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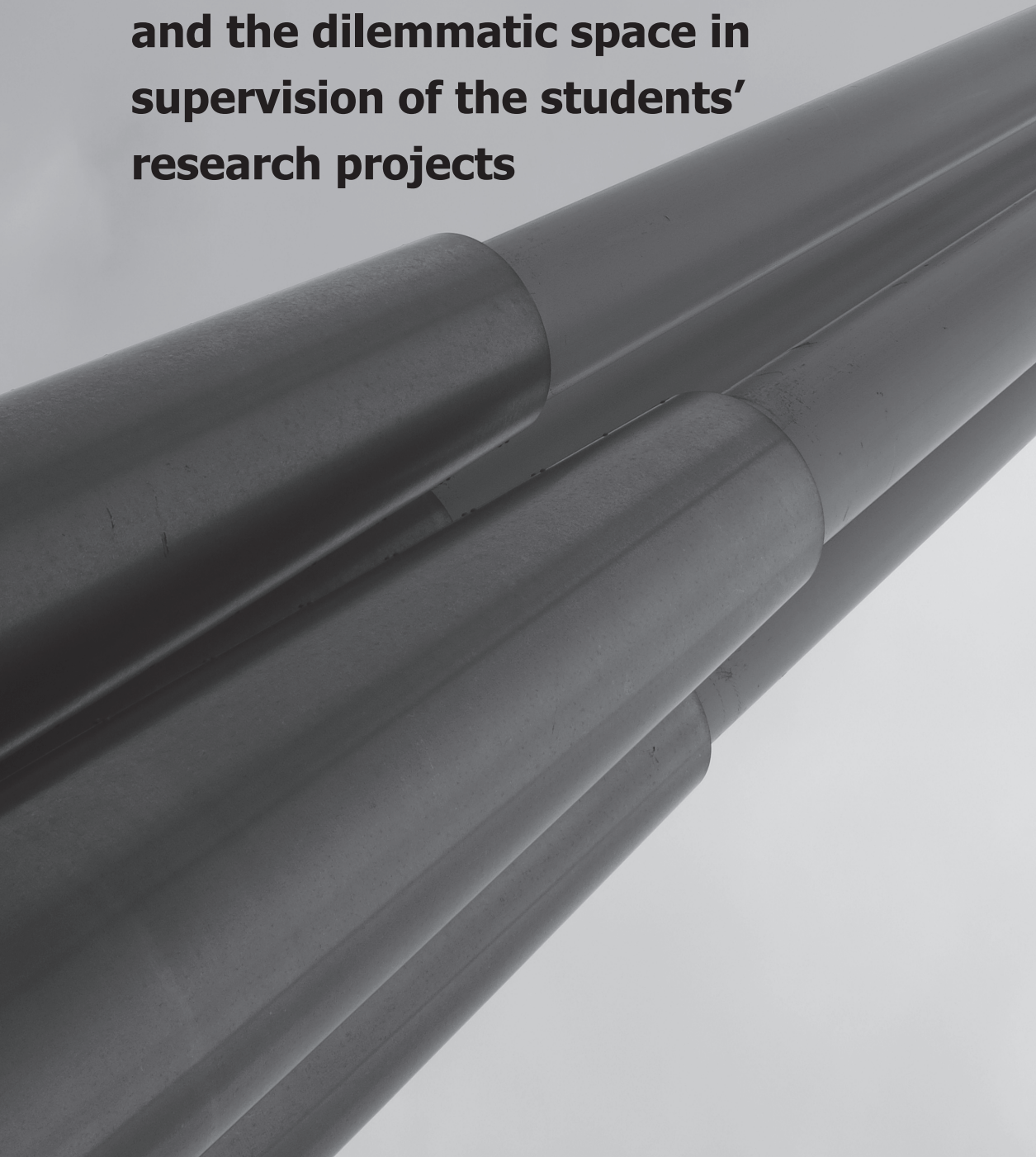
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Chapter 5

Novice supervisors' practices and the dilemmatic space in supervision of the students' research projects

5. Novice supervisors' practices and the dilemmatic space in the supervision of students' research projects.

Growing interest in students' research projects in higher education has led to an emphasis on research supervision. In this study, we hence focus on novice supervisors' approaches to research supervision as they explore their practices and experience difficulties when supervising medical students. The concept of teacher noticing was used as a sensitising concept and relations with teacher dilemmas were explored in the research supervision context. To provide in-depth insights into supervisors' practices and pedagogical choices, twelve stimulated recall interviews with supervisors were analysed. The supervisors were all involved in individual undergraduate or master's level research projects at a research-intensive university. The analysis revealed four kinds of dilemmas that might influence research supervision practices, namely questions regarding regulation, student needs, the student-supervisor relationship and supervisors' professional identity. We explain the relationship between novice supervisors' practices and dilemmas in detail. Further, the implications of the study are discussed so as to enhance initiatives for the professional development of supervisors.

5.1 Introduction

Growing interest in student engagement in research within university education, for example, in students' research projects, has led to an emphasis on research supervision. As a result, an increasing number of studies have investigated research supervision (e.g., Anderson, Day, & McLaughlin, 2008; Harwood & Petrić, 2017; Maxwell & Smyth, 2010; Wichmann-Hansen, Thomsen, & Nordentoft, 2015). Recent studies involving experienced supervisors have identified factors within research supervision that contribute to student learning, including responsiveness to students' needs and ways in which supervisor-student relationships are maintained (e.g., de Kleijn, Meijer, Pilot, & Brekelmans, 2014; Lee, 2008; Mainhard, van der Rijst, van Tartwijk, & Wubbels, 2009). These factors are useful for fostering supervisors' reflections on their practices as well as for the study of research supervision. Novice supervisors in particular can benefit from support in exploring their approaches to supervision, facing challenges and adapting pedagogies (e.g., Turner, 2015). Indeed, adequate support can enable novice supervisors to deliberately learn from and use their personal supervision experiences (cf. reflective practice, Schön, 1983), both as a student and a supervisor (Amundsen & McAlpine, 2009). This study aims to provide input for development initiatives for novice supervisors by focusing on what novice supervisors do to promote student learning during research projects and why they do what they do during student-supervisor interaction. Our results will inform supervisors' professional development initiatives in order to foster student learning within students' research projects in university education. This study contributes to a body of knowledge concerning research supervision by using supervisors' reflections on recordings of student-supervisor interactions rather than interview data based on their experiences. This study aims to reveal dilemmas that novice supervisors face during interactions with students and identify relations of those dilemmas with pedagogical choices in supervision practice.

5.1.1 Supervision of students' research projects in higher education

Previous studies have aimed to demystify experienced supervisors' practices and have emphasised student and supervisor characteristics or types (de Kleijn, et al., 2014; Grant, 2003; Halse, 2011). However, adapting supervision to student characteristics or traits in practice may prove difficult for novices (e.g., Kandiko, & Kinchin, 2012). In comparison to experienced doctoral supervisors, novice supervisors worry about being taken seriously by students and feel unprepared for to work in environments that lack clear guidelines for most job activities, as is usual in academic departments, which can also apply to supervising undergraduates (Amundsen & McAlpine, 2009). The term novices is used to indicate that the supervisors who participated in this study have relatively few years of supervisory experience as opposed to expert supervisors. In this study we draw on prior studies concerning doctoral research supervision pedagogy in which research supervision has been constructed as teaching (Boud & Lee, 2005; Manathunga, Lant, & Mellick, 2006). An underlying assumption when conceptualising research supervision as a teaching activity is that students are considered to be learners and it is assumed that their capabilities will develop when they receive effective feedback (Dixon & Hanks, 2010; Walker & Thompson, 2010). The findings presented in the literature suggest that, in order for students to learn from their research projects, in addition to providing them with a research-rich environment, supervisors need to apply a pedagogic approach (Boud & Lee, 2005; Manathunga, et al., 2006). This notion is in line with studies concerning master's and undergraduates thesis supervision, which emphasise supervisors' reflections on their practices during interactions with students so as to foster high-quality supervision in terms of students' research projects (Malcolm, 2011; Wichmann-Hansen, et al., 2015). In addition, interactions between academics and students that help to understand the needs of their students are considered pivotal in teaching within higher education context in general and in supervision of students' research projects at doctoral, master's and undergraduate level (Ashwin, 2012; de Kleijn, et al., 2014; Mainhard, et al., 2009; Todd, Bannister, & Smith, 2006).

In comparison with traditional classroom practice, research supervision can be considered unique, since the research projects provide students with the relative freedom to choose a topic, while the duration of students' research projects is generally longer than that of traditional teaching units and research projects mainly involve one-to-one student-supervisor interactions (e.g., de Kleijn, et al., 2014; Todd, et al., 2006). In contrast to supervising master's and undergraduate dissertations, both students' research activities and the nature of supervisors' work as an academic play a central role in doctoral research supervision practices (e.g., Kandiko & Kinchin, 2012; Manathunga & Goozée, 2007). The supervisors of undergraduate and doctoral students' research projects draw on personal experiences gained in other supervision and teaching contexts, including previous experiences as both students and a supervisor (Amundsen & McAlpine, 2009; Todd, Smith, & Bannister, 2006; Turner, 2015). Supervisor training that focuses on eliciting development opportunities through the analysis of supervisor behaviour, can contribute to supervisors' professional knowledge and their supervision practice (e.g., Emilsson & Johnsson, 2007; Lizzio & Wilson, 2004; McCulloch & Loeser, 2016). In sum, previous findings from literature suggest that supervision of master's and undergraduate research projects can be considered a form of teaching (Malcolm, 2011; Manathunga, et al., 2006; Wichmann-Hansen, et al., 2015).

5.1.2 Pedagogical choices in supervision practice

Supervisors have to simultaneously realise multiple goals in practical teaching situations in order to foster student learning. For example, supervisors aim to develop students' sense of agency within a project whilst also maintaining an effective student-supervisor relationship that can result in indirect, albeit very potent ways of steering (Turner, 2015). For instance, supervisors shape master's students' research activities via the often implicit and unconscious diagnosis on student characteristics, including their enthusiasm for a topic, motivation and attitude towards the supervisor (de Kleijn, et al., 2015). In addition, supervisors should foster student learning during interactions with individual students and also adapt their pedagogies to student research competencies as well as the

wider context of the institute and department in which they work (de Kleijn, et al., 2015; Grant, 2003; Manathunga & Goozée, 2007; Pearson & Brew, 2002). The relations between supervisors, students and the context in which they work and learn can introduce supervisors to different, perhaps conflicting, values, responsibilities and goals. Supervisors' intentions to promote their own research development, for instance, might conflict with strategies that would foster a rich learning experience for students (Bruce & Stoodley, 2013). Thus, supervisors can have multiple goals simultaneously in supervision practice which can influence their pedagogical choices.

Findings from a previous study into research supervision pedagogy suggest that the supervisors' awareness of alternative options for practice influences their research supervision practices (Bruce & Stoodley, 2013). Indeed, the broader the supervisors' repertoire of approaches to supervision, the more they have to choose from. However, as supervisors can pursue several goals simultaneously choosing an approach may prove complex. One reason for this is that human behaviour in complex situations, for example, research supervision practice, depends on individual characteristics such as needs, drives and goals as well as structural aspects or perceptions of the environment (e.g., Shah & Kruglanski, 2008; Simon, 1957).

5.1.3 Dilemmatic space
Against the background of supervisors' goals and their perceptions of the context, teacher dilemmas can emerge that may influence their pedagogical approaches (Jonasson, et al., 2015; Leong, 2014). Supervisors might, for instance, experience a dilemma between providing a student with answers and fostering student ownership in research projects. Particular student behaviour could trigger the 'spitting out' of answers, although that approach might hamper students' independent and reflective thinking (Wichmann-Hansen, et al., 2015). Within teaching in general and higher education in particular, teacher dilemmas have been studied in relation to the concept of dilemmatic spaces which are 'social constructions resulting from structural conditions and relational aspects in everyday practices' (Fransson & Grannäs, 2013, p. 11; Leong, 2014). According

to this view ever present dilemmas are inherent to teaching and specific teaching situations will bring certain considerations more to the fore while leaving others to the background (Fransson & Grannäs, 2013; Leong, 2014). All teacher's dilemmas will be evoked, for example, when a policy change requires teachers to alter their assessment practices after years of conducting assessments in a certain way (Leong, 2014) or when teachers have to balance the classroom space between the shy and talkative students (Frelin 2010, cited in Fransson & Grannäs, 2013). Practical reasoning in these situations is deeply rooted in the human desire to do the right thing in the right place at the right time in the right way (MacIntyre, 2007). What is regarded as 'right', however depends on the relationships between a supervisor and others (Fransson & Grannäs, 2013). Findings from a study into undergraduate research supervision indicate that the issue of boundaries is apparent in the role of the supervisor in the sense that supervision evokes confusion among supervisors as to what is expected of them (Todd, et al., 2006). Previous research has indicated that teaching dilemmas influence teaching practices. In higher education specifically, teaching dilemmas may depend on teachers' sense of urgency or uncertainty in relation to their teaching practice (Scager, Akkerman, Pilot, & Wubbels, 2016). Within undergraduate research supervision this uncertainty may occur when supervisors feel they have to defend the students' dissertations to a second assessor or when their expertise does not match the students' interest (Malcolm, 2011; Wiggins, Gordon-Finlayson, Becker, & Sullivan, 2016). In this study, we will explore relationships between novice supervisors' practices and their dilemmas using the idea of a dilemmatic space as an analytical framework.

5.1.4 Novice supervisors' noticing
Within teaching in general, novices tend to focus on instructional decisions and student skill performance (Talanquer, Tomanek, & Novodvorsky, 2007). It has been argued, therefore, that novices need to learn to use evidence of student learning in their student-teacher interactions in order to enable them to assess the effectiveness of their instruction (van Es & Sherin, 2008). Teacher noticing is about identifying meaningful patterns in student learning through teachers'

reflection on classroom practices (Erickson, 2011; van Es & Sherin, 2008). Teacher noticing means that (1) teachers focus on student understanding in student-teacher interaction, (2) teachers interpret student understanding based on the interaction and (3) teachers decide what pedagogy is appropriate based on the former points (e.g., Barnhart & van Es, 2015). Novices may direct their attention towards superficial characteristics of student-teacher interaction or else may generalise their own experience as a student in order to adapt their pedagogies (van den Bogert, van Bruggen, Kostons, & Jochems, 2014). In this study, we used teacher noticing to guide our attention towards important aspects and to describe novice supervisors' practices during supervision meetings (cf. sensitising concept, Bowen, 2006).

5.1.5 The role of the discipline

University teaching can depend on discipline-specific characteristics, such as a consensus on research paradigms within scientific disciplines or ways in which knowledge is structured (Colbeck, 1998; Smeby, 2000). This study was conducted within the medical discipline at a research-intensive university. It involved both applied and pure study programmes within the discipline, which served as an example of a hard discipline (e.g., Biglan, 1973). A classification of subject matter within disciplines based on a study by Biglan (1973) indicates that disciplines can be classified based on two dimensions. The hard/soft dimension involves the paradigmatic development within a field, while the applied/pure dimension involves the practical applicability of scholarly research (Biglan, 1973). Within hard disciplines knowledge construction is often characterized by a relatively high consensus on both paradigms and research content (Becher & Trowler, 2001; Biglan, 1973).

5.1.6 Research aim

The aim of this research study is to deepen our understanding of how supervisors foster student learning during students' research projects in bachelor's and master's medical education as well as to explore the relation between research supervision practices and the dilemmatic space in which novice supervisors

negotiate research supervision. The results from this study will provide input for supervisors' professional development initiatives regarding supervising research projects within university teaching. This study aims to contribute to an existing body of knowledge about research supervision by both using supervisors' direct observations of student-supervisor interactions and by focusing on novice supervisors.

5.2 Educational context

The majority of students enrolled in research-intensive Dutch universities pursue a master's degree after completing their undergraduate degree. Students conduct an individual student research project at the end of both the undergraduate and the master's phases. We use the term 'students' research projects' to indicate a context in which research, teaching and student learning are closely related. A central aim of students' research projects is to foster student understanding of research and to promote research competencies such as scientific reasoning and critical thinking. Specifically, within both graduate and undergraduate medical education, research projects are integrated into curricula worldwide so as to foster students' ability to develop knowledge by conducting research and to incorporate research into clinical care by means of the critical appraisal of research findings (GMC, 2015; NFU, 2009). This means that, in the Dutch context of the present study, all students complete a mandatory full time research project as part of their medical degree. The supervisors who participated in this study supervise students in mandatory research projects towards the end of either their undergraduate or master degree in one of the health sciences. More precisely, students' research projects are carried out within a medical, biopharmaceutical or biomedical programme. The arrangements for supervisor support and training in relation to these programmes consist of two to four voluntary training sessions held over a short period of, which focus on supervision aims, supervisors' roles and the provision of feedback, although the present study is not conducted in the context of such training. All three programmes include a three-year undergraduate

phase. After that, there is a two-year master's phase in biopharmaceutical and biomedical programmes, or a three-year master's phase in medicine. Students' research projects within the undergraduate and master's phase can differ in terms of their duration, although the students perform similar research activities (e.g., performing a literature search, formulating research questions, writing and conducting a research plan and writing a research report). Most of the research projects in this study vary in duration from 12 to 16 weeks, although some projects take 40 weeks. The students conduct their research projects individually in a setting that is similar to a fulltime internship either in a laboratory or research department within the health sciences. The projects are worth a minimum of 18 European Credit Transfer and Accumulation System (ECTS) credits. At the time of data collection, all students' research projects were about halfway towards completion.

Most supervisors are PhD-students or immediate postdoctorates. In the context of three- to four-year PhD programmes, this means that supervisors who are immediate postdoctorates or PhD students all have relatively little experience with research supervision. The student-supervisor interactions are typically one-to-one and often face-to-face. The students had either chosen or were assigned to a supervisor and chose a research topic of their interest to themselves. The supervisor provides the student with feedback regarding the research process and preliminary products. The supervisors who participated in this study are day-to-day supervisors of students' research projects. A senior researcher monitors the quality of the research projects and has less frequent contact with students. In the case of medicine, the PhD-students involved in our projects assess the students' research report, after which a second, external assessor is consulted. Within the biopharmaceutical and biomedical sciences the students' research reports are assessed by the day-to-day supervisor and an external assessor. In our study, we focus on the one-to-one supervision meetings between the student and the day-to-day supervisor.

5.3 Method

5.3.1 Participants
All the participants in this study were supervisors of students' research projects in the same research- intensive Dutch university. Eleven supervisors from two departments participated in the study. All the participants were junior researchers within the domain of the health sciences. The health sciences provided an authentic research context, wherein supervisors were likely to have more similar than different conceptions of research (e.g., Brew, 2001). Characteristics of the participating supervisors are presented in Table 5.1. The majority of the students' research projects took place either during the third year of the undergraduate degree or in the subsequent first year of the master degree. One or two students did conduct their research projects during the final year of the master degree. At the time of data collection the eleven supervisors were supervising twelve students' research projects. One supervisor was supervising two students' research projects.

Table 5.1. Supervisor characteristics

Background variable		Number
Discipline[a]	Biomedical sciences	7
	Biopharmaceutical sciences	3
	Medicine	4
Gender	Female	7
	Male	4
Age (years)	Range	25-30
	Mean	27.3
Research experience (years)	0-3	9
	3-6	2
Supervising experience (years)	0-3	9
	3-6	2
Teaching experience (years)	0-3	8
	3-6	3

Note. [a]Three supervisors reported supervising students in two of the three categories

and preferred to be interviewed twice. In total, there were seven research projects being conducted as part of an undergraduate degree and five projects as part of a master's degree. The supervisors were supervising four male and eight female students. All the students had previous relevant university education within the health sciences domain prior to beginning their student research project.

5.3.2 Data collection and instrument

The participating supervisors were asked to reflect on a one-to-one supervision meeting with their student. All supervision meetings and interviews were conducted in Dutch. In order to elicit the supervisors' reflections on supervising students' research projects as well as to promote their reflective thoughts, we used a method similar to the stimulated recall method. In stimulated recall interviews, the participants select and discuss parts of student-supervisor interactions (Dempsey, 2010). In this way we were able to elicit the cognitions underlying the supervisors' supervision of their students (e.g., Verloop, 1989). Prior to the individual interviews a one-to-one research supervision meeting with a student was videotaped. Immediately after this meeting the supervisor selected meaningful fragments. The key question for selection was: 'At what times during the supervision meeting did you feel you needed to guide the student and what were your thoughts?' The supervisors were encouraged in the interviews to explain their practices during the supervision meeting with a student, based on video fragments. Data collection took place during spring 2015 and ethical approval was granted by the ethics research committee of the university's graduate school of teaching. All twelve interviews with the supervisors were audiotaped and lasted an average of 35 minutes.

5.3.3 Analysis

All the interviews were transcribed and coded based on a constant comparison analysis using teacher noticing as a sensitising concept (Bowen, 2006). As a starting point an existing coding scheme concerning teacher noticing was used (van Es & Sherin, 2008). Atlas.ti 7 software was used to iteratively analyse the data in several phases. During the first phase, the first author watched the videotape of a supervision meeting in order to interpret the supervisors' explanations in the transcripts. After that two transcripts were coded inductively by the first and second author to obtain a sense of the information contained in the interviews. Next, the first and second authors worked independently through a set of three transcripts to identify what fragments referred to the supervisor noticing student learning. The fragments were assigned descriptive codes to the fragments based on the coding scheme of van Es and Sherin (2008). After that, the two authors discussed the descriptive codes until consensus was reached regarding the selection of fragments and descriptive codes. A total of 445 fragments were selected. In the second phase, the authors categorised the descriptive codes to establish a tentative coding scheme that fitted the supervision context of this study. The first author then applied the tentative coding scheme to an additional set of two transcripts until no new codes emerged from the data. Next, a research assistant was brought into the project who coded two transcripts together with the first author. After this round of coding and final adjustments, only a few new codes emerged. The results were compared until consensus was reached on the code descriptions. As an additional step intended to enhance the quality of the analysis, we assessed the inter-rater agreement. The first author and the research assistant both coded one-third of the transcripts independently. In two rounds of independent coding a good level of agreement between the researchers was reached for the ten codes within the coding scheme (kappa = .64; 72.6% agreement) (Fleiss, 1981).

During the third phase of the analysis the data were explored with regards to a dilemmatic space. To that end, the first author made a selection from the previously analysed fragments. The fragments that reflect the supervisors' difficulties when supervising students were selected. As a criterion for selection we used supervisors' expressions such as '…that is difficult for me' and '… that is what I'm most concerned about'. A total of 88 fragments were selected, which the first and second authors then discussed. The first author then coded the fragments into four themes that emerged from the data, after which the first and second authors interpreted the fragments for each theme. They found that formulating questions related to each theme, from the perspective of the

supervisor, demarcated a dilemmatic space. In this way a dilemmatic space in which the supervisors negotiated research supervision was established based on the data. The first author wrote a description of the themes and questions. Next, the first author and an independent researcher analysed fragments independently based on the descriptions in order to improve the analytical rigour. As a result, the themes were rephrased so as to establish four themes of the same order, all four of which relate to the supervisors' difficulties fostering student learning in supervision practice.

During the final phase of the analysis, the relationships between the dilemmatic space and the supervisors' practices were explored in a between-case data matrix (Miles & Huberman, 1994), which displayed the described dilemmatic space and practices. A summary of the between-case data matrix reflecting the illustrative fragments and references to other fragments is shown in Appendix 4. The fragments in the data matrix were discussed by the first and second authors. Examples from the data were then chosen to illustrate the relationship between the dilemmatic space and the supervisors' practices.

5.4 Results

5.4.1 Teacher noticing and dilemmatic space within the data

Five codes concerned the practices supervisors used during their undergraduate research supervision meetings. 'Fostering motivation' was concerned with encouraging the student and rendering the supervision meeting pleasant. 'Giving directions', 'promoting knowledge construction', 'thinking along' and 'creating awareness' were all directly related to the students' research process. 'Giving directions' was used to provide feedback, hints or instructions to the student, while checking students' knowledge level was a characteristic of 'promoting knowledge construction'. Through 'thinking along' the supervisor collaborated with the student, while 'creating awareness' was concerned with encouraging the student to underpin the steps taken during the research process. The full code descriptions are given in Appendix 5. Fictitious supervisor names are used and all examples taken from the data have been translated from Dutch.

Three codes emerged for the actors involved in the supervision practice, which refer to the person the supervisor was drawing attention to when watching the video, namely the 'student', the 'supervisor' or 'other'. Two codes referred to excerpts concerning (1) the supervisor's concerns regarding the planning of the project and (2) the aims of undergraduate research supervision as perceived by the supervisors.

Four codes emerged that described the dilemmatic space in which supervisors negotiated pedagogies during the supervision meetings. The codes were illustrated using questions to clarify the underlying dilemmas as elicited during the interviews. The first question was concerned with regulation in which supervisors deal with the question 'To what extent can the student regulate the research process?' An example from the data is shown below.

'[…] On the one hand, he [the student] wants a structured project. On the other hand, he has indicated that he wants to do research independently. That was one of his learning goals for his final student research project. He wants an idea of where to start when he has a research project or research question again. For me, that's seeking a balance between those two.' (Mary).

Mary indicates that she experienced difficulties in structuring the learning process, since the student needed a structured research project and a sense of autonomy at the same time.

The second question, reflected the difficulties the supervisors experienced when determining the student needs ('What are the student needs?'). The supervisors exhibited difficulties in interpreting student behaviour or the student learning outcomes, for example, when a supervisor felt that a student did not process that supervisor's feedback in the way the feedback was intended. That led the supervisor to question her/his own actions. This is illustrated by the fragment below.

'And that's what I'm most concerned about. Are the tasks that I propose to her impossible to do? Yes, because she says she can't do it. Well… Is it too difficult for her? Or is she just cutting too many corners?' (Peter).

In this fragment, Peter shared his concerns about his student's actions. Fragments regarding the interpretation of students' needs reflect instances in which the supervisors might not know how to respond to their students and hence they questioned their actions.

The third question reflected the supervisors expressed concerns regarding their relationship with their students. Dilemmas regarding the student-supervisor relationship are reflected in the following question 'What should I do to maintain a good supervisor-student relationship?' which is illustrated in the following fragment.

'I wanted her to rephrase the text on her poster into scientific language. It was actually there, although the part about the cholesterol was missing, but I don't want to hurt her feelings. Because she tried her best and made a good sentence and she understands it.' (Vera).

Fragments involving the student-supervisor relationship illustrate the emotional aspects involved in interaction with the student. The supervisors indicated that it can be difficult for them to be clear to their students, as expressed above by Vera not wanting to hurt her student's feelings.

The fourth question was 'What is my role as a supervisor as perceived by others?' This concerns the supervisor's professional identity. It is illustrated in the following example.

'I have to tell him that I've noticed he's using [a translation engine] to translate and copy text. Yes, I have to tell him, otherwise he'll keep doing this. And his other supervisor at the school [university] is also going to read this'. (Anna).

In the fragment above Anna explains that she has to provide her student with instructions, since a second supervisor will also assess this research product. These fragments illustrate an emerging professional identity as the supervisors explore their roles based on their own role perceptions as well as those of others, such as a senior researcher and the student.

5.4.2 Exploring relationships between the dilemmatic space and supervisors' practices

'Promoting knowledge construction' and 'giving the student directions' as practices (see Appendix 5) were described by the supervisors across the four questions within the concept of dilemmatic space. The 'promoting knowledge construction' and 'giving directions' practices related to all the questions within the dilemmatic space. We hence chose to present examples from the data that illustrate variation regarding relationships between the dilemmatic space and supervisors' practices (see below).

5.4.2.1 The regulation question and giving directions

Within fostering regulation (Question 1) as a dilemmatic space we found that the supervisors were mainly providing the student with directions (see example below).

'What I've noticed is that I'm going to lecture him at a certain point. I often do that. I leave him more or less space to come up with his own things. I've noticed that during the supervision meeting, I've interrupted him once or twice. [Pointing at the video] Look, things like this. I already know he's got ideas about this, we've discussed this before. Despite that I tell him what the aim was and what we're going to do. Then I quietly wonder how that comes across to him, because I am determining the direction.' (Robert).

This example shows that the supervisors struggle with the extent to which they should promote student agency. In this case Robert is aware of that issue, although he still felt that giving the student directions was needed at that point.

5.4.2.2 Fostering motivation within the dilemmatic space

'Fostering motivation' was reflected in fragments in which the supervisors indicated that motivating the student and rendering the supervision process pleasant ('Practice/Fostering motivation') can be related to fostering student regulation (Question 1), to difficulties in interpreting student needs (Question 2) and to difficulties in maintaining the student-supervisor relationship

(Question 3) within their dilemmatic space. Dilemmatic questions regarding the supervisors' professional identity (Question 4) did not reflect 'fostering motivation' as a practice.

The following fragment from the interview conducted with Linda illustrates the relationship between 'fostering motivation' and the relationship between the supervisor and the student (Question 3; see below).

'She indicates that she isn't quite calm yet. I try to calm her down. She knows herself, she told me: "Every now and then I can't put my mind to rest. It [the research project] isn't easily out of my head." She keeps telling me that. And still this feeling isn't gone, she's trying to ignore it. Now, we're talking about it again.' (Linda).

In this fragment, Linda attempts to calm the student down and she provides her with clarity, without any reference to the issues resulting from the research project. A similar practice is also described by Linda in a situation where she is satisfied with the student's work, although this may relate to difficulties in interpreting students' needs (see the next fragment).

'Sometimes it's difficult to figure out what more you can do to make someone better. Sometimes it's already sufficient'. Interviewer: 'Did you try to figure out what you could do for her during this meeting?' 'Yes. This time I asked her, like feedback, at the end of the meeting about things that I could do. It's difficult for me to know what she thinks. […] Perhaps I'm doing too much for her?' (Linda).

Moreover, Anna describes 'fostering motivation' as a practice used in order to stimulate student regulation within the research project. This notion is reflected in the fragment below.

'He has to ask me if he gets stuck or when he has a question about the order of the findings in the report. He may try his best regarding his findings, although he needs to ask me when he gets stuck. From my own and others' experiences as students I know this is really difficult.' (Anna).

All three of these fragments involving fostering motivation as a practice suggest that the supervisors' assess the students' needs, including their need for supervisor support.

5.4.2.3 *Supervision aims and the identity question*
Finally, fragments concerning the 'supervision aims' were only reflected within the dilemmatic space of professional identity, as illustrated below.

'I find it difficult to provide feedback on this kind of rules of engagement [the student being late, the student sending an e-mail to the senior researcher without mentioning the supervisor]. I find it difficult, because it's only about how I like it.' (Mary).

In this fragment, Mary describes one of her supervision aims, namely to promote her students' professional behaviour. However, she feels unsure about doing this. One reason for this uncertainty could be that she understands the student to be acting in accordance with her own personal preferences ('…how I like it') rather than those of the supervisor (i.e., Mary).

5.5 Conclusions and discussion

The aim of this study was to describe novice supervisors' practices during research supervision as well as to explore relationships between supervisors' practices and the dilemmatic space which may reflect pedagogical choices in practice. This is based on the idea that research supervision practice can be seen as teaching with the aim of promoting student learning (e.g., Manathunga, et al., 2006). Supervision practice is complex, since pedagogical choices made in the real world can depend on supervisor characteristics, structural aspects of the environment and student understanding in student-supervisor interaction (Barnhart & van Es, 2015; Simon, 1957). Moreover, as novices are learning to identify patterns in students' cognitive development they may experience difficulties adapting their practices (e.g., van Es & Sherin, 2008). In this study,

the concept of teacher noticing was explored within the data. The interviews in this study elicited supervisor dilemmas which were conceptualised within the concept of dilemmatic space.

The analysis in this study revealed a dilemmatic space, that is, a decision-making space indicated by four interrelated questions about regulation, student needs, the supervisor-student relationship and supervisors' professional identity. Teacher dilemmas have previously mainly been explored separately. Amundsen and McAlpine (2009), for example, elicited novice supervisors' concerns about their professional identity. With rather similar results to our own, Wichmann-Hansen et al. (2015) found that experienced supervisors find it challenging to interpret students' questions and identify and develop their analytical skills. De Kleijn and colleagues (2014) suggested that experienced supervisors struggle with relational aspects and also with their own professional position. Although the themes were quite broadly formulated in our study concerning novices, previous findings indicate that experienced supervisors negotiate research supervision within a similar dilemmatic space (de Kleijn, et al., 2014; Wichmann-Hansen, et al., 2015).

Five practices were identified in this study encouraging student learning: 1) fostering student motivation, 2) giving directions, 3) promoting knowledge construction, 4) thinking along and 5) creating research awareness. This indicates that novice supervisors partly focused on instructional decisions in practice; for example, giving directions (cf. Talanquer, et al., 2007). Promoting knowledge construction could mean that the supervisors interpret student understanding during student-supervisor interaction, although based on the concept of teacher noticing this was expected to prove difficult for novice supervisors. These findings indicate that noticing can be a useful concept for understanding novice supervisors' practices, although longitudinal research is needed to provide insight into the adaptation of supervision practices. The supervision practices 'thinking along with the student' and 'creating research awareness' could be specific to a context in which students participate as a researcher (e.g., Healey and Jenkins, 2009). The supervision practices identified in our study may complement each other in terms of fostering student learning, although relations with student

perceptions of research within teaching still need to be explored (e.g., van der Rijst, et al., 2013). Furthermore, the results show that, in addition to supervision practices, novice supervisors reflect on the actors involved in students' research projects, the planning of the project and their personal supervision aims.

Relations between supervision practices and themes within a dilemmatic space were found. Dilemmas regarding fostering agency were related to student regulation and giving student directions. This could indicate that novices are aware of themselves as either hindering or fostering student ownership. Fostering student regulation might have been a prominent dilemma for the supervisors who participated in this study, since the results indicate that encouraging student regulation is related to direct means of steering students. Motivating students, as a practice intended to promote student learning, was related to fostering student regulation, the interpretation of student needs and the supervisor-student relationship. This result suggests that supervisors may encounter difficulties in making themselves clear to the student and maintaining the relationship (e.g., Turner, 2015). In addition to supervision practices, personal supervision aims seem to play a role in novice supervisors' dilemmatic space. The personal supervision aims were reflected in relation to concerns about their professional identity. This could be explained by a potential overlap between supervisors' conceptions of themselves, research and teaching, on the one hand, and supervisors' values and intentions as expressed through the dilemmatic space, on the other hand (e.g., Brew, 2003; Robertson & Bond, 2001; Visser-Wijnveen, et al., 2010).

5.5.1 Limitations and implications
When interpreting the results of this study the following points should be borne in mind. First, the participating supervisors have explicated their implicit dilemmas after the supervision meetings. In addition, the fact that the supervision meetings were videotaped might have affected both the students' and supervisors' behaviour. However, during the interviews, the supervisors were encouraged to reflect on all aspects of the supervision meeting including the potential influences of the video recording. The few times that the supervisors

mentioned being aware of the recording, they indicated that they had forgotten about it soon after the start of the meeting. Yet, this might raise questions about the validity of the explications. Nevertheless, the interviews took place immediately after a supervision meeting and the supervisors chose the moments within the meeting to reflect upon themselves. Second, the results were based on a sample of eleven supervisors employed within a single research-intensive university who voluntarily participated and were interested in improving their research supervision practices. This might affect the generalisability of our findings. Importantly, the findings of a previous study into data saturation in qualitative studies indicate that the number of supervisors in this study is close to the point at which it has been found that only limited new categories emerge from the data (Guest, et al., 2006). Furthermore, the literature concerning relations between research and teaching indicates that we need to consider potential disciplinary differences with regard to teaching (e.g., Colbeck, 1998; Smeby, 2000). This study was conducted, including multiple departments within the medical discipline as a hard discipline and this may hamper the generalizability of findings to other disciplines.

This study has three important implications for supervisor training practice within higher education institutions. First, based on the findings of this study it could prove beneficial to evoke supervisors' reflections on their own practices using video recordings in addition to more implicit ways of using supervisors' experiences to improve supervision practices. Further, the number of years of supervisory experience can serve as an indicator of quality in terms of supervision practices. For example, in the context of training, if novice supervisors could select both a positive and a challenging fragment from a meeting with a student. Subsequently, the supervisors could share their reasons for selecting the video fragments, watch the fragments together with their colleagues, discuss their supervisory behaviour and explore alternative practices (cf. Wichmann-Hansen, et al., 2015). Second, the findings of this study add to findings of earlier studies suggesting that novice supervisors approach research supervision using their previous experiences as both students and supervisors (Amundsen & McAlpine, 2009; Turner, 2015). They do so by using dilemmas that are inherent to student-supervisor interaction as a starting point for sharing those experiences among colleagues who also supervise students. Moreover, the questions found in the dilemmatic space can be used to facilitate the sharing of ideas about research supervision practice. Third, the findings from this study suggest that fostering supervision practices that influence student learning during research projects requires an explicit focus on the part of supervisors. This is not always evident, since students' research projects are not directly seen by academics as an opportunity for promoting student learning (e.g., Brew & Mantai, 2017). Supervisor training could, therefore, focus on relations between supervisor's concrete experiences in supervising students, as well as their reflections on supervision practices and student learning.

Future studies concerning research supervision practices and the dilemmatic space of experienced supervisors could provide additional insights into the role of supervising experience in supervisor learning. For example, in comparison to novices, how do experienced supervisors reflect on their practices? Based on findings from previous studies it is expected that experienced supervisors experience similar dilemmas to novice supervisors (Amundsen & McAlpine, 2009; de Kleijn, et al., 2014; Wichmann-Hansen, et al., 2015).

5.5.2 Conclusions

Promoting student learning in research supervision not only requires supervision experience that can be drawn upon in practice, but also the ability to interpret characteristics of student learning in interaction (e.g., van Es & Sherin, 2008). The diversity of concerns that novice supervisors' elicited in this study highlights the importance of the considerations that influence pedagogical choices. Interpreting student understanding is difficult for novices, since this is also mentioned as a theme within the dilemmatic space. This study provides in-depth insights into how novice supervisors supervise students' research projects. Our results show that, although students' research projects are common practice within higher education, stimulating student learning is not straightforward for novice supervisors. The findings further suggest that initiatives supporting supervisor development can benefit from explicit supervisor reflections on their practices

using video in contrast to more implicit ways of incorporating supervisor experiences in supervisor training. Furthermore, this study has revealed a dilemmatic space, demarcated by four dilemmas, in which research supervision takes place in practice. Based on the findings of this study it is suggested that dilemmas regarding the determination of the student needs, the extent to which the student can regulate the research process, the student-supervisor relationship and the role of the supervisor as perceived by others all influence supervision practices. Hence, they should be addressed in supervision training.