Please cite the Published Version

From emergency sirens to birdsong-Narratives of becoming a mathematics teacher

Elisabeta Eriksen, Bjørn Smestad, Annette Bjerke, Camilla Rodal, Yvette Solomon

From emergency sirens to birdsong – Narratives of becoming a mathematics teacher

Elisabeta Eriksen[1], Bjørn Smestad[1], Annette Hessen Bjerke[1], Camilla Rodal[1], and Yvette Solomon[2]

[1]Oslo and Akershus University College of Applied Sciences, Norway; elisabeta.eriksen@hioa.no, bjorn.smestad@hioa.no, annette.hessen@hioa.no, camilla.rodal@hioa.no,

[2]Manchester Metropolitan University, UK; y.solomon@mmu.ac.uk

As part of a larger research project, we asked third-year PSTs to reflect on what they had learned about being mathematics teachers of the teacher education programme. The reflections were intended as presentations for first-year PSTs. In this article, we analyse the films by the third-year PSTs to understand the messages more experienced PSTs choose to communicate to novices. Concepts from Gert Biesta are the framework for the content analysis, and we find a complex picture of how qualification, socialization and subjectification interact in the narratives.

Keywords: Preservice teacher education, mathematics education, mentors.

Introduction

This article presents partial results from a research project examining pre-service teachers' (PSTs) developing identities as mathematics teachers, and, in particular, their experiences of mathematics in school placement. Previously published results from the project report how first-year PSTs value what they learn from mentors in practice more than the 'theoretical' input of the university based courses, not seeing the theoretical knowledge as transferable into teaching practices (Bjerke, Eriksen, Rodal, Smestad, & Solomon, 2013). In one intervention addressing the challenge, third-year PSTs presented to the first-year PSTs films describing experiences of becoming mathematics teachers in the course of the first three years of the programme. In this article, we analyze the third-year PSTs' presentations to understand how they view their own emerging professional identities.

Our research question is: What domains of their educational experiences do PSTs highlight in their presentations of their first three years in mathematics teacher education?

Research background and theoretical underpinnings

While learning to teach is about acquiring professional knowledge and skills, it is also about developing a teacher identity (Haniford, 2010). Adding to the identity work of experienced teachers, PSTs have the responsibility of successfully positioning themselves in relation to their teacher education programmes and cooperating teachers (Haniford, 2010). Identity formation is driven by the individual's goal state of what he/she wants to become (Smeby, 2007). Biesta (2012) discusses these processes under the headings of qualification, socialisation and subjectification, and we choose his concepts as the starting point of our analyses of PSTs' narratives.

For Biesta (2012), all education (including teacher education) is a question of judgement, because educators' decisions about the purpose of what they do occur within domains that may be in synergy with each other, but may also be in conflict. He notes three such domains, which interact and overlap: the domains of qualification, socialisation and subjectification. Qualification is about knowledge, skills and dispositions; socialisation and subjectification can be seen as opposites: while

socialisation applies to the induction of novices into existing practices, subjectification denotes how education contributes to a process of individuation, of becoming an independent subject. Educational judgements are underpinned by an understanding of the interdependencies between the three domains. In teacher education, the situation is more complex still: the purpose should not just be PSTs own qualification, socialisation and subjectification, but also to enable PSTs to become 'educationally wise', aspiring towards virtuosity in making educational judgements themselves. Such judgements are situated: they are made during the practice of teaching, and cannot be set out in advance, or in general - they are rooted in concrete situations and relate to the need to handle tensions and see possible synergies. To become 'educationally wise', one needs experience, together with opportunities to see more experienced others in action, and to discuss those actions in terms of the virtuosity of judgement which underpins them.

Method

The 32 PSTs in this study were enrolled in a four-year programme for primary school teachers (grades 1-7, ages 6-13) in Norway. They had chosen to continue with mathematics beyond the compulsory course spanning the two first years in teacher education, and were asked to look back on their mathematics education course and four school placements and to prepare group presentations describing their development as mathematics teachers in grades 1-7. They were asked to reflect on what they know now which would have been good to know in their first year; how they plan their mathematics teaching now compared to in their first year; what they have learned along the way; and what are the pitfalls and experiences to bear in mind for future mathematics teachers.

Six presentations were made - all short films (F1-F6) incorporating line drawings and sometimes photographs, with voice-over commentary and music. Five of the six films were organised as developmental stories from their novice anticipation and preparation of their first placement, to their reflective stance as third-year PSTs. The remaining film focused on four pitfalls for novice PSTs.

To analyse the data, we operationalised Biesta's (2012) concepts in terms of: descriptions of their knowledge, skills and dispositions; processes and accounts of making educational judgements and justification of judgement; and accounts of being and becoming a mathematics teacher, as exemplified below:

Qualification: References to knowledge, skills and dispositions, processes and practices from the teaching profession.

Socialisation: References to learning and to expectations in the school context.

Subjectification: References to inner feelings, identity and becoming a teacher and to perception of self (as a teacher).

The presentations were transcribed and analysed in several steps. First, they were coded according to Biesta's terms *qualification, socialisation* and *subjectification*, synergies and conflicts between these domains, and professional judgement. Then disagreements among the researchers were resolved, and all presentations were re-read and coded by another member of the group. A decision was made to organise the analysis in two parts - one around PSTs' novice anticipation, and one around their reflective stance in third year. Finally, we re-read each presentation to make sure that important longitudinal messages were not lost in our attempt to organise the analysis in two parts.

Looking back at early experiences in school placement - Emergency sirens

Qualification

In the films, there are a few examples of what PSTs learned in the first year, for instance pieces of 'theory', such as the importance of using multiple representations, giving feedback, and using the "didaktisk relasjonsmodell" (F1) (a hexagon connecting elements relevant for lesson planning: topic, learning objectives, the pupils in that class, etc.). The first-year PSTs are, however, uncertain about how to put the knowledge into practice. The uncertainty about effective use of manipulatives is most usual (F1, F4, F5), but other dilemmas are also identified:

> I also thought about all the theory I learned at university: Piaget's theory of stages of development, Bruner's representation theory and theory of scaffolding, Vygotsky's focus on cooperation, Bandura and his theories on motivation and self-efficacy. How should I use these theories to plan a lesson on fractions? [...] Which pupils should work together: the ones that are on the same level in terms of subject knowledge, or should the strong ones help the weak? (F1)

Several of the films show students meeting concepts as an overwhelming mass of words (Figure 1). At the same time, there are many statements about elements of qualification the PSTs perceive as lacking, both in terms of knowledge ("Do I know enough about this topic?" (F5)) and of processes:

> Just think if I have to explain several ways of doing something, to support conceptual understanding! It won't work. It just won't work. Manipulatives, manipulatives. (F5)

> It's only natural to carry on from where we left off [in the textbook]. It's not like I have other suggestions on what to do from here onwards. (F2)

Figure 1: Knowledge in overwhelming amounts in the first year (F1, F4, F5)

Socialisation

The mentor is, naturally, the main role model for students in their first year of teacher education, and the mentor features in most of the (few) examples we find of socialisation when describing the first year. The PSTs are uncertain about what the mentor expects of them, other than using the "didaktisk relasjonsmodell" (mentioned above) which is common in Norway:

> As first-year students we used it [the didaktisk relasjonsmodell] slavishly (F6)

> ...I have to carry on from here [in the textbook], that must be what [the mentor] expects (F2)

The mentor can be viewed as an evaluator:

> Shit! This took the entire hour. The mentor glares at me. It didn't go as planned. (F3)

However, the anxiety of seeing the mentor write "like there was no tomorrow" is followed by "I had so many questions" - suggesting that the mentor is regarded as a person to ask for advice, as well.

Subjectification

A basis for subjectification is the development of a certain degree of self-confidence. In the description of the first year, we see little self-confidence - uncertainty and fear dominates:

> What if I don't succeed? (F5)

> I went from being one of the best in mathematics to being perplexed when the pupils asked me questions about the subject. (F1)

Conflicts and synergies between domains

The three domains of education overlap. These non-empty intersections are implicitly present in the films. There are clear examples that a perceived lack of qualification (being overwhelmed by new concepts and by making sense of these in practice) leads to a lack of self-confidence - "I felt unsure and very, very small" (F1) - which we regard as part of subjectification. This can also work the other way: lack of confidence leads to lack in qualification:

> In the first school placement, I struggled a lot with getting the class to settle down. Later on I came to think it was because I did not feel like a confident and clear classroom manager. (F1)

There can also be a conflict between qualification and subjectification, in the sense that learning more makes you aware of your shortcomings:

> The more I learnt, the more I discovered what I didn't know. [...] Based on Piaget's theory I knew most of the pupils were at the concrete-operational stage. But which of Bruner's representations should I use? [...] Or should I use the strange Cuisenaire rods that I still haven't really gotten to grips with? (F1)

> Drowned in the curriculum he feels puzzled. What is most important? (F4)

Inside the domain of qualifications there are interactions between elements. In one case, the confidence in mathematics is shaken by the practice of teaching:

> I went from being one of the best in mathematics to being perplexed when pupils asked me questions. (F1)

At the same time, during the first year the process of lesson planning is weighed down by the awareness that there are many considerations to be taken. This is visible in form of the time that goes into writing a lesson plan (shown with clocks in the films), and the number of books that fill the desk in the process (Figure 2).

There can be a tension between socialisation and subjectification in meeting the mentor: in one example, the role model (supposed to provide socialisation) is so impressive that the PST's self-confidence suffers:

> The meeting with the mentor was scary. I saw him as a Superman who really knew his work. He was confident, clear and, not the least, had strong subject knowledge. (F1)

Figure 2: Lesson planning during first-year school placements (F1, F4, F6)

In another example, a PST's attempt at making a choice outside of the textbook is struck down by the mentor:

> Hmmm….I think maybe we should stick to the textbook. (F3)

With an emerging sense of agency, the PST questions the mentor's view and asks herself: "Should we always stick to the textbook?" (F3).

To conclude, there are synergies between (a lack of) qualification and (a lack of) subjectification, but also a conflict between qualification and subjectification, as well as between socialization and subjectification.

Practicing educational judgement

Judgement is difficult. A lack of self-confidence leads to a very detailed plan with little room for judgement on-the-fly.

> As a first-year PST the plan for the lesson was a long script. We had written down word for word what to say during the lesson. We were dependent on this script and could not improvise along the way. We even planned how to explain simple mathematical things that we actually knew well. This is also about lack of experience and confidence as a teacher. (F6)

At the same time, a lack of qualification translates into constraints on opportunities for judgement in the process of lesson planning:

> It's natural to continue from where we left off, it's not like I have other suggestions. (F2)

Looking at their recent experiences in school placement - Birdsong

Qualification

Changes from first to third year are visible in all aspects of qualification, from subject knowledge and knowledge of students and teaching, to the practices of teaching. In terms of knowledge, some films refer to knowing more mathematics, but, in terms of mathematics pedagogy, the films stress that the understanding is deeper, the knowledge can be operationalised to a greater extent.

The process of lesson planning during the first year involved long hours dedicated to the task (F1, F4, F6), and resulted in long scripts produced for each lesson (F4, F6). The films highlight, in comparison, how much quicker lesson planning goes (F1, F6), and how much shorter the scripts become (F1, F4) by third year, but the films give different suggestions on how to take advantage of the reduced burden, from watching TV and playing with the dog (F6) to investing time and energy on the 'frills' of differentiation and using a variety of teaching methods (F1).

Teaching practices out of reach during the first year are now on the agenda (F1): motivating pupils, providing them with opportunities to feel both confident and challenged, seeing the individuals as well as the class as a whole, giving more room to children's contributions, and encouraging enquiry.

Socialisation

The main presence that embodies the socialisation component is the teacher mentor, although some PSTs also mention peers and other colleagues playing a role. At this stage the mentor has transitioned from a feared judge to a colleague (F1), in some cases a role model (F2, F4), although disagreements between the views of PSTs and their mentor may occur, for example regarding the role of textbooks (F3). However, adopting established practices of the teaching community, such as body language (F1) or ways of saying or doing things in the classroom, seems to be perceived by PSTs as a sign of having become teacher-like:

I've even put together extra handouts [for those who might need another type of challenge]. (F2)

Subjectification

Through the journey from first to third year, the PSTs have grown into teachers who are aware that teaching is not just about what you know, it is about making choices about complex situations. As there are no deterministic answers to these dilemmas, neither objectively speaking nor in terms of what is the established way of the teaching community, these choices come down to the individual, they are drawing on the domain of subjectification: "We're more aware that there should be a reason behind our choices" (F4), "I understand my own thoughts" (F5). In their third year, we hear the PSTs stress the importance of trusting their own choices (F1, F2, F4), and being yourself (F2).

Planning lessons is now an altogether more positive experience, described with attributes such as joy, and belief in oneself. Importantly, some of the PSTs realize that becoming a teacher is a continuous process, and experimenting is a part of it:

Don't be afraid to try out new things. (F2)

A lesson plan can never be too good. It's like a piece of silverware that you take out and polish from time to time. (F4)

Conflicts and synergies between domains

As PSTs become more comfortable as teachers (subjectification), some find reassurance in their theoretical knowledge (qualification) as well as their awareness of what is acceptable among teachers (socialisation):

Not everything has to be perfect [...]. The theory I used to think about while planning lessons in my first year is now under my skin. (F1)

The routines of teachers (socialisation) also contribute to being more successful in the practices of teaching, such as lesson planning (qualification): "You don't have to reinvent the wheel (F1)". There is an aspect of growing confidence (subjectification) when the PSTs reuse lesson plans they have had positive experiences with (F1).

Unlike in their first year, lesson planning in the third year takes less time (F1, F6) and the scripts for the lesson are shorter (F1, F4) or even disappear altogether ("We've thrown out the script", F6). The

change is attributed in general to an increase in confidence (subjectification) but in some cases also to an aggregated influence of all three domains:

> … more confident in myself and the mathematics, I know more about the pupils' level in mathematics, I have become a clear leader, I dare to make mistakes, I am better at dealing with things as they happen. (F1)

In another film, the three domains come together in synergy to express the PSTs' development:

> By contrast with first year, when we used the the syllabus for the course a lot, we now have more knowledge of the subject and of pedagogy. We've become better at making use of our own knowledge, we cooperate more closely with colleagues. (F6)

The way these sentences are linked, makes it possible to interpret it as meaning that better qualification leads to better self-confidence (subjectification) which again leads to better cooperation with others (socialization).

Practicing educational judgement

Increased self-confidence by the third year is not synonymous with knowing just what to do:

> How can I connect algorithms and conceptual understanding? I need to be able to show them different strategies, to be sure as many as possible understand. How many strategies for division are there? Maybe they come with some I haven't thought of? Maybe some misconceptions will surface during the lesson? How can I then, in the best possible way, deal with this? (F4)

The difference from the first year is being able to deal with dilemmas, to practice professional judgement, guided by what they see as the goals of teaching:

> There's still a lot to think about, but I understand my own thoughts now, I know where I'm heading (F5)

In the third year practicing educational judgement features as a defining factor of the PST-mentor relationship at this stage: the detailed scripts for lesson plans that were in the first year in part written for the sake of the mentor (and in part to boost one's confidence, to feel prepared) are now shorter. A mentor's voice sets expectations:

> Just show me that you are aware of the choices you make, and that you can argue for them (F2)

During the third year, educational judgement is visible in reflections on one's own teaching:

> I've become better at assessing myself, and I can more readily explain what went well and what could have been done better in class (F1)

Teaching analysis draws on and at the same time feeds into the domain of qualification and perhaps also socialization. This way of assessing oneself - and the knowledge that you do it well - can be regarded as an engine for development also after graduation, it feeds into subjectification.

Concluding remarks

The titles of two subsections of the analysis reflect the soundtrack of a film where the experiences of first- and third-year school placements are introduced with emergency sirens and birdsong respectively. In terms of Biesta's (2012) framework, the overall picture the presentations paint is

that, looking back on their first-year school placement, PSTs remember a combination of a lack of qualifications, unclear expectations from mentors and low self-confidence. The fear many PSTs report on, seems rooted in their low self-confidence and the unclear expectations. Although first-year PSTs are allowed to try different approaches and to fail, the same combination of a lack of repertoire, uncertainty of the mentor's role and lack of self-confidence holds them back. By the third year their qualifications have increased, their role as PSTs is clearer and their self-confidence has grown. Because of this, they also find themselves practicing educational judgement more often.

Such narratives, perhaps in combination with logs from early placements, could be part of educational experiences, supporting PSTs' identity work. First-years might also benefit from watching the films, as not all challenges discussed can be dealt with by the teacher educators. While teacher education can and should make explicit what is expected of PSTs in their school placement, it cannot rush becoming educationally wise. However, we hypothesise that creating spaces where first- and third-year PSTs can discuss their experiences would contribute to the domain of socialisation and subjectification for both groups. Analyzing the students' contributions in terms of Biesta's concepts reveal the complex relationships between qualification, socialization and subjectification in teacher education. The three domains are interdependent, with conflicts and synergies which influences PSTs overall experience. More insight into these conflicts and synergies may contribute to better understanding of PSTs' experiences of their school placements.

References

Biesta, G. (2012). Becoming educationally wise: Towards a virtue-based approach to teaching and teacher education. In A. L. Østern, K. R. Smith, T. Krüger & M. B. Postholm (Eds.), *Teacher education research between national identity and global trends NAFOL Year Book 2012* (pp. 29 − 53). Trondheim: Akademika Publishing.

Bjerke, A. H., Eriksen, E., Rodal, C., Smestad, B., & Solomon, Y. (2013). A Tripartite Cooperation? The Challenges of School-University Collaboration in Mathematics Teacher Education in Norway. In A. M. Lindmeier & A. Heinze (Eds.), *Proceedings of 37th Conference of the International Groups for the Psychology of Mathematics Education,* (Vol. 2, pp. 89 − 96). Kiel, Germany: PME.

Haniford, L. C. (2010). Tracing one teacher candidate's discursive identity work. *Teaching and Teacher Education*, *26*(4), 987 − 996.

Smeby, J. C. (2007). Connecting to professional knowledge. *Studies in Higher Education*, *32*(2), 207 − 224.