Inconsistency, Regression Or Development? The Professional Identity Of a Novice Primary School Mathematics Teacher

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There is an increasing awareness of the social dimensions in the professional identity development of mathematics teachers. This paper reports on similarities and differences in how a novice teacher talks about good mathematics teaching and high-performing mathematics students at the time of her graduation and then one year later. By analysing the social dimensions of the novice teachers' professional identity development these changes, often referred to as inconsistency and/or regression, can be understood as development in her memberships in different kind of communities of practice.

Introduction

The teaching profession, with or without focus on mathematics teaching, is often described in terms of a changed profession without much continuity between teacher education and schools (Cooney, 2001; Sowder, 2007). Several studies report that what novice teachers of mathematics have learned in teacher education tends to regress when they start work as teachers (Bjerneby Häll, 2006; Cooney, 2001; Sowder, 2007). In contrast to teacher education, novice teachers' own schooling is often attributed an important value in relation to how student teachers and novice teachers think about teaching and how they teach (Gellert, 2000; Lortie, 1975; Persson, 2009; Wang, Odell & Schwille, 2008).

Many previous studies regarding becoming a mathematics teacher have focused on student teachers' and/or novice teachers' beliefs. In several of these studies teachers' appear to be inconsistent towards their beliefs (Phillip, 2007). This is explained in different ways, for example that beliefs are situated, that different beliefs are dominant in different situations, that the individuals has unconscious beliefs or that the researcher and the teachers have different interpretations of concepts (Goldin, 2002; Phillip, 2007; Speer, 2005; Wilson & Cooney, 2002). However, Phillip (2007), Speer (2005) and Wilson and Cooney (2002) all stress it as problematic when researchers claim teachers to be inconsistent and according to Phillip (2007) inconsistency stop existing when researchers better understand the teachers in relation to their social environment.

In recent years research on teachers' professional identity formation has expanded (Beijaard, Meijer & Verloop, 2004; Ponte & Chapman, 2008). Graduating from teacher education and starting to work as a teacher can be seen as a transfer or shift in professional identity where the interplay between the individual and their social environment is highlighted as a central part about which to develop understanding (McNally, Blake, Corbin & Gray, 2008). Studies of professional identity consider not only what teachers know and/or believe but also who they are, how they view themselves as teachers, how they relate to students, how they deal with problems, how they reflect on issues, and how they identify themselves with the profession. Important, too, are their relations with parents and colleagues, their participations in professional groups and the kind of teacher they want to be (Ponte & Chapman, 2008)

The empirical material presented in this paper derives from a study of novice primary school mathematics teachers' professional identity development (Palmér, 2013). In this paper the focus will be on how one novice primary school mathematics teacher, Nina, talks about good mathematics teaching and high-performing [1] mathematics students at the time of her graduation and then one year after. In the case of Nina there are both similarities and differences at the two times focused on. The question to be investigated in the paper is if the differences are to be understood as inconsistency, regression or development.

Professional identity development

Peressini, Borko, Romagnano, Knuth and Willis (2004) argue for using a situated perspective in studies of mathematics teachers' teaching. The term situated refers to a set of theoretical perspectives which conceptualise learning as changes in participation in socially organised activities and individuals' use of knowledge as an aspect of their participation in social practices.

In this paper a situated perspective, communities of practice (Wenger 1998), is used aiming to capture both the individual and the social dimensions of professional identity development. A community of practice is defined through the three dimensions of mutual engagement, joint enterprise and shared repertoire. Mutual engagement is the relationships between the members, about them doing things together as well as negotiating the meaning within the community of practice. Joint enterprise regards the mutual accountability the members feel in relation to the community of practice and it is built by the mutual engagement. The shared repertoire in a community of practice regards its collective stories, artefacts, notions and actions as reifications of the mutual engagement.

According to Wenger (1998), identity formation is a complementary dual process in which one half is the identification in communities of practice and the other half the negotiation of the meaning (regarding the mutual engagement, joint

enterprise and shared repertoire) in communities of practice. An individual can identify and negotiate in communities of practice through engagement, imagination and/or alignment (modes of belonging). Engagement implies active involvement and requires the possibility to physical participation in activities. Imagination implies going beyond time and space in physical sense and create images of the world and makes it possible to feel connected even to people we have never met but that in some way match our own patterns of actions. Participation through alignment implies that the individual change, align, in relation to the community of practice the individual wants to, or is forced to, be a member of. These three ways of identifying and negotiating involve different approaches and different conditions and do not require or exclude each other. Since imagination and alignment expand participation in communities of practice beyond time and space in physical sense individuals can be members of and sense belonging to communities of practice without visible shared practice.

The study

Nina is 24 years old when she is about to graduate from teacher education. She is specialised in science, technology and mathematics for primary school. Within her teacher education she has taken 37,5 credits of courses in mathematics education.

The empirical material in this paper is from the first year after Nina's graduation from teacher education. An ethnographic approach has been used to make visible the process of professional identity development in communities of practice. Ethnography is not a collection of methods but a special way to look at, listen to and think about social phenomena where the main interest is to understand the meaning activities have for individuals and how individuals understand themselves and others (Arvatson & Ehn 2009; Aspers 2007; Hammersley & Atkinsson 2007). According to Aspers (2007), gaining such an understanding requires interaction which implies that the researcher participates with, observes and interviews respondents in the field of study.

The empirical material in the case of Nina is from self-recordings made by her, observations and interviews. All of these have been made in a selective intermittent way (Jeffrey & Troman 2004) which means that the time from the start to the end of the fieldwork has been long but with a flexible frequency of field visits. To accomplish a balance between an inside and outside perspective in line with the ethnographic approach (Aspers, 2007); the observations have been both participating and non-participating. For the same purpose the interviews have been both spontaneous conversations during observations and formal interviews (individual and in groups) based on thematic interview guides. The self-recordings were recorded by Nina herself on an mp3-player. She was told to record whatever and whenever she wanted and that it was up to her to decide

what was important for the researcher to know about starting to work as a primary school teacher of mathematics.

These varying empirical materials (observations, interviews, self-recordings) have different characteristics but are in the analysis treated as complete-empiricism (Aspers, 2007). In this paper only how Nina's talks, not how she acts, is focused on. However, the analysis of her talk is based on the complete empiricism implying all the empirical material constituting wholeness. Based on this complete-empiricism interpretations are made regarding her engagement, imagination and/or alignment in different communities of practice she seems to negotiate and/or identify with and how these memberships influence her talk about about good mathematics teaching and high-performing mathematics students at the time of her graduation and then one year after.

The case of Nina

In this section the case of Nina will be presented in three sub-sections. In the first sub-section the time of her graduation will be focused on. In the second sub-section the time one year after her graduation will be focused on. The joint theme in these two sections is how Nina talks about good mathematics teaching and high-performing mathematics students. In the third sub-section similarities and differences in her talk at the two times are focused on.

Nina at the time of graduation

The first interview with Nina is conducted three weeks before her graduation from teacher education. In the interview Nina says that she has experienced a "new approach" to mathematics teaching during her teacher education and she expresses a very clear opinion regarding how she wants to "reform mathematics teaching". When being asked to give examples of good mathematics lessons she tells about lessons "outside the frames" of the text book, for example:

> We worked with the number eight. And then we played bowling with the children. And it really is an example, a concrete example, they didn't think much of it as mathematics but they counted the whole time, how many fell and were left standing. And the whole time they saw the connection to eight. (interview)

The examples Nina gives of good mathematics lessons can be summarised as varied, laboratory-based, concrete, reality-related and problem-orientated. As good, she also emphasises mathematics teaching where the students do not realise that they are being taught mathematics. Such mathematics teaching is, according to Nina, student-centred and captures the students' interest. Nina distinguishes between this approach to mathematics teaching and her own experiences as a student in school and the teaching she has met during pre-service teaching.

> [I have] been at two different schools quite a long time and it feels like many teachers are very controlled by the text book and that is what counts (interview).

The good examples Nina gives are from teacher education and her own teaching during practice periods. When talking about these mathematics lessons she refers to "we" as in herself and fellow students from the teacher education.

Further Nina talks about "stimulating" all students in a mathematics class, not only "the norm in the class" but also the "weak and the strong" students. She says that her examples of good mathematics teaching "refers to all children", both the "weak and the strong". She specially emphasises the importance of paying attention to and challenge the "high-performing" mathematics students.

Less good mathematics teaching is, according to Nina, "old-fashioned", "traditional", following a "patterned scheme" within the "frames" of the text book where the students do not cooperate and solve tasks in only one way. She says that a strictly use of a text books can result in an incorrect interpretation of the fast students as being the "high-performing" ones, while the ones that really are the "high-performing" do not get any input except "sit like that and work in their text book".

Nina one year after graduation

After graduation Nina moves back to her hometown and during the following year she seldom has contact with her fellow students. At this time it is difficult to get an employment as a primary school teacher in Sweden since there are more educated teachers than teacher jobs. In the absence of teacher jobs Nina starts to work as a teacher assistant at Aston School for John, a boy in grade one, who has attention deficit hyperactivity disorder. Aston School has three classes in every grade from preschool class up to grade six. Nina likes Aston School but her work as a teacher assistant (spending all day with John) prevents her from joining the fellowship with the other teachers except John's class teacher Diana. Nina say's that Diana is as a "tutor" for her and that they are "very close". Except Diana Nina does not cooperate with any of the other teachers at Aston School and she describes herself as the "lonely one".

> Diana and I use each other to get things done. And all the time we are two resources which the other teachers are not. […] The only thing is that I don't have time for planning and therefore I never attend any meetings with the other teachers, conferences about students or anything. Because of that, I don't really belong to any staff group. (self-recording)

At Aston school they work with ability groups when teaching Swedish and mathematics. Nina says that this organisation works out fine and that the groups focus on totally different things.

> The group containing the slightly weaker students' moves along very slowly, they do very simply tasks [...] Then the groups with students who are good and interested in mathematics, if you can say it like that, they work faster, moving forward. They don't have to keep the group together; everyone works in their own direction. Everyone does different tasks [in the text book]. You are simply left to work at your own pace and to become good at what you want. (self-recording)

During the mathematics lessons John is in the ability group with "good and interested" students, which is taught by Diana. When talking about the mathematics teaching in this group, Nina says "our mathematics teaching" and "our class". Since Nina has no time for planning it is the Diana who plans the mathematics lessons. The lessons are based on a text book that Nina says that she "actually" likes. She says that the text book is different from "the ordinary ones she counted in when she was little". As good with the text book, she stresses that every chapter starts with the goals for that chapter followed by a "math lab" where the students work with "practical material" in pairs "showing what they have done and limn each other's solutions". According to Nina, this is good since the students "are to see how differently they think and that it can be right irrespectively of how they have done it". However, as the group of "good and interested" students work in their own pace it is not always possible for them to work together.

Similarities and differences at the time of graduation and one year later

When comparing how Nina talks about good mathematics teaching and high-performing mathematics students at the time of her graduation and then one year later there are both similarities and differences. One example can be seen in how she talks about text books. Just before graduation she expressed mathematics teaching based on the text book as "old-fashioned" and negative. One year later she "actually" likes the text book. However, the words used to describe why she likes the text book are similar to the words she used to describe good mathematics teaching just before graduation. Just before graduation she expressed good mathematics teaching as varied, laboratory-based, concrete, reality-related and problem-orientated. One year later she expresses the text book as good because it includes the use of practical material, math lab, and work in pairs where the students are to show their different solution.

Another example containing both similarities and differences is how Nina talks about student's different levels in mathematics. Just before graduation, she talked about the importance of teaching every student on their level which is in line with the ability groups used at the Aston school. However, before graduating, she stressed that the fast students are not necessarily the ones who are high-performing and, that the high-performing students need challenges other

than working in the text book. After one year, when she talks positively about the ability groups used at Aston school, the pace of working in the text book is central where the "slightly weaker students" work slowly and the "good and interested" students are to work individually, in their own pace, in their text books.

Analysis and Discussion

How are these similarities and differences to be understood? As shown in the introduction own schooling is often attributed an important value in relation to how teachers think about teaching and how they teach. Further studies have shown that what novice teachers have learned in teacher education tends to regress when they start to work as teachers. Based on such studies one explanation could be that Nina has regressed and now emphasise the "traditional" individual text book centered mathematics teaching she herself experienced as a student as good. Based on the empirical material in the case of Nina (which does not include Nina's time as a student in primary school) no interpretations can be made regarding how her talk one year after graduation equals the mathematics teaching she herself has experienced as a student. However, when she says that the text book used at Aston school is good she says that it differs from "the ordinary ones she counted in when she was little".

As also shown in the introduction an explanation based on beliefs research could be that Nina is inconsistent in her talk at the two times. However, Phillip (2007), Wilson and Cooney (2002) and Speer (2005) all stress it as problematic when researchers claim teachers to be inconsistent and according to Phillip (2007) inconsistency stop existing when researchers better understand the teachers in relation to their social environment.

Instead, in this paper, Nina's talk about about good mathematics teaching and high-performing mathematics students at the time of her graduation and then one year after will be analysed in relation to her memberships in forms of engagement, imagination and/or alignment in different communities of practice she seems to negotiate and/or identify with. Maybe she, based on her experiences the year after graduation, has developed a new view regarding text books and high-performing mathematics students. As mentioned, this analysis is based on the complete empiricism implying that the analysis of her talk one year after graduation is based on all the empirical material in her case (interviews, self-recordings and observations).

Nina's descriptions of good, and less good, mathematics teaching at the time of her graduation can be understood as her having a membership in a community of reform [2] mathematics teaching. In this community of practice, there is a joint enterprise and a shared repertoire regarding good and less good mathematics teaching. At the time for graduation Nina participates in this community of

practice by engagement and imagination as imagining her future teaching. As for engagement, Nina does not express being a part of the negotiation of the shared repertoire, but she has been engaged in its teaching during her teacher education.

One year later two communities of practice are visible in Nina's talk about mathematics teaching. One is the above described community of reform mathematics teaching. The possibilities for Nina to participate by engagement in this community disappeared when she graduated from teacher education and moved away from her fellow students. One year after graduation she participates mainly by imagination and she does not carry out any mathematics teaching in line with its shared repertoire. The new community of practice is a community of teachers working in John's class, that is Nina and the class teacher Diana [3]. Based on her work as teacher assistant this is the only community of teachers that Nina can participate in at Aston School but she does not express any kind of alignment. Together Diana and Nina work with the high-performing mathematics students at Aston School. Even if Nina is not involved in the planning of the mathematics lessons she talks about "our mathematics teaching" and "our class". Diana is the core member in this community through planning and shaping its shared repertoire and Nina participates by engagement.

Nina's talk about good mathematics teaching and high-performing students one year after graduation seems to be a merger of the shared repertoires in the community of reform mathematics teaching and the community of teachers working in John's class. In "our mathematics teaching" the text book is the core role and Nina says that she "actually" likes it. This "actually" can be related to the negative role of the text book in the shared repertoire in the community of reform mathematics teaching. Further Nina evaluates the text book centred teaching in relation to the shared repertoire in the community of reform mathematics teaching (practical material, math lab, work in pairs where, different solution). In the community of reform mathematics teaching it is important to take both the "weak and the strong" students into consideration in the mathematics teaching. One year after graduation Nina still emphasise this but who the high-performing students are and the strategy for considering their needs has changed. In the community of reform mathematics teaching the high-performing students are not necessarily the fast students while in the community of teachers working in John's class the pace of working in the text book is central. Further, in the community of reform mathematics teaching the high-performing students need other challenges than working in their text books while in the community of teachers working in John's class the high-performing students work individually in their text books.

Conclusion and Implications

Before graduation Nina expressed a clear opinion regarding good mathematics teaching and high-performing mathematics students. One year later there are both similarities and differences in how she talks about the same issues. The differences in her talk that may look as inconsistence or regression in the eyes of an observer becomes consistent when analysing the social dimensions of her professional identity development. By analysing the social dimensions of her professional identity development her talk one year after graduation can be described as her merged participation in two different communities of practice. Some might argue that it was previous known that school culture and colleagues impact novice teachers. However, the results presented in this paper enable an understanding of how such impact evolves. Furthermore, this understanding makes it possible to reinterpret earlier studies presenting novice teachers changes as inconsistence or regression. Maybe, it is not inconsistence or regression, but professional identity development as new or increased memberships in communities of practice regarding mathematics teaching.

Notes

1. Nina alternates between the terms ”high-performing”, ”gifted” and ”good and interested”. When she is not quoted the term ”high-performing” will be used for consistency.
2. The term “reform” used for this community of practice is based on Nina’s use of the word in relation to her description of good mathematics teaching.
3. Diana may be part of a larger community of teachers at Aston school but from Nina’s perspective it is only Diana who she is involved working with.

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