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# Lesson study in teacher education: Learning from a challenging case

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## Abstract

Whereas most studies of lesson study in teacher education seem to report on success stories, this article investigates a negative case. From an implementation of lesson study in Norwegian teacher education, we analyse data from a mathematics group that struggled with their implementation. Analysis of data from group interviews, mentoring sessions and teaching the research lesson indicates that several crucial aspects of lesson study were missing. The student teachers did not formulate a research question for their research lesson, they did not focus on observing pupil learning, and their lesson was not organized to make pupil learning visible.

Keywords: lesson study, teacher education, mathematics, negative case

## Highlights:

- We examine one group of student teachers that struggled with implementing lesson study.
- Four indicators of a negative case emerged from analysis of empirical data.
- Student teachers had little focus on observing pupils' learning.
- Individual work on tasks prohibited observations of pupils' learning.
- Analysis of a negative case can inform future implementations of lesson study in teacher education.

## 1. Introduction

In this article, we focus on the implementation of lesson study in teacher education in Norway. Lesson study has been used for professional development of teachers in Japan for more than a century, and it has also been commonly used for professional development since it was adopted in other parts of the world (Fernandez, 2002; Fernandez, Cannon, & Chokshi, 2003). Although the majority of studies include implementation of lesson study among in-service teachers, some recent attempts have been made to apply a lesson study approach in initial teacher education (Fernandez & Zilliox, 2011; Parks, 2008; Sims & Walsh, 2009). Such studies on lesson study seem to mostly report on success stories (e.g., Dudley, 2013) – even studies that go into more critical discussions of the “messiness” of learning from lesson study report on implementations that appear successful (e.g., Parks, 2008) – but this article takes a different approach and investigates a negative case.

We report from a project where lesson study has been applied across subjects in elementary teacher education in Norway. In this project, we implement an adapted version of lesson study in connection with the school-based part of teacher education (internship/field practice/practicum) – in this article referred to as field practice. Groups of student teachers from four different subject areas participated in the study: mathematics, science, sports science and English as a foreign language. An important part of the data collection consisted of video observations from student teachers' conversations with their mentor teachers during mentoring sessions in field practice in a control group and an intervention group. Based on their analyses of this empirical material, Helgevold, Næsheim-Bjørkvik and Østrem (2015) found that groups of student teachers in the intervention (24 mentoring sessions) were more focused on subject related matters. They also had a greater focus on pupils and their learning compared to student teachers in the control group (30 mentoring sessions) in which the student teachers were more concerned about practical teaching issues, referred to as “doings”. In addition, lesson plans and cultural resources were more visible in the lesson study situation, and the student teachers were all more involved in the mentoring conversations compared to the control group situation. According to these authors, however, “Math can also be looked upon as an extreme case, representing a different picture from the other subjects” (Helgevold et al., 2015, p. 133). From this background, we found it interesting to investigate this “extreme case” of mathematics. We follow Helgevold and colleagues when they state that the case of mathematics is interesting “in the sense that they represent information about problematic situations as compared to the general patterns” (p. 134). To supplement the thin descriptions of mentoring conversations conducted by these authors, we focus on a negative case in depth. We analyse data from group interviews, mentoring sessions as well as teaching of a research lesson in a group of mathematics student teachers where the implementation of lesson study was not all positive.

The purpose of this article is to investigate a negative case where the lesson study intervention did not work out the way it was expected, in order to identify possible indicators of why the implementation failed. We hypothesize that careful analysis of data from such a negative case could inform future implementations of lesson study in teacher education – perhaps even more so than yet another success story.

In the following sections, we present the background for the study, and we provide some relevant information about the Norwegian teacher education context. We then review literature on lesson study and previous attempts to implement lesson study in teacher education. Following this, we discuss the methodological considerations and choices that were made in our study, before we present and discuss the results from our analysis of the negative case. We conclude that a “negative” case can indeed be positive, in that much can be learned from it, and we discuss some particular lessons that can be learned from our negative case and how these lessons can inform future studies or implementations of this kind.

## **2. Theoretical background**

In Norway, student teachers attend a four-year bachelor program in order to qualify for teaching in primary or lower secondary school, and the National Curriculum Regulation prescribes a total of 20 weeks of field practice spread throughout the four years. There are two teacher education programs that cover grades 1–10; one program prepares for teaching in grades 1–7 (called “Grunnskolelærerutdanning 1–7”) and one prepares for teaching in grades 5–10 (called “Grunnskolelærerutdanning 5–10”). During field practice, student teachers are usually organized in groups of three or four, and the mentor teachers serve the role as teacher educators (Nilssen, 2010). In the Norwegian context, the mentor teacher is an experienced practising teacher who has (normally) taken a course in supervision for mentor teachers.

The task of educating teachers for the complex work of teaching in the 21<sup>st</sup> century constitutes a significant challenge for teacher education. In order to professionally conduct the work of teaching, teachers need compound professional knowledge that includes subject matter knowledge, pedagogical knowledge, curricular knowledge, pedagogical content knowledge (Shulman, 1986), as well as cultural awareness and awareness about individual differences and needs among pupils (Bransford, Brown, & Cocking, 2000). The work of teaching includes subject-specific tasks or challenges, but it also includes “broad cultural competence and relational sensitivity, communication skills, and the combination of rigour and imagination fundamental to effective practice” (Ball & Forzani, 2009, p. 497). Teachers’ professional knowledge – including the components and role of it – has been discussed for decades (e.g., Davis & Simmt, 2006). It is generally agreed upon that teachers need a particular kind of knowledge in order to teach effectively

(Ball, Lubienski, & Mewborn, 2001), but there is less agreement about how such knowledge develops.

Ball and Cohen (1999) contend that classrooms are complex and unpredictable, and the knowledge needed for teaching must be learned in and from practice. This implies that, “they would have to learn, before they taught and while teaching, how to learn in and from practice” (Ball & Cohen, 1999, p. 10). Development of practice and development of practitioners can thus be regarded two sides of the same coin. From this outset, it can be argued that lesson study has a potential to serve as a model for improving teachers’ knowledge for teaching (Cerbin & Kropp, 2006; Murata & Pothen, 2011; Stigler & Hiebert, 1999) – in particular what can be referred to as pedagogical content knowledge (Shulman, 1986) – and an implementation of lesson study already in teacher education might thus be feasible. In the following, we first present a discussion of pedagogical content knowledge. Following this, we review literature on lesson study and the implementation of lesson study in teacher education.

### *2.1 Pedagogical content knowledge*

The term “pedagogical content knowledge” was first presented by Shulman (1986) in his attempt to approach the lack of a coherent theoretical framework to describe teachers’ professional knowledge. When distinguishing between content knowledge and pedagogical content knowledge, he argued that the latter, “goes beyond knowledge of subject matter per se to the dimension of subject matter knowledge for teaching” (Shulman, 1986, p. 9, original emphasis). He further elaborated on this category of teacher knowledge as follows:

Within the category of pedagogical content knowledge I include, for the most regularly taught topics in one’s subject area, the most useful forms of representation of those ideas, the most powerful analogies, illustrations, examples, explanations, and demonstrations – in a word, the ways of representing and formulating the subject that make it comprehensible to others (ibid.).

Following Shulman’s seminal work, numerous researchers have grasped these ideas – in particular the notion of pedagogical content knowledge – and applied them in their research. Although most studies that investigate pedagogical content knowledge refer to Shulman’s ideas, they refer to disparate interpretations from reading different versions of Shulman’s framework (e.g., Shulman, 1986; Shulman, 1987). As a result, definitions of pedagogical content knowledge – and the operationalization of these definitions – differ across studies (Kaarstein, 2014).

In their systematic review of research on pedagogical content knowledge in mathematics education, Depaepe, Verschaffel and Kelchtermans (2013) conclude that researchers conceptualize pedagogical

content knowledge differently, but they still seem to agree that, “it deals with teachers’ knowledge, it connects content and pedagogy, it is specific to teaching particular subject matter, and content knowledge is an important and necessary prerequisite” (p. 22). Depaepe and colleagues also derive that collaborative learning, mentoring, as well as working in a professional community, seem to support the development of pedagogical content knowledge. Implementation of lesson study in teacher education could thus be favourable. Before reviewing previous implementations of lesson study in teacher education, we take a closer look at some foundations of lesson study.

## 2.2 Lesson Study

Lesson study is an approach to professional development that centres on collaboration. This is nothing extraordinary, and it is not what makes lesson study unique. In the continually increasing body of literature on lesson study, however, there does not seem to be a common understanding of what lesson study is and how it works. A number of misconceptions appear to exist (Fujii, 2014). The idea is simple: “teachers organically come together with a shared question regarding their pupils’ learning, plan a lesson to make pupil learning visible, and examine and discuss what they observe. Through multiple iterations of the process, teachers have many opportunities to discuss pupil learning and how their teaching affects it” (Murata, 2011, p. 2). This is the underlying idea, and its inherent simplicity might be part of the explanation why misconceptions appear.

Although conceptions and uses of lesson study vary across contexts, some elements in what can be referred to as the lesson study cycle are normally epitomized (figure 1).

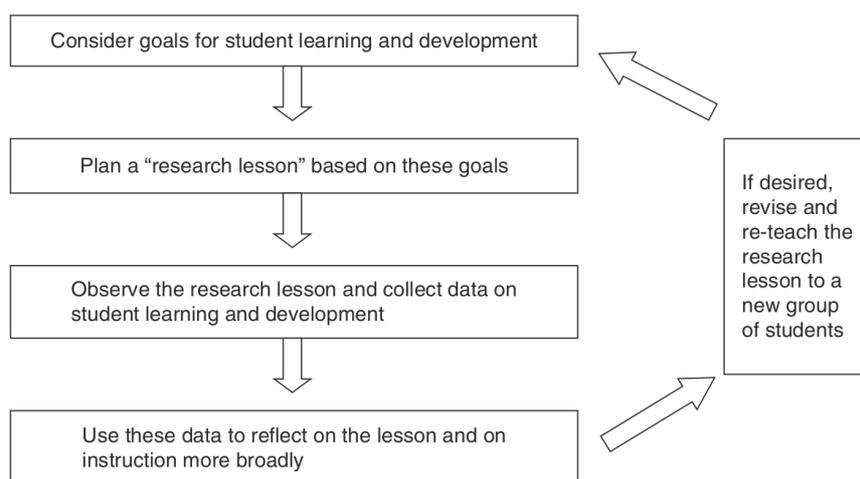


Figure 1. The lesson study cycle (from Murata, 2011, p. 2)

Describe the process is not, however, sufficient for explaining what lesson study is. Certain key ideas distinguish lesson study from other approaches to professional development and teacher learning. In the following we focus in particular on three fundamental ideas: i) pupil learning, ii) observation, and iii) research lesson.

First, pupil learning is focal in lesson study. Throughout the lesson study cycle, “teachers identify goals in terms of pupil learning of a topic, investigate curricular materials that teach the topic, plan a lesson to make pupil learning visible in the classroom with the topic, gather data in the lesson, and, afterwards, discuss the student learning that occurred during the lesson” (Murata, 2011, p. 4). Teachers frequently plan lessons with the aim of covering a particular amount of content, but in lesson study, everything orbits around pupil learning. It is thus crucial for the lesson study group to formulate a specific research question and pursue this throughout the process (Chokshi & Fernandez, 2004).

Second, and related to the first point, observation is crucial in lesson study. Since lessons are planned in order to make pupil learning visible, all participants in the lesson study group fixate their attention on observing pupil learning. While observing, it is important to adopt the pupil lens by attempting to anticipate their behaviour (Bekken & Mosvold, 2004). The focus on observation also relates to the formulation and pursuing of a research question for the lesson study cycle, because guidelines for observation need to be drawn from the research question – as it provides frames for how to identify and gather evidence from observation (Chokshi & Fernandez, 2004).

Third, the research lesson is the unit of analysis in lesson study. Referring to it as a research lesson indicates that the lesson aims at investigating a certain problem related to the participating teachers’ own learning. When implementing lesson study in other countries, this aspect tend to disappear, and Fujii (2014) refers to it as a common misconception about lesson study.

From these core ideas, several studies have emerged that focus on lesson study. A structured search reveals that 12 articles on lesson study (the term “lesson study” appears in the title, abstract or keywords) have previously been published in *Teaching and Teacher Education*. Of these 12 articles (11 empirical and one review), five were from the US, three from Hong Kong, two from UK and one from Norway. Seven articles focused on in-service teachers, whereas four articles focused on student teachers – early childhood, elementary as well as secondary level (Fernandez, 2010; Helgevold, et al., 2015; Parks, 2008; Sims & Walsh, 2009). Five articles focused on mathematics, two focused on English, two focused on multiple subjects, whereas one article focused on art. As far as research design is concerned, most were case studies or implementation in single courses for student teachers; two were interventions or design experiments (Helgevold, et al., 2015; Norwich & Ylonen, 2013). Most of the studies had few participants; only two studies had more than 30 participants (Helgevold, et al., 2015; Sims & Walsh, 2009). Although several articles included critical discussions on the implementation of lesson study, most articles focused on what worked. Two articles had a more explicit focus on what did not work (Adamson & Walker, 2011; Parks, 2008). Our article follows in this direction when we analyse a negative case where lesson study

implementation in teacher education was not all successful.

### *2.3 Lesson Study in Teacher Education*

Lesson study originally evolved as a systematic approach to professional development in Japan from the middle of the 19<sup>th</sup> century (Fernandez, 2002). Following a comparison study of teaching practice in three countries (Stigler & Hiebert, 1999), from which awareness about the Japanese lesson study model emerged, lesson study has gradually increased in popularity also in other parts of the world. From an original emphasis on using lesson study among practising teachers (e.g., Dudley, 2013; Norwich & Ylonen, 2013), recent studies have investigated the use of lesson study also in teacher education (e.g., Fernandez, 2010; Fernandez & Zilliox, 2011 Parks, 2010; Sims & Walsh, 2009). We describe three examples of such studies.

In a Canadian study, Chassels and Melville (2009) investigated possible benefits and challenges of implementing lesson study in teacher education. Their study included data from three groups: student teachers (referred to as teacher candidates), mentor teachers (referred to there as “practicum associate teachers in field placement schools”), and one teacher educator (the first author). Their analysis indicates that lesson study might stimulate development of student teachers’ awareness of the needs of the pupils as well as different possible teaching strategies. The importance of collaboration is also affirmed.

In an Indonesian study, lesson study was implemented in mathematics and science teacher education (Saito, Harun, Kuboki, & Tachibana, 2006). This study indicated observable changes in relation to the academic base of the lessons, the structure of the lessons, as well as in the pupils’ reactions, when lesson study was implemented. Two important insights were reported: 1) a need to shift the focus from teaching methods to pupil learning, and 2) a need to involve the entire school in order for lesson study to be successful.

In the third example, lesson study was implemented in an introductory course on the principles of teaching in a US program for pre-service teachers in early childhood education (Sims & Walsh, 2009). The researchers observed several obstacles as well as positive outcomes, and modifications had to be made to the lesson study process. The benefits of shifting the focus from the teacher to the lesson (plan) was stressed as well as the increased ability to deal with constructive criticism.

Some previous attempts to implement lesson study in teacher education have reported on possible challenges and constraints, but we observe that most studies are stories of success. It can also be observed that the researchers often have a double role in the studies; they not only investigate the implementation of lesson study in teacher education, but they also serve as teacher educators in the particular program in which lesson study is implemented. Based on these observations, we believe it

makes sense to investigate less successful attempts to implement lesson study. We also suggest that it is necessary to investigate implementations of lesson study in a situation where the researchers are not directly involved in the teaching of the actual course/program in which lesson study is implemented. The case we focus on in this article is a special case in that it satisfies both of these conditions.

### **3. Methods**

This study is part of a larger, cross-disciplinary project entitled Teachers as Students (TasS) in which lesson study was used in a time-lagged design experiment (Hartas, 2010) in Norwegian teacher education. The TasS project includes data from a control group and an intervention group. Two groups of student teachers from four different subject areas – mathematics, science, sports science and English as a foreign language – participated in both data collection periods. In the intervention, data collection includes video observations from student teachers' conversations with their mentor teachers during planning of lessons (pre-lesson mentoring sessions), from conducting lessons, from conversations with mentor teachers after conducting lessons for a first time (in-between mentoring sessions), conducting lessons for a second time, and from conversations, evaluating lessons (post-lesson mentoring sessions). The data collection also includes video observations from group interviews held with each of the groups before they started their period of field practice, and group interviews after the student teachers had finished their field practice.

The interviews before field practice were supposed to last about 90 minutes, consisting of four parts. The introductory part focused on questions about student teachers' rationale for choice of education and major subject. The questions in the second part provoked the student teachers to reflect on their preparations for the forthcoming field practice (e.g., focus on pupils, their own knowledge and skills in the subject). The third part of the interview presented the student teachers with a case of a particular teacher, and they were asked to reflect on what this teacher should focus on regarding planning and teaching in order to strengthen the opportunities to learn for all pupils. The fourth part was more specific to their major subject (in our case, mathematics) in that questions were related to the case and focused on the pupils, their perceived difficulties, ways of organizing the teaching and so on.

The interviews after field practice were also supposed to last about 90 minutes, consisting of three parts. The questions in the first part initiated the student teachers to reflect about experiences from field practice. In the second part, a 3-minute sequence of a video from the beginning of a lesson taught by one of the student teachers was chosen for reflections about their own teaching. The questions in the third part provoked further reflections about experiences from field practice, how these experiences affect their motivation for work in the profession and so on.

As a preparation for the field practice in INT, three workshops on lesson study were organized for university teachers and mentor teachers. A crucial part of these workshops consisted of developing a “Handbook for Lesson Study” in collaboration between participants to support the intervention. The aim of the Handbook was to guide all involved parts (student teachers, mentor teachers, and academic staff) throughout a lesson study cycle. This cycle normally consists of, 1) defining a topic and goal for the research lesson, 2) planning and observation with a particular focus on collecting data, 3) giving information about pupils’ learning, iv) reflecting and refining the lesson plan, and then often repeating this (Hart, Alston & Murata, 2011).

According to previous analyses from our project, the implementation of lesson study was least successful in mathematics (Helgevold, Næsheim-Bjørkvik, & Østrem, 2015). Investigating an extreme case can provide useful information about particularly successful or problematic issues that go beyond the general patterns (Flyvbjerg, 2006), and we aim at identifying such issues in our further investigations of the negative case of mathematics.

We investigate one group of student teachers – Anna, Brenda and Chandra (all pseudonyms) – in a three weeks long period of field practice in their second year of the 5–10 bachelor program. These student teachers had completed 60 study points (ECTS) in their major subject, mathematics, within the third semester, but they still had to teach this subject in their fourth semester at this particular university. They received the Handbook as a guide for their lesson study cycle. Since they did not have any mathematics coursework on campus before this period of field practice, however, these particular student teachers did not get any additional preparation for the lesson study project before meeting their mentor teacher.

Our empirical material consists of video recordings of two group interviews from this particular group of student teachers in mathematics, before and after a period of field practice. It also consists of video recordings of three mentoring sessions (pre-lesson, in between and post-lesson mentoring session) as well as a “research lesson” taught twice by the student teachers. We analyse transcribed data from group interviews held before and after the field practice in order to identify possible indicators of a negative case from the student teachers’ preparations before field practice and their reflections about experiences after field practice. We also include a sequence from their discussion with their mentor teacher from a mentoring session (pre-lesson mentoring session) in order to identify how the student teachers plan their lesson study cycle. The video recordings of the other two mentoring sessions and the two research lessons are used to supplement the analysis. Through extensive watching of video recordings and detailed reading of transcripts, we identified four indicators, emerging from the data, which seem to shed some light on why the implementation was not successful in mathematics. These four indicators are organized as thematic episodes and

presented in the following section.

#### **4. Results and discussion**

The topic for the lesson study cycle is about proportional quantities, and the three student teachers are going to teach this topic in a 10<sup>th</sup> grade class. One indicator of mathematics as a negative case emerges in the group interview before field practice when the student teachers reflect on their preparation on campus.

##### *4.1 Indicator 1: The lack of teaching PCK on campus before field practice*

In the dialogue below, we observe that the interviewer's question (99) challenges the student teachers to reflect on the preparation on campus, concerning the mathematical content:

99. Interviewer: But you talked about the subject matter, eh what do you think that you lack in order to be more prepared in the subject? You mentioned something

100. Chandra: Well, the basic [knowledge]

101. Interviewer: [Can you] give an example?

102. Chandra: Eh well, we are now going to teach about (3 sec) proportional quantities, aren't we?

103. Anna: Yes

. .  
. .

106. Anna: To us, I notice that even though the tenth-grade math, that's a math we know, but it has been a couple of years since we learnt that [math] at school, and we have, I think we can say that we haven't had that math here at the university. The math we have been taught here, it hasn't focused on that type of math that we should teach [to our pupils]

.  
.

118. Anna: To learn more about pedagogical content knowledge. Well, how we can teach different topics. And when the pupils have difficulties in understanding something, what can we do then?

119. All student teachers: Mhm.

120. Anna: Because now, I haven't a clue about how to handle a pupil who definitely does not understand what I try to teach him/her.

At the third workshop – about one month before field practice – mentor teachers and teachers on campus agreed on the topic for the lesson study cycle, and we observe that the student teachers know that the topic is about proportional quantities (102), (103). However, they suggest that they were not taught about the “basic knowledge”, concerning this particular topic (100) on campus before field practice. It is important to be aware of the fact that the instruction from university teachers for the subject of mathematics finished at the end of the third semester (60 study points) at this particular university, but the student teachers should teach mathematics in their fourth-semester field practice. There was thus no possibility of adapting the teaching on campus to the topic they were supposed to teach in field practice. This is an obvious weakness that illustrates the importance of establishing a close connection between teaching on campus and in field practice. One of the student teachers also suggests that there seems to be a mismatch between what has been taught on campus and what she thinks she needs as background knowledge for teaching pupils in the classroom (106).

Later in the interview, the same student teacher repeats that she misses more basic knowledge or pedagogical content knowledge (PCK), about how to help pupils learn about specific topics (118). The other student teachers agree (119). There seems to be a need to learn more about pupils’ difficulties, and teaching strategies “how to manage” (120) pupils who do not understand the mathematics, indicating a need for more teaching on campus about PCK. It is important to emphasize that teachers need a compound professional knowledge as a background for their teaching where both subject matter knowledge and pedagogical content knowledge are crucial components (Shulman, 1986).

#### *4.2 Indicator 2: Focus on mathematical topic, but lack of research question*

The second thematic aspect, illustrating an indicator of a negative case, has been identified from the pre-lesson mentoring session. The student teachers have planned to introduce a task that focuses on prices for sending text messages from two mobile subscriptions. The task expresses the connection between the proportional ( $y = 0.99x$ ) and the linear function ( $y = 0.29x + 20$ ). In the dialogue below, the three student teachers and their mentor teacher (MT) discuss the planning of the lesson:

1. MT: Ok, actually, then you can just say how you think you will do it.
2. Chandra: Yeah. We have written that the theme is, eh, the title is: Proportional quantities.
3. MT: Mhm.
4. Chandra: Eh. And the learning goal for the lesson is to know more about proportional quantities.
5. MT: Yeah.

6. Chandra: We have thought about starting with what they already know, that we should repeat  $y = ax + b$  (equation of straight lines), and let them explain it to us, so it's easier for them to see the connection when we introduce  $y = kx$  (straight line through origin).

7. Brenda: We have understood that they know what the “ $a$ ” is (the slope of the line) and what the “ $b$ ” is (the intersection with the  $y$ -axis). Then they, when we introduce to them that  $y$  is equal to  $k$  multiplied by  $x$  ( $y = kx$ ), then they can in a way see the connection.

A crucial element of conducting a lesson study involves for the student teachers to identify a focus for their own learning by posing a research question (Helgevold et al., 2015). If the student teachers should collaboratively plan, conduct and evaluate a research lesson about proportional quantities, they need an inquiry-based question, helping them to investigate pupils' learning about this topic.

We learn from the sequence of the dialogue above that the student teachers have written (also identified in their lesson plan) that the theme is about proportional quantities (2), and the goal is to know more about proportional quantities (4). In an earlier study (Bjuland, Mosvold, & Fauskanger, in press), we have analysed this pre-lesson mentoring session with a focus on the student teachers' knowledge- and learner-oriented perspective (Bransford et al., 2000). The student teachers have identified a focus on the subject matter, and they illustrate a concern about the pupils' preconceptions about proportional quantities. We have also pointed out an assessment orientation, since the student teachers plan to challenge the pupils to explain what they know about straight lines. The student teachers are clear about what the goal for the pupils' learning is, and this is repeated and elaborated on later in the same mentoring session provoked by the question of the mentor teacher:

87. MT: (...) it could be good to make it clear in the beginning of the lesson that the goal, eh, they should learn, the goal of the lesson is to learn about proportional quantities and show how it can easily be connected with everyday life.

88. Anna: Mhm.

Throughout this pre-lesson mentoring session, both the mentor teacher and the student teachers are concerned with what the pupils' “should learn” (87), but there are no sign of identifying a research focus for the student teachers' own learning. As far as their lesson plan is concerned, we cannot find any evidence of formulating an investigating question, approaching the planning of the lesson with a research focus.

#### *4.3 Indicator 3: A lack of focus on observation*

Observation of pupil learning is decisive in lesson study, and the importance of planning how to observe pupil learning – and what behaviour to anticipate in particular (Bekken & Mosvold, 2004) –

was emphasized in the preparation of the mentor teachers. This was also described in the lesson study handbook that student teachers were supposed to use. When asked about this in the interview after field practice, however, the student teachers became hesitant:

260. Interviewer: Mhm. You were supposed to have a focus on observation. What did you decide on observing? (All three student teachers gaze into the air)

261. Anna: (10s.) Do you mean what we were going to observe about her?

262. Interviewer: Or on pupil learning?

263. Chandra: (5s.) I don't think we talked a lot about that.

264. Interviewer: No.

We observe that a long break (10 seconds) appears after the interviewer has posed the question about what they decided to observe. During this break, the student teachers looked up into the air as if they were thinking hard. Finally, Anna breaks the silence and asks if the question was about how they were going to observe the mentor teacher (261). The interviewer discreetly indicates that she refers to observation of pupil learning, and another break occurs (262). Following this break, Chandra concludes that this is something they did not discuss a lot (263). We interpret this statement, along with the relatively long breaks, as an indication that the focus on observation of pupil learning has been almost absent in this group of student teachers.

In the mentoring sessions before and after the lesson, there was no discussion of observing pupils' learning. The mentor teacher did not challenge the student teachers about how they could observe pupil learning in the pre-lesson mentoring session, and in the mentoring session after the first lesson, there were no questions about observation. The two student teachers who were not teaching the lesson did not appear to make any focused observations during the lesson. In the few instances when they acted, it was to serve as assisting teachers and help pupils. Instead of asking about pupil learning and observations of pupil learning, the mentor teacher asked questions such as: "Do you know if everybody managed, if they understood what to do?" The questions and comments were all related to practical issues concerning the student teacher's actions in the classroom – not so much on pupil learning.

It could be argued that the student teachers show some signs of assessment orientation in the pre-lesson mentoring session when they plan for pupils' explanation about the straight line. In that respect, the pupils' thinking is made visible for the student teachers. A crucial element of lesson study is that one of the student teachers should teach the research lesson, and the other student teachers should make close observations and collect empirical material related to the pupils' learning of the topic – which in this case is related to understanding proportional quantities.

Analysing data from mentoring sessions, and from the research lesson taught, we cannot find any evidence of a focus on structured observations from the student teachers or the mentor teacher. This is also highlighted in the next indicator.

#### *4.4 Indicator 4: Individual work on tasks – difficult to make observations*

In lesson study, there is an emphasis on making pupil learning visible (Murata, 2011). As a result, Japanese mathematics lessons often seem to be organized as structured problem solving (Fujii, 2014; Stigler & Hiebert, 1999). Having the pupils work individually on textbook tasks does not make pupil learning visible, and a research lesson would normally have a different structure. When discussing their lesson plan with the mentor teacher, it appears that the student teachers have missed this particular aspect of lesson study:

150. Brenda: And then we thought they could work on problems individually. We have found two problems from the booklet.

151. MT: Mhm (nods)

152. Brenda: One is a quadrangle and one is a triangle (MT and Anna flips through the paper, and each finds a pile of papers), so someone (mumbles) is something everyone can do (MT and Anna flips through their paper copies) or, we didn't think they seemed to be very difficult (.)

153. MT: No. Which one is that? (Looks in her papers)

154. Anna: Four, eight forty-two=

155. Chandra: =two hundred and forty-three (MT flips through her papers, takes on her glasses and starts reading)

156. MT: Yes. This is a, at least eight forty-two, this is something everyone can manage, and it is a very nice and illustrative problem. That (both MT and Anna flips to the next page), and eight forty-three. It is a quadr-, eh, a triangle (reads through the problem while pointing with her pen). Yes (nods while she continues to look down at the papers). Is everyone supposed to do that one?

157. Brenda: That's what we wondered about, if that is something everyone can manage, or if you think it will be too difficult.

158. MT: I think maybe someone will miss it (turns around and looks at Brenda).

159. Brenda: Yes.

The sequence of the dialogue from the pre-lesson mentoring session illustrates that the student

teachers have chosen two mathematical tasks for individual work (150). The “quadrangle” and the “triangle” signs seem to indicate some progression in complexity, concerning the two tasks (152). This is also emphasized by the mentor teacher since the first task is “something everyone can manage” (156), while the second task seems to be a more challenging one (156–159). We observe that the focus is on doing tasks with an orientation at differentiating on task-level.

When the activity for the pupils is to work individually on tasks, it is difficult to make close observations by collecting data from the research lesson. In the mentoring session after the lesson, the mentor teacher asks Chandra – who taught the lesson – if her intention was that the pupils should work on the task individually, in pairs or in groups. Her response indicated that this was not something she had been conscious about, and it was not made explicit for the pupils in the lesson.

## **5. Concluding discussion**

There is more to lesson study than planning a lesson together and observing it (e.g., Fujii, 2014). Lesson study is a structured approach to teacher learning, and certain common elements are necessary in order to justify calling it lesson study. One such common element is the strong focus on pupil learning, and this focus on pupil learning has implications on the structure and organization of the research lesson. Lessons are planned in a way that makes pupil learning visible (Murata, 2011), but the student teachers as well as the mentor teacher in our study seemed to have missed this point. In close affinity with this, they also seemed to have ignored the focus on structured observation. In fact, they revealed that they had not discussed observation much at all in their group – although this was emphasized in the lesson study handbook. Parks (2008) accentuated observation in the assignment she gave her pupils in their lesson study project, and our findings suggest that careful attention to this crucial aspect of lesson study is particularly important when implementing lesson study in teacher education.

While lesson study has a focus on pupil learning, teacher learning is also indicative (e.g., Dudley, 2013). Analysis of our negative case indicates that the student teachers were not only struggling to shift the focus from the organization of teaching to pupil learning (Saito et al., 2006), but they were also hassling to direct attention to their own learning. Emanating from this, the student teachers in our study failed to formulate a research question targeting their own learning. What separates lesson study from many other collaborative efforts to plan and discuss teaching is that the participants approach the process as researchers. The lesson is the unit of analysis – thus the reference to it as a “research lesson” – and the participants thus need to shift the focus from the teacher to the lesson (Sims & Walsh, 2009). The lesson study group thus needs to shift their attention from the organization of the teaching to pupil learning (Saito et al., 2006). This is particularly challenging when implementing lesson study in teacher education, since the student teachers lack experience in

teaching and thus often struggle with the conducting of the lesson.

Instead of bemoaning our failed attempt to implement lesson study in this particular group, we suggest that the observations from this negative case constitute some important lessons to be learned for implementing lesson study in student teacher education. Student teachers often focus more on surviving in the classroom (cf. Bransford et al., 2000), and their inability to focus on pupil learning and making this visible is thus natural. We suggest that teacher educators (both university teachers and mentor teachers) need to focus on this in particular and challenge the student teachers in this respect. On the one hand, this can be seen as a prerequisite for successful implementation of lesson study in teacher education, but, on the other hand, it can also be seen as a potential asset of implementing lesson study in teacher education – since this shift of focus is central to becoming a teacher.

In conclusion, we want to reiterate the aspect of teacher learning in lesson study (see also Dudley, 2013). Posing a research question that targets a desired object of learning for the (student) teachers is a vital part of lesson study. Fujii (2014) reports that this aspect is easily overlooked when implementing lesson study in other cultural contexts – but it is strongly embedded in the Japanese culture – and we suggest that there is a potential of missing this aspect also when implementing lesson study in teacher education. Student teachers need to develop professional knowledge for teaching, and this knowledge is strongly embedded with practice (Ball & Cohen, 1999). A critical component of teacher education is that student teachers develop an ability to learn from teaching, and lesson study has the potential to serve as a framework where this can happen (Sims & Walsh, 2009). Based on the lessons learned from our negative case, we argue that certain components are particularly important for successful implementation of lesson study in teacher education. First, there must be careful attention to approaching the research lesson as researchers – which includes posing a research question targeting the student teachers' own learning. Second, structured observations should be planned and conducted with careful attention to pupil learning. Third, it is imperative to consider what lesson structure is more appropriate for lesson study; in mathematics, prominence is often given to structured problem solving (Fujii, 2014).

Our study is not intended as a refutation of lesson study as an approach, neither in professional development nor in initial teacher education. Professional training of competent teachers is necessary, and we believe that practice should be at the centre of a high quality teacher education (Ball & Forzani, 2009). We also believe that lesson study is a good candidate environment in which such professional training – or at least part of it – can be carried out. Implementing lesson study in initial teacher education is, however, not straightforward, and learning from a negative case like ours can be useful for making future implementations successful.

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