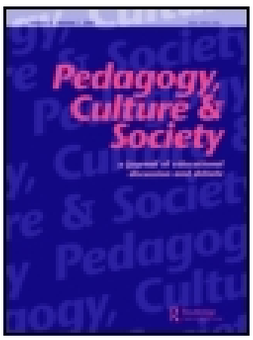

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Student teachers' research and development (R&D) practice - constraining and supporting practice architectures

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ABSTRACT

An important aim of teacher education is to produce teachers who are innovators and education researchers who engage in continuous learning about teaching as part of their professional lives. For student teachers to develop research skills and turn their knowledge into professional research and development (R&D) competence, they must practice their skills and apply their knowledge to relevant contexts. This study uses the theory of practice architectures as a theoretical and analytical lens to examine the arrangements that enable and constrain student teachers' R&D practice. A descriptive case study was conducted with participants from two practicum groups from a master's programme in Norway. While the use of observational tools was found to enable R&D practice, constraining arrangements were also identified. The article argues for greater attention to student teachers' research activities during practicum, particularly organisational conditions needed to enhance the relationship between university learning and practicum-based learning.

KEYWORDS

Research and development (R&D) practice; practice architectures; observational tools; teacher education; student teachers' professional competence; mentoring of student teachers

Introduction

An important aim of teacher education is to produce teachers who are innovators and act as education researchers and who engage in continuous learning about teaching as part of their professional lives (British Educational Research Association 2014; Darling-Hammond 2006; Toom et al. 2010). Consequently, transdisciplinary research and development (R&D) competence is often a requirement to qualify for entry into the teaching profession (European Union 2018; Organisation for Economic Co-Operation and Development 2005). To develop their research skills and knowledge into professional R&D competence, student teachers should consult and conduct research during their initial teacher education (Niemi and Nevgi 2014). They need to practice their research skills and apply their research knowledge to relevant contexts (Grootenboer, Edwards-Groves, and Kemmis 2021) so that these research activities become enmeshed in their professional identity (Jenset, Klette, and Hammerness 2018). The main opportunity for this in teacher education is the period of practicum.

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In this paper, we see student teachers' research and development (R&D) activities in the practicum as part of R&D practice. The extent to which student teachers enact research skills, reflect on knowledge of teaching and learning, and apply these skills and knowledge to classroom contexts, is a socially dependent affair, and, as such, a practice (Nicolini 2013) that student teachers practice. The project for this practice is the development of professional R&D competence (Kemmis et al. 2014). Activities are easily observable and central to finding out what is going on in a practice. However, examining student teachers' R&D practice is more than just observing R&D activities in their period of practicum, it also means paying attention to the relational aspects (Mahon, Francisco, and Kemmis 2017). R&D practice is site-based, meaning that practice is dependent on many cultural elements, political elements of power, and dependent on material and economic factors (Kemmis and Grootenboer 2008). All these elements interrelate and influence student teachers' development of professional R&D competence (Mahon et al. 2020). Student teachers' R&D practice is a complex social entity including stakeholders from both school-based and university-based sectors of teacher education (Menter and Flores 2021; Zeichner 2010) and hence, a study of student teachers' R&D practice might enlighten factors that enhance (or not) the relationship between university learning and practicum-based learning.

Although many studies support the importance of the site of practicum for student teachers' development of professional R&D competence (e.g., Cochran-Smith and Lytle 1999; Flores 2020; Menter and Flores 2021; Windsor et al. 2020; Ulvik and Smith 2011; Zeichner 2010), knowledge of how student teachers' research activities are addressed during the practicum is scarce (Munthe and Rogne 2015). Researchers have examined understandings of and responses to R&D practice from student teachers (Puustinen et al. 2018; Sjølie and Østern 2021), teacher educators (Ulvik and Smith 2019; Brew and Saunders 2020), and school-based mentor teachers (Pajchel et al. 2021; Smestad and Gillespie 2020) and identified the type of research skills and knowledge that benefit future teachers as education innovators in their professional lives (Darling-Hammond 2017). However, little attention has been paid to the organisational conditions required for student teachers' R&D practice. By reporting on a study that examines student teachers' R&D practice, this paper aims to shed new light on how organisational conditions can support, or hinder, student teachers' R&D activities in the practicum which can in turn potentially support, or hinder, their development of professional R&D competence.

Since a study of student teachers' R&D practice requires the identification of the factors that constrain and enable their actions, the theory of practice architectures is used as a theoretical and analytical lens (Mahon, Francisco, and Kemmis 2017). Kemmis and Grootenboer (2008) argue that practices are not formed solely by the practitioners; they are embedded in practice architectures – sets of supporting arrangements – that enable or constrain the practices that occur at a particular site at a particular time. Thus, obtaining a comprehensive understanding of student teachers' R&D practice requires an analysis of the arrangements that facilitate or prevent such practice. In this paper, we ask the question: In what ways do pre-figured arrangements enable or constrain student teachers' R&D practice during their period of practicum?

In the following section, we explain the theoretical framework in greater detail before describing our understanding of R&D activities and the relevance of mentoring. Following this, an explanation of our research design and methods including a two-level data

analysis is offered. The findings are presented according to the two levels of analysis. We conclude by discussing the implications of these findings.

Theoretical background

Practice architectures

Initially introduced in 2008 by Kemmis and Grootenboer (2008), the theory of practice architecture offers theoretical and methodological tools for studying the realities faced by student teachers. Mahon et al. (2020) suggest that the theory is not only an analytical framework for understanding education practice but that it can also be a catalyst for change. They claim that an understanding of practice 'informs actions that can ultimately lead to the transformation of education settings' (Mahon et al. 2020, 4). Following this logic, student teachers' R&D practice both shapes and is shaped by practice architectures.

According to the theory of practice architectures, practices are composed of sayings, doings, and relatings that hang together to comprise a distinctive project (Kemmis et al. 2014). Sayings, doings, and relatings are closely connected and shaped by various types of 'extra-individual' arrangements: cultural-discursive, material-economic, and social-political arrangements that together pre-figure practices. Such arrangements enable or constrain what is said in or about a site of practice (sayings), what is done in a site of practice (doings), and the relationships in a site of practice (relatings) (Mahon, Francisco, and Kemmis 2017).

In R&D practice, the 'sayings' are the reflective conversations about teaching and learning (which can also mean individual, internal reflection in thought, or written in logs) and how research is spoken about. The 'doings' are the activities where student teachers consult and conduct research to better understand and deal with classroom challenges, applying knowledge learnt on campus to relevant settings. And the 'relatings' are the relationships between the stakeholders in the practice (student teachers, school-based mentor teachers, university-based teacher educators and, ultimately, the pupils themselves).

At a site of practice, such as a school, different arrangements exist simultaneously. The cultural-discursive arrangements at the site of student teachers' R&D practice are those arrangements that govern the language and discourses used in practice, such as the use of pedagogical terminology and learning theories used in mentoring sessions. The material-economic arrangements are the physical space and resources, or lack thereof, in and around the site of practice, such as the arrangement of chairs, tables and meeting areas and the compensation mentor teachers receive in terms of work hours or additional salary. The social-political arrangements are arrangements relating to issues of power, which affect the social aspect of practice and the organisational rules, hierarchies, and relationships in and around the site of practice. Examples are university partnership agreements, student teachers' compulsory attendance in practicum, and mentors' evaluation of student teachers in the classroom (Kemmis et al. 2014).

R&D activities can be seen and heard and are consequently the gateway to understanding what is going on in a practice. Nevertheless, a true understanding of what makes a practice, an understanding that might lead to a transformation of that practice, requires

an analysis of the arrangements holding the practice in place. Using the theory of practice architectures as a theoretical and analytical lens, the study examines student teachers' R&D practice, aiming to better understand the arrangements that support, or hinder this practice's contribution towards student teachers' development of an R&D competence, which might ultimately be enmeshed in their professional lives.

R&D activities in practicum

R&D activities encompass a wide variety of actions, ranging from writing simple reflections to interviewing pupils and teachers, conducting systematic observations, reading and discussing research articles, and writing a master's thesis. R&D activities in the practicum concern applying research methods learnt on campus to school-based situations with the aim of generating reflection and critical enquiry into teaching and learning (Cochran-Smith et al. 2020). Gathering contextual evidence of teaching and learning, reflecting on, and discussing such evidence are here considered R&D activities in the practicum (Flores 2018). Placing student teachers with experienced school-based mentor teachers offers a collaborative environment for enquiring into teaching and learning, which Menter and Flores (2021) argue is crucial for understanding the complexity of teaching. Willegems et al. (2017) demonstrate that collaborative teacher research can expand student teachers' knowledge about pupils' learning. Therefore, we pay particular attention to R&D activities that take place during mentoring sessions.

Windsor et al. (2020) argue that the use of observational tools during mentoring sessions can help student teachers and mentors recognise evidence of learning in their classes and improve the quality of mentoring sessions. Observational tools include observation grids with specific pre-defined points of focus, such as pupils' reactions to the lesson, learning targets, class management, or subject-specific focuses. An observation grid, which is often a spreadsheet or digital log, guides the observer to attend to the events and issues in focus (see Appendix A for an example of a such grid). Grids may be accompanied by observation guides, with space allocated for written reflection on the focus points (Bryman 2015). Models may be used as alternatives to observation grids. In the Nordic countries, a didactic relations model (Bjørndal and Lieberg 1975) is commonly used to stimulate reflection on lesson planning. In this paper, observation grids, guides, and the didactic relations model (see Appendix B) are all considered observational tools and included in R&D activities.

Research has found that the use of observational tools during the mentoring of student teachers during their practicum period encourages reflection (Mathisen and Bjørndal 2016), provides a common base for feedback after an observed lesson, and imposes a predictable structure on the mentoring session (Windsor et al. 2020). Structuring mentoring sessions around non-judgemental evidence gathered from observed lessons allows for collaborative, reflective work based on research on teaching and learning. The use of observational tools to structure mentoring sessions can provide student teachers with the opportunity to fuse knowledge with practice (Grootenboer, Edwards-Groves, and Kemmis 2021). Based on this concept of a fusion of knowledge and practice, R&D knowledge and skills that are learnt on campus must be practised before becoming enmeshed in student teachers' professional competence.

Mentoring as practice

For Zeichner, Payne, and Brayko (2015), the period of the practicum provides an arena for dialogue between school-based mentor teachers, university-based teacher educators, and student teachers. Practicum offers student teachers opportunities to reflect on teaching and learning in collaboration with their peers and in-service teachers (Lejonberg et al. 2018). Organised mentoring sessions where school-based mentor teachers lead student teachers to engage in collaborative enquiry into teaching and learning (Ulvik and Smith 2011), sometimes with the involvement of university staff, represent one such opportunity. Mentoring sessions have been identified as common spaces that offer opportunities for dialogue between school-based teachers, university staff, and student teachers (Zeichner, Payne, and Brayko 2015) and are often referred to as hybrid or third spaces that connect campus courses with practicum in university-based initial teacher education (Zeichner 2010; Zeichner, Payne, and Brayko 2015; Daza, Gudmundsdottir, and Lund 2021). Mentoring is also a practice. It is a site-based, cooperative human activity that is understood and conceptualised in different ways (Kemmis et al. 2014).

Student teachers' R&D practice during their practicum period can be enabled and constrained by mentoring practices at the school and by their pre-assigned mentor's understanding of mentoring practice (Orland-Barak and Wang 2021). For example, how the mentor teacher talks about R&D might influence how relevant student teachers see the role of research in their professional lives (Jenset, Klette, and Hammerness 2018). The many arrangements governing how the practicum is organised also enable and constrain student teachers' R&D practice. Thus, an exploration of the practice architectures supporting student teachers' R&D practice also entails considering mentoring practice as the mentor leads them through their practicum period (Heikkinen et al. 2018).

According to Maskit and Orland-Barak (2015), mentoring student teachers is challenging. In teacher education worldwide, student teachers' teaching in real classrooms has for decades been seen as a capstone experience (Orland-Barak and Wang 2021) in which the role of the mentor is central (Clarke, Triggs, and Nielsen 2014). The use of observational tools to structure mentoring sessions can also provide mentor teachers with opportunities to connect contemporary learning theories with their practicum through collaborative, reflective dialogue on research (Zeichner 2010). Thus, student teachers' R&D practice during their practicum can contribute to collaborative professional learning.

Communicative learning spaces

Sjølie, Francisco, and Langelotz (2019) introduced the concept of 'communicative learning spaces' which are sites of collaborative professional learning where teachers, student teachers, and teacher educators come together to learn about teaching and pupil learning. Building on Habermas's idea of communicative action (Habermas 1996) and Bhabha's concept of a third space (Bhabha 1994), the authors underline the importance of collaboration in teacher learning and student teacher learning and view collaboration as the keystone for achieving educational change. Sjølie, Francisco, and Langelotz (2019) argue that communicative learning spaces can be a powerful enabler of teacher learning, where 'becoming a teacher' is an on-going, unfinished process that spans teachers' professional lives. They identified the features that characterise communicative learning spaces and

the factors that enable and constrain their development. In line with Habermas (1966), they found 'relational trust' to be a prerequisite. According to Sjølie, Francisco, and Langelotz (2019), communicative learning spaces are dialogic, democratic, and supportive of the professional learning of all participants at the site.

This paper explores student teachers' R&D practice during their practicum period. It views the site of practicum as a potential communicative learning space where student teachers can reflect on teaching and learning with their peers and in-service teachers and fuse their knowledge of R&D with their R&D practice through collaborative reflective dialogue concerning research.

Context

The study is based on third-year students' practicum during a five-year teacher education master's programme in Norway. In 2017, a national five-year primary and secondary school teacher education programme with increased emphasis on R&D was implemented (Universities Norway - UHR. 2017). Each year of the teacher education programme includes a period of practicum of 15–30 days. Third-year students spend two 15-day periods on practicum at the same practice school, amounting to a total of 30 days. Student teachers must pass their practicum each year to continue with the master's programme and gain their teaching qualification. Student teachers are assigned to practicum groups. Each group comprises three or four student teachers and one mentor teacher from a school that has a practice school mentoring partnership with the teacher education institution. According to national guidelines on the mentoring of student teachers and novice teachers, mentor teachers must have accomplished a minimum of 15 credits in mentoring (Norwegian Ministry of Education and Research 2018). In Norway, partnership contracts between teacher education institutions and practice schools regulate the number of mentoring hours, the number of hours student teachers are required to teach, and the assessment criteria for passing the practicum (Universities Norway - UHR 2017). School-based mentor teachers assess the student teachers assigned to their school during the period of practicum and complete an assessment form that is sent to the teacher education institution.

In accordance with national regulations, third-year students must submit an R&D assignment:

> In the third year of the programme, the student shall write a research and development assignment (R&D) as a combination of one of the teaching subjects and 'pedagogy and pupil-related skills'[1]. The assignment shall be profession-orientated and linked to the field of practice or other aspects of the school's activities. (Universities Norway - UHR 2017, 12)

Webinars covering a range of qualitative and quantitative research methods including classroom observation, interviews, action research, lesson study, text analysis and possible approaches to the R&D assignment were offered to all third-year student teachers prior to their practicum period in autumn 2020. The student teachers had to present their chosen research questions, themes and research methods, to an assigned university-based supervisor approximately 6 weeks prior to the assignment deadline which was a couple of weeks before their period of practicum began. All the student teachers in this study had been through an initial approval round and were expected to

hand in an R&D assignment 'linked to the field of practice' a few weeks after their practicum period.

Research design and methods

Drawing on a descriptive case study design (Yin 2018), we obtained qualitative data from observations and interviews conducted at two schools during the student teachers' 15-day practicum period in autumn 2020, a few weeks prior to their R&D assignment deadline. Two practicum groups participated in the study, each comprising four student teachers and one school-based mentor teacher.

The participating mentor teachers responded to an open invitation to take part in the study, which was sent via email by the first author to all mentor teachers of third-year students. Contact was then made with the mentor teacher's assigned student teachers, who were invited to participate. The first author carried out the school-based observations and interviews. She was employed by the teacher education institution to teach pedagogy to first-year students but had never taught the student teachers in this study. Ethical considerations stipulated by the Norwegian Centre for Research Data (NSD) were adhered to. Written informed consent was collected from all participants, and the voice recordings were stored so that only the researchers had access to them. The participants were assigned pseudonyms, and their anonymity was ensured.

One focus group interview with each group was conducted at the start of the 15-day period. The interview questions in the initial focus group interviews concerned the role of R&D in practicum. Twenty hours of mentoring sessions were observed by the first author, and these observations determined the points of focus for the second set of interviews. The interview guide for the second set of interviews contained questions on the perceived usefulness of structured observation grids and the didactic model, the use of which had been observed in the mentoring sessions. Both practicum groups participated in a second focus group interview at the end of the practicum period. Five student teachers consented to an additional individual in-depth interview. Three student teachers declined. The in-depth interviews lasted 30–60 minutes.

Non-participatory observations of mentoring sessions were audio-recorded. They were not video recorded, as the mentor teachers expressed concern that video might make the student teachers uncomfortable. To minimise observed bias, the first author assumed a non-participatory role. She placed the recorder near the participants and sat in the corner of the room, noting times of possibly relevant utterances that might need transcribing and body language and material structures (such as the use of digital projectors, the sharing of PC screens, and class photographs) that would be absent on the audio recording. Sketches of the room's layout and photographs of artefacts were also included in the data. Generally, the observed mentoring sessions included all four student teachers allocated to the mentor teacher. However, some of the observed mentoring sessions comprised only one or two student teachers and their mentor.

Data analysis

All interviews – both focus groups and individual interviews – were recorded and transcribed. Observation recordings of the mentoring sessions were listened to multiple

times, and sections of the recordings relevant to the research question were then transcribed. All transcribed interviews and transcripts of observations of mentoring sessions, interview guides, and researcher logs were then uploaded to NVivo for analysis.

Although the collected qualitative data cannot be said to be representative of student teachers' R&D practice in general, the schools where the student teachers' practicum took place did not stand out as being different from other schools used for student teachers' placements. A standard partnership agreement existed between the placement schools and the teacher institution. Consequently, it can be assumed that the data capture typical representations of central actors in the teacher education programme under study.

The data were analysed on two levels. In the first level analysis, data were coded using the stepwise-deductive inductive research model (Tjora 2019). Patterns of meanings and recurrent themes were sorted, coded, re-coded, and categorised in a back-and-forth, inductive-deductive process. Three themes emerged from the data during this first level of analysis: 1) structured mentoring with observational tools, 2) mixed messages, and 3) mentors' evaluation of student teachers. Starting with each of these themes, a second level of analysis was conducted on the material to identify the 'sayings', 'doings' and 'relatings' representing the cultural-discursive, material-economic, and social-political arrangements. These utterances were then categorised according to whether the arrangements enabled or constrained student teachers' R&D practice.

In the next section, we present the findings under the three themes. The data representing the themes are presented in the first-level analysis, and explanations of the arrangements that enable or constrain student teachers' R&D practice are presented in the second-level analysis.

Structured mentoring with observational tools

First-level analysis

During the practicum period, two materials were introduced into the mentoring sessions by the mentor teachers. One mentor introduced observation grids during the second week of the practicum. Appendix 1 shows one example of such a grid. The other mentor used a didactic relations model at the start of most of the sessions. Appendix 2 is an English translation of the model used in the mentoring sessions. Student teachers and mentor teachers were familiar with this model and the use of observation grids in the classroom from their classes on campus. We refer to these materials as observational tools as they were used to scaffold the mentoring sessions around classroom observations.

The transcriptions of the mentoring session observations with and without the use of observational tools were compared to identify any differences in the use of pedagogical terminology, critical dialogue, or student teacher engagement when either observational tool – the didactic relations model or observation grids – were used during mentoring. The transcripts showed that student teachers who were not responsible for the lesson were more active in the post-lesson mentoring session when they were asked to use observational tools to observe and give feedback than when they did not use such tools.

The conversation excerpt below from the observation data was the only comment from Student Teacher 1 during an hour-long mentoring session in which observational

tools were not used. Student Teachers 2 and 4 did not comment at all on the lesson that Student Teacher 3 had taught. The mentoring conversion took the form of a dialogue between the mentor teacher and the student teacher who taught the lesson, apart from this one comment when the mentor directly asked for Student Teacher 1's opinion:

> Do you have any thoughts on this? Was there anything that you liked about this [Student Teacher 3's lesson]? *(Mentor Teacher)*

> No, . . . um, well, I kind of noticed that she put the things they were going to go through on the blackboard. . .. And that you [to Student Teacher 3] kind of work very systematically. You speak clearly.(Student Teacher 1)

The observation data from both schools showed a lack of engagement on the part of the student teachers who had not been teaching the lessons when observational tools were not used to steer the dialogue. In contrast, levels of engagement increased when mentors used observational tools in the mentoring sessions. In the following description of a mentoring session, the practicum group was reflecting on their observations of a 9th grade social science class. The mentor teacher had arranged for all four student teachers to observe a lesson taught by a substitute teacher while the mentor was busy in a meeting. She had given them an adapted version of an observation grid about the importance of structure and rules for class management (Norwegian Directorate for Education and Training 2020) and told them to use the grid when observing the class:

How did the teacher establish control and structure in the classroom? What did you see? (Mentor Teacher)

Well, he waited till everyone was kind of quiet before he started. . ., and then, well, he said that everyone had to shut their laptops and such and that he wanted them to listen . . . . So, yes, I think he had control. (Student Teacher 6)

Well, I actually disagree. . .. I mean, I know he was a substitute, and I don't mean that he was a bad teacher, but, well. . . they weren't listening to him. . .. Some kids were still on their laptops. (Student Teacher 7)

Thereafter, the practicum group – one mentor and four student teachers – discussed the difficulty of controlling a class when the teacher does not know the pupils. The group reflected on the pedagogical terms used in the 'structure and rules' observation grid, and everyone participated in the discussion. The student teachers' observations based on the observation grid extended to their own lessons and those of their peers. For the analysis, recordings of the mentoring sessions in which observation grids were used were compared to the same practicum group's earlier mentoring sessions in which observation grids were not used. The recording transcripts indicated greater engagement by the student teachers who did not have responsibility for teaching the lesson when the observation grids were used than when such grids were not used.

In addition to this increased engagement, the comparison of the transcripts showed that questions concerning pedagogical and didactic approaches were asked by both the mentor and the student teachers when an observation grid was used. In contrast, only the mentor teachers asked questions concerning pedagogical or didactic approaches during mentoring sessions in which observation grids were not used. These questions were often starting points for dialogue, as indicated above, in which both mentors and student teachers were asked to provide reasons for their choices of action in the classroom.

During the focus group interview of this practicum group, both the student teachers and the mentor teacher were asked about their experiences of using the grid, and both noted an improvement in the level of reflection in the mentoring sessions after a predetermined focus had been agreed:

> I think that using the observation grid 'structure and rules' has been very useful. We talked about what to observe in the lesson, for example, what the teacher does if a pupil doesn't follow the rules, how the teacher controls the class in a subtle way . . . , what to look for . . . , eye contact between teacher and pupil . . . , approaching without confronting, etc. We noted comments during the lesson and then talked about what we'd seen after the lesson. I found that I reflected on what I wrote down rather than just writing something for the sake of writing. (Student Teacher 5)

Like Student Teacher 5, the other student teachers from both practicum groups also reported an improvement in their level of reflection and engagement both before and during the mentoring session when the mentor teacher introduced observational tools (either observation grids or the didactic relations model).

The mentors' use of pedagogical terms often acted as memory joggers for the student teachers. In a focus group interview, Student Teacher 3 stated, 'She [the mentor teacher] re-launched the didactic relations model!'. In this case, Student Teacher 3 was referring to the didactic relations model (see Appendix 2) that he had learnt about in pedagogy classes on campus and how his understanding of the model had deepened due to the mentor's use of the model during practicum. A printout of the model was posted on the wall of the meeting room where the mentoring sessions took place. The mentoring sessions often started with the prerequisites of the pupils, and a discussion of whether the student teacher had considered these when making choices about the lesson.

Responding to an interview question on whether her mentor's use of pedagogical terms deepened her theoretical knowledge, Student Teacher 2 stated,

> Yes, because I then see a clear connection between what I've read, or read about, and what I experience here, with the help of the mentor, who has also done the same course, and knows of the theoretical terms that are mentioned now and then in the mentoring sessions, and then it's like . . . 'Oh yeah, that's what it is!'.(Student Teacher 2)

Interviews with the mentor teachers revealed that it was the mentor teacher who decided to use observational tools (the didactic relations model or observation grids) to structure mentoring sessions. Neither mentor had received instruction from the teacher education institution on how to use observational tools to mentor student teachers. Both mentors based their choice of method on their own practitioner experience.

Second-level analysis

The use of observational tools in mentoring sessions became actions of R&D practice, as the student teachers applied their knowledge of research methods, classroom management, and subject-specific didactics in their reflective feedback based on their observations of the lesson. This was a fusing of knowledge and practice (Grootenboer, Edwards-Groves, and Kemmis 2021) that took place as part of an authentic, collaborative enquiry into teaching and learning. It demonstrates how the 'sayings' (the use of pedagogical terms) and 'doings' (planning lessons in consideration of pupils' learning prerequisites)

characterise material-economic arrangements (the materials brought into the mentoring conversation) and how these material-economic arrangements in turn characterise what is said and done during practicum. In addition, the mentor's 're-launching' of the model demonstrates how 'relatings', also enabled the student teachers' R&D practice and, consequently, the development of their R&D competence. The mentor's use of pedagogical terms that were familiar to the student teachers deepened and contextualised the theoretical knowledge they had learnt on campus. This systematic focus fostered discussion of learning theories, pedagogical concepts, and didactics during lesson planning and contributed to collaborative reflection on practice.

In this case, the student teachers' R&D practice was enabled by cultural-discursive arrangements whereby a mutual professional language is used at both the school site and the university sites of teacher education, the material-economic arrangements that provide both mentor teachers and student teachers with access to observational tools, and the social-political arrangements that allow the mentor the authority to decide which pedagogical concepts work in practice. The cultural-discursive arrangements that support a shared professional language are strengthened by the material-economic arrangements that provide access to observational tools for use during the mentoring session. The mentor teachers' use of observational tools in the mentoring sessions was made possible by the social-political arrangement that provides student teachers with an experienced mentor teacher who leads the mentoring sessions. Consequently, mentor teachers have the power to 're-launch' (Student Teacher 3) pedagogical concepts that might otherwise be forgotten. All of these arrangements contributed to enabling the student teachers' R&D practice.

Mixed messages

First-level analysis

Third year students were chosen for this study as we expected them to gather data in their practicum for their R&D assignments, which were due to be handed in shortly after the practicum period. However, most of the student teachers did not gather data for their assignments during the practicum. During the focus-group interviews, the student teachers expressed concern about the R&D assignment due to be submitted, which they had barely started. The students discussed campus-organised digital courses in research methods which included instruction on finding school-relevant research questions and how to generate data in practicum. Despite 'practicum-based' expectations in the national guidelines (Universities Norway - UHR 2017, 12), interviews with the student teachers revealed that most of them had been told by their university teachers not to generate data while in their practicum period: 'And since we've been told not to use so much data from practicum in our written R&D assignment, so, well, we haven't had so much focus on R&D so far' (Student Teacher 1). Seven of the eight student teachers had decided to base their research on text analysis; only one student gathered data during the practicum.

The initial student teacher interviews, which were conducted in the first week of the practicum, revealed that the student teachers were confused about what R&D was, what type of R&D activities could be carried out in the practicum, and why they had been told

not to collect data during this period of practicum. Only one of the eight student teachers took the online courses offered by the university in the weeks prior to their period of practicum. Student Teacher 2 explained:

> Seeing as we've been told so clearly not to do research for our R&D assignment in the practicum this year, neither I nor many others have spent any time at the R&D lectures, because . . . well, they haven't seemed relevant. So I've used the time on other things.(Student Teacher 2)

The student teachers' expressed disinterest in the R&D lectures; they were not deemed relevant for their R&D assignments as they were not intending to gather data during their practicum, but rather analyse texts for their assignments. The online lectures on classroom observation, action research, interview techniques and lesson study, were not seen to be important enough to prioritise in the pre-practicum period.

Second-level analysis

The 'sayings' revealed a state of confusion over the significance of research activities in the practicum. The 'doings' of their R&D practice did not encompass gathering information in the practicum for the university-based assignment. The 'relatings' were evident in the student teachers' interpretation of what the teacher educators had recommended on campus which in turn influenced what was said or not said, (sayings) and done or not done (doings) during the practicum.

The cultural-discursive arrangements that enabled student teachers' R&D practice appeared to be weakened by the mixed messages from the teacher education programme. On the one hand, the programme learning targets underlined the importance of R&D competence for teacher qualification, specifying that the obligatory R&D assignment should be 'profession-orientated and linked to the field of practice' (Universities Norway - UHR 2017, 12). On the other hand, the student teachers interpreted their instructions from the teacher educators on campus to mean that they should avoid conducting research activities during their practicum. This mixed messaging confused the student teachers and indicated to them that R&D competence was not needed during their practicum. In this case, the organisational conditions that ought to enable student teachers' R&D practice actually constrained it. Social-political arrangements weakened cultural-political arrangements and potential learning from gathering contextual data in practicum for R&D assignments.

Mentor evaluation of student teachers

First-level analysis

During the interviews, some of the student teachers expressed concern about passing their practicum and having to please their mentor teachers. Student Teacher 1 stated,

> So, if we say no, well . . . . I didn't dare anyhow. But you feel a little stupid, because when you're sitting there thinking this here is something that I ought to object to, but I don't dare because the consequence could be that I don't pass practicum. And I want to, right. So you just bite your tongue and take those 12 hours of Norwegian[2], and pretty much teach yourself a completely new subject, and, well, there's not an issue with that in itself, but it creates a bad

> relationship with the mentor, and then it becomes even more difficult to do the things you actually aren't supposed to do.(Student Teacher 1)

Student Teacher 2 spoke to the researcher about the mentor teachers' partial absence from the classroom:

> At the start of practicum, [the mentor teacher] asked us what we thought about being left alone with the class, without her being there. I thought at first, 'Yes, absolutely!', thinking it would be good to take over a class without the regular teacher being there. But it has ended up that she kind of. . . disappears from most of the lessons and kind of expects us to observe each other.(Student Teacher 2)

Student Teacher 2 expressed frustration about the mentors' absence and the resulting lack of opportunities for observation. She reported feeling that they had been given teaching assistant roles instead of being asked to observe and reflect on teaching and learning in the classroom. This restricted their R&D practice. In an interview at the end of the practicum period, Student Teachers 1 and 2 (quoted above) reported that they had not raised these issues with their mentor teacher. During the interviews, four student teachers objected to having to teach a subject that they had not chosen as one of their teaching subjects. At the time of the interviews, none of the student teachers in this study raised the issue of teaching a less favourable subject or their mentor's absence from the classroom with their respective mentor.

Second-level analysis

The 'relatings' of the practice were revealed through individual student teacher interviews. Observation data analysis revealed 'sayings' and 'doings' confirming the importance of these 'relatings' and how 'sayings', 'doings' and 'relatings' interrelate. The power imbalance between student teachers and mentor teachers resulting from the social-political arrangement whereby mentor teachers had assessment responsibility seemed to constrain student teachers' R&D practice. The student teachers did not question decisions made by their mentor teachers that they considered unfair due to fears that their mentor teacher would fail them. Time spent in 'teaching assistant roles' without supervision by a mentor teacher constrained their critical enquiry into teaching and learning.

The interviews with the student teachers revealed that most of them taught at least one lesson in a subject in which they were not competent. Some reported teaching up to six lessons a week in a subject in which they had no previous didactic instruction and which they did not believe they would ever teach in the future. However, they taught the subjects and did not openly object. Their opportunities to openly object to teaching subjects that they were not comfortable with were constrained by the social-political arrangement according to which the mentor teacher has the power to assess and the material-economic arrangements whereby student teachers are assigned mentor teachers whose teaching subjects are not fully compatible with the student teachers' chosen subjects. Furthermore, the cultural-discursive arrangements in place normalised this non-compatibility. Student teachers' teaching of non-chosen subjects indirectly constrained their R&D practice as their lack of subject-specific knowledge and didactic competences reduced their ability to reflect on choices of teaching methods. In addition, the potential for the practicum group to be a communicative learning space (Sjølie, Francisco, and

Langelotz 2019) for democratic, critical discussions about teaching and learning was thwarted by the silent discontent of the student teachers.

Discussion and implications for teacher education

For this paper, we explored student teachers' R&D practice during the practicum period to investigate how certain arrangements enabled and constrained this practice. We observed R&D activities, paying particular attention to how the participants interacted in relation to these activities, and analysed our material through the lens of practice architectures (Kemmis et al. 2014). Although situated in the bounded socio-political context of Norway, we believe this study to be of interest internationally as it argues for the organisational conditions needed to support student teachers' R&D activities in practicum. Producing teachers who are innovative education researchers continuously learning about teaching as part of their professional lives (British Educational Research Association 2014; Darling-Hammond 2006; Toom et al. 2010) requires attention to the organisational conditions supporting research activities in practicum and the factors that might enhance, or not, the relationship between university learning and practicum-based learning (Menter and Flores 2021; Zeichner 2010). Findings in our study indicate organisational conditions in need of improvement. There might be parallels with other countries aiming for a research-based teacher education.

A common language for professional dialogue

Like Windsor et al. (2020), we found that observation grids used during the practicum enabled student teachers' R&D practice as the mentoring sessions in which such grids were used showed evidence of pupil learning, which encouraged critical scrutiny of the lesson. We also found that the mentor's use of a didactic relations model (see Appendix 2) familiar to student teachers from their campus curricula supported systematic collaborative enquiry, as proposed by Cochran-Smith and Lytle (1999). Both observation grids and the didactic relations model used in this study served as structuring tools for the mentoring sessions and increased the student teachers' levels of reflection on teaching and learning. We call these structuring tools observational tools and consider the collaborative and individual enquiry structured around observed evidence of teaching and learning as part of R&D practice. An examination of the arrangements that supported or hindered this part of R&D practice showed that some arrangements enabled collaborative and individual enquiry, while some arrangements constrained other aspects of R&D practice that might otherwise have enabled the student teachers to develop their professional R&D competence.

The student teachers' and mentor teachers' familiarity with the pedagogical terms and observational tools used exemplifies how cultural-discursive and material-economic arrangements enabled the use of observational tools as part of R&D practice. Furthermore, the social-political arrangement of mentors leading the enquiry into teaching and learning practice also here enabled student teachers' R&D practice. Mentoring in teacher education programmes has been criticised for being disconnected and being conducted according to competing paradigms, whereby university-based teacher educators talk one language, and school-based mentors talk another (Orland-Barak 2016;

Zeichner 2010). In contrast, our findings indicate that the use of observational tools in mentoring sessions gave the participants a common language for professional dialogue.

Power imbalance detrimental to communicative learning spaces

Social-political arrangements were found to enable R&D practice when mentor teachers led student teachers in an enquiry into practice, collaboratively addressing teaching and learning challenges. However, the student teachers expressed feelings of powerlessness which caused them to suppress their criticism of their mentor teachers and their questioning of their mentor's actions. The dual role played by mentor teachers – as both mentors and assessors – established a power imbalance that was problematic for student teachers' critical enquiry during the practicum. This social-political arrangement constrained student teachers' collaborative, professional learning by restricting the mutual trust that, according to Sjølie, Francisco, and Langelotz (2019), is a prerequisite for communicative learning spaces. Evans, Waring and Christodoulou (2017) argue that research applied to classroom challenges encourages critical scrutiny of teaching and learning. In this study, the critical and democratic dialogue needed for communicative learning spaces was hindered by the power imbalance between mentor teachers and student teachers in the practicum group. In this sense, social-political arrangements were found to constrain the student teachers' R&D practice by causing them to suppress their critical enquiry into their practice due to concerns about displeasing their mentors.

Limited research collaboration during practicum

Although observational tools were found to enable student teachers' R&D practice in this study, the mentor teachers' choice of observational tool was based on their practitioner experience and not on recommendations from the teacher education institution. The social-political and material-economic arrangements that allowed the mentor teachers such a large degree of autonomy in their choice of mentoring methods could also constrain or enable the student teachers' R&D practice, depending on the mentor teacher's understanding of and response to R&D (Pajchel et al. 2021). These autonomy-supportive arrangements may also explain the variance in understandings and responses to R&D found in earlier studies (Puustinen et al. 2018; Ulvik and Smith 2019; Munthe and Rogne 2015; Smestad and Gillespie 2020). We consider that the social-political and material-economic arrangements that govern the mentor teachers' autonomy are linked to the fact that research collaboration between placement schools and teacher education institutions is limited. The nature of the social-political arrangements supporting R&D practice in this study were collaborative, not compliant, as the mentor teachers chose to use observational tools to support enquiry into teaching and learning. In line with Willegems et al. (2017), we conclude that more collaboration between placement schools and teacher education institutions on research at the site of the practicum might lead to a mutual understanding of R&D practice and professional R&D competence. However, our study has also shown the importance of mentor teachers' autonomy for enabling student teachers' R&D practice and hence, we suggest teacher education institutions providing access to observational tools for mentor teachers to use, or not, in their mentoring of student teachers. Our findings indicate that greater attention to student teachers'

research activities during the practicum might enhance the relationship between university learning and practicum-based learning.

Transformation of practice

According to Kemmis et al. (2014), a practice cannot be changed without transforming the arrangements that support that practice. The findings of this study reveal constraining arrangements in need of transformation. Ensuring mentor-led collaborative enquiry into teaching and learning during the practicum requires enabling cultural-discursive, material-economic, and social-political arrangements. Tighter collaboration between universities, schools, mentor teachers and student teachers whereby all partners learn together about teaching and learning in collaborative research teams (Willegems et al. 2017) could create communicative learning spaces (Sjølie, Francisco, and Langelotz 2019). If mentoring sessions are to become communicative learning spaces, the social-political arrangement according to which school-based mentors assess student teachers' practicum will have to be addressed. This social-political arrangement could be transformed by facilitating collaborative research between university-based, school-based, and student teachers on teaching and learning, whereby these parties engage in democratic, critical enquiry into teaching and learning.

This paper contributes to the much-needed discourse on what R&D practice is and what organisational conditions hinder or support student teachers' R&D practice, which can ultimately influence the enmeshment of R&D competence in their professional lives.

Notes

1. Pedagogy and pupil-related skills is a compulsory subject in Norwegian teacher education programmes.
2. This student teacher had not studied Norwegian as a teaching subject.

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References

Bhabha, H. K. 1994. *The Location of Culture*. London: Routledge.

Bjørndal, B., and S. Lieberg. 1975. "Environmental Education in Primary School. A Presentation of a Norwegian Curriculum Development Project." *Scandinavian Journal of Educational Research* 19 (1): 131–151. doi:10.1080/0031383750190108.

Bjørndal, B., and S. Lieberg. 1978. "Nye Veier I Didaktikken? En Innføring I Didaktiske Emner Og Begreper, Pedagogisk Perspektiv." In *New Paths in Didactics? An Introduction to Didactic Topics and Terms, Pedagogical Perspectives*. Oslo: Aschehoug.

Brew, A., and C. Saunders. 2020. "Making Sense of Research-Based Learning in Teacher Education." *Teaching and Teacher Education* 87: 102935. doi:10.1016/j.tate.2019.102935.

British Educational Research Association. 2014. *The Role of Research in Teacher Education: Reviewing the Evidence: Interim Report of the BERA–RSA Inquiry*.

Bryman, A. 2015. *Social Research Methods*. Oxford, UK: Oxford University Press. doi:10.1016/j.tate.2019.102935. Incorporated.

Clarke, A., V. Triggs, and W. Nielsen. 2014. "Cooperating Teacher Participation in Teacher Education: A Review of the Literature." *Review of Educational Research* 84 (2): 163–202. doi:10.3102/0034654313499618.

Cochran-Smith, M., M. Alexandersson, V. Ellis, L. Grudnoff, K. Hammerness, A. Oancea, and A. Toom. 2020. "Transforming Norwegian Teacher Education: The Final Report for the International Advisory Panel for Primary and Lower Secondary Teacher Education." *NOKUT - Norwegian Agency for Quality Assurance in Education*.

Cochran-Smith, M., and S. Lytle. 1999. "Relationships of Knowledge and Practice: Teacher Learning in Communities." *Review of Research in Education* 24: 249–305.

Darling-Hammond, L. 2006. "Constructing 21st-Century Teacher Education." *Journal of Teacher Education* 57 (3): 300–314. doi:10.1177/0022487105285962.

Darling-Hammond, L. 2017. "Teacher Education Around the World: What Can We Learn from International Practice?" *European Journal of Teacher Education* 40 (3): 291–309. doi:10.1080/02619768.2017.1315399.

Daza, V., G.B. Gudmundsdottir, and A. Lund. 2021. "Partnerships as Third Spaces for Professional Practice in Initial Teacher Education: A Scoping Review." *Teaching and Teacher Education* 102: 103338. doi:10.1016/j.tate.2021.103338.

European Union. 2018. *The European Higher Education Area in 2018: Bologna Process Implementation Report*. European Education and Culture Executive Agency. European Union, Publication Office.

Evans C, Waring M and Christodoulou A. (2017). Building teachers' research literacy: integrating practice and research. Research Papers in Education, 32 (4): 403–423. doi:10.1080/02671522.2017.1322357.

Flores, M. A. 2018. "Linking Teaching and Research in Initial Teacher Education: Knowledge Mobilisation and Research-Informed Practice." *Journal of Education for Teaching* 44 (5): 621–636. doi:10.1080/02607476.2018.1516351.

Flores, M. A. 2020. "Developing Knowledge, Competences and a Research Stance in Initial Teacher Education in the Post-Bologna Context." *Nordic Journal of Comparative and International Education (NJCIE)* 4 (3). doi:10.7577/njcie.3777.

Grootenboer, P., C. Edwards-Groves, and S. Kemmis. 2021. "A Curriculum of Mathematical Practices." *Pedagogy, Culture and Society*. doi:10.1080/14681366.2021.1937678. Advance online publication.

Habermas, J. 1966. "Knowledge and Interest." *Inquiry* 9 (1–4): 285–300. doi:10.1080/00201746608601463.

Habermas, J. 1996. *Between Facts and Norms. Contributions to a Discourse Theory of Law and Democracy*, edited by W. Regh. Cambridge, MA: MIT Press.

Heikkinen, H. L. T., J. Wilkinson, J. Aspfors, and L. Bristol. 2018. "Understanding Mentoring of New Teachers: Communicative and Strategic Practices in Australia and Finland." *Teaching and Teacher Education* 71: 1–11. doi:10.1016/2017.11.025.

Hiim, H. 2016. "Educational Action Research and the Development of Professional Teacher Knowledge." In *Action Research for Democracy: New Ideas and Perspectives from Scandinavia* . edited by N. Sriskandarajah, B. S. Nielson, H. P. Hansen, Gunnarsson, E., 147–161. New York: Routledge.

Hiim, H., E. Hippe, and D. Keeping. 1989. *Undervisningsplanlegging for Yrkeslærere. [Lesson Planning for Vocational Education Teachers]*. Oslo. Universitetsforlag.

Jenset, I. S., K. Klette, and K. Hammerness. 2018. "Grounding Teacher Education in Practice Around the World: An Examination of Teacher Education Coursework in Teacher Education Programs in Finland, Norway, and the United States." *Journal of Teacher Education* 69 (2): 184–197. doi:10.1177/0022487117728248.

Kemmis, S., and P. Grootenboer. 2008. "Situating Praxis in Practice: Practice Architectures and the Cultural, Social and Material Conditions for Practice." In *Enabling Praxis. Challenges for Education*, edited by S. Kemmis and T. Smith, 37–62. Rotterdam: Sense.

Kemmis, S., H. L. T. Heikkinen, G. Fransson, J. Aspfors, and C. Edwards-Groves. 2014. "Mentoring of New Teachers as a Contested Practice: Supervision, Support and Collaborative Self-Development." *Teaching and Teacher Education* 43: 154–164. doi:10.1016/j.tate.2014.07.001.

Kemmis, S., J. Wilkinson, C. Edwards-Groves, I. Hardy, P. Grootenboer, and L. Bristol. 2014. *Changing Practices, Changing Education*. Singapore: Springer Singapore.

Lejonberg, E., E. Elstad, L. Vikan Sandvik, T. Solhaug, and K.-A. Christophersen. 2018. "Mentors of Preservice Teachers." *International Journal of Mentoring and Coaching in Education* 7 (3): 261–279. doi:10.1108/IJMCE-12-2017-0076.

Mahon, K., C. Edwards-Groves, S. Francisco, M. Kaukko, S. Kemmis, and K. Petrie. 2020. *Pedagogy, Education, and Praxis in Critical Times*. Singapore: Springer Singapore.

Mahon, K., S. Francisco, and S. Kemmis. 2017. *Exploring Education and Professional Practice: Through the Lens of Practice Architectures*. Singapore: Springer Singapore.

Maskit, D., and L. Orland-Barak. 2015. "University–School Partnerships: Student Teachers' Evaluations Across Nine Partnerships in Israel." *Journal of Education for Teaching* 41 (3): 285–306. doi:10.1080/02607476.2015.1046265.

Mathisen, P., and C. Bjørndal. 2016. "Tablets as a Digital Tool in Supervision of Student Teachers' Practical Training." *Nordic Journal of Digital Literacy* 11 (4): 227–247. doi:10.18261/issn.1891-943x-2016-04-02. E.

Menter, I., and M.A. Flores. 2021. "Connecting Research and Professionalism in Teacher Education." *European Journal of Teacher Education* 44 (1): 115–127. doi:10.1080/02619768.2020.1856811.

Munthe, E., and M. Rogne. 2015. "Research Based Teacher Education." *Teaching and Teacher Education* 46: 17–24. doi:10.1016/j.tate.2014.10.006.

Nicolini, D. 2013. *Practice Theory, Work, and Organization. An Introduction*. Oxford: Oxford University Press.

Niemi, H., and A. Nevgi. 2014. "Research Studies and Active Learning Promoting Professional Competences in Finnish Teacher Education." *Teaching and Teacher Education* 43: 131–142. doi:10.1016/j.tate.2014.07.006.

Norwegian Directorate for Education and Training. 2020. *Observasjoner knyttet til struktur og regler. [Observations Connected to Structure and Rules]*. https://www.udir.no/laring-og-trivsel/klasseledelse/skjema-kollegaobservasjon-egenpraksisvurdering.html. Accessed 05. September 2020.

Norwegian Ministry of Education and Research. 2018. "Teacher Education 2025." In *National Strategy for Quality and Cooperation in Teacher Education*. Goverment.no.

Organisation for Economic Co-Operation and Development. 2005. Attracting, Developing and Retaining Effective Teachers - Final Report: Teachers Matter. Chapter 4. *Developing Teachers; Knowledge and Skills*. ISBN: 9264018026. (Paris: OECD) Retrieved 29 10 2022. https://www.oecd.org/education/school/attractingdevelopingandretainingeffectiveteachers-homepage.htm

Orland-Barak, L. 2016. "Mentoring." In *International Handbook of Teacher Education: Volume 2*, edited by J. Loughran and M. L. Hamilton, 105–141. Singapore: Springer Singapore.

Orland-Barak, L., and J. Wang. 2021. "Teacher Mentoring in Service of Preservice Teachers' Learning to Teach: Conceptual Bases, Characteristics, and Challenges for Teacher Education Reform." *Journal of Teacher Education* 72 (1): 86–99. doi:10.1177/0022487119894230.

Pajchel, K., K.M. Jegstad, G. Eklund, S. G. Aalbergsjø, and P. Ø. Sollid. 2021. "The Role of School Placement Within Research-Based Teacher Education–Through the Eyes of Science Mentors." Teachers and Teaching Teachers and Teaching teachers and Teaching Teachers and Teaching 27 (27): 1–4. doi:10.1080/13540602.2021.1933416.

Puustinen, M., J. Santti, A. Koski, and T. Tammi. 2018. "Teaching: A Practical or Research-Based Profession? Teacher Candidates' Approaches to Research-Based Teacher Education." *Teaching and Teacher Education* 74: 170–179. doi:10.1016/j.tate.2018.05.004.

Sjølie, E., S. Francisco, and L. Langelotz. 2019. "Communicative Learning Spaces and Learning to Become a Teacher." *Pedagogy, Culture and Society* 27 (3): 365–382. doi:10.1080/14681366.2018.1500392.

Sjølie, E., and A.L. Østern. 2021. "Student Teachers' Criticism of Teacher Education – Through the Lens of Practice Architectures." *Pedagogy, Culture and Society* 29 (2): 263–280. doi:10.1080/14681366.2020.1729842.

Smestad, B., and A. Gillespie. 2020. "Dimensions of Teachers' Transdisciplinary Competence Based on a Systematic Review of Three Transdisciplinary Areas." *Nordic Journal of Comparative and International Education* 4 (3): 117–138. doi:10.7577/njcie.3757.

Tjora, A. 2019. *Qualitative Research as Stepwise-Deductive Induction*. Oxford: Routledge.

Toom, A., H. Kynäslahti, L. Krokfors, R. Jyrhämä, R. Byman, K. Stenberg, K. Maaranen, and P. Kansanen. 2010. "Experiences of a Research-Based Approach to Teacher Education: Suggestions for Future Policies." *European Journal of Education* 45 (2): 331–344. doi:10.1111/j.1465-3435.2010.01432.x.

Ulvik, M., and K. Smith. 2011. "What Characterises a Good Practicum in Teacher Education?" *Education Inquiry* 2 (3): 517–536. doi:10.3402/edui.v2i3.21997.

Ulvik, M., and K. Smith. 2019. "Teaching About Teaching: Teacher Educators' and Student Teachers' Perspectives from Norway." In *International Research, Policy and Practice in Teacher Education: Insider Perspectives*, edited by J. Murray, A. Swennen, and C. Kosnik, 123–137. Cham: Springer International Publishing.

Universities Norway - UHR. 2017. *National Guidelines for the Primary and Lower Secondary Teacher Education Programme for Years 5–10*. Universities Norway/Universitet- og Høgskolerådet.

Willegems, V., E. Consuegra, K. Struyven, and N. Engels. 2017. "Teachers and Pre-Service Teachers as Partners in Collaborative Teacher Research: A Systematic Literature Review." *Teaching and Teacher Education* 64: 230–245. doi:10.1016/j.tate.2017.02.014.

Windsor, S., J. Kriewaldt, M. Nash, A. Lilja, and J. Thornton. 2020. "Developing Teachers: Adopting Observation Tools That Suspend Judgement to Stimulate Evidence-Informed Dialogue During the Teaching Practicum to Enrich Teacher Professional Development." *Professional Development in Education* 48 (4): 642–656. doi:10.1080/19415257.2020.1712452. Advance online publication.

Yin, R. K. 2018. *Case Study Research and Applications: Design and Methods*. 6th. Los Angeles, CA: SAGE.

Zeichner, K. 2010. "Rethinking the Connections Between Campus Courses and Field Experiences in College- and University-Based Teacher Education." *Journal of Teacher Education* 61 (1–2): 89–99. doi:10.1177/0022487109347671.

Zeichner, K., K. A. Payne, and K. Brayko. 2015. "Democratizing Teacher Education." *Journal of Teacher Education* 66 (2): 122–135. doi:10.1177/0022487114560908.

Appendices

Appendix A

Example of Observation Grid used in mentoring sessions. *Classroom management 'Structure and Rules'* from the Norwegian Directorate of Education and Training (2020), translated by first author (Table 1):

Table 1.

Observations connected to structure and rules	
What does the teacher do to establish and communicate good structure?	
	Notes
1. The teacher has control and an overview of the class 2. The teacher communicates expectations of the pupils' behaviour and work efforts 3. The teacher contributes to creating a safe, secure and predictable learning environment 4. The teacher gives explicit messages and warnings if rules and norms are not followed	
What does the teacher do to establish and uphold rules and procedures in the classroom?	
	Notes
5.The teacher has established clear classroom routines and rules, and follows these up in the lesson 6. The teacher recognises and praises the pupils when the rules are followed 7. The teacher reacts with consequences when rules and routines are not adhered to	
Other observation points (to be mutually decided between teacher and observer before the observation)	
	Notes

Appendix B

The Didactic Relations Model

Initially introduced by Bjørndal and Lieberg (1975), the *Didactics Relations Model*, was later published in Norwegian in a textbook for teacher education (Bjørndal and Lieberg 1978). The original model had five interrelating vital factors of teaching to consider when teachers were planning their lessons: **Aims and objectives** – including curricula competence targets; **Evaluation/Assessment** – including ways to monitor pupils' progress and lesson appropriateness; **Learning activities and process/teaching and learning methods** – what will the pupils be doing and what will the teacher be doing; **Pedagogical framework, conditions and scope** – e.g., number of pupils, size of classroom, teaching equipment available; and **Educational Content** – e.g., subject, themes, teaching materials. All of these factors were equally important for the lesson planning and hence the circular nature of the model. The model was later developed by Hiim, Hippe, and Keeping (1989), to include a sixth vital category - **pupils' learning resources** - underlining the importance of adapting lessons to a classroom of individuals, each with their own learning interests and capabilities. This model has been used extensively in teacher education in Norway during the last three

decades (Hiim, 2016). Figure 1 is our English translation of the Didactic Relations Model hanging on the wall of the room where the mentoring sessions took place:

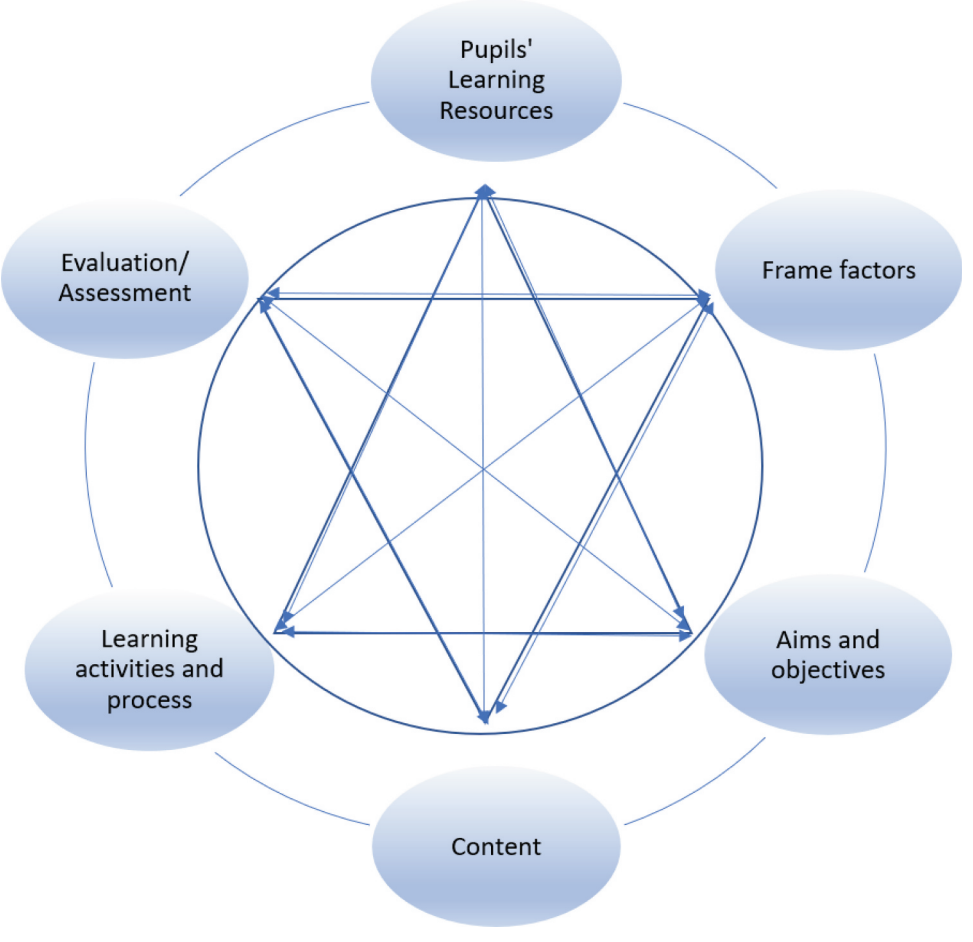

Figure 1: The Didactic Relations Model, (Hiim et al. 1989, 104, reproduced with permission).