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When working together to plan a lesson in a Swedish professional development initiative

Anna Bengtsson

Linnaeus University, Faculty of Technology, Kalmar, Sweden, anna.bengtsson@lnu.se

This paper is based on a study that draws on Wenger's Communities of Practice perspective and accounts for the coherence of mutual engagement, joint enterprise and shared repertoire in a community of Swedish upper secondary mathematics teachers participating in a professional development initiative. The aim of this paper is to describe and understand practice when teachers are working together to plan a lesson. An overall characteristic of practice is that it develops in a teaching culture, and as the community lacks of awareness of how it organises their teaching, practice becomes resistant to change when planning the lesson. Also, this paper addresses further research considering teaching culture when teachers work together to plan a lesson as a way to obtain, and maintain collegiality.

Keywords: Collegiality, lesson, teaching culture, community of practice.

INTRODUCTION

The present trend aimed at improvements in schools is through collegial collaboration. Today “communities of practice” fill the air (Putnam & Borko, 2000). However the shift towards collegiality is a new setting for many teachers. Teachers in secondary education primarily feel responsibility for their own classroom practices, resulting in largely autonomous and isolated work and private learning activities (Hodkinson & Hodkinson, 2004). The discussions in many staff development sessions are characterised as “style shows”. These sessions provide few opportunities for meaningful reflection and growth and maintain the individualism and isolation of teaching (Ball, 1994). Collegiality is de-privatising the work of teaching, and it means being able to disagree constructively about professional practice (Evans, 2012). It is more than simply sharing ideas, it means confronting tra-

ditional practice – the teacher’s own and that of his or her colleagues.

The Swedish upper secondary school was reformed 2011 and a new curriculum was formulated. It emphasises that teachers should cooperate with other teachers in order to achieve the educational goals (National Agency for Education, 2013). This paper is based on a case study that captures the characteristics of a community of four upper secondary mathematics teachers in a professional development initiative. A version of the Japanese lesson study – learning study – gave access to empirical data of the study. Learning study involves teachers and researchers working together to plan a lesson. The lesson is taught by the teachers in one or several cycles, and is observed, evaluated, and modified by the team before the next cycle is taught (Marton & Lo, 2007).

The aim of this paper is to describe and understand practice when Swedish upper secondary mathematics teachers work together to plan a lesson.

BACKGROUND

In order to understand practice I will review literature regarding a Swedish lesson and a Japanese lesson, as the idea of working together to plan a lesson was imported from Japan.

In Japan teachers work in collegiality and Japanese lesson study was chosen as model for Swedish learning study.¹ The premise behind lesson study is simple; if you want to improve teaching, the most effective place to do so is in the context of a classroom lesson.

1 The difference between learning study and lesson study is that the former comes with a theory of learning. Most often learning study draws on the theoretical assumptions of the variation theory. However, in this paper, the variation theory is not in focus.

Yoshida (2004) writes that Japanese teachers spend hours planning a single lesson in a lesson study. The teachers first engage in the problem from which the lesson will be launched, as the Japanese mathematics lessons are based on structured problem solving. Then the anticipated solutions, thoughts and responses that students might develop as they struggle with the problem will be explored. This is in relation to the kinds of questions that may be asked to enhance student thinking during the lesson, as the type of guidance that could be given to students who show misconceptions in their thinking. The end of the lesson, the moment at which students understanding can be advanced, is carefully considered in the lesson study (Yoshida, 2004; Stiegler & Hiebert, 1999).

Swedish lessons however, are largely synonymous with solving of exercises. The teacher presents a few tasks on the whiteboard, while the students are listening. Similar exercises will then follow and the remaining time of the lesson is spent for individual work in the textbook. The exercises are solved with a specific method and have a correct answer. It is not necessarily that the students are practicing the same skills in their individual work in the textbook as those the teacher presented at the beginning of the lesson (Lundin, 2008). Swedish teaching resemble in many ways with U.S. teaching. Evans (2012) writes that teaching is highly personal in the U.S., and over time, every teacher develops a unique instructional repertoire, a set of personal, artful, assumptions and responses.

Stiegler and Hiebert (1999) stress that teaching is a cultural activity, it is composed of elements that interact and reinforce one another. The methods teachers use, are not determined by their qualifications as much as by the culture in which they teach and the role of the teacher will follow his/her assumption of the nature of learning. When a lesson takes the form of following the teacher's directions by practicing a procedure during seat-work, the teacher believes his/her responsibility is also to keep students engaged and attending. Moment to moment attention is fundamental. Teaching in this typical culture is about enhancing students' interest by increasing the pace of the activities, by praising students for their work and behaviour, by the cuteness or real-lifeness of tasks and by their own power of persuasion through enthusiasm, humour and "coolness". This practice should be relative error-free, as the importance of the feeling

of success is not underrated in a learning situation. The teacher acts as if confusion and frustration are signs of them not succeeding at their jobs (Stiegler & Hiebert, 1999). The Japanese teaching culture on the other hand is reinforced by that learning occurs by first letting the students struggle to solve mathematical problems.

Stiegler and Hiebert (1999) write about challenges in importing lesson study to another teaching culture. Trying to improve teaching by changing individual features usually makes little effect, positive or negative, especially when the feature is imported from another teaching culture. Lewis (2009) however, argues that there is evidence that lesson study can be used effectively outside Japan. She reports changes in teachers' professional community in terms of, capacity to improve instruction, shared language, processes, and frameworks for analysing instructions.

Collegiality is not a feature in the Swedish teaching culture, and in this case, the model of working together to plan a lesson is imported from Japan. It is above given that planning a Swedish lesson is different from planning a Japanese lesson.

THEORETICAL FRAMEWORK

Within the paradigm of social practice theory, Wenger (1998) conceptualised Communities of practice as a social theory of learning.

Practice is doing in historical and social context that gives structure and meaning to what we do. [...] In this sense, practice is always social practice. (Wenger, 1998, p. 47)

Wenger (1998) writes that communities of practice are groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly. A community of practice has a shared domain of interest. Membership therefore entails a commitment to the domain and a shared competence distinguishes members from other people. In pursuing their interest in their domain, members engage in joint activities and discussions and share information. They develop a shared repertoire of resources: experiences, stories, tools and ways of addressing recurring problems. We belong to several communities of practice, in some we are core members, in many we are merely peripheral.

The framework is not about whether the practice is right or not. It is about the active involvement and how it takes place; what is brought to the table in a community of practice (Wenger, 1998). The teachers in the case are an active part of their community but at the same time they are influenced by a teaching culture. The teachers are accountable to the quality of the community of the practice. Their experience of teaching and learning mathematics will be negotiated in the community of practice and validated as competences. The tension between competences and experience is very important for the dynamic in a community of practice. When the core is too strong there is a lack of tension between competences and experience and the community of practice may become static and stand in the way of learning (Wenger, 1998).

The framework of Communities of practice has been used in previous mathematics education research examining teacher learning, with different focus, and in different ways. My approach to the framework is neither attempting to design, nor analysing if a community of practice emerges or not. *I see the mathematics teachers as a community of practice; it is my unit of analysis.*

Framing this case as a community of practice pays attention to the teachers' negotiation of meaning. Meaning is defined as an experience of everyday life and is located in a process; in the negotiation of meaning² (Wenger, 1998). That is the negotiation of their experiences of teaching and learning mathematics. A community has dimensions of source of coherence through mutual engagement, a joint enterprise and a shared repertoire. Mutual engagement defines a community and being engaged gives a sense of belonging. It can give rise to differentiation as to homogeneity, as it involves competences and competences of others (Wenger, 1998). The teachers' practice draws on what the teachers know, and their ability to negotiate what they do not know. The joint enterprise is what is being negotiated and reflected upon in the community. It does not imply that everybody agrees with everything.

2 The negotiation of meaning involves the interaction of two constituent processes, participation and reification. Participation is defined as active social involvement but also as personal membership. Reification is defined as a shortcut for communication, a focus, a projection of what they mean. Participation may refer to the active involvement in planning the lesson (Wenger, 1998).

This reflects the complexity of mutual engagement (Wenger, 1998).

Communities of practice are not self-contained entities. They develop in larger contexts – historical, social, cultural, institutional – with specific resources and constraints. Some of these conditions are explicitly articulated. Some are implicit but are no less binding. (Wenger, 1998, p. 79)

An explicit condition for the practice of this case is that it takes place in a setting; the teachers are to plan a lesson. The process of defining a joint enterprise is keeping the practice in check, just as it also pushes it forward (Wenger, 1998). A history of teaching culture may also be a binding condition, as it is so fully integrated into teachers' worldview. A shared repertoire is the development of the joint enterprise, it is the words, tools, concepts that are produced or adopted throughout the community of practice.

My approach to Communities of practice and the aspects of practice have been characterised by concepts from the theory. This is for the analysis of empirical data. Next methods will be discussed.

METHODOLOGY

This research has arisen in response to the shift towards collaborative work in schools. This is a search for understanding rather than establishing explanations and looking for causes. This is a distinction between qualitative and quantitative research (Stake, 1995).

Stake (1995) writes that we study a case when it itself is of very special interest, when we look for details of interactions with their context. This case constitutes four upper secondary mathematics teachers in a setting of learning study, taking place at an upper secondary school in Sweden. The four teachers have been teaching mathematics in upper secondary school for 4–12 years and they have been employed at the school for 3–12 years. An external advisor, based at a university, is also participating in the learning study. The teachers and advisor met on 7 occasions and in between the teachers were set up for work. Each meeting had a purpose and the work in between was also defined. Their meetings focused discussions on what and how to teach the mathematical concept of slope aiming to plan a lesson.

The choice of method in this case study is based on it being qualitative research as well as on the nature of the selection of case. Through the setting of the learning study there was access to 14 two-hour meetings. Empirical data was therefore generated through observation of these meetings. Previous research regarding learning study has mostly aimed at developing practice and the advisor and the researcher is then the same person. In this case study, I was a strict observer (Bryman, 2001) meaning that I did not interact with the respondents. Field notes were taken during these observations, and transcribed as soon as possible after the observation. The field notes did not follow a structure or include any categories. I was writing down my immediate reflections, trying to make sense of the case as it unfolded in practice (Flyvberg, 2006). The meetings were also video-recorded. The video-recordings have not been important for the purpose of hearing the exact words; it was the meaning that was important. It gave access to the source of empirical data again, and again. Hence I would not capitalise on making sense of the case (Stake, 1995).

An interview took place once the learning study was conducted, a month later. Interview questions were used to confirm the empirical data (Bryman, 2001). The interview was also held to provide a complement, to find out what was not understood or not heard through the observations. The interview was consequently semi-structured, i.e., a set of questions had been prepared but there was also space for further questions. The themes focused on in the interview were the teachers' expectations and experience of collegiality. The interview was also aimed at complementing and confirming issues of the setting of learning study.

The case study has an abductive approach, rather than a deductive or an inductive approach. Eriksson and Lindström (1997) say abduction is a way to discover meaningful underlying patterns. It makes possible to connect surface and deep structures. The abduction has a starting point in interpreted knowledge. The interpretation is made in a wide sense, including literature, conceptual analyses and historical sources. The perspectives determine which of the deep structures that are tangible. From this approach new knowledge is established (Eriksson & Lindström, 1997). By focusing on different aspects, the interpretations have helped to define the unit of analysis. Alvesson and Sköldberg (2000) define abduction as entailing a commutation between data and theory in a scientific

and systematic way to look for answers to research questions of interest. They continue that the researcher is minimising the risk of interpreting what they think they are seeing in light of their own unreflected preunderstandings or to reinvent the same theory but in new words and concepts. A chronologically analysis and an attempt has been made to capture the case through short, impressionistic scenes that focus on one moment or give a particular insight into meaning and community (Stake, 1995).

WHEN THE LESSON IS THE UNIT OF ANALYSIS

The teachers have focused discussions on teaching and learning slope, which has resulted in a mapping of the concept of slope and relating mathematical concepts. The lesson will take the form of the teacher presenting the concept, increasing the difficulty and pace of the activities. They have identified that understanding the meaning of a coordinate in the Cartesian coordinate system is crucial for the students to fully understand the rate of change. The following scene captures the teachers planning an initial part of the lesson concerning coordinates:

- Teacher 1: So now I have drawn four points here. [...] Then they will be named A, B, C and D.
- Teacher 3: Will you name them A, B and C?
- Teacher 1: They can be named anything. Or?
- Teacher 3: I was thinking that you have the points and that you fill out the coordinates, the coordinates should not be given. [...] Or will you display all the three coordinates at the same time?
- Teacher 1: Four [points]. But it might be a smart idea to present one point at a time. [...] I did not plan to write the coordinates out, but of course you can do that as well.
- Teacher 2: It becomes clear if you write them out.
- Teacher 3: Why did you not want to write them out?
- Teacher 1: I can write them out!
- Teacher 3: I think there is a value in introducing one point at a time.

The community negotiate how the points should be labelled, if they should be introduced one by one, if they are to write them up on the whiteboard. It is typical for this case that as the community plans the lesson they start to negotiate teaching techniques. The mutual

engagement concerns how to create a presentation maximizing the students' attention and understanding of the content. It gives rise to differentiation, as it involves competences of three teachers. The teachers' practice draws on different techniques of presenting content, developed in larger implicit contexts. As history of how to maximize the students' attention may be a binding condition, as it is so fully integrated into teachers' worldview. The joint enterprise is what is being negotiated and that is different techniques introducing coordinates. The process of defining a joint enterprise when planning the lesson is keeping the practice in check, just as it also pushes it forward (Wenger, 1998). The scene captures that it is hard to coordinate practice to move forward.

To give a dimension to the above their previous experience of collegiality, will be included. I asked them about their experience of working together:

Teacher 2: We have never experienced anything like this [learning study] together. We are very traditional, those who teach the same courses in parallel classes might construct tests, mark tests and assess students' grades together.

Asking to what extent they have experience of planning lessons together, they say:

Teacher 1: Yes, sometimes, as an outline of a lesson. It is more often the activity we plan, rather than the lesson. We plan the courses together, in term of its schedule; let's cover this chapter by then, let the students take a test then and so on. In addition we also talk about what we have done today as in how far [in the textbook] we have come. We have done this for a long time, more or less. When it suits us.

The teachers have no previous experience of planning lessons together; they are rather collaboratively engaged in more organisational matters in the faculty.

Discussing the model of working together to plan a lesson, the teachers reflected:

Teacher 2: It does not feel that the primary goal of this learning study is to plan a perfect

lesson. What is important to me is that I have got something from this. When I teach my lessons later, that are not in a learning study, then I take this with me. Those lessons will not be ruled by manuscript.

Teacher 4: That is also my experience, that it was everything around that gave me that good feeling when processing the lesson. The lesson was very tightly structured and I felt by the end, as I was teaching, that the students were quite exhausted. Normally I would have cut it, or done something different. It rarely happens that you have such a controlled lesson for 60 min. The last 20 min you often let them work on their own.

As the teachers reflect about the role of the lesson they reflect that the lesson is not the primary goal of the learning study, it is the teachers' professional development that is their mutual engagement. Still the lesson has a value, for them to imagine and to engage around. The analysis gives that it is the joint lesson that keeps the practice check, as it moves forward. However the shared repertoire is not defined by a lesson as a product. The projection of the joint enterprise is what was negotiated as they planned the lesson.

When planning the lesson further they negotiate to let the students discern the relation between distance and change:

Advisor: We want the students to discern what a distance is and what a positive and negative change is.

Teacher 3: But then.....I don't know. As I do, I always let Δx be positive, should we talk about negative and positive change on the x -axis then. (...)

Advisor: I have experienced that students do not have the meaning of positive and negative change. I always say to them to follow the direction of the axis. If you go with the axis then it is a positive direction and if you go in the other direction then it is negative.

Teacher 2: That is a way of going through the structure of the coordinate system! (...)

Teacher 3: What comes with this is that Δx can become negative and then we have the negative sign in the denominator to handle. If we instead always treat Δx as positive then if Δy is negative the m -value ($y = mx + c$) is also negative. (...)

Teacher 2: It is still the structure of the coordinate system.
(...)

Teacher 3: We create a natural structure for the student. We say we call them point one and two. It says in their formula-booklet.

Advisor: Yes, but this could be point one and this point two, it doesn't matter which point is point one.

Teacher 2: I think, (...) we should not decide which point that is the first and the second. It is rather the structure [of the coordinate system].

Teacher 3: You think? I do not! I think the students will drown in minus signs and they need to consider going left or right.

Teacher 2: Why should we be afraid of minus signs?

Teacher 3: Because it becomes wrong. Minus signs are shit. [Laughing]

This scene rather captures a lack of discontinuity; it shows a static core in the community. The challenge in the community is to allow discontinuity, to keep the tension between competence and experience (Wenger, 1999). The competence is formulating questions from your experience, but from a new perspective.

The core is very static regarding the negotiation of Δx ; students' difficulties with negative numbers will cause frustration and confusion in the classroom, thus it is better to avoid it in the teaching. The idea is to always let the leftmost point be point number one and hence the right most point number two. Then the students can use the algorithm in the formula booklet, without any risk of ending up with a negative denominator. It saves students from "drowning in minus signs". The community does not agree when they are negotiating how to teach the content in the lesson. A shared repertoire does not imply shared as in a common view on what is negotiated (Wenger, 1998).

Wenger (1998) writes that practice develops in historical, social and cultural contexts that give structure

and meaning to what we do. The analysis will be discussed in relation to the background.

DISCUSSION

An overall characteristic of practice is that it develops in a teaching culture. As the community lacks awareness of how it organises their teaching, practice becomes resistant to change when planning the lesson. This case captures the fact that the teachers value the lesson and negotiates its importance, but their mutual engagement is in regard to their teacher professional development. They say they were engaged around everything that was learned as were working together to plan the lesson; it was not an engagement to produce a perfect lesson in itself. Stiegler and Hiebert (1999) write that the unit of the lesson has validity for the teachers, as it does not lack of generalisation to real life experience. The lesson is also a part within a teaching culture and coincides with teachers' thoughts on the nature of mathematics and how learning takes place. The Japanese mathematics lesson tells a story, it is tightly connected with a beginning, a midpoint and an end. They are different from the Swedish mathematics lesson, which are described to be more modular with fewer connections. Yoshida (2004) writes that a lesson is highly sharable among teachers in Japan. Teachers plan these lessons in collegiality and all work in lesson study is done after school. According to both Evans (2012) and Stiegler and Hiebert (1999), U.S. teachers find professional communities as "more work" and they would rather go home early to plan tomorrow's lessons. Even so:

Teaching can only change the way cultures change: gradually, steadily, over time as small changes are made... (Hiebert & Stigler, 2004, p. 13)

Working together to plan a lesson in professional development initiatives might be challenged in certain teaching cultures; when teaching is highly personal, underpinned by a unique instructional repertoire; if the lesson is more modular with fewer connections and not a unit in itself. In the introduction I have problematized that; collegiality is a new setting for many teachers; collegiality requires structure that goes beyond simply sharing ideas, that sustains the individualism and isolation of teaching and collegiality requires de-privatising of the work of teachers to start to engage critically with issues of practice. This paper addresses further research considering

teaching culture when teachers work together to plan a lesson as a way to obtain, or maintain collegiality.

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