

## **Women's stories of learning mathematics**

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In this session we looked at women from three generations of one family. All three women have no formal qualifications in mathematics and all left education at the minimum school leaving age. They were video recorded talking about their experiences of learning mathematics at school and their current levels of confidence. Given their different ages (82, 64 and 44) we might expect their stories to be different, but there are surprising similarities. I am at an early stage in this 'grounded' research, approaching the topic with no intended preconceptions of what I might discover.

### **Theoretical background and significance**

There is a substantial body of research into attitudes to mathematics and closely related themes. These studies use as their subjects school students (eg Hodgen et al 2009, Tapia and Marsh 2005), university students, training and practicing teachers, and adults returning to learning (eg Ward-Penny 2009). These could be described as a 'captive audience' for researchers. Adults who are not in education are unlikely to be the subject of surveys on attitudes to mathematics. Given the scarcity of research evidence, we know little of the long term impact of school mathematics on people's attitudes to, confidence with and use of mathematics. We know little also of the emotional legacy in the general population of learning mathematics.

We know that attitude is important to achievement from the plethora of research on this topic with school students. For example in a paper for BERA Conference 2007 Brown, Brown and Bibby (2007) claim that perceived difficulty, lack of confidence, disaffection and perceived lack of relevance relate to predicted GCSE grade. Another example comes from the USA (Singh, Granville and Dika 2002). I make the assumption that in teaching children mathematics we are not solely aiming to affect their attainment while they are children, but that we are intending to have a long term positive impact on their attainment in and use of mathematics. Research that throws some light onto the long term impact of learning mathematics is therefore useful.

The focus on women from poorer backgrounds is justified by the evidence that both gender and socio-economic circumstance are factors in attainment. Much research into achievement has analysed the differences in the findings for girls and boys, for example APU (1982) in this country and Bachman (1970) and House (1975) in other countries.

The findings were broadly similar: lower achievement by girls and more negative attitudes at secondary level. (Onion 1998, 8).

Despite efforts by the government in England and its agencies, the relationship between socio-economic status and achievement in mathematics persists, for example as shown in the longitudinal study by Demack, Drew and Grimley (2000). This is also an issue in Australia (McConney and Perry 2010) and in the USA (National Center

for Educational Statistics. 1995). Furthermore Nunes et al (2009) show that the educational achievement of mothers has a high correlation with the attainment of their children in the early years of schooling.

Finally, an aspect of the significance of this study for me is one of personal significance. My first participants are drawn from my own family of origin. The three women interviewed so far are my mother, my older sister and her oldest daughter, my niece. I am interested in them as people and curious to hear what they have to say about their experiences of mathematics, partly because they differ so markedly from my own.

## **Methodology**

The choice of interview as a technique for this research is rather obvious. If I am interested to find out about the legacy of women's mathematics education, what better way to find out than to ask them. I recognise that in doing this I am not seeking historical truth about what occurred in the past; I am instead seeking to find out what people remember of learning maths and what impact it had on them. I am hoping to hear about critical incidents, those events charged with emotion that are more likely to be remembered, as well as about the possibly more mundane setting and narrative drive through the years of schooling for my participants. In his seminal work *The Psychology of Personal Constructs* (Kelly 1955) tells us about the importance of the meanings that individuals attach to events and that there is no absolute truth to be had about events in the past.

Moving onto the issue of choice of subjects, according to Cohen and Manion:

A good informant is able and willing to establish and maintain a close, intimate relationship with the researcher. (Cohen and Manion 1994, 60).

As I have a pre-existing close relationship with my relatives they are more likely to be good respondents. Starting with my relatives, I intend to use a 'snowball' sample, drawing on their friends and acquaintances. I hope that this personal connection will make it more likely than otherwise, that the respondents will be candid with me. Participants were asked to tell their own story of learning maths at school, with prompts where needed. This was followed up with a question about current state of feelings towards mathematics and use of mathematics in every day life.

The methodology presented at the BSRLM Conference in March 2011 mentioned 'voice' and 'personal life history' (eg Kelchtermans 1994, Nelson 1992)), although I do not elaborate on these here. Aspects of 'Grounded Theory' are key to the way I intend to proceed with this research so some basic information about 'Grounded Theory' is given in the following passage.

### ***Grounded theory***

In 1967 Glaser and Strauss published the first book on Grounded Theory (Glaser and Strauss 1967). Essentially grounded theory is a method of research and analysis that allows the on-going collection of data to influence both the choice of subsequent samples and the way in which the data are categorised. So for instance, I may begin by asking participants in my research only about their mathematics lessons and not be alert to information they give me about the wider context of their education. It then emerges that factors outside the mathematics classroom, indeed outside school, are crucial to success in mathematics. The notion of continuing the iterations until new

data provokes no change in categorisation method or suggested sample is called 'saturation'.

Not long after the publication of their book there was a divergence between Glaser and Strauss and each developed a different strain of grounded theory. Strauss and Corbin's book (1990) sets out the delicate and complicated process of allowing the data to influence subsequent research. Glaser suggests that aspects of the Strauss and Corbin method contaminate the data (Glaser 1992). The criticisms given by Glaser (1992) of Strauss and Corbin's ideas on grounded theory were critiqued among others by Kelle (2005). Kelle leans more towards a Straussian approach but essentially tries to reconcile the two views.

.....basic problems of empirically grounded theory construction can be treated much more effectively if one draws on certain results of contemporary philosophical and epistemological discussions..... (Kelle 2005. 1)

More recent work on grounded theory includes a description of Constructivist Grounded Theory Method (eg Charmaz and Bryant 2011), hence taking into account one of the key contemporary philosophical positions that Kelle suggests. Constructivist grounded theory moves on from the somewhat positivist assumptions of early grounded theory that the process of finding something out does not affect what is found out. It takes into account that who the researcher is and how the researcher inter-relates with participants will have an effect on the data. These more recent views on grounded theory method will be of more use to me in my research than the earlier approaches.

### **Outcomes from interviews**

At this stage of the research, three interviews have been undertaken. I have begun to transcribe and analyse the interviews, but none of the transcription or analysis was shared at the BSRLM Conference session. At the session I showed short clips from each of the interviews, preceded by a short introduction about each respondent I asked participants to note down what they observed and to agree their observations with one another. In the latter part of the session we considered similarities and differences between the interviews with the three respondents. For the purposes of this report, for each respondent I include the thumbnail sketch that was shared with participants at the session, and, in lieu of video clips, a description of what was shown. This is followed by the identification of some similarities, which emerged.

#### ***Case 1: Joan***

Joan was born in 1927. She was evacuated during WWII which disrupted her schooling. She left school aged 14 and spent most of a year as an apprentice cutter in a fashion workshop. She worked in various clothing factories until she had children. While raising her children she worked as a cleaner, took in mending and did piece-work at home, for example painting Christmas cards and packing Easter eggs. She returned to work in a clothing factory when the children were older and worked briefly in manufacturing before retiring in her 50s. The interview took place in March 2010 when Joan was 82 years old.

Joan begins her account with times tables and she chants or sings the beginning as she (mis) remembers it "Once one is one, two twos are two and so on". "and then three times and you were getting on by then....and up to twelve times and that's as far as I got." In the next clip she tells us about learning about money. "And

then we got onto pounds, shillings and pence. And I was alright with them; I was never very good with decimals” “I was never very good at maths” In the next clip she talks more about decimals and tells us that she did not want to go to arithmetic lessons at school. In the next clip Joan is talking more comfortably about measurement in a practical context when she was an apprentice cutter. In the final clip shown, Joan returns to the theme of written arithmetic and use of the decimal point. She mentions that her husband is good at maths and does the household accounts.

### ***Case 2: Lucille***

Lucille was born in 1946. She is the oldest of Joan’s three children. She left school aged 15 and worked as a punched card operator, then did various office jobs until she stopped work to raise a family. While raising her children she worked as a cleaner and continued in cleaning work until ill health prevented her working. She is now registered carer for her husband Charlie who has multiple sclerosis. The interview took place in March 2010 when Lucille was 64 years old.

Lucille tells us at the start that she is “no good at maths”. She talks about primary school and says she was OK with learning tables, but not with long division. She elaborates on this, “I remember the teacher doing it on the blackboard and by the time she’d finished she’d lost me at the first bit.” She laughs. Her husband who is present for the interview introduces the topic of algebra as something he struggled with. Lucille adds “I never even got taught algebra at my school; we never did it.” In the next clip I ask Lucille about decimal currency. She replies “Woowh, don’t talk to me about that; when it first went decimal in 1970 I couldn’t cope with it at first. I didn’t know what they were talking about.” And then she goes on to say, “I got the hang of it after a while. In fact it was the kids who helped me, ‘cause they was at school and they knew”. When she asks Charlie if he was OK with decimals he said he was. In the next clip Lucille is asked about learning pounds shillings and pence at school. She explains, “Just the same; everything was written on the blackboard and you copied; the teacher would do it and then say, you know, ..then she’d rub that off and write up what you should do and get on with it.” In the next clip Lucille tells us about avoiding maths lessons “I was in the toilets having a fag. I didn’t like the teacher; she was horrible. She hit me with a duster: one of those brush dusters, not a duster. She threw it at my head and it hit me there” (touching temple). In the final two clips shown Lucille goes on to say that she is still not good at adding up, She reiterates that “the kids” are better than her and that she does not do any arithmetic now.

### ***Case 3: Angela***

Angela was born in November 1965. She is the oldest of Lucille’s five children. She grew up in London and moved to Harlow with her family when she was 15. She left school aged 16. She had two children, a boy and a girl, with her first partner and three boys with her second partner. She now lives in Harlow with her third partner. The interview took place in May 2010 when Angela was 44 years old.

Four clips were shown from the interview with Angela. Angela mentions times tables and finding maths easy. She says she had no problem with maths until senior school. She talks about many changes of school. In the second clip she talks about two of the schools she attended. She talks about the teachers writing on the board. There is a memory of a teacher “throwing things at the boys”. Although not herself a victim of this violence it stuck in her mind. The final two clips are a mixture of positive and

negative recollections. Angela tells us that she did not like “maths in stories” and that she was not good at presenting her work; she gives the example of long division for this. She says that she was OK with algebra. The final clip finishes with Angela talking about truanting from school and how this led to her being in a ‘special class’.

### *Similarities among the three cases*

The similarities that were identified between the extracts from the three interviews shown in the BRSLM session fall into two categories: those that relate to mathematical content and others that are more general. The mathematical content areas are: multiplication tables (all three respondents), long division (Lucille and Angela), pre-decimalisation currency (Joan and Lucille), decimals (Joan and Lucille) and algebra (Lucille and Angela). There is a question here to be asked about the significance of these findings. It would be possible to ignore details about mathematical content and to focus the research as it continues on affective reactions to mathematics in more general terms. However, at this stage, I am inclined to keep an open mind about the significance of particular mathematical topics.

The non-mathematical similarities identified are: teacher violence (Lucille and Angela), changes of location (Joan and Angela), truanting (Lucille and Angela) and gender references (Joan and Lucille). Both Lucille and Angela remember a teacher throwing things in a maths lesson, in Lucille’s case at her, and in Angela’s case at the boys in the class. These are significant negative recollections. The changes of location for Joan were brought about by World War 2. For Angela the moves were related to firstly her parents’ divorce and secondly a family move out of London. Furthermore Angela truanted from school, for various reasons. Here we see events well beyond the maths classroom impacting on these women’s education in general and hence on their learning of mathematics. Finally, on gender, both Joan and Lucille make reference to their husbands being better at maths than them. I shared with participants at the session that Angela has referred to her sons begin good at maths; she did not mention her daughter. The part of the video that included this was not shown at the session.

It will be interesting to see whether the particular mathematical topics that have emerged so far and the themes of teacher violence, disruption and absence, and gender come up in subsequent interviews and also to see what new themes emerge.

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