Family mathematics/numeracy: identifying the impact of supporting parents in developing their children's mathematical skills

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For a number of years, parents have been encouraged to become involved in their children's learning. This has led to 'family learning' provision of various types being developed and funded. There have been a number of studies looking at parental involvement in their children's learning, though less with a focus on the perspective of the parents (although see Abreu and Cline 2005). The researchers have started a small scale, pilot investigation in the impact of the provision on parents in supporting their children. Previous authors (McMullen and Abreu 2010) have noted that such parental support means that parents are engaging in some aspect of teaching. The study involves interviewing parents about their motivations for learning, their views on their ability to support their child's learning, and the extent to which the courses involved have assisted this process. The data collected so far indicates heterogeneity in motivations although some possible categories are emerging which may assist planning for such programmes.

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Introduction

Parental involvement in school education has been the object of various studies, for example the Impact project (Mertens and Vass 1990), in which it was argued that such involvement assisted the development of children's learning. Family learning programmes have been provided to help support such parental involvement by developing the skills of the adults. A study of more general adult numeracy provision (Swain et al 2005) has demonstrated that helping their children is one of the motivations for adults to attend classes. LLU+ was asked to run a number of these programmes by two London boroughs and the authors decided to use the opportunity to undertake a small scale, pilot study into the impact of such programmes.

The study

This study is an investigation into the impact that various Family Mathematics programmes have had on parents in two types of provision. The researchers have supported programmes in two London boroughs. In one borough two 60 hour programmes have run in early years centres and in the second borough seven 30 hour programmes have run in primary schools.

The learners were asked to complete short questionnaires on joining the classes and volunteers took part in semi structured interviews. The questionnaires were intended to find out why the parents joined the course and the type of support that they already provided for their children. The purpose of the interviews was to find out from the parents examples of how they support their children and the

elements of the course that may have assisted this, or aspects that may need further development.

It was decided that the class teacher (the authors) would collect the data including conducting the interviews as there was a wish to minimise disruption and make the learners feel comfortable during data collection. The authors are aware that the participants are likely to be positive about the programmes (and that some of the questions chosen may be seen as 'leading' e.g. 'in what ways has the course changed your own mathematics / numeracy knowledge?') and so it was important to us that participants discussed specific examples of interventions (e.g. 'can you describe a recent time when you have successfully helped your child with mathematics?'). In other words, the authors were more concerned with *how* the provision may have helped rather than whether it did.

It is perhaps unsurprising, given the multicultural nature of the London boroughs, that these groups contain a variety of backgrounds although we note that the groups (so far) are made up almost exclusively of women and contain very few participants identifying themselves as 'white British'. This may say something about the wider relevance of the research and suggests an investigation into those that attend, and those that do not, would be worthwhile.

Other literature

There is a small but growing body of (international) literature on Family Mathematics provision. McMullen and Abreu (2010) found that many parents were unclear about current teaching methods and were reliant on their children's explanations, but the children often had difficulty explaining. Their research concludes that participating in different mathematical approaches allows parents to be more positive and understand their value.

Abreu and Cline (2005) looked at the impact of children's home culture on their maths learning in school. They looked at school maths in school as a different social practice to school maths in the home. They found few differences between groups of parents apart from some language issues. However they report that their research shows that parents do not find it easy to teach their children at home and argue that parents need support with both how maths is taught in school and strategies for bridging the home-school gap.

Ginsburg and Farina (2008) explored the roles women take when attempting to solve mathematical problems with their children. They conclude by advising that 'adult educators should be sensitive to helping parents consciously prepare for this work.'

In order to discuss the data that is collected the team has found it useful to describe two types of provision. One type (Type I) of provision focuses on children's learning and the content of the school curriculum, adult skills are discussed and developed as a secondary feature. Another type of provision (Type II) focuses on the development of adult skills with an awareness of children and the school curriculum. We claim that Family Mathematics programmes lie on a continuum between these two types with the longer programmes at the children centres closer to Type II and the shorter programmes closer to Type I. It is possible to see that Type I provision focuses on subject pedagogic knowledge while Type II is more of a mix between subject and subject pedagogic knowledge in the sense of Shulman (1985).

The data

The research is ongoing and at, the time of the report, 8 learners had been interviewed, 3 from each of the longer courses and 2 from one of the shorter. The following quotes are selections from the interviews which illustrate the type of responses obtained in the research.

On changes

> There's a lot of maths English I did not know. .. I never heard of it and I learn a lot now. Which changes my feelings, I become a lot more confident. Because I lost a job before because of maths… I come for my kids, to help in the future as well. (Parent B)

On how the course impacts

> Anything we are doing is helping. When I look at what we are learning back home, and what we are learning here, its different ways… When I come to class and learn myself how to do the maths, I understand my children. (Parent E)

> The things we did with the games and that with the rabbits, it makes it more exciting. (My children) really liked that one. My kids are 8 and 6. They wanted to win – there were arguments over the game. 'Can we play it again!?' (Parent G)

Table 1 displays some key characteristics of the parents and their children as described in the interviews.

Main motivation	**Own maths**	**Child's mathematics**	**First Language**	**Home activities**	**Prog. type**
A - Improve own maths & help children	Always loved maths. Assessed at L1	Confident at the moment but child is very young	Spanish	Counting	II
B - Improve own maths	Poor – caused job loss. Assessed at E3	Very young – too young to say	Tigrinya / Amharic. Has done ESOL classes	None noted although discusses counting	
C – To help child	Grade C at GCSE but feels she is not good at maths.	Worried that child will not enjoy maths.	English	Counting	
D – To help children	Not confident. Did not like maths. Grade G GCSE. Assessed at E3.	Quite confident and really enjoys maths.	English	Has done activities with younger child but not confident helping 9 yr old.	
E – To help children & improve own maths	Likes maths but not confident. Used to be confident in own country. L1	Not confident. Thinks maths is ok.	Somalian - difficulty with maths terminology	Had tried to help children but didn't always understand the questions.	
F - Help children	Lacked confidence. No qualifications in maths. E3 assessed.	Lacks some confidence but enjoys maths.	Chinese	Tried to help but didn't understand school methods.	
G – To help children	Fairly confident in own maths .	Confident.	French	Cooks with her children.	I
H - Help children	Enjoys maths but not confident. No quals. Assessed at E2.	Very confident and really enjoy maths	English	Counting using pennies and practical activities. Helped with homework.	

Table 1 Key characteristics of parent participants and children identified from interviews

Some categories of parents

The following have emerged as categories of the parent participants. (Note that the descriptions should be understood as reported rather than statements of fact.)

1. Confident in own maths / joined to help child:

> A – has gained ideas about helping her child and knowledge about school methods (but has also been able to make sense of what she learned at school).
>
> G – confident in own maths but not in helping child due to only knowing one method and not knowing how to explain or teach her child; gained knowledge of different methods, ideas for helping and confidence; worried about confusing her children.

These individuals expressed very positive attitudes towards mathematics, confidence in their own abilities and joined mainly to help their children (although A mentioned improving her mathematics as well). They were already helping their children through activities but were not completely confident about how to help them – either now or for the future. It is interesting to note that their children are also confident in mathematics. One of them had joined a type I course and one had joined a type II course (this may not be important to the participant and may just be a case of opportunity and location). It is not surprising therefore that they reported gaining knowledge about school methods, finding out what their children are learning and getting ideas for how to help them at home i.e. the pedagogy. One of them was worried about confusing her child but has now gained confidence in their ability to help. This learner mentioned particular strategies and methods such as using *compensation* for subtraction and the *lattice method* for multiplication, as being particularly helpful.

2. Low confidence in own maths but enjoys it / joined mainly to help child:

> E – Low confidence is linked to not being able to help due to language issues and not having studied mathematics for a long time. Used different methods in her own country; child not confident with mathematics. Improved understanding of mathematics language through doing written questions. Being able to help her child has improved her own confidence and reports her child has improved a lot.
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> F – Low confidence is also linked to language; children previously didn't understand her methods; through the course she gained knowledge of UK school methods and improved her language. This learner connected with her child through a course resource using a school method that he understood. Now she thinks maths is 'magic'.
>
> H – Enjoyed mathematics but had forgotten some of it and is not very confident. She already helped with homework but has gained knowledge of methods, strategies and resources for helping her child. She has found using games fun and has reminded her of some forgotten mathematics.

This is an interesting group in that they have expressed an enjoyment of mathematics but are not confident in their abilities. For two of these people, this lack of confidence may be related to the fact that English is not their first language. Their children vary in their level of confidence, while two of them enjoy it and the other thinks it is 'ok'. All of them had tried to help their children at home but with limited success, consistent with McMullen and Abreu (2010) noted above. It is therefore understandable that these people are very keen to find a way to be able to help their children with mathematics. The two ESOL learners report having benefitted from an

improved understanding of the mathematical language as well as knowledge of the school methods. They hint at an improved connection with their children through their knowledge of the school methods in this country which are different to those learned in their own countries, (c.f. Abreu and Cline 2005) although the parents in this study did not express resistance to the alternative methods. They also mention methods and resources that have been particularly helpful, such as the box method for multiplying and the 100 square for counting. The learner who also wanted to improve her own mathematics reports that her improved ability to help her own child has, in turn, improved her own confidence. Indeed, all of them have gained some confidence, want to continue learning and take qualifications in mathematics.

3. Low confidence / did not enjoy mathematics

> B – Poor maths caused her to lose her job; has language issues; gained new knowledge (UK methods) and improved understanding of mathematics language. Has gained confidence. Not helping her young child at the moment.
>
> C –Did not enjoy mathematics at school. Learner has gained enjoyment of mathematics due to teaching styles on the course matching her learning. Developed a passion for passing on her knowledge using teaching strategies from the course eg talking to her child about toy shapes
>
> D - This learner had bad experiences at school. But her attitude towards mathematics has improved; due to the practical teaching styles on course and links to relevance in everyday life. Has enjoyed learning current school methods and found them helpful for improving her own skills. Has gained confidence and ability to help her children with mathematics.

This group have joined for different reasons and may be the most difficult to persuade to join such courses due to their negative experiences and feeling about mathematics. For the two learners who joined to help their children, it appears that a strong desire to do so has overcome their own feelings and lack of confidence with mathematics. They were already helping their children at home but have gained confidence in their ability to do so and are very keen to use the new ideas and activities they have been exposed to with their children. One learner has not mentioned helping her child at all as a reason for joining the course and does not claim to help her child at home. Nevertheless she does help with counting although does not consider this to be mathematics. She has gained confidence and learned new things in mathematics and mathematics language. These learners point out the teaching styles and strategies on the course as being particularly attractive to them, an important issue as they did not enjoy mathematics at school. The difference in teaching methods seems to have helped change their attitudes towards mathematics and they are keener to engage with maths as a result (c.f. McMullen and Abreu 2010, where parents reported an improvement in their feelings about mathematics).

Discussion

Overall it is noted that participants on both programme types have identified a range of positive aspects of the courses and a variety of reasons for their attendance. There are parents who have their own skills higher in their sights although we also note that they feel this will help them assist their children later. There are parents who feel that the UK education system is something of a mystery to them some of whom also need significant language support. There are parents who want to learn methods that help their children learn.

From the position of a provider it seems to be important that such courses encompass a variety of aims in order to meet the range of needs of the participants. We argue that such courses should be taught in an interesting and engaging way that highlights that mathematics can be fun. It appears however, that a *more detailed initial assessment and diagnosis of learner motivations* may be helpful in responding to parents needs and in the planning and delivery of provision.

It seems that knowledge of current school methods is a priority for most but there are many other things that different people gain from such Family Mathematics courses. Our findings are consistent with Abreu and Cline (2005) although we have looked at it from the point of view of the parents' feelings about mathematics rather than the perspective of the child. Here the differences seem to be that the 'confident parents' gained more confidence from knowledge of school methods, while the less confident parents needed to develop their own mathematics, as well as knowledge of school mathematics, before feeling equipped to help. However all parents were able to express some impact on their ability to work with their children.

Conclusion

This pilot research suggests a number of possible follow up studies. There is a possible quantitative study with a relatively large set of learners identifying the mix of motivations for attending. There is a possible smaller scale, in depth longitudinal study tracking the changes in motivation and the impact of specific activities on the parents and their children.

In addition, as we noted above, there is a possible study into the composition of such family learning groups.

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