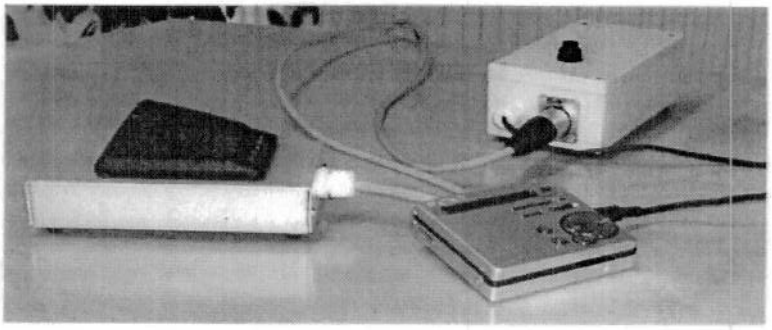

Figure 2. Microphone (left), push button (above right), and mini-disk recorder.

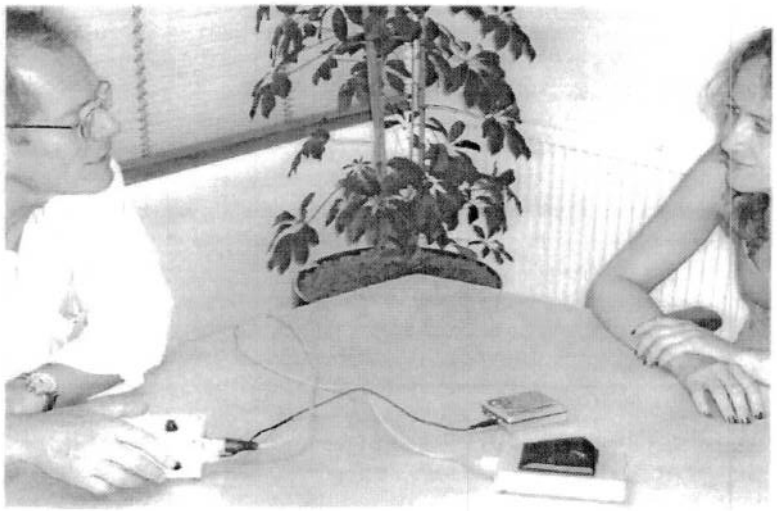

Figure 3. Mentor teacher (left) using the push button during a dialogue.

concern related to a situation that had occurred in the previous week during their teaching activities in schools. To achieve ecological validity (Straetmans, 1993), the mentor teachers conducted the dialogues with their 'own' students, that is, with students with whom they had already established rapport and in authentic settings, that is, settings considered to be representative of this kind of work.

Based on Geldens' (2007) research that demonstrated that analyzing more than 15 minutes of recording does not improve the assessment of the quality of a mentoring dialogue and to ensure comparability of the data, the recordings of the dialogues were restricted to the first 15 minutes. Mentor teachers were instructed to press the button during the dialogue each time they experienced a reflective moment. Immediately after the dialogue, in a stimulated recall interview, the mentor teachers were asked to watch the video recording of the dialogue and to stop the video whenever they recalled a reflective moment. To avoid confusion about the term 'reflective moment,' ordinary language was used to instruct the participants: 'push the button/stop the video when, during the mentoring dialogue, you had a conscious thought accompanying your conversational turns.'

2.5. Data analysis

All 60 recorded dialogues in the main study were transcribed word for word. Table 2 shows an example of a transcription. Utterances were marked as separate using the principle of turn taking. The moment when a mentor teacher commences speaking marks the beginning of a conversational turn. A mentor teacher's turn ends the moment the student teacher commences speaking. In the transcriptions, reflective moments were connected to the accompanying conversational turns of the mentor teachers. From the overview in Table 2, it becomes clear that there are four options with regard to the registration of the frequency of reflective moments: (A) registration by both push button and stimulated recall, (B) registration by the push-button method

Table 2. Example of transcription and registered reflective moments.

Time	I	Utterances of mentor teacher (MT) and student teacher (ST)	SR	PB	SC
3.39	ST	Well, you know, Ralph was turning about all the time and talking, while there wasn't anything to laugh at really, because it's quite serious.			
3.48	MT	Yes, and the other kids, what did they do?	SR *(A)*	PB	3
3.49	ST	The other kids were participating very seriously and then it's just like Ralph is playing the clown by joking and attracting everyone's attention. I don't know. It irritated me quite a lot.			
3.59	MT	I can imagine Ralph's behaviour was disturbing and irritating.		PB *(B)*	4
4.04	ST	Yes, you can say that.			
4.07	MT	What did you do when Ralph was talking and laughing?	SR *(C)*		3
4.11	ST	I just continued the lesson. On the one hand, I thought I might send him off now. That kind of negative thing. I think that would have influenced the group. Maybe on the other hand, it wasn't right that I ignored him. After all, it wasn't all right what he did. Perhaps I should have pointed it out to him more often.			
4.41	MT	I think to start with it's correct what you've done. I probably would have done the same.	*(D)*		14

Notes: Time = Time in minutes; I = Interlocutor; SR = Reflective moments mentioned in the stimulated recall interview; PB = Reflective moments registered using the push button; SC = Supervisory skill code numbers assigned to mentor teachers' supervisory skills in the example: 3 = asking for concreteness, 4= showing empathy, 14 = giving opinion.

(A) = Reflective moment registered with both SR and PB; *(B)* = Reflective moment registered with PB only. *(C)* = Reflective moment recorded with SR only. *(D)* = Conversational turns with no reflective moment registered.

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only, (C) registration by the stimulated recall method only, and (D) no registration of reflective moments at all.

To label the mentor teachers' conversational turns, a category system was implemented which draws on research literature about training for supervision, therapy, and promotion of reflection in student teachers (Brammer, 1973; Egan, 1975; Korthagen, 2001; Rogers, 1969) as well as the work of Glickman (1981), Blumberg (1980), and Vrolijk (1991). This work enabled us to distinguish the following repertoire of 15 supervisory skills: (1) 'showing attentive behaviour,' (2) 'asking an open starting question,' (3) 'asking for concreteness,' (4) 'summarizing feeling (showing empathy),' (5) 'summarizing content,' (6) 'showing genuineness,' (7) 'completing sentence/clarifying question,' (8) 'confronting (giving feedback, summarizing inconsistencies, utilizing the here and now),' (9) 'generalizing (asking for similar situations),' (10) 'helping in making things explicit,' (11) 'helping in finding and choosing alternatives,' (12) 'asking for something new,' (13) 'giving information,' (14) 'giving opinion/assessing,' and (15) 'giving advice/instruction.' For utterances which cannot be labeled, a category 'other' was used.

Three raters independently categorized all mentor teachers' utterances of conversational turns. For each dialogue they read the transcript, viewed the video recording to consider the non-verbal aspects, and finally assigned their codes to the mentor

teacher's utterance. When, in some cases, two (or more) types of supervisory skills were performed during one turn, only the last type was coded, because, in almost all cases, this was the trigger for the student teacher's reaction. All raters scored all the 2274 conversational turns of the mentor teachers made in the 60 dialogues. On average, the Cohen's kappa for each combination of two raters was 0.76, the lowest kappa being 0.73. In order to analyze which shifts occurred, we used the standardized mean difference (*d*-index) effect size (ES) to make a comparison between the pre-training and post-training measurements, which expresses the distance between two group means in terms of their standard deviation (Cohen, 1988).

3. Findings

3.1. Frequencies of reflective moments

Table 3 presents the registered frequencies of reflective moments of individual mentor teachers before and after training. The results described in Table 3 answer the first research question concerning the manifestation of reflective moments. In addition, in Table 4 the numbers of reflective moments of the whole group are shown.

Before training, the whole group of mentor teachers used 989 (100%) conversational turns. In the stimulated recall interviews 20% of these turns were identified as being accompanied by a reflective moment, whereas the push button showed only 9% identification of reflective moments by the teachers. After the SMART training, the mentor teachers made 1285 (100%) conversational turns. In the stimulated recall interviews 33% of these turns were identified as being accompanied by a reflective moment, whereas this was 19% on the basis of the push-button method. Two-tailed *t*-tests show that after training, both methods produced a significant increase in the identification of the number of reflective moments (stimulated recall: $p < 0.01$, ES = 0.58; push button: $p < 0.01$, ES = 0.71). The frequencies and calculated standard deviations in the Columns 2, 3, 6, and 7 of Table 3 indicate that there are considerable individual differences within the group.

3.2. Linking reflective moments to the use of supervisory skills

The second research question concerned the relationship between shifts in the use of specific supervisory skills and shifts in the frequencies of reflective moments. An average of two-thirds (before training) to three-quarters (after training) of the total number of reflective moments was related to six supervisory skills. Table 5 depicts the frequency of use of these skills and/or the frequency of accompanying reflective moments before and after the SMART training. The (two-tailed) paired samples *t*-tests ($p < 0.05$) showed that on the group level, the frequencies of use of five skills differed significantly before and after training. The frequencies of 'asking for concreteness' (ES = 2.00) and 'summarizing content' (ES = 0.96) increased and the frequencies of 'giving opinion' (ES = 0.56), 'giving information' (ES = 0.89), and 'giving advice/instruction' (ES = 1.09) decreased. The ESs found are medium to large (Cohen, 1988).

The frequencies of the reflective moments altered also after the SMART training, varying with the type of supervisory skill. Based on data gathered through the stimulated recall method, there were statistically significant measurable differences in the frequencies of reflective moments, related to the use of four supervisory skills: 'asking for concreteness' (ES = 1.32), 'summarizing content' (ES = 0.62), and 'helping in finding

Table 3. Frequencies of reflective moments of 30 mentor teachers (MT).

	Before SMART training				After SMART training			
	PB	SR	Overlap PB &SR		PB	SR	Overlap PB &SR	
MT no.	Reflective moments in full no. and in (%) of total no. of conversational turns			CT	Reflective moments in full no. and in (%) of total no. of conversational turns			CT
01.	00 (00)	07 (16)	00 (00)	44	18 (67)	13 (48)	10 (37)	27
02.	01 (02)	07 (14)	00 (00)	51	04 (10)	08 (20)	03 (08)	40
03.	02 (05)	10 (25)	01 (03)	40	08 (14)	17 (30)	04 (07)	57
04.	04 (12)	04 (12)	01 (03)	29	01 (03)	09 (24)	01 (03)	38
05.	00 (00)	02 (07)	00 (00)	29	03 (07)	09 (20)	00 (00)	46
06.	09 (33)	09 (33)	07 (26)	27	23 (50)	28 (61)	22 (48)	46
07.	03 (12)	03 (12)	03 (12)	26	02 (04)	11 (19)	02 (04)	57
08.	01 (04)	12 (33)	04 (14)	36	07 (16)	18 (41)	06 (14)	43
09.	10 (28)	13 (36)	06 (17)	36	13 (25)	27 (51)	08 (15)	53
10.	00 (00)	05 (17)	00 (00)	30	04 (10)	11 (28)	03 (08)	39
11.	03 (08)	09 (24)	04 (11)	37	17 (35)	11 (22)	06 (12)	49
12.	00 (00)	01 (03)	00 (00)	39	16 (32)	23 (46)	10 (20)	50
13.	01 (03)	04 (12)	02 (06)	34	00 (00)	08 (20)	00 (00)	40
14.	02 (08)	03 (25)	01 (08)	13	09 (19)	19 (40)	06 (13)	48
15.	02 (09)	11 (50)	02 (09)	22	03 (06)	08 (16)	03 (06)	49
16.	06 (18)	10 (30)	06 (18)	33	02 (12)	10 (71)	01 (06)	17
17.	05 (24)	07 (33)	03 (14)	21	05 (08)	12 (18)	04 (06)	65
18.	03 (06)	02 (04)	00 (00)	49	14 (40)	07 (20)	04 (11)	35
19.	02 (04)	03 (07)	02 (04)	46	00 (00)	09 (21)	00 (00)	42
20.	00 (00)	03 (08)	00 (00)	36	06 (16)	13 (34)	05 (13)	38
21.	02 (09)	06 (26)	02 (09)	23	10 (32)	17 (55)	09 (29)	31
22.	05 (26)	05 (26)	03 (16)	19	05 (16)	12 (39)	03 (10)	31
23.	00 (00)	02 (06)	00 (00)	31	07 (21)	10 (30)	06 (18)	33
24.	00 (00)	07 (10)	00 (00)	69	00 (00)	08 (17)	00 (00)	46
25.	03 (09)	14 (40)	03 (09)	35	03 (05)	18 (30)	03 (05)	61
26.	00 (00)	06 (60)	00 (00)	11	08 (18)	21 (48)	06 (14)	43
27.	00 (00)	02 (04)	00 (00)	48	04 (12)	09 (27)	03 (09)	33
28.	01 (03)	08 (26)	01 (03)	31	20 (40)	21 (42)	18 (36)	50
29.	12 (48)	10 (40)	09 (36)	25	08 (21)	15 (39)	08 (21)	38
30.	10 (53)	11 (58)	10 (53)	19	19 (48)	25 (63)	16 (40)	40
Total	87 (09)	196 (20)	70 (07)	989 (100)	239 (19)	427 (33)	170 (13)	1285 (100)
SD fn	3.35	3.71			6.63	6.13		
SD %	13.94	16.13			16.74	15.54		

Notes: PB = Frequencies registerd with Push Button; SR = Frequencies registered during Stimulated Recall interview; Overlap PB & SR = Frequencies recorded with PB and SR simultaneously, at the same instances of time; CT = Full numbers of Conversational Turns of each MT; SDfn = Standard Deviation full numbers.

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Table 4. Frequencies of registered reflective moments for the whole group of mentor teachers.

		Before SMART training				After SMART training			
		Stimulated Recall (SR)				Stimulated Recall (SR)			
		Yes	No			Yes	No		
Push Button (PB)	Yes	A (70)	B (17)	87 *(09%)*	Push Button (PB)	Yes A (170)	B (69)	239 *(19%)*	
	No	C (126)	D (776)	902 *(91%)*		No C (257)	D (789)	1046 *(81%)*	
		196 *(20%)*	793 *(80%)*	989 turns *(100%)*		427 *(33%)*	858 *(67%)*	1285 turns *(100%)*	

Notes: Sections A = Frequencies of reflective moments recorded with both the SR method and the PB method (overlap). Sections B = Frequencies of reflective moments recorded with the PB only. Sections C = Frequencies of reflective moments recorded with SR only. Sections D = Frequencies of conversational turns with no reflective moments registered. Added up, the sections A, B and C give the total number of registered reflective moments.

and choosing alternatives' (ES = 0.92) showed an increase, whereas 'giving information' (ES = 0.60) decreased. Based on the data gathered through the push-button method, there was only a significant increase in the number of reflective moments after training related to the use of 'asking for concreteness' (ES = 0.96).

In sum, when we combine the data gathered by means of both push button and stimulated recall, it appears that the highest frequency of reflective moments for the group mentor teachers occurred for the supervisory skill 'asking for concreteness.' The significant increase in the frequency of 'asking for concreteness' from 16% to 31% proved nearly proportional to the increase in the number of parallel reflective moments. The stimulated recall method measured an increase from 22% to 40% and the push-button method measured one from 25% to 49%. Parallel to the increase of the use of the supervisory skill 'summarizing content' from 10% to 18%, there is an increase of accompanying reflective moments from 12% to 16%, although this is only shown by the stimulated recall method. Parallel to the decrease in the use of the supervisory skill 'giving information' (from 14% to 5%), the related number of reflective moments also decreased significantly (from 13% to 2%), although this too was only the case in the data collected by the stimulated recall method.

3.3. Refinements in the results

The third research question focused on refinements in the results through simultaneous application of both methods. Tables 3 and 4 show that on the individual level and on the group level, the methods used registered different frequencies of reflective moments. For the whole group, higher frequencies of reflective moments were measured by the stimulated recall method (20% and 33%) in comparison with the push-button method (9% and 19%). The results registered using the two methods differ significantly, both before training [(PB) 9% versus (SR) 20%, $p < 0.01$, ES = 0.85] and after training [(PB) 19% versus (SR) 33%, $p < 0.01$, ES = 0.94].

Examination of the results produced by each method separately (see Table 4) leads to consideration of two issues. First, the quantity of the registered reflective moments

Table 5. Frequencies of use of supervisory skills (in %) and related frequencies of reflective moments (in %).

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	Frequency of use of supervisory skills				Frequency of reflective moments							
					Stimulated recall				***Push button***			
Supervisory skill (code no.)	*Before training*	*After training*	*Sign. p<0.05*	d-coeff	*Before training*	*After training*	Sign. p<0.05	d-coeff	*Before training*	*After training*	*Sign. p<0.05*	*d-coeff*
Asking for concreteness (3)	16	31	0.00	2.00	22	40	0.00	1.32	25	49	0.00	0.96
Summarizing content (5)	10	18	0.00	0.96	12	16	0.00	0.62	13	11	0.22	
Giving information (13)	14	5	0.00	–1.09	13	2	0.02	–0.60	10	3	0.17	
Giving opinion/assessing (14)	10	6	0.04	–0.56	5	4	0.93		3	3	0.31	
Giving advice/instruction (15)	13	3	0.00	–0.89	17	4	0.27		8	2	0.34	
Helping in finding and choosing alternatives (11)	4	7	0.06		6	9	0.002	0.92	7	10	0.06	
	67	70			75	75			66	78		
	N=989	*N=1285*			*N=196*	*N=427*			*N=87*	*N=239*		

Notes: The first column shows those supervisory skills of which either the frequency of use and/or the frequency of accompanying reflective moments changed significantly after training in supervisory skills. Columns 2 and 3 show the percentage of the frequency of use before the training and after the training, respectively. Columns 4 and 5 show the significance and the difference measured in Cohen's d, respectively. The frequency of reflective moments accompanying supervisory skills is shown in columns 6 and 7 (using stimulated recall) and in columns 10 and 11 (using the push-button). Columns 8 and 12 show any significant change. Columns 9 and 13 give the equivalent in Cohen's d. N= conversational turns in full numbers.

differs between both methods. The total number of all registered reflective moments is the summation of the frequencies in Sections A (overlap), B (push button only), and C (stimulated recall only). To compensate for possible weaknesses of each method, the total number of reflected moments (A + B + C) may be used as a basis for calculating a more optimal estimation of the frequency of reflective moments, namely with the formula $[A + {}^{1}/_{2}(B + C)]/n$. The number of reflective moments both methods registered simultaneously (A) is added with the mean of the number each method registered separately ${}^{1}/_{2}(B + C)$. The result of this addition is then divided by the total number of conversational turns. This results in the frequency of reflective moments as a percentage of the total of mentor teachers' conversational turns. In our study, this ratio before training was $[70 + {}^{1}/_{2}(17 + 126)]/989 = 14\%$. After the training, this value rose to $[170 + {}^{1}/_{2}(69 + 257)]/1285 = 26\%$.

The second issue that emerges from the two-method approach concerns the quality of the recorded reflective moments. As the data of Table 4 shows, in some cases, both methods simultaneously register reflective moments during mentoring dialogues; more often, however, the individual methods register reflective moments occurring at different points in time. The push-button method appears to report reflective moments that go unnoticed by the stimulated recall method (Section B, Table 4) and vice versa (Section C, Table 4). To calculate the percentage of overlap, we applied the formula $[A/(A + B + C)] \times 100$. The number in Section 'A' divided by the sum of the numbers in Sections 'A,' 'B,' and 'C' (all registered reflective moments) multiplied by 100 was used to get a percentage. From this calculation emerges the finding that before training there was an overlap between the two methods in 33% of the total number of registered reflective moments (Sections A + B + C, Table 4) and after training in 34%. In other words, in one-third of the cases, both before and after training, reflective moments were registered at the same points in time, while, in the other two-thirds of the cases, they were registered at different points of time.

4. Conclusion and discussion

4.1. Main conclusions

Against the background of improving mentor teachers' use of supervisory skills, the study aimed at capturing frequencies of reflective moments, which are specific instances of time during mentoring dialogues in which mentor teachers' cognitions related to the use of supervisory skills are manifested consciously. Taken together, as an answer to the first research question, results show that before mentor teachers were trained in supervisory skills, their use of distinct supervisory skills entails, on average in one-seventh of the conversational turns, a reflective moment. The frequency of reflective moments increased significantly after training, up to a quarter of the mentor teachers' conversational turns. In answer to the second question, the findings to some extent point towards a synchronization of mentor teachers' thinking and doing during the mentoring dialogue. Shifts in frequency of use of the skills 'asking for concreteness,' 'summarizing content,' and 'giving information' harmonize with shifts in the number of reflective moments. Concerning the answer to the third question, the application of the two-method approach showed that each method registered a different number of reflective moments. Also both methods for a large part captured reflective moments at different points of time.

To conclude, based on the assumption that the level of consciousness in a learning process is displayed by the frequency of mentor teachers' reflective moments during

mentoring dialogues, the data of the study suggest the existence of different levels of consciousness in acquiring and using supervisory skills, the possibility of measuring reflectivity using concurrent and retrospective methods simultaneously and the potential of such measurements to inform and improve professional development opportunities for mentor teachers.

4.2. Interpretation

The results of this study suggest that in this instance, mentor teachers' training in supervisory skills was followed by greater awareness of their own use of supervisory skills during mentoring dialogues. Using Eraut's (2004) typology of learning and the Korthagen and Lagerwerf's (2001) three-level theory as a frame for this study, it appears that supervisory behavior of the group mentor teachers takes place implicitly rather than explicitly. After training, higher frequencies of reflective moments accompanying the use of supervisory skills indicate that 'reactive leaning' (Eraut, 2004) or learning on 'schema level' (Korthagen & Lagerwerf, 2001) has been triggered. This change could have been prompted by the introduction of new knowledge and skills during the SMART training program. While using supervisory skills during mentoring dialogues, it seems that mentor teachers consciously examine their underlying (new) knowledge base more often and may, as in the case of Gestalts, also examine subconscious emotional and motivational rudiments of their own specific interventions in the dialogue. Accordingly, as evidenced by the dissimilar frequencies of reflective moments, it now appears that shifts in these mentor teachers' use of supervisory skills are accompanied by changes in levels of consciousness in the use of supervisory skills.

The finding that the frequency of reflective moments after (SMART) training on average did not exceed one-quarter of all mentor teachers' conversational turns may be due to the fact that implementing a new behavior demands more effort on the part of the individual's working memory. It is likely that because of the restricted availability of cognitive schemata, those mentor teachers who participated in the supervisory skills training for the first time did not yet have as many cognitions during dialogues as experts in the field. This may be especially true for novices who have been shown to have more difficulty holding on to cognitions in their working memory while they are taking action (Chi et al., 1988; Feldon, 2007; Sweller, 1994).

4.3. Limitations and further research

One limitation of this study is that changes in the frequencies of reflective moments are reported on the basis of a quasi-experimental design. For practical reasons implementing a design with a control group was not feasible. Hence, it is difficult to exclude entirely alternative hypotheses about increases of reflective moments. Registered individual differences in the number of reflective moments before and after training in supervisory skills could be influenced by variables outside the training such as individual characteristics of the participating mentor teachers and specific features of the workplace. Another limitation is that both methods that were employed in this study registered different quantities of reflective moments. On the one hand, during stimulated recall, participants no longer need to act and consequently have more time for reflections. Hence, the registered number of reflective moments could be higher than it was in the reality of the mentoring dialogues. On the other hand, registration

with the push button could be biased by the so-called 'dual task problem' (Pashler & Johnston, 1998). Button pushing during mentoring dialogues does not come for free. It is a secondary task that can, even if only briefly, elevate cognitive load. By carrying out multiple cognitive tasks concurrently in a mentoring dialogue – paying attention to the content of the dialogue, performing newly acquired supervisory skills, and pushing the button – a row of tasks, as it were, is lined up in working memory. Due to limited capacity, working memory can only deal with one task at a time, so others can interfere. This may have led to a higher probability that mistakes were made (Feldon, 2007).

Predominantly throughout the study, both methods registered reflective moments at different points of time. This finding suggests that each of the two methods records reflective moments in which different cognitions have different contents. To shed some light on this issue, research into the contents of mentor teachers' cognitions, manifested during reflective moments, could be helpful. This type of follow-up research would be interesting also because it might establish the extent to which frequencies of reflective moments may help to indicate not only different levels of consciousness but also whether mentor teachers did (not) achieve one or another developmental stage of expertise in the use of supervisory skills. After all, developmental stages in a specific expertise domain are reflected in distinctive cognitions during professional action (Berliner, 2001; Chi et al., 1988). To further investigate mentor teachers' reflective moments in connection with the use and acquisition of supervisory skills, a follow-up study will be conducted, aiming at uncovering contents of mentor teachers' cognitions manifested during these instances.

4.4. Implications

Despite the limitations mentioned above, this study provides data about three aspects of mentor teachers' use and acquisition of supervisory skills that have not been well studied: first, the relationship between mentor teachers' reflective moments as they relate to the use of supervisory skills in mentoring dialogues; second, practical support for theoretical models such as Korthagen and Lagerwerf's (2001) three-level model and Eraut's (2000) distinction between types of learning; and third, exploration of new methods and approaches to studying the occurrence of the so-called 'interactive cognitions' (Clark & Peterson, 1986) that are in operation during a person's actions and are manifested consciously during reflective moments. The push-button method can be applied by other practitioners, also in other professional domains. It has produced empirical evidence for the limitations of the stimulated recall method, although the combined use of the push button and the stimulated recall seems to contribute to our understanding of the relation between the frequency of reflective moments and mentor teachers' levels of consciousness in learning to use specific supervisory skills.

Given that a broad repertoire of supervisory skills is a powerful and complex instrument for mentor teachers when carrying out mentoring dialogues, it is clear that to make the most of its use, mentor teachers will need many opportunities to try out, discuss, and reflect upon how these skills are put into practice. As a model of instruction, mentor teachers' supervisory behavior is often subdivided in discrete supervisory skills and consequently teaches those skills through explicit instruction, behavioral practice, observation, and immediate feedback. Such an approach concentrates mainly on distinct and overt supervisory skills. However, expertise in the use of

supervisory skills is not merely an undifferentiated use of skill but also includes contextual understanding. Therefore, mentor teachers constantly have to make decisions about which supervisory skills must be invoked to encourage the learning of each mentee in each mentoring dialogue (Helman, 2006).

Hence, to increase the impact of training, exercises should not only focus on behavioral aspects of learning to use distinct supervisory skills. In addition, during behavioral practice mentor teachers have to be encouraged to talk about and reflect on cognitions mediating their use of supervisory skills during the dialogues, because cognitions can point to a specific perspective or frame of reference that is guiding person's actions (Meijer, Verloop, & Beijaard, 2002). Eliciting cognitions, which make up reflective moments related to the use of supervisory skills, may provide clues for improving and speeding up the development of mentor teachers' supervisory repertoire and, subsequently, may enhance the effectiveness of training. After all, the ultimate goal of promoting mentor teachers' reflectivity during mentoring dialogues is to contribute to the development of versatility in their use of supervisory skills, and consequently to serve the learning of each individual student teacher.

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