

What Might We Learn From the Prodigals? Exploring the Decisions and Experiences of Adults Returning to Mathematics

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This paper reports on a research project which explored the decision making process and the experiences of adults who had returned to mathematics after a significant period of time away. Data was gathered using a combination of a questionnaire and follow-up interviews with selected participants. This paper presents some of the key findings together with some examples from the stories of these learners. Finally, it argues that these ‘prodigals’ offer a vivid reminder of the role of mathematics as cultural capital, and an additional perspective on many issues of current interest in mathematics education.

Introduction and Background

At the time of writing, the twin issues of disaffection and underachievement appear prominently in many pieces of research (for example, Nardi and Steward 2003) and published reviews of teaching and learning (for example, Smith 2004). Against this rather pessimistic background there exist a significant number of individuals who voluntarily return to learning mathematics in one form or another. Having met a number of these individuals personally, I questioned how we might best consider their actions against the wider background; do they contradict our conceptualisations of disaffection and underachievement, or are they the ‘exceptions that prove the rule’?

In order to focus this research around this apparent contradiction, this research was designed to include only a subset of adult learners: those whose initial schooling had taken place within the United Kingdom, and who had spent some time away from formal education before beginning their current study of mathematics. This last criterion gave rise to the collective moniker ‘prodigals’, after the biblical story of the prodigal son, and excluded learners who had begun adult learning courses directly from school.

The three key research questions can therefore be posed using this new term: firstly, who are the prodigals? What are their demographic characteristics, and is there sufficient diversity within the group to suggest that there are different types of prodigal learners in mathematics? Secondly, what motivates the prodigals to return to the study of mathematics? How might we conceptualise their decision-making process? Finally, how do the prodigals’ experiences of learning mathematics as an adult compare to, and contrast with, their experiences of learning mathematics at school? By combining the answers to these three questions, we can begin to consider what we might learn from the prodigals.

Construction of the Sample

Constructing a sample that accurately reflects the prodigal community is problematic; in the words of Coben (2003, 73), “experience tells anyone who has ever worked with adults that there is no such thing as a generic adult learner of numeracy.” Furthermore, there is considerable diversity in the prodigals’ experiences, and some sub-groups were difficult to isolate, such as those undertaking informal, community-based courses, as well as learners who were studying using independent tutors and entering exams as private candidates. The sample for this initial exploratory research was drawn from learners in official programmes,

connected to a school or further education institution. Although this was primarily due to matters of convenience, there is some evidence to support this approach: the 2006 report into the Skills for Life programme reported that “more than two million of the 2.4 million people taking up courses by July 2004 undertook them in further education.” (House of Commons Committee of Public Accounts 2006, 6)

In an attempt to increase the range of backgrounds included in the study, participant groups were selected from two contrasting regions, one centred on a major city, and another which was largely non-metropolitan. In fact, the eventual results demonstrated little or no differences between regions. The groups for inclusion were selected through a process of negotiation with staff working in adult education and a consideration of each group’s background; groups where the majority had been educated outside of the United Kingdom were excluded for the reasons discussed above. Participant groups were also chosen so as to encompass both adult numeracy courses and GCSE (General Certificate of Secondary Education) or GCSE-equivalent courses.

Methodology

The research was conducted in two stages. The first stage consisted of a questionnaire. After a promising pilot, this was distributed to participants (n=66). It contained a combination of open and closed questions, which are discussed below, together with the results. After some preliminary analysis, the questionnaire was followed up by six face-to-face semi-structured interviews, and one interview conducted by e-mail. The questions in these interviews were designed not only to help support the generation of a narrative of each individual’s experience of learning mathematics, but also to support the development of a convergent validity regarding common responses. This concern also influenced the choice of participants – for example, since a number of questionnaires had mentioned that ‘memory’ was a concern when learning mathematics as an adult, at least one participant who had included this response on their questionnaire was selected for interview.

The focus on the individual places this research firmly within an interpretive paradigm, drawing on some of the ideas of grounded theory. It was conceived and conducted as an exploratory study, and an attempt was made to minimise dependence on any one theoretical framework during the study; this is due in part to the nature of the research, but it is also consequent of the objects of study; Coben (2003, 110) comments that “explicit reference to a theoretical frame is constrained by the under-theorised state of the field.” The analysis of the interview data drew on the phenomenographic tradition, managing the transcripts by sorting features qualitatively into broad categories which allowed for subsequent analysis.

All participants volunteered to take part in the research. Its aims and purposes were explained to them, anonymity was ensured and the option to withdraw was offered to participants at each stage of the research.

Questionnaire Results: Demographic Characteristics

The first section of the questionnaire concerned the participant’s gender, age, and previous educational history. The majority of the sample (80%) was female, a tendency which has been observed elsewhere in adult education contexts (for example, Benn and Burton 1994; Coben et al. 2007). This gender bias was statistically independent of course type ($\chi^2 = 0.310$, $df=1$, $p=0.578$).

The age distribution of the participants was roughly normal, centred at about 35. However, there was a highly statistically significant relationship between age and course type

($\chi^2 = 12.810$, $df=3$, $p=0.005$). The age profile of the adult numeracy learners demonstrated a negative skew, and the age profile of the GCSE learners demonstrated a positive skew. One contributing factor towards this skew could be the presence of learners who were retaking their GCSE within a decade of leaving school. This suggestion is supported by the information gathered regarding participants' previous educational history. Of 39 GCSE-level participants, 17 had already attained a GCSE grade in mathematics and were seeking to better it. (This proportion increases to more than half if CSE and O-level grades are included.) This high proportion could be interpreted as a consequence of the role of the GCSE qualification as a gatekeeper.

Interestingly, 12 of the 26 participants on adult numeracy courses had also previously achieved a GCSE or CSE grade in mathematics. This belies the existence of a uniform pathway through adult qualifications in mathematics. Although some learners might begin with a numeracy qualification and then move onto GCSE, this model does not fit all learners. Another possible stereotype challenged by the results of this section was that of adult learners of mathematics possessing a low general level of education. There was a huge range of responses in terms of previous educational history, ranging from no qualifications to a degree in Fine Art. Finally in this section, 84% of those taking an adult numeracy course indicated that they had undertaken a previous adult education course, compared to 25% of the GCSE level learners ($\chi^2 = 21.467$, $df=1$, $p<0.001$).

Questionnaire Results: The Decision to Return to Mathematics

The second section of the questionnaire concerned the participant's decision to return to studying mathematics. Issues of motivation are, of course, difficult to assess and summarise; writers such as Hamilton and Hillier (2006) suggest that the decision to return to mathematics should be considered as both gradual and sudden, and this dual perspective was followed up in the interviews. Despite its basic approach, however, this section of the questionnaire yielded interesting results.

Firstly, a question about the timescale of the decision suggested that most learners had been considering taking the course for a substantial period of time; the modal response was 'for significantly longer than a year'. (This tendency seemed much more pronounced in the females than the males, but the difference was not statistically significant.)

Next, participants had to indicate their motives for returning to the course. Initially they were required to tick which motives from a list of twelve (drawn from the literature, and together with a thirteenth 'other' option) they felt were relevant to them. They then had to indicate which motive was the single most important one. Whilst space constraints prevent a full summary of the results here, intrinsic motives such as confidence and personal development scored highly with the numeracy learners, whilst extrinsic motives focused on the GCSE qualification itself scored more highly with the GCSE learners. This became especially obvious when the *most* important reason was selected – 22 out of 31 GCSE level learners selected "I need a qualification to help me get onto another course." No other reason scored more than 3 votes.

Questionnaire Results: Learning Mathematics as an Adult

The third and final section of the questionnaire encouraged the participants to compare their experiences of learning mathematics as an adult with their school experiences. This was done through a combination of paired Likert scales and open-ended questions.

Typically, the adult experience was portrayed much more positively, with 'as an adult' responses tending to be about two grades higher on a five-point Likert scale than their

corresponding ‘at school’ responses. The validity of these increases was supported by the accompanying open-ended responses. These comments related to a number of clear themes; for example, the role of the teacher in the learning process, and the use of contexts and applications.

“I didn’t have things explained at school, work was put in front of you and you were expected to do it.” (GCSE Learner)

“Hated my school maths teacher. He didn’t make maths fun. My current maths tutor is fantastic, if you don’t understand she will explain it in as many different ways as possible until you do. She also relates all our maths to everyday life.” (GCSE Learner)

Some of these were inevitably shaped by the structure of the questionnaire, but in other places issues which I had presumed to be relevant (such as the use of ICT) were ignored, and others became apparent instead. These themes continued to be present in the interviews. Although some participants were less enthused about learning mathematics than others, (and one openly resented being forced to take the course in order to progress in their wider education,) the overwhelming tone of the comments was very positive, both in terms of the participants’ attitudes towards mathematics and their own self-confidence. One participant wrote that “it has been rewarding to change past negative messages”; another rejoiced in “the fact that after 30 years of thinking I can’t do maths I can!”

Summary of the Interview Dialogues

As discussed above, the interviews served to explore issues such as the decision making process in a finer level of detail, as well as offering me an opportunity to clarify meaning. Many of the earlier findings were confirmed or further exemplified in the individual narratives that emerged. For example, the role of mathematics as a gatekeeper qualification was again evident, with many participants needing a qualification for a promotion or for entrance to another course. The role of the teacher also continued to be prominent in many stories, both at school and as an adult:

“It was far more informal – there was no sort of, ‘yes sir, no sir, three bags full sir’, you know, if I had a question I could ask *****. It was far more informal, almost on a sort of friendly level – you know, just a friend who could do maths, whereas before it was sort of, you know, Mr. Such-a-body...” (Adult Numeracy Learner)

A related concern was the issue of fault and the apportioning of blame. It was interesting to see how different participants interpreted their experiences and allocated responsibility for their perceived ‘failure’, both onto themselves and to others, and this might offer some insight into the reliability of prodigals as narrators.

Other themes that re-emerged included the issue of explanation and context, and the role of mathematics as a functional toolkit:

“There’s still things I can’t do, and don’t understand, but in general I’m a lot happier... for instance, the course is sort of designed around real life, so if I went into a shop and it said that there was seventy-five percent off, I’m now able to stand there and work out how much I am actually saving. So yeah, there are lots of situations in life where I am now using number, where, I feel a lot happier... yeah, definitely.” (Adult Numeracy Learner)

As discussed above, some issues became prominent at the interview stage that had not been directly examined in the questionnaire. One of these was the effect of ability grouping on achievement and motivation. Interestingly, negative experiences were reported by prodigals who had been placed in bottom sets, middle sets and top sets:

“Yeah, because I think the highest I could get was a ‘D’ anyway, and I didn’t even get that, I got an ‘F’, so it was almost pointless really... I think because I couldn’t do it I just lost interest.” (GCSE Learner – Bottom Set)

“It was like they were constantly pushing you. And the way they’d split the classes up, so you had bottom maths, middle maths, higher maths, it was like – the person in higher maths was... ‘oh yeah, but I’m better at maths than you, I’m in a higher group than you’, and all that sort of stuff, and we never had that in college, because you’re all in the same group.” (GCSE Learner – Middle Set)

“I was put in the wrong group really, because I was put in the top group, and I had no idea what he (*the teacher*) was on about most of the time. So I switched off, really. I think if I’d started in a lower group I would have found my feet and then maybe been able to progress up. But at the top group there was all the really bright kids, and I had no idea what I was doing.” (GCSE Learner – Top Set)

Issues of space prevent a full discussion of the accounts that made up the interviews, but other key issues raised included the role that some of the participants’ desire to help their children played in their decisions, and the influence that learning mathematics and conquering certain fears has had in developing a wider academic self-confidence.

Discussion

Each of the three research questions identified above has been answered in part, but each also lends itself to further study. Preliminary demographic features of the prodigals have been identified, and these have some resonance with pre-existing research into the general adult education community. However, both the demographic results and the differences revealed in the decision making process point towards there being at least two different *types* of prodigals, which are connected to the two different types of course considered. It would be interesting to extend this research to prodigals undertaking A-level courses, or distance learning degrees in mathematics, and see how their responses compared to the two groups explored above. This study has also produced some preliminary conclusions about the motivations behind the prodigals’ decisions, and also explored how their experiences of learning mathematics as an adult compare (generally favourably) to their experiences at school. However, the question still remains: what might we learn from the prodigals?

Perhaps the most obvious, and encouraging thing that we can take from this group of learners is proof at the level of the individual that negative attitudes towards mathematics can be changed, and negative experiences can be overcome. Moreover, there is some evidence that whilst an improvement of one’s general confidence and academic self-concept is not always an explicit motive for returning to study mathematics, it is often a consequence. It is possible for learners to improve what has been termed as a ‘mathematical trajectory’ (Noyes 2007), often with great benefits to the individual concerned, and sometimes with a refreshing enthusiasm. “For the first time in my life,” one learner wrote, “I actually enjoyed solving maths problems. Weird or what?”

Beyond this, the results outlined above form a vivid reminder of the role of mathematics as cultural capital in the sense of Bourdieu (1973). A proper deconstruction of the meaning of this term as it applies to mathematics, and the relevance this has to the stories detailed above lies outside the scope of this summary, but the role that mathematics plays as a gatekeeper is indisputably clear throughout both the questionnaire and interview results.

Finally, it is also striking how often, and how strongly, the narratives gathered touch on issues that relate to current discussions in mathematics education, such as the consequences of ability grouping in the classroom, or the place of contexts in demonstrating relevance. Whilst this is undoubtedly partly an artefact of the methodology, the frequency and

nature of the occurrences suggests a genuine phenomenon. Possibly, then, the prodigals offer an additional perspective on these issues. Although their viewpoint is undoubtedly biased, it could be challenging in a healthy way; perhaps they are the ‘exception that proves the rule’.

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References

- Bourdieu, P. 1973. Cultural Reproduction and Social Reproduction. In *Knowledge, Education and Cultural Change*, ed. R. Brown. London: Tavistock.
- Benn, R. and R. Burton 1994. Participation and the Mathematics Deterrent. *Studies in the Education of Adults* 26(2): 236-249.
- Coben, D., ed. 2003. Adult Numeracy: A Review of Research and Related Literature. London: NRDC.
- Coben, D., M. Brown, V. Rhodes, J. Swain, K. Ananiadou, P. Brown, J. Ashton, D. Holder, S. Lowe, C. Magee, S. Nieduszynska and V. Storey 2007. Effective Teaching and Learning: Numeracy. London: NRDC.
- Hamilton, M. and Y. Hillier 2006. Changing Faces of Adult Literacy, Language and Numeracy – A Critical History. Stoke on Trent: Trentham Books.
- House of Commons Committee of Public Accounts 2006. Skills for Life: Improving Adult Literacy and Numeracy – Twenty-First Report of Session 2005-06. London: HMSO.
- Nardi, E. and S. Steward 2003. Is Maths TIRED? A Profile of Quiet Disaffection in the Secondary Mathematics Classroom. *British Education Research Journal* 29(3): 345-367.
- Noyes, A. 2007. Rethinking School Mathematics. London: Paul Chapman Publishing.
- Smith, A. 2004. Making Mathematics Count. London: HMSO.