

“It doesn’t have to be like this”: Women mathematics teachers’ experiences of professional learning

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Despite the range of possibilities for mathematics teacher professional learning and the reported success of individual initiatives, the overall picture in England appears to be one of restricted access to opportunity together with a lack of appropriate support for individuals. This study explores women mathematics teachers’ experiences of professional learning throughout their careers, focusing on the ways in which their learning is supported. Four in-depth life histories were elicited through semi-structured interviews in the form of guided conversations, supplemented by time-lines of mathematics and of professional learning. The teachers’ narratives reveal that much professional learning is informal, with teachers accorded limited agency and support. Spaces to discuss mathematics learning and teaching are constrained, with teachers appearing isolated within school environments. Where opportunities for collaborative professional learning exist, women participate actively in the wider mathematics education community. Analysis of the narratives suggests that teachers’ agency over their professional learning needs to increase, creating spaces for women to collaborate on mathematics-focused professional learning.

Keywords: professional learning, mathematics, gender, agency

Background

Teachers’ on-going professional learning is the subject of continued attention, particularly in mathematics where students’ participation, attitudes and experiences cause concern. In England, traditional models of professional learning were frequently in the form of continuous professional development (CPD), comprising short courses of the delivery kind, situated away from the workplace (Hoban & Erickson, 2004). These courses were costly yet found to have limited effect (Borko, 2004; Timperley, 2011). As understanding of what constitutes effective professional learning has increased the nature of support for learning has shifted. Effective teacher learning is more likely when there is active participation, collaboration, when learning opportunities are sustained and aligned with local and national developments and when there is a focus on content (Desimone, 2009). A situated perspective provides a view of the complexity of teacher learning; Clarke and Hollingsworth’s (2002) interconnected model of professional growth encompasses a wide variety of learning opportunities, highlighting the role of an individual’s knowledge and beliefs together with the broader socio-cultural context.

A focus on professional learning rather than development emphasises the active engagement of teachers in learning which is “on-going and in-depth” (Timperley, 2011, p.5), focussing attention on teacher agency, with teachers leading their own learning. Opportunities for secondary mathematics teachers to access

mathematics-specific professional learning are fragmented, with no clear guidance on pathways nor any overview of participation or impact (ACME, 2013). This study was designed to address gaps in the literature regarding teachers' experiences of professional learning throughout their careers (Joubert & Sutherland, 2009). The focus on women mathematics teachers was deliberate, aimed at exploring how women negotiated the tensions in doing mathematics and being female (Mendick, 2006). The research questions included:

- What are women mathematics teachers' experiences of professional learning?
- What do they perceive as significant in their professional learning?
- Do they identify critical persons and/or critical phases?

My own professional biography as a mathematics teacher, student, participant in and facilitator of professional learning was the impetus for this research; a series of events and disturbances (Mason, 2002) stimulating reflections on practice as both a mathematics teacher and academic. The aim of the research was not only to explore women's experiences of professional learning, but to share their stories, to provide teachers at all stages of their careers with stories of others' experiences, "inscribing a wider range of possibilities for women's lives by providing contrasting exemplars" (Stanley, 1993, p.46) thus creating spaces for imagining alternatives. These alternatives may support individuals in their on-going work on identity, "the way we make sense of ourselves to ourselves and the images that we present to others" (Day & Kington, 2008, p.9). Teachers' agency over their professional learning is shaped by the wider social and cultural context in which they negotiate their lives (Holland et al., 1998).

Methodology

A life history approach (Cole & Knowles, 2001; Plummer, 2001) was utilised as it offered the potential for rich narratives. The participants were four women secondary mathematics teachers in north-west England, each with at least ten years teaching experience. Data collection took place between April 2011 and May 2012, comprising two semi-structured "guided conversations" (Cole & Knowles, 2001, p.72) with each participant. Data analysis continued throughout the research, with three broad phases: an initial phase encompassing the interview conversations and transcription; an immersion phase and a final phase of re-presentation. The approach to analysis evolved during the research and may be described as bricolage (Kvale & Brinkmann, 2009, p.233). During the immersion phase biographical timelines were developed, with both historical data and participant validation aiding the verification of the narratives. The coding and categorization of data aided analysis though ultimately these fragments were unified in individual narratives. In the final phase further contextualisation located the narratives in relation to contemporary developments in mathematics education and teacher learning with the aid of timelines of mathematics education and of professional learning.

This paper draws from the narratives, identifying key cross-cutting themes.

Findings

The teachers' narratives reveal that much professional learning is informal, with early learning drawn from teaching and from individual work on mathematics. Collaboration is often restricted to informal discussions within mathematics departments; contact with the wider mathematics education community is limited.

Participation in formal professional learning opportunities focussed on mathematics is restricted although such experiences appear to have a significant impact.

Although not the focus of this paper, participants reported their learning through initial teacher education as significant, with many of the critical incidents from teachers' narratives focussed on this time, despite the fact that all the teachers had at least ten years teaching experience. Mentors played an important role, acting as models or "anti-models" (Williams, 2011, p.140). Many of the teachers' school experiences at this time came as a shock; Nicole describes them as crazy, although looking back she views them as character building.

Early years

The teachers report the challenge of their first teaching post, where they often received little mathematics-specific support. Leila's description of her first year of teaching is stark:

I was just left of my own accord. **No-one** mentored me, even in my NQT year. Left in the mobile, just got on with it and literally learnt the hard way, through text books, so that's how my learning took place. [...] Once I got into teaching there was no-one. Just got on with it and do as you are told.

The isolation she describes is echoed in Marta's account. She recalls having to teach mathematics from the textbook, describing the experience as:

Absolutely awful. And you tried to do it your best that you can but if you, if you are in a classroom and you have to stay in the classroom and the door is shut, and you've got thirty something kids there and a textbook each and no equipment and even if you had you probably wouldn't really know what to do with it. You're quite isolated really aren't you?

Gaining confidence

The women report a richer experience of professional learning after several years of teaching, all of them highlighting the importance of learning through teaching. Much of this learning centres on learning mathematics; Nicole notes "I probably understand maths far better now because I've **taught** it than what I ever did to pass any of the qualifications to become a teacher". For Heather and Marta this work on mathematics follows patterns established in their own school days. Heather works alone, from the textbook, making notes, relishing the challenge of engaging with new or less familiar mathematics topics as she prepares for her further mathematics class. Marta recognises the value of struggling with topics:

I think that sometimes if you struggle with something, and you have to unpick it right back and build it back up again, then it makes you better in teaching it. I think you get an understanding of where the children are sticking at and you help them get round that.

This work on mathematics is solitary; of the four, only Marta talks about working on mathematics with colleagues. The teachers gain support from informal conversations with colleagues in the mathematics department, conversations which often centre on sharing resources. Beyond these informal discussions about mathematics teaching, spaces for deeper engagement were often constrained. When asked whether there was time for the department to think about mathematics and mathematics teaching Heather responded:

Not really, no. No. [...] We had a twilight last week, we had to fill in a form saying about the good practice that we do, so it was literally just listing what we already do, we weren't thinking of new ideas and stuff...

The wider mathematics education community

Working with student teachers provided an important source of stimulation for on-going professional learning. Heather's role as a mentor for student teachers enabled her to gain access to developments in mathematics education beyond the school:

I know [the head of department] is not always so keen on having students coming in and that sort of thing but I really like continuing that because we don't change otherwise, and it's really important to have new faces coming in and new ideas because whenever we have students come in I **always** learn something from them.

Leila too noted how important this link with students on placement from university initial teacher education courses was, remarking that the students were a source of new ideas, although she recognised that she went back to her "old ways again" after the students had gone. This work with student teachers is the extent of Heather and Leila's reported experiences of engagement with the mathematics education community beyond their own departments.

Local authority networks facilitated through the Key Stage 3 National Strategy provided Nicole with the opportunity to work collaboratively with teachers from local schools, for example on materials to strengthen cross-curricular numeracy. She notes that more recently resources to support such collaboration appear to have been cut. Nicole makes use of web-based resources to support the teaching of mathematics but remarked on the absence of local networks and collaboration, wondering whether this might be due to competition between schools.

Formal professional learning

Beyond their initial teacher education and first year of teaching, formal support for learning appears limited. When it is offered the impact appears dramatic. Nicole, for some time the only qualified mathematics teacher in her department, received support as part of the Key Stage 3 Strategy as the mathematics results in her school were below those of other core subjects, resulting in the school being targeted for intervention at a local level. This support came from a local authority consultant who "was extremely supportive but also her job was kind of to open your minds about how you would go about teaching". The consultant, together with a senior teacher in the school, encouraged Nicole to take risks with her teaching and she sees this as crucial in her development as a mathematics teacher:

...the lady who came in from the authority who'd say 'Well, well, that went pear-shaped so what are you going to do differently tomorrow? [...] and still had a big grin on her face and still said 'You're doing well' [...], so those are people who probably I attribute getting outstanding off Ofsted to because they taught me to be an individual rather than worrying about what the rest of people around me thought...

Short courses form part of the landscape of professional learning, though these were not reported as significant for two of the teachers and only Marta reported attending mathematics-specific short courses. Three of the teachers had engaged in postgraduate study, although this was not focussed on mathematics. Other mathematics specific courses or workshops do not feature in either Leila or Nicole's accounts of professional learning and Heather notes "I haven't been on a course for

ages and when I have been on recently I think it was more head of year courses, not maths”.

“It doesn’t have to be like this”: Marta’s experience of professional learning

The early years of Marta’s teaching career appear unremarkable in comparison with the experience of the other teachers in the study. She recollects her first few years teaching in a “reasonably tough school” under a very “dry regime” as overwhelmingly tedious. This all changed, the catalyst being a new head of department who came in saying “ ‘Oh, hang on, you don’t need to teach it like that, you can teach it this way, and do it this way’; to have that was quite powerful really”. This head of department was a key figure in Marta’s development, guiding her developing philosophy of mathematics education and exposing her to a mathematics education community beyond the school.

[The head of department] came in with a much more practical attitude [...] and also a bit of a risk taker, to try things, be part of projects, to go to meetings, to discuss things, I think that is all part of generating into a much more reflective type of practitioner really, somebody who would think about what they were doing and try to make it better.

Around the same time (1985-1995) there were a variety of curriculum development projects in mathematics which Marta engaged with, initially led by the head of department and later, as head of department herself; these included projects such as the Mathematics Enhancement Project (MEP) and Cognitive Acceleration in Mathematics Education (CAME). She went on to take on a variety of roles beyond schools, acting in an advisory role and as a regional mathematics co-ordinator. A significant experience in Marta’s teaching career was attendance at a one-day course introducing the MEP; she describes this as

having like sort of a light switched on moment [...] and I remember feeling, you know, really enthusiastic about what he was talking about and taking it into my classroom and it changed my practice, not entirely, but certainly for aspects [...]. I think I got a precision there that lifted my level [...]. It caused quite a dramatic shift in how I taught. For the better I think.

Marta talks in detail about her teaching, emphasising the importance of exploring alternative methods to solve a problem for example, demonstrating both her own willingness to explore the mathematics and a fluency with key ideas.

Discussion

Despite the acknowledged value of continued professional learning and the recognition that this needs both the commitment of school leaders and the involvement of individual teachers in needs-analysis and planning (Ofsted, 2010) there is evidence in the women’s narratives of huge variation in access to and support for professional learning. Three of the four women report no significant mathematics-specific professional learning over several years. Spaces for them to work on their understanding of mathematics are restricted to the classroom. The contrast between Marta’s experience and that of the other three women is marked and may perhaps be explained by the different era in which she began teaching, entering the profession in the early 1980s, some twelve to twenty years before the other participants, a time when teachers were actively engaged in curriculum developments, often supported by universities (McLaughlin, 2013).

The presence of expertise in the form of models appears to be a significant factor in increasing the teachers' sense of agency over their professional learning, encouraging them to take risks in their teaching and to participate in the wider mathematics education community. Although support for professional learning, including access to models such as mentors, appears restricted beyond initial teacher education, the participants in this study created opportunities for learning, notably through engagement with initial teacher education programmes. The teachers' stories may act as stimuli, supporting teachers to reflect on their own professional learning in mathematics, recognising significant moments, acknowledging needs, imagining and articulating alternatives for the future.

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