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The mediating role of a minority ethnic teacher's past experiences as a tool for understanding mathematical learning and teaching

Sarah Crafter, University of Northampton, UK
Guida de Abreu, Oxford Brookes University, UK

This paper will examine how a teacher's past experiences, alongside experiences of the present and imagined future, play a mediating role in understanding home and school mathematics learning and teaching. The sociocultural approach will form the basis for the introduction of two key theoretical concepts which are i) heterochronicity, which looks at the way meaning is generated over time in the overlapping histories of the individual and society and ii) prolepsis, where the notion of future mediates with the past and present. As such, the movement through cultures of learning are temporal and spatial. The analysis will draw on a case study exemplar of a minority ethnic teacher (Pakistani Kashmiri) working in a school which was mostly made up of South Asian pupils (Pakistani, Indian and Bangladeshi) in the Southeast of England. The findings will shed light on how she interweaves her own experience of growing up in the English school system with herself as a school teacher, herself as a mother and her understandings of the parents in the school. Thus, her own past experiences of mathematics learning are embedded at the level of the individual, the family and the wider community. Perhaps more importantly, this paper will address how her general understandings of the wider community have a powerful influence on her representations of mathematical learning.

Introduction

Much emphasis within educational research on mathematics learning is placed on current teaching and learning practices as they are experienced at a given moment in time. There have been studies which access teacher's beliefs and how these influence their teaching practices (e.g. Beswick, 2007), teachers perspectives on pedagogy and practice (Escudero and Sánchez, 2007) and studies on classroom interactions between teachers and pupils (e.g. Gorgorió, Planas & Vilella, 2002) to name a few. However, less seems known about the personal event histories of teachers and the way in which their own educational experiences of the past help construct the teacher of the present. This paper seeks to shed light on the ways in which individual past experiences are embedded and located within local communities and cultural histories. This paper will argue that neglecting to think about the accumulated educational experiences of the teacher, and the community to which they belong, is a mistake. The teacher is not created on the day they embark on their training but have part of themselves and their own educational experiences is embedded, or in some instances invested, in the teacher of the present.

This paper will use two constructions of time and space, namely the concepts of heterochronicity (Beach, 1999) and prolepsis (Cole, 1998) to examine the interweaving of the past, present and future of an ethnic minority teacher working in an English school. Sociocultural theorising will provide a backdrop for the historical and the contextual aspects of this study.

The case study of Shazia

This paper selects a case study teacher interview from a wider teacher sample in a study examining home and school mathematics learning. This paper is born out of a wider study examining parental involvement in children's mathematics learning at home and school in culturally diverse settings. The case being analysed is Shazia, a British Pakistani Kashmiri teacher of year 6 (ages 10/11 years) pupils in a school which mostly catered for children who were from a South Asian (Pakistani, Indian, Bangladeshi) background. The percentage of pupils from ethnic minority backgrounds in this school was 96%. Out of all the children in the school 88% were from South Asian communities. She is selected for discussion in this paper in part because of her ethnic minority status, but also because as a 4^{th} generation immigrant (and belonging to the Pakistani community) she grew up taking part in the English education system. Consequently she is able to reflect on her own past school experiences, her current teaching and the historical-cultural elements of the communities to which she belongs. It is to the theoretical discussions on past experiences that we turn now.

Teachers past experiences

The role of teachers own past experiences is gaining increasing focus in academia. Renshaw and colleagues (2007) in Australia provide examples of teachers who drew on their past experience in order to justify their resistance to current school policy. Studies with college students show that idiosyncratic memories (something significantly positive or negative) and pivotal moments can change the course of their academic identity (Pillemer et al. 1996). We argue the same may/could be said for teachers and their teaching practices. In this paper we are not so much concerned with what Wartofsky (1979) would describe as the external representations of mathematical activity (i.e. it's symbolic form or the act of making a calculation) but rather the impact of its internal representation. In other words, the meanings embodied in a form of social (re)production, and in particular, in episodic reconstruction of the past. Important

moments in our past (i.e. such as a teacher who gets cross with us for not understanding a mathematical problem) often come to inform what we do in the present (i.e. I am a teacher who never shouts at my pupils if they don't understand something) (Middleton,2002). Sometimes we intentionally rehearse these experiences to the point where they are a built-in feature of our practices. Sometimes, memories of the past unintentionally provide the basis for present and future practices. In this study we sought out certain memories from the teachers and focused their thoughts towards their relationship with mathematics in the past. The interviews then are constructive events whereby intentional and unintentional past experiences unfold through the unpacking of memories. The use of past experiences always requires some level of selection (Brockmeier, 2002) and in this study we asked teachers about their own mathematical learning at school, how positive or negative this learning was, and their own experiences of being a parent and teaching their child mathematics (if appropriate).

Sociocultural theorists having long been interested in different levels of historical theorising as this was one of the basis for Vygotksy's original writings. Drier (1997) points out that our life-trajectories are full of contradictions and conflicting practices which are often conducted in various contexts with numerous others. What becomes meaningful or significant as a past experience comes about through participation with others and how those link to the self.

Those who engage in sociocultural theorising have done well in examining how human activity unfolds and develops as part of histories of individuals and societies (see Dien, 2000). Dien adeptly reminds us that our own personal histories and past experiences are always experienced against the backdrop of how we are situated with our communities and families. Wenger (1998) talks about the way the practices of individuals and community converge and diverge at moments in time, and that these practices are constantly in negotiation. For example, school curriculums change over time but in the home community learning is often locked into a particular mode which reflects the parents own schooling and the cultural norms and values associated with that.

The concept of heterochronicity enables an examination of how meaning is generated on an individual and societal level and is also transitory through time (Beach, 1995). For instance, when looking at the meanings of interpretation and experience from the past to the present, it is worth understanding the historical significance of school mathematics as a societal activity and the way this can impact on the lives of different individual

generations. In a study on high school students becoming shopkeepers and shopkeepers going back to adult learning maths classes in rural Nepal, Beach (1995, 1999) found that different patterns for learning occurred for each group. Students who were going to become shopkeepers were following the traditional understanding of the leading activity, from school to work. In calculating a mathematics task the students were predominantly using the knowledge gained from school (written methods), while adapting their calculation techniques (object artifacts; using the arm for measuring and calculating) when required. For the shopkeepers who enrolled on mathematics classes, there was no clear transition from school to work like there was for the students. Instead, the shopkeepers eventually combined traditional mathematics practices (object calculation) with written numerals (or counting fingers). The concept of heterochronicity for the purpose of the present research paper looks beyond the cognitive act of forms of mathematical calculations to include changes in representations meanings and identities over time and across different generations.

However, meaningful pasts are never experienced alone without the notion of an imagined future. The notion of prolepsis (Cole, 1995; 1996) explores "the representation of a future act or development as being presently existing" (Webster's dictionary cited in Cole, 1996, p. 183). For example, the recollection of memories from the cultural past (such as a bad experience with a teacher) could influence a trainee teacher's future endeavours in their own teaching practice. An imagined future may also constrain the present – so a primary teacher who was not confident at mathematics at school but who believes it is crucial for the future may relate this representation to their current teaching practice. However, the teacher who had a bad past experience with mathematics but who feels you can still be successful without it may have a different approach to practice.

Elsewhere we have argued that parents' use their own past experiences help to form a meaningful representation of their child's current learning (O'Toole & Abreu, 2005). Through our analysis we know that past experiences can be similarly powerful in informing teachers' current practices. Rogoff (1990) refers to the link between past participation in activities with that of the present as appropriation. Appropriation is an exchange of understanding so that events in the external world can act to change the internal world of the individual and visa versa. Focusing on past experiences enables an exploration of the knowledge and meanings that teachers have appropriated from their

past histories while at the same time exploring the extent to which they still view these as impacting on their student's learning.

The focus on mathematics teaching is particularly enlightening because it is often assumed to be a subject free of cultural influence, something which has been ardently questioned by those interested in culture or community (Abreu, 1995; Gonzalez, Moll, & Amanti, 2005; Street, Baker, & Tomlin, 2008). Teachers themselves often subscribe to a narrow view of mathematics and mathematical pedagogy (see Lloyd, 2006) although evidence shows that personal experiences do inform teaching and learning in mathematics classrooms (Ebby, 2000).

In view of this we were interested in teachers descriptions of their personal past experiences and how they informed their representations (or understandings of) current teaching practice. As mentioned above, we have analysed the case study of an ethnic minority teacher for this paper because we were interested in the overlapping histories of society and the individual. As such, we ask: What are moments divergence and moments of convergence with the wider community, herself and her family through intersections with the past, present and future?

Explorations of the data

This section explores how past, present and future intersect with Shazia's discussions around the community (the parents of the children who attend the school), her individual self experiences (her experiences as a pupil and a teacher) and her family experiences (including the role of her own parents and her role as a mother to her own children). This is a preliminary analysis which hopes to pave the way for further thinking. We will begin by looking at the way in which Shazia constructs the community of parents whose children attend the school. We have to bear in mind that because the school houses a large proportion of South Asian pupils, when she talks about 'them', the parents, it is this generalised group (mostly including Bangladeshi, Pakistani & Indian) she is referring to.

The intersection of past, present and future within the community

From the outset, Shazia's discussions around the community centred on their lack of involvement in homework and other more implicit[1] forms of home learning. She identifies historically embedded cultural practices in the community, in the form of family size and responsibilities, which might contribute to a lack of parental involvement in school. In this first quote Shazia raises some issues of practicality for parents in her local community:

> If you think, quite often, and I'm not generalising I do seriously mean, and I'm talking in the context of our school, a lot of our Pakistani families in particular, have quite large families. If you've got eight to ten children, by the time you've bathed, fed, clothed, bedded – it's probably eleven o'clock, you haven't got time to stand in the kitchen making biscuits with one of them. And if one of them does it then they all want to do it, and they've all got different attitudes, different behaviour patterns, different, you know
> *So it's a bit of a logistical nightmare?*
> Logistically it's impossible, I should imagine.

Her reference to making biscuits is not benign – instead it is nod in the direction of implicit everyday mathematics which is favoured by schools (DCSF, 2007). Interestingly she links this to her own position within her family and how she has altered her practices with her own children:

> ...as you go down the generations I've only got two children, I don't intend on having any more, therefore I have time. We do make biscuits, and we do, you know, whenever we go to [the supermarket] my daughter always, she always, this is her job now, she always weighs the fruit out. She always puts it in, makes sure its…, pick it out, put it in the bag, you know.

In the interview with Shazia I ask why she thinks the parents in her local community find it difficult to do practical activities that implicitly involve some kind of mathematics. In this next quote she tries to show that cooking in Pakistan or India is a practice that historically did not afford the involvement of children (because it is dangerous). In the same way she described in the quote above the context of some families in terms of number of children which does not afford spending time with an individual child in a way that makes cooking a game with a mathematical objective:

> *Why do you think that parents find it so difficult, if that's the right word, to do practical things, other than you said it is a cultural thing, anything else?*

[1] By implicit we mean everyday activities which can also be used for mathematical learning purposes e.g. cooking

> I mean, it's not, I don't know, it stems back, I don't if you look at it historically, it stems back to when they were living in villages in Pakistan or in India and things like cooking is done on an open fire, it's dangerous I suppose. If you go back that far, then there's probably reasons behind it, but it becomes, things like that which start as habit or necessity become cultural, don't they, it becomes part of the culture. And you do tend to, and children are very much seen as a blessing and they are there to be pampered and looked after until so-and-so age and then they start taking care of themselves, although there's no specific age. They're not taught to be independent, again, I think I was discussing this with someone, that our children are so, so dependent

Shazia touches upon a similar link between personal histories and societal histories discussed by Dien (2000). As she writes, the developing individual is influenced by the cultural milieu of their community which may be invested in cultural traditions of the past. This is what Shazia is referring to when she discusses the antecedents to particular cultural practices which influence home mathematics learning. On the other hand she has made personal changes to the kinds of mathematical practices she undertakes with her own children which we will later show, she attributes to her upbringing in the UK.

The intersection of past, present and future and the individual self

Shazia's representation of her own mathematics achievement as a teacher is linked with her mathematics experiences at school when she was a child. Contextual circumstances also played a role in her representations of her educational experiences. In this first quote she tells of some of the language difficulties she faced when returning to school from a long trip to Pakistan:

> I was never clever enough to go to the top [of the mathematics class]. When I was in, prior to junior school **we actually spent a year and a half in Pakistan**, when I came my English, and **this is what our children do now** you see 'oh its only junior school, when they go to high school we won't take them out', what they don't realise is, that this is the foundation. This lays all the grounding for what they are going to learn later on. And when I came from Pakistan I couldn't speak English….. and I was bullied like nobodies business because I was put in a special unit. This absolutely horrendous corner of the room
> *In language units*
> In language units, I was taken into there. And I was there for two weeks, and I just thought, 'there's no way I'm staying here' and I quickly started speaking English again. But I hated it because I was really bullied….. But very luckily moved very quickly and ended up by the second year in [name of school] which was wonderful.

Note how she makes a link between her own past experiences and the present practices of the local community who also tend to take their children out of school for long periods

of time. The impact of having time out of school had a profound effect on her English language skills and her subsequent social relationships with the other children in the form of bullying. This next quote shifts in time from junior school (ages 7-11) to senior school (ages 11-16). Shazia's own representations of her mathematics achievements did not match those of the school. The first author asked her:

> *Did the teachers have a big effect on your education and what they were like?*
> Um, not at the junior school, no. I honestly can't remember that clearly. But I do remember in High school, for some silly reason they put me in the top set for maths, and, basically if you were in the top set they assumed you knew everything and they're just giving you something to get on with. And I couldn't cope with any of it. Then they moved me down into the second set, and the lady I had there was the Deputy Head, she was fantastic. I probably, that was probably the first time I understood anything I was doing. I think I was taught by her for two years in maths, really made a difference, to my maths.

Standing alone this quote only tells us that, while she was clearly very capable in mathematics she felt out of her depth in the top set. Also of interest is her past experience with a teacher she really admired and who made a big difference to her mathematical understanding. She then links her past experiences and struggles with mathematics to her present teaching.

> *So was it [mathematics] quite a positive thing at school*?
> Um, I've always enjoyed maths, I don't think I ever found it easy but I always liked maths. And I love teaching it, I really, really love teaching it, I think that out of all the subjects, I think I have to say, I love teaching maths the most.

Again, while these quotes stand alone they also offer insights or threads of significance to the links between Shazia's past experiences and present teaching practices. For example, her notion of a good teacher is arguably born out of her own past experiences. She recounted numerous times when she felt she went through the motions of doing her mathematics in school whilst never truly understanding what she was doing. It was only when she became a teacher herself that she began to gain a fuller understanding of the mechanics of mathematics *'I honestly don't think I understood how I knew the tables or what they were until I started working here'.* She described how her struggle to understand some aspects of mathematics learning had made her more empathetic to the problems that her children may have:

> I never, to this day, I cannot do long division, I still have no idea how you're supposed to do it, and that's an honest to goodness, very truthful remark, I just

> do not know how to do it. I'm so glad we don't have to teach it. Well I suppose I do have to …. I can't do it, I couldn't do it, try explaining that to me, why can't I do long division? It was just, I suppose a different way of learning, but, um, I don't know, it makes me little more open to the problems children have, picking things up and having them explained in a different way.

She goes on to say

> I think, as a teacher, if you can, sort of, put across your own enthusiasm of a topic, make it interesting. There's nothing worse than sitting down and doing pages of sums that you don't really anyway, you know, you're just doing it. It's much better to do one activity based around a challenge, you know, make children understand through that, rather than, um, sitting and trying to work things out when it's impossible for you to do it. So I think the teacher makes a big difference in that sense. You know, I don't think it's so difficult to put across information, it's how you put it across that's the difficult bit. I know last year, when we were doing currency exchange, which way round the children were putting it, you know, can we divided the pounds by the dollars or the dollars by the pounds, and things like that. And we found a currency converter on the internet … and we projected the screen on to the board, and they loved it, they just loved. And I was really excited as well. And you could do any currency around the world, it was just do good. And they were coming up and saying 'can you do Pakistan, can you do Jamaica?' you know, all this, it was brilliant, they just loved it. And silly little things like that, you can come across in a much more interesting way. And also know, when to stop, when to start, when to push forward and when not to. I suppose that comes with experience doesn't it?

The intersection of past, present and future and the family

Shazia's discussion on the role of family come in two forms – her past relationship with her father and her current home mathematical practices with her own children. This first quote shows the intersection between the two:

> *Has your experiences, either as a teacher or at school, helped with your own children's education, can you tell me a bit about it?*
> I have to admit that I have never ever sat them and taught …. But, and I don't know whether this is an experience of being a teacher or a student but just the fact that I grew up in this country, and I think I was always envious of all my English friends who did go home and bake cakes at the weekend. I just got told to get home and cook dinner. I was really young when my dad, my dad taught me how to cook, he just taught me for the sake of having an extra person in the house who could cook. I appreciate it now, but I didn't then. So I never experienced, you know, things like going to the seaside and going to the cinema. And he would never allow me to go the cinema, taboo. So doing things like that, I think that's more to do with experience of growing up in this country, rather than teaching

Shazia talks about how her family cultural background shaped what they did with their children. So her father told her how to cook with the aim of developing cooking skills and making her competent in helping to prepare meals for the family. But, he did not engage with childhood practices common to her colleagues in the English schools, which she felt she missed out on. So, she now uses some of this cultural knowledge to organise practices for her children. Quotes below show how Shazia incorporates implicit mathematics practices at home with her own children, like cooking, with the express purpose of using it as a learning tool.

Some of Shazia's understanding of the local community of parents seem to be born out of her own experiences at home. Although the quote does not refer specifically to mathematics it provides some context to understanding why young women, from this community in particular, might withdraw from educational achievement and provides an interesting bridge between past and present:

> Our family, my dad particularly, and it was like some of our parents are beginning to be now, he used to say, believe it or not, he'd probably get arrested for saying this, he actually used to say, 'you either become a doctor or I break your legs'. You know, he was really heavily into this, and you'll find that with a lot of our parents, you've got to be a doctor, a lawyer, and accountant or I don't know
> *One of the major professions*
> One of the major professions …. And I had absolutely no interest in any, I did not want to be a doctor, there is no way I wanted to be a doctor. Midwife I could have coped with. If he'd said, ok I'll let you, but if mentioned anything, if I deviated even that much I'd get it or else. It was literally that aggressive or else thing. So I just flunked it, I dropped out basically. I didn't want to do it, I couldn't do it, I wasn't interested in that. But, I think with mine, I got married quite early, so after that my husband was very supportive, yes you can teach, that's fine. But our family, on the whole, I mean all, in fact I would say the girls are more world wise and able and capable than the boys are in our family.

Shazia's personal trajectory shifted when she started a new life with her husband and began her own family. While she held onto some cultural traditions and practices (such as wearing traditional dress, having long hair and observing fasting times etc...) she utilises other forms of cultural knowledge from her upbringing in the English school system (and as she mentions several times – from observing the upbringing of her English friends) and her training as a teacher. Shazia talked about the shift in her representations of mathematical activities through everyday mathematics learning in this next quote:

> You know, the way I taught my son, well, I didn't actually teach him, but helped him to learn his tables was by games. You know, we did square numbers and one morning we'd walk to school and it wasn't even something at home it was ten minutes to school, it would be 'ok, let's do our square numbers today, ok, lets do our three times table today', and just by that, um, just participating, its not even a specific, you know I can't pinpoint and say 'I want them to help with their tables', it's just little things, you know, when you do send something home where you expect the child to come back with an acquired concept or an acquired knowledge, we just want parents to participate

The intersection between her own family experiences and her personal history from the past becomes aligned through her narrative with the past/present histories of the community of children she teaches:

> Well I mean basically, as I said before, having grown up in the community, having gone through the same problems that my family, because we're now fourth generation. My kids, well my parents are very much like my parents are here now, at the school. And it was, more or less, well you go to school, that's it, you know, their responsibility stops the moment I step on to the schools doorstep, as it were. And things like homework and school work is all to do with the school, it's got nothing to do with them. Whereas, I now, having gone through the education system here, I personally as a parent, if my son brings homework, I have to. Also I want him to be responsible, but I also need to make sure that I back up that responsibility and remind him, he is a child at the end of the day. 'Have you got your homework?' 'did you do it?', 'have you done it correctly', 'Oh, mum I'm stuck', 'ok, let me have a look and I'll explain'

Conclusions

This preliminary analysis has sought to look at how past, present and future intersect in relation to community, the individual and the family and the ways this might inform the teachers representations of the current practice. Episodic experiences from the past can provide intentional spaces for the construction or reconstruction of who we are and the way we want to be seen by others. Narratives that seem to stand alone, when seen through the lens of shared personal and societal histories can offer understanding for the way in which children from culturally diverse communities experiences home and school mathematics learning. Using the case study of Shazia has been particularly useful for this purpose because of her ethnic minority status and her cultural knowledge of the local community. We do not suggest here that her cultural knowledge is representative or ultimately accurate or truthful. Rather, that her representations of the local

community of parents offer insights into the intersection between her own personal history and the society in which situated.

This paper will bend with a final quote from Shazia who discusses a projected future whereby, as suggested by the concept of prolepsis, imagined futures collide with the present.

> I'm hoping in the years to come, when you get a different generation of parents come in, children, adults who have been educated here for instance, you will notice the difference. But it's still not, and I do think its going to take, ten, twenty years. I can't imagine happening over night.

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