Learning from ones practise
Teacher’s growth during in service training in the classroom

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In service training is in many ways important for teachers’ development in their profession. In many cases one or two teachers are sent to a continuation course and at the very best they return with some idea of how to improve the practice. The problem then occurs in how to implement these new ideas to the other teachers who did not attend the course, as well as the problem of putting the learned theories into practice. In this paper I will show how a teacher develops through in service training in the classroom. The teacher participated in a research project, “The pedagogy of learning”, which among other things aims to develop teachers’ learning. The method used in this project is Learning Study. Learning Study is an iterative process where teachers in collaboration with researchers plan and conduct research lessons, with an intention to improve educational settings by revision based upon the analyses of the data (video recording from the research lesson and post-test) which indicates the students’ development. In this particular study we saw a change in the way the teacher acted towards the students. In lesson one the teacher was more concerned about getting the students’ to find the right answer than listen to what they said and try to discern how they thought instead of try to get them to understand how she thought. In the third lesson the teacher puts more emphasis on how students came up with the answers, by asking the students how they thought when they came up with the answer.
1 Introduction

This study is made in the project “The pedagogy of learning” funded by the Swedish Research Council, and is carried out by researchers from three different universities in Sweden\(^1\). The basis of this project is an interest in understanding what students learn in the classroom. The point of departure is that the entanglement of what teachers do, how students learn, and theory about teaching and learning, is crucial for attempts to improve learning. The primary focus is on an object of learning, not on teaching methods. In this paper the primary focus is on the teacher’s development during the study. The paper starts with a discussion about the use of action research, which is followed by a description of the methodological framework. In the third part some results from the study are presented and finally things are wrapped up in a conclusion.

2 Background

It is abundantly clear from many years of efforts to reform schools that change must come from the inside. We can no longer see teachers as research subjects and consumers of research; we have to acknowledge the fact that they are also producers of educational knowledge (Zeichner & Niffke, 2001). Shulman (1999) highlights the advantages and liabilities of two ways of studying the educational practise, from the inside or the outside. In action research you combine those two sides. Bekken and Mosvald (2004) write:

Educational research has too little influence on improving classroom teaching and learning. Teachers do not routinely locate cases in research archives to help them interpret students’ conceptions (p. 482).

They give four reasons to the fact that teachers do not seem to value educational research:

1. Lack of knowledge base to support teacher learning.
2. Lack of tradition among teachers for analysing and learning from practice.
3. Lack of time for collaborative work.
4. The tendency to look for quick solutions.

In Japan lesson studies have been used to turn practitioner knowledge into professional knowledge. In a lesson study, a group of teachers meet regularly to discuss, plan and observe lessons, containing a specific content. The purpose is to develop teaching and the students’ learning, and the belief is that the most effective place to do so is in the context of a classroom lesson. A group of teachers choose an object of learning, usually something they have identified as problematic from their own practice. They then prepare a lesson together, taking into consideration the particular problems the students might have with the object of learning. The next phase is teaching the lesson. One of the teachers teaches the lesson but the lesson itself is seen by all as teamwork. The lesson is documented, often by videotape. The documentation of the lesson is then analysed. The analyse leads to a revision of the lesson, and the teaching of the revised lesson in a new group of students. A lesson study can involve several evaluations, reflections and revised lessons (Bekken & Mosvald 2004, Lewis 2002, Stiegler & Hiebert 1999, Yoshida 1999). Documentation of a lesson with video is considered as an effective tool for linking theoretical issues to classroom practise, but still there is little empirical research on the effects of the improvement of teacher knowledge and practices (Cestari, Santagata & Hood, 2004). Also Brandsford, Franks, Vye and Sherwood (1989) stress the value of using video segments of teachers teaching which teachers can watch, to improve

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\(^1\) Leader of the project is Mona Holmqvist, Kristianstad University College. Researchers in the project are Laila Gustavsson, Ference Marton, Ulla Runesson and Anna Wernberg.
practise. They suggest an approach where teachers watch teachers doing a worse job, a better job and so on, by use of contrasts. The contrasts open up for the possibility to notice the differences between the performances in the different segments. The most common way today is that a teacher teaches his or her own class, without visiting other classrooms (Hobson, 2001). This arrangement restricts the possibility for teachers to develop the practise by the use of contrasts between own and others’ teaching.

3 Research Questions

The research questions concerned how a teacher acting in a classroom change depending of a deeper theoretical understanding about pupils learning.

1. In which ways does a teacher change her/his acting while teaching during in service training?
2. How can this observed change be related to the training?
3. Is the teacher aware of her/his changes?

4 Method

The method used in the study is learning study (LS). It is a fusion of lesson study (Lewis 2002; Stiegler & Hiebert, 1999; Yoshida, 1999) and design experiments (Brown, 1992; Cobb et al 2003). Like the design experiment, a learning study seeks to understand the ecology of learning (Cobb et al. 2003). A theory must be associated with the Learning study approach, in this case the variationtheory, which focuses on the distinction between an enacted object of learning (the opportunities that the students are given to learn observed by the researcher) and lived object of learning (what the students actually learn) (Holmqvist, 2002). Learning Study is an iterative process (see appendix 1 for an example) where teachers in collaboration with researchers plan and conduct research lessons, with an intention to improve educational settings by revision based upon the analyses of the data (video recording from the research lesson together with pre- and post-test) which indicates the students’ development. In the presented study three research lessons were conducted, and jointly planned by a group of five teachers (two primary and three secondary teachers) who were all teaching at the same school. The research lessons were seen upon as teamwork by the way they were planned in the group. Between the three lessons eight days passed. The teachers attended three research meetings where the lessons were analysed and revised. During these meetings the focus was on the enacted object of learning and the lived object of learning. It is important that the discussions are about the object of learning in a Learning study cycle. Alexandersson (1994) have noticed that teachers not always pay attention to the object of learning when talking about what students are supposed to learn. Instead they were more concerned about what they did and how they did it. The researcher also provided the teachers with research literature found on the particular subject matter.

4.1 Participants

The research lessons were jointly planned by a group of 5 teachers, teaching at the same school. Two teachers taught the third grade students and three taught secondary students. The teachers were also assisted by Wernberg (doctoral student).
The three research lessons were taught by the two third grade teachers. One teacher taught lesson one and three and the other taught lesson two. This was a choice made by the teachers themselves.

Two third grade classes (26 students), participated in all moments of the study (pre-test, research lesson and post-test). They were divided into three groups based on differences concerning their school achievement (high, middle and low), containing the same number of students, mixed from two classes. The design precludes influences of learning activities in their classes afterwards, while the students have further teaching in their classes instead of in the research lesson groups.

![Figure 1. A flowchart of how the students were divided during the research lessons.](image)

### 4.2 Procedure

In the research lessons the teachers decided to focus on the topic “the clock”. This was mainly chosen because the teachers felt learning to tell the time, and especially elapsed time, was experienced to be a difficult concept for children at this age. They had noticed that the problem occurred most frequently regarding differences not connected to complete hours (e.g. between 2.15 pm and 4.45 pm). The students had worked with the chosen object of learning, before the research project started. All three research lessons were quite similar aiming to make it possible for the students to discern how the two hands on the clock were connected to each other and how to figure out the elapsed time. All three lessons lasted approximately one hour. The change was on a micro level revealed from the comparison between research lesson one and three, which also were taught by the same teacher. As it turned out research lesson two became similar to research lesson one and there were barely any change in the outcome off the students’ performance in the post-test. Beside that, lesson two was taught by another teacher. For that reason only research lesson one and three will be dealt with in this paper.

Between the lessons the teachers attended a research meeting. The test-results were examined and the videotaped lesson were analysed and revised. During these meetings the focus was on the enacted object of learning and the lived object of learning. In other words were the students given the opportunity to learn the given object of learning or if not what could be done differently in the following lesson.
In addition stimulated recall (Haglund, 2003) was used to get a deeper understanding of the teacher’s changed focus. Stimulated recall can be described as a method to remind a person about a former episode or a difference between two episodes (Alexandersson, 1994). About two months after the research lessons a teacher was shown two similar sequences from two lessons and asked to reflect on what she saw.

5 Results

In this first sequence the teacher showed a clock on the over head projector incorrectly set with the hour hand at 8 and minute-hand at 6, which gave most student the impression of 8.30 (in Swedish expressed as “half nine”). The assignment were chosen because the teachers had seen that many students put the hour hand wrong when the time was half past. The teacher asked the students to set their real clocks exactly like hers, which is impossible, to make them focus on the hour-hand. In research lesson one the teacher were concerned about the students finding the right answer.

Excerpt research lesson 1:

Teacher: It can’t be done, no. It must be an odd clock I have up here. Why can’t I put it like that? Think about it.
Carl: Because, mm, it is one like that, not one like we have it is like the one hanging up there, a clock like that (the student point at a clock on the wall).
Teacher: You mean that your clock is a real one and mine is not.
Carl: Yes, that too.
Teacher: Or did you not mean it like that?
Carl: No, it is one of those you have on the wall, like that.
Teacher: Mm, but it is an artificial one with plastic (Teacher is talking about a student-clock were you have to move the hands by yourself) what else could be the reason? Paul.
Paul: Mm, the way you set it, thus half is right but then it should be between seven and eight.
Teacher: Yes, exactly. It is in fact this, a clock can never be like this because when the clock has been (sets the clock at eight) exactly eight like that, can you set this time then?
Paul: Yes.
Teacher: Then the minute-hand is at twelve and the hour-hand can be at exactly eight. But if you turn the minute-hand half a turn so it gets down here (teacher turns the hands to 8.30) let it turn until it comes down to six, then what happened with the hour-hand? Tina.
Tina: It moves a bit over eight.
Teacher: Yes, it moves too.

In research lesson three the teacher gave the students time to think and also she did put more emphasise on how students came up with the answers, by asking the students how they thought when they came up with the answer.

Excerpt research lesson 3:

Teacher: Could you put your clock like that? (he teacher is referring to the overhead clock) Did anyone succeed?

Some students say no.
Teacher: Nobody? What does your clock look like Ellen?
Ellen: It’s mm, not exactly the same.
Teacher: Not exactly the same, how does it look then?
Ellen: … It
Teacher: Mia, yes no, you will get a chance.
Ellen: It is not exactly at eight, it is a bit past eight.

…
Teacher: Half eight, yes. Why, have you thought about why it can not look like I had it from the beginning and why you could not put your clocks like that, why can it not be like that? Now you have to think. Tina, why can it not be like that? Paul.
Paul: It has to be, it has to be in between eight and nine otherwise it will not be half, to half.
Teacher: Why must it be like that?
Paul: Otherwise it will not be half nine.
Teacher: No, because it is like this, when can the hour-hand be exactly at eight, Elba? Mia.
Mia: When it is eight.
Teacher: When it is eight, set your clocks at exactly eight. (Teacher does the same at her clock). Can you set you clocks like this then, Elba?
Elba: Mm.
Teacher: That went well; did your hands end up exactly like mine? (Yes from the students).

In the second sequence the teacher asked the students to set their student clock (plastic clocks used by the students were both hands had to be moved separately) on 7.15. In the first research lesson the teacher corrected the students if they had the wrong answer.

Excerpt research lesson 1:

Teacher: Mm, it looks like it is in the middle, that’s right, just past.
Teacher: The minute hand has moved from seven to quarter past, then what happens to the hour hand?
E: It has moved a little bit.
Teacher: It has moved, not too much, and then it will be half.
Teacher: Do you think the minute hand has moved that much in fifteen minutes? I don’t think so, I think that, like that yes.

In research lesson three the students worked in pairs when they should set their clocks at different times. Also one student had a real clock and the other student had a student clock. In this lesson the teacher gave the student the opportunity to discover how the two hands should be set, instead of telling them how it should be set.

Excerpt research lesson 3:

Teacher: Talk with each other and see if you can come up with why it is different on the clocks.
The teacher is telling two students whose clocks don’t look the same to compare their clocks and discuss their result with each other.

Two students have the same time but they are both wrong.
Teacher: What is your clock?
Paul: Five past half
Teacher: Five past?
Paul: Twelve.
Teacher: What time is your clock, Ted?
Ted: Five past half twelve.
Teacher: Take a closer look, is it five past half twelve? I agree that both your clocks are the same, but is it five past half twelve? How did you think when you put it like that?
The students then expressed how they first look at the minute-hand, being five minutes past, and then looking at the hour-hand saying “past what? Past twelve”. Then they got the time to be half past twelve instead of the correct answer half past eleven. Instead of telling the students the correct answer she leaves them and let them think for a little longer.

The time passed between researches lesson one and three were only eight days, but even so one could see a change in the way the teacher acted towards the students. In lesson one the teacher were more concerned about the students finding the right answer and she tried to get them to understand how she thought, instead of listening to what they said and try to discern how they thought. In the third lesson the teacher put more emphasise on how students came up with the answers, by asking the students how they thought when they came up with the answer. The change was notable especially at a micro level. It was the way the teacher changed from telling the students the right answer to giving them the opportunity to discern by themselves, combined with the fact that she tried to adopt the students’ ways of seeing things by attempting to anticipate their behaviour and determine how to use this knowledge to build the students’ understanding. In lesson one the teacher did not pay much attention to one student who stated it was the size of the clock that explained why the minute-hand and the
hour-hand did not move at the same speed. In lesson three the teacher encouraged the pupils to tell her how the hands moved.

5.1 Test-results

The result from the post-test were analysed in terms of the lived object of learning. The result (table 1) after the first research lesson showed that most of the students had improved their understanding in telling the time, i.e. the intended object of learning. After the third research lesson we could see greater improvements in the result at the post-test (table 1).

<table>
<thead>
<tr>
<th>Items</th>
<th>Lesson 1</th>
<th>Lesson 2</th>
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<tbody>
<tr>
<td></td>
<td>% answers pre-test</td>
<td>% answers post-test</td>
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<tr>
<td>Item 1. Tell the time in figures (6.35/10.35).</td>
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<td>40</td>
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<td>Item 2. Tell the time in figures (6.30/7.30).</td>
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<td>60</td>
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<td>Item 3. Draw the time in empty clock-face (9.30).</td>
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<td>60</td>
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<td>Item 4. Draw the time in empty clock-face (1.45/12.15).</td>
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<td>50</td>
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<td>Item 5. Elapsed time.</td>
<td>40</td>
<td>60</td>
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<td>Means</td>
<td>52</td>
<td>55</td>
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5.2 Stimulated recall

About two months after the research lessons the teacher acting in research lesson one and tree were shown two similar sequences from the two lessons and asked to reflect on what she saw (table 2).
8.30. Also the teacher asks the student when the hour-hand can be at eight.

**Situation 2**

The teacher asks the students to set their student clocks at different times. The teacher gave response to and corrected the students. She does not open up for a discussion with the students.

The teacher asks the students to set their clocks at different times. One student had the real clock and the other student had the student clock. She asked the students to put the two clocks next to each other and talk about the result, focusing both the hour- and minute-hand. The teacher does not correct the students but asks questions like; How did you think?; Why did you come up with that answer? Finally she lets the students tell her how to set the teaching clock at the correct time.

When asked about situation one the teacher expresses that she could see how she used more “why-questions” in lesson three than in lesson one. She also felt that the students were more active in lesson three and that they were involved in a dialogue. In lesson one it was obvious that she got concerned when a student did not answer correct at a question more or less immediately, automatically she passed the question to another student or gave the right answer herself. In situation two the teacher felt that she gave the students much more space in her second lesson. For example she gave them time to think. In her second lesson she let the students’ thinking by letting them think for a while. Besides, she did not give the students the right answer.

When asked about her change between the two research lessons she put an emphasis on the discussions in the group in the Learning study cycle. She stressed the fact that they discussed what it takes to learn and not what materials to use, things they had discussed in the past, which might not have improved the students learning. In the discussions the teacher tried to examine all aspects of the lesson through the eyes of the students. Together with the use of video analyse they could scrutinise some part of the lesson to see what was needed to be changed in the next research lesson to improve the students learning.

- I very much believe in having time to sit down talking with my colleges
- I feel that the discussions have been very exciting...I believe it is this discussion, around it and it makes you take the things with you.
- You give us the kind of questions that makes one think.
- *Did you consciously think the third time that you should act in another way?*
- I don’t believe so. In the third lesson I don’t believe it was conscious so. But of course the discussion before, what you talk about you take it with you.

Another aspect was the use of pre and post-test. Before having looked at research lesson one and analysed the results, the teachers were very pleased with the lesson. In fact they were still content with the lesson after seeing it, but the results of the post-test made them re-evaluate their opinion. It was the test-results that made them dissect the lesson and look at it with different eyes.

The positive development of the result from the research lessons show that the teacher’s change in her way of acting in the second research lesson has had an improvement of the
students learning, as well as her understanding of how to use a theory about learning (the variationtheory) in planning the lesson.

6 Conclusion

The learning study cycle presented in this paper consist of three research lessons and a total of five teachers attended the research meetings were the lessons were planned, analysed and revised. One could argue that the change in the teachers acting towards the students is due to the different personality off the teacher teaching the research lesson. This could be true, if it was not the same teacher, who taught both lessons. Biesta (2005) argue that for learning to take place individuals has to come into presence “…we should think of education as the situation or process which provides opportunity for individuals to come into presence, that is, to show who they are and where they stand” (s.62). This is exactly what the teacher did in lesson three but not in lesson one. Donovan and Brandsford (2005) give an example from a children’s story were a fish is told by a frog about the world outside the water. When the frog describes a bird, the fish in his mind sees a fish with wings and legs. The student (excerpt research lesson one) who explains it is the size off the clock that makes it possible for the hands to be set differently is left with such a misconception. The teacher does not try to understand how the student thought about it and what it would take for him to understand the differences between the hands. He is left with his misconception that is the size of the clock that makes it possible for the hands to bet set differently just as the frog is left with his misconception about a bird looking like a fish with wings and legs. Also Alexandersson (1994) and Borko (2004) point at the value of teachers listening carefully to students’ explanation in order to build on their understandings and/or misconceptions. After seeing the research lesson the teacher in this study realises how important it is to listen to the students and also identifying the critical aspects in the object of learning. In lesson three she use feedback to discern the students’ different thoughts (Donovan & Bransford, 2005). By doing so she also challenge the students’ beliefs and enables the students to learn if learning is seen as a change in our understanding of the world around us (Biesta, 2005; Bransford, 1989; Eriksson, 2005; Holmqvist, 2004, and Marton & Tsui, 2004).

The teacher teaching lesson one and two was not aware of her change in acting towards the students until it was pointed out to her by the researcher in the stimulated record session. The teacher herself claims that this was due to the analyse of the lessons and the discussions between the lessons.

This particular study is limited in number of participants and the stimulated recall is done quite some time after the research lessons. Still I would like to argue for the importance of teachers coming together and on a theoretical base discuss how to improve students’ capabilities and development of an object of learning in a classroom setting. After conducting the first research lesson all the teachers agreed that they had done a perfect lesson and that the students had to have learned a lot about the object if learning. After analysing the lesson and the post-test the teachers re-evaluated their believes and looked at the lesson differently. The result from the post-test and the video analyse made the teachers look at the lesson differently. They now in more depth discussed the object of learning, and how they could modify the lesson. Due to the participation in the Learning study the teachers were now more concerned about what it takes for the students to learn, and they asked themselves what could be done differently in a lesson in order to make it possible for the students to learn.
References


Example of a Learning study cycle:

1. Choosing the object of learning (the teachers decide what they want to look deeper into)
2. Analysing critical aspects of learning (by tests, interviews or/and observations)
3. Planning the lesson
4. Lesson 1 (students group a)
5. Analyse of lesson 1, taking into consideration the outcome of the post-test and a first analyse of the lesson. Conducting a revised lesson plan
6. Lesson 2 (students group b)
7. Analyse of lesson 2, taking into consideration the outcome of the post-test and a first analyse of the lesson. Conducting a revised lesson plan
8. Lesson 3 (students group c)
9. Analyse of lesson 3, taking into consideration the outcome of the post-test and a first analyse of the lesson