IDENTITY, MOTIVATION AND TEACHER CHANGE IN PRIMARY MATHEMATICS: A DESIRE TO BE A MATHEMATICS TEACHER

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Teacher change in mathematics education is recognised to be a difficult and at times painful process. This is particularly so for generalist primary teachers, who have often had negative experiences of mathematics. In this paper I explore how one teacher developed a desire to be a mathematics teacher, thus enabling her to engage with change despite its difficulty. Drawing on theories of identity and situated learning, I conceive of motivation in terms of desire and argue that emotion is a potentially powerful element of mathematics teacher education.

INTRODUCTION

Negative mathematical experiences and relationships to mathematics are well-documented problems amongst primary teachers (e.g., Bibby, 1999). Teacher change in mathematics is also known to be a hard and painful process (Clarke, 1994). Hence, as Stocks & Schofield (1996) argue, teachers need a "deep desire" (p. 291) in order to engage and persevere with change. Yet, there is little research within mathematics education that seeks to understand and theorise how such motivation develops (Middleton & Spanias, 1999). In this paper, I explore this issue using the case of one teacher, Ursula.

METHODOLOGY AND CONTEXT

The research reported here is based on a four year longitudinal study into the professional change of the six teachers involved as teacher-researchers in the Primary Cognitive Acceleration in Mathematics Education (CAME) Project research team (Hodgen, 2003). The Primary CAME project research team consisted of four researchers, four teacher-researchers and the Local Education Authority mathematics advisor. Over the first three years of the project, the research team met on an approximately fortnightly basis to develop Thinking Maths lessons specifically for Years 5 and 6 in England (ages 9-11). The teacher-researchers participated in the trialling and development of lessons, in addition to leading professional development sessions and acting as tutors for a further cohort of teachers. (Johnson et al., 2004)

The fieldwork was conducted between November 1997 and July 2001. Data collection was qualitative using multiple methods, including observations of the day-long meetings, lessons and PD sessions, semi-structured interviews with individuals and groups, and structured mathematical interviews. My own role was as a participant observer. Initially, the data was analysed through open coding methods and informed by constructivist grounded theory (Charmaz, 2000). As the research progressed, I developed the analysis through narrative methods drawing on Kvale's

(Kvale, 1996) approach. I used participant validation and comparison between data sources to triangulate and develop my analysis.

Ursula

Ursula (a pseudonym), the focus of this paper, participated as a teacher-researcher throughout the four year period. At the start on the research, she had been teaching for five years. She had previously participated in a 20 days mathematics course. In many respects, Ursula was a somewhat unusual primary teacher. The Primary CAME professional development experience was unusually extended and intense. Moreover, during the course of the project, she moved from being a classroom teacher to being a Numeracy Consultant. Hence, I discuss Ursula as a "telling" rather than as a "typical" case in order to amplify and illuminate the possibilities for change through a process of analytical induction (Mitchell, 1984).

MOTIVATION AND DESIRE

My consideration of desire arose in part because Ursula, along with two of the other teachers, referred to mathematics in strongly affective terms. They all talked about their "love" for doing or teaching mathematics and used emotive stories from their past to illustrate this. Yet, the professional change experience was at times painful for all three.

Ursula, like many primary teachers, had anxieties about aspects of the secondary mathematics curriculum that were related to her own schooling. For example, she associated her "fear of algebra" to her experience of starting and giving up A/S mathematics:

> there was just this enormous algebraic equation going across the board. Absolutely enormous, and I'd walked in late because it was after school … and I couldn't come to grips with this at all. And that was that. Walked out the classroom and didn't go back again […] It is just a whole negative thing. I assume that I can't do anything [to do with equations], I have a complete mental blank. Whenever I see anything like that I just get a mental blank and I just think - I can't do that (Interview, July, 2000).

In addition, Ursula experienced difficulties throughout her involvement in the project. The experience was difficult: "I just can't do this"; exasperating: "I'm so annoyed, I'm I feel like smacking him [one of the researchers]"; and confusing, "What is special? I'm doing this already." Despite these difficulties, Ursula not only persevered with the project but also became a Numeracy Consultant and, at least for a time, identified herself as a "subject specialist […] a maths teacher" (Interview, July, 1999). The resulting changes in her beliefs about mathematics and mathematics education were very significant (Hodgen, 2004).

IDENTITY, LEARNING AND CHANGE

I outline my conception of identity in some detail elsewhere (Hodgen, 2003, 2004). Briefly, I draw on Wenger's (1998) conception of a fragmented identity located in communities of practices and Holland et al.'s (1998) notion of identity change in

terms of authorship and improvisation. Wenger argues that that change and learning are facilitated by a "combination of engagement and imagination" which enables identification "with an enterprise as well as to view it in context, with the eyes of an outsider. Imagination enables us to adopt other perspectives across boundaries and time … and to explore possible futures … [and] trigger new interpretations" (p. 217). Holland et al. emphasise "aspects of identities that have to do with figured worlds - story lines, narrativity, generic characters, and desire" (p. 125). Learning is, as Evans (2000) argues, "facilitated by fantasy" (p. 224).

In order to conceptualise desire, I draw on the Lacanian psychoanalytic theory. For Lacan, imagination, fantasy and desire are fundamental to understanding human action. He conceives of identity in terms of an unattainable completeness:

> "[T]he human subject is always seen as incomplete, where identifications of oneself are captured in an image: as an individual I am forever trying to complete the picture I have of myself in relation to the world around me and the others who also inhabit it (Brown & Jones, 2001, p. 10).

Lacanian theory is particularly appropriate, because of the way in which pleasure is seen as dialectically linked to pain. Thus, it provides a way of locating the motivation to sustain change in relation to the very real difficulty of this for teachers.

LOVE, FANTASY AND MATHEMATICS TEACHING

In this section, I discuss two quotes from interviews some 2 1/2 years apart. These were from key moments in Ursula's professional change and are typical of her engagement at these times. Ursula described the initial trial of the first TM lesson that she herself developed as follows:

> They were really noisy. I had stand up arguments between children about the maths, shouting at each other. If anyone had come in, they'd have thought it was chaos, but I loved it. (Research team, January 1998)

The image presented here was certainly an exciting one in which children were engaged in mathematical talk. However, the way in which she expressed this message is very significant. Schools and classrooms are generally characterised by order, control and turn-taking. "Chaos" and children "shouting at each other" are the very antithesis of what classrooms are expected to be like. Ursula used these descriptions in order to emphasise that mathematics in this incident was different to ordinary primary mathematics lessons. Her description of the children's mathematical talk was framed in language that implicitly challenged her own authority as the teacher. She presented the children as arguing about mathematics without apparent teacher intervention. This is in marked contrast to the culture of many mathematics classrooms where authority for what is right or wrong, together with what counts as mathematics, rests with the teacher. Thus, in this brief description Ursula pointed to three inter-related issues in relation to school mathematics: the children's control of the mathematics; the contrast with other people's mathematics lessons; and, her own strongly expressed belief in this way of working.

Equally important was the form in which she presented presented the lesson as a deviant case. She emphasised that "anyone," implying, I suggest, anyone who taught in the ordinary way, would have judged the episode as chaotic. This highlights the intuitive and undeveloped nature of Ursula's beliefs in relation to mathematical authority at this stage. Ursula believed that, contrary to her own experiences, authority should be dependent not on the teacher but on mathematical discussion. Whilst she believed this to be the case, she did not *know* it to be the case and would have had difficulty justifying this belief to others.

Two and a half years later, Ursula commented on her earlier discomfort and confusion:

> I've had a big shift actually in the fact that I used to like things like Roofs [a TM lesson] 'cos you had a really exciting answer at the end of it and the kids were pleased, but that was it. And I actually like the lessons now where you ask them a question and they go away still talking about it much more. But I used to feel very uncomfortable with those, they used to feel that there was no conclusion to my lesson and there was nothing going for it. … I used to love to get to the end. … I'm much more comfortable now about just leaving up in the air. (Group interview, June 2000)

Ursula described herself as having working with two competing and contradictory approaches within TM lessons: one, as in Roofs, where she was looking for closure with a "really exciting answer at the end of it"; and, another, where there was no conclusion and she left the mathematics "up in the air." The first approach was comfortable, because it was closer to the norm in school mathematics, and to her existing practices of teaching, which, although investigative, nevertheless sought closure. The latter approach had been *very* uncomfortable in part because it was so different to her existing practices. The "up in the air-ness", the very thing that was attractive, was also painful. This discomfort was increased by the way in which Ursula constructed this new identity as deviant to her own ordinary practices in school mathematics. Despite this pain, it is evident from the earlier comment that she found this new approach attractive. Indeed, I suggest this attraction stemmed in part from the way in which she could only glimpse these new ideas. This glimpsing is itself both painful, because of the uncertainty and unpredictability, and attractive, because the unpredictability is interesting. A key feature here is that the desire is for reconciliation in order to understand and overcome the unpredictability.

The use of the strong emotive term of "love" in these extracts is of further significance. It points beyond Ursula's uncertainty and suggests that she herself held competing beliefs in relation to mathematical authority. In the first description, I suggest that she was making a strong statement about her identity as a mathematics teacher. Within the constraints and affordances of the past and present, an individual can "explore, take risks and create unlikely connections." (Wenger, 1998, p. 185) Indeed, an individual's identity, and ultimately legitimacy, within a community depends not simply on their acceptance by the community, but on the individual's identification with it. In expressing "love" for her image of the chaotic and different

practice of CAME, a practice which as a newcomer she could only imagine, Ursula was articulating a desire not only for this different way of teaching but also to be a different teacher herself. Yet, because of the difference to her ordinary practices, this different way of being could only be imagined and partially realised. It is interesting that in the later quote Ursula emphasised her changed beliefs by placing her desire firmly in the past, using the emotive "love" to describe her previous practice of looking for a clear end result. At the time of this interview, towards the end of her involvement in the project and as she was beginning to apply for primary management posts, she appears to have achieved a degree of closure on her mathematical desire.

DISCUSSION

I use the term desire deliberately to emphasise not just a personal and emotional investment in professional change but also a compulsion to change. Ursula found the possibility of change deeply attractive in terms of her teaching, despite the difficulties and confusion she experienced throughout her involvement. She seemed to be driven to engage with CAME, a drive she expressed as love. Thus, I suggest, she experienced what Lacan calls "jouissance … which simultaneously attracts and repels." (Zizek quoted in Brown, Hardy, & Wilson, 1993, p. 14) Ursula's motivation to change was not simply that she perceived the need; it was rather that she was compelled to change through this powerful emotive and motivating force of desire. Through this, Ursula was able to develop the more rounded emotional relationship with mathematics evident in the later interview.

The professional development experience described here was unusually intense and extended. However, my analysis suggests that the crucial factor in Ursula's professional change was the richness, quality and affective nature of her experience. It is noteworthy that Ursula's mathematical desire appeared to pre-date her participation in Primary CAME. It seemed to originate from her participation on a 20 days mathematics course, on which she was able to reflect on her own negative and painful experiences of school mathematics. In particular, she began to challenge external authority figures in the form of the course tutor and through her engagement with him to construct a more positive image of mathematics.

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