Why parents can't always get what they (think they) want

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This project focuses on parents' funds of knowledge about how they use mathematics in informal, practical ways (for example in the home economy, in their work, and in planning activities), and how these funds of knowledge can be used to support children's mathematical development. Research suggests that there are close connections between children's mathematics learning, their economic literacy, and the support that they receive from parents and/or carers. We see this as an opportunity to take an innovative approach to school-home partnerships: developing the means to empower parents to make use of the everyday mathematics that they know and understand to support their children's learning. In this paper we report our project to investigate parents' beliefs and feelings about their own knowledge and understanding of mathematics, and their current perceptions of their role in their children's mathematics learning. This investigation informs a series of workshops designed to help parents find ways to support their children's mathematics learning, drawing on parents' social and cultural funds of knowledge.

Keywords: qualitative research; everyday mathematics; focus group; homework

Introduction

It is widely recognised that parents and families are the primary educators of children and are responsible for laying down the social and intellectual foundations for their learning and development. This assertion is grounded in the education research literature, conveying the clear message that parental and community support benefits children's learning, including their numeracy development (Cairney, 2000). Existing literature on parents' roles in children's mathematics learning often focuses on parents' abilities to help children with classroom tasks. The building of communication channels for parents to become informed about their children's activities and performance generally leads to improvements in children's achievement (Sirvani, 2007). However, there is conflicting evidence regarding parents' abilities to help children with homework. A meta-analysis of this research indicates that helping with homework can have a negative effect on children's achievement, especially when help consists of supervision rather than more engaged forms of guidance (Patall, Cooper, & Robinson, 2008).. A stimulating family environment can be largely beneficial for children's mathematics learning. The frequency with which parents engage with extra-curricular activities, e.g., sports events and holidays, is positively related with children's self-efficacy towards mathematics (Fan & Williams, 2009); and the provision of abundant cultural capital at home, e.g., books, music, and discussion of everyday facts, helps children to improve their mathematics achievement (Chiu & Xihua, 2008). Families often face problem-solving situations, which require the instantiation of considerable mathematical knowledge and practice (Goldman & Booker, 2009). Research on mathematics in the home consistently shows that families often draw on distinctive funds of knowledge that include an array of information,

skills and strategies that can be qualitatively different to, but equally effective as, the mathematical knowledge that children are taught in school (Baker & Street, 2004). Earlier attempts to connect home and school mathematics demonstrate that day-to-day household situations are rich in opportunities for children to learn and apply different forms of mathematics (Winter, Salway, Yee, & Hughes, 2004).

This project is based on findings from recent research conducted by the authors (Jay & Xolocotzin, 2012) where we found a sizeable proportion of parents are motivated to support their children's mathematics learning, but are anxious about their ability to help. We also found that children's involvement in the everyday mathematics of the family (including, for example, management of the home economy, time management and children's autonomous economic activity) is an important source of mathematics learning. Using a partnership approach informed by Goos and Jolly (2004), and by the parent-engagement model of Hoover-Dempsey et al. (2005), we will develop workshops to empower parents to draw on and share their own uses of mathematics to support their children's mathematics learning.

Empowering parents to support their children's mathematics understanding

The Everyday Maths project reported in this paper aims to develop methods for empowering parents to reflect upon and share their uses of mathematics in everyday life, so they can support their children's mathematics learning. The project focuses on parents of children in Year 3 and Year 4 in Bristol primary schools. In the first stage, we investigated parents' motivations and attitudes towards their children's mathematics learning, and of their own uses of mathematics. We did this through focus groups and informal playground interviews, the findings of which are reported in this paper. We are currently in the second stage, which involves designing workshops to empower parents to reflect upon and share their social and cultural funds of knowledge relating to mathematics with their children.

Focus groups

We ran focus groups in 15 schools across Bristol, and 1 inner-city school in Birmingham. The schools ranged in size (from 30 to 90 children in Year 3), ethnicity (Bristol is a diverse city, rich in culture and migration, and schools were situated in a range of areas around the city), economic affluence (we ran focus groups in the some of the most affluent and least affluent areas of Bristol) and location (leafy suburbs and inner city). Our topic guide for the focus group was structured to explore issues related to the ways in which parents interacted with their children about mathematics; parents' experiences of school mathematics and how that differs from their children's experiences; interaction with school about mathematics; parents' confidence and feelings about mathematics, and about helping their children with mathematics; and ways in which parents use mathematics in their everyday lives. Over the course of the focus groups, we kept a shared reflective journal. An initial coding framework for the focus groups was based on the key ideas noted in the reflective journal: the initial codes were grouped conceptually and given working definitions. Using NVivo 9 (QSR International) we independently used the initial framework to code two separate focus groups, allocating sections of text (anything from a sentence to several paragraphs) to particular descriptive codes. Subsequent discussions resulted in the number of codes being reduced, with some codes being deleted, and others being re-defined. A further trial round of coding resulted in some new codes being added and others being re-defined to create the final coding framework for the groups. This

framework was then used to code the entire corpus of focus group transcripts. We present these themes below.

Theme 1: Difference and dissonance

The theme of "difference and dissonance" concerns the efficacy of parents to help their children complete homework, how this efficacy plays out in practice, and the emotional response of both parents and children to this practice. Parents talked extensively about how they found their children's mathematics homework "strange", "weird" and unfamiliar. They did not recognise the mathematics techniques that children were being taught in school and because of this struggled to grasp how to complete homework sheets. This sense of mathematics being unfamiliar was cross-cutting with regards to our sample. It was identified and discussed by parents with different levels of education (e.g. parents who left school early and parents who studied mathematics at university), employment status (e.g. unemployed parents and middle class professionals), and parents from different ethnic groups (e.g. British, Somali, Iranian, etc.). A British parent described the problem which resonated with our sample:

> […] my daughter comes home - she's in a support group and she comes home with these bits of paper and I look at it and I go… I know the answer, it's very simple, I can't see this explanation of how you've got to work it out, how on earth does that work? And that's where I find myself getting lost

Some parents put this lack of familiarity down to their own inadequate education or to forgetfulness, whilst other parents recognised that the mathematics taught to their children is different in kind to the mathematics taught when parents were at school. The differences in the content of mathematics and how mathematics was taught resulted in dissonance between parents and children during homework time. Parents who struggled to support their children's learning felt disempowered and sometimes avoided their children or got upset if they were asked for help.

Theme 2: Home-school communication

The above issues of difference and dissonance were framed by parents in terms of poor home-school communication. To this we can add that parents varied in the extent to which they had access to resources they could draw from to support them in developing contemporary curriculum knowledge. Poor home-school communication combined with parents' limited resources resulted in parents being dependent on schools to provide extra support after school, such as homework club. Under these circumstances, schools (or rather, teachers) were positioned as possessors of relevant skills and knowledge, and parents become dependent on the teachers, in order to help with homework.

Parents talked about wanting more information about the mathematics techniques taught in school; how to teach mathematics; children's progress in mathematics; the amount of time spent doing mathematics in school; when mathematics was taught; the amount of time children should spend doing mathematics at home (both prescribed homework sheets and additional activities like multiplication revision); how schools measured progress; and how parents can prepare children for tests.

Theme 3: Everyday mathematics

Whilst parents commonly described how they struggled with homework, when asked to reflect about whether their children engaged in mathematics not set by teachers a rich array of examples was offered. Popular examples discussed by parents revolved around cooking and money. With regards to the former, parents described how children engaged in weighing, measuring and mixing ingredients, timing how long cakes took to bake, estimating portion size, etc. With regards to the latter, parents talked about children saving and spending pocket money, estimating the shopping bill, and finding the cheapest items in a shop. Sometimes the concept of money itself was also discussed with children:

> It is interesting when they ask you how much things cost … when you do tell them how much something costs and they go, blimey, that's a lot of money, … we have quantified in the cost of an iPad before in our house and that would be four iPads, and it's just try and quantify costs in terms of something that they use on a daily basis, or four cans of beans, or whatever.

Parents also talked about children engaging with the home environment by utilising everyday items during play, including rulers and tape measures to measure the height, width and depth of objects such as cupboards and doorways. This sense of curiosity about the objective properties of the home environment extended beyond the house and into the garden. One parent described her daughter counting the number of weeds in the garden, whilst another parent described introducing the idea of applied sciences to tree-climbing:

> It's almost like – so there's the technology side of things and learning but also the practical – like the pulley system. My son's gone up into the tree, so we've made pulley systems to go into the tree and we can do all that and like, I know we're not working out forces and pulleys and all the rest of it but it's still a practical application of science and mathematics and all that sort of thing and that's a really fun thing to do, you know?

In addition to exploring the physical environment, children also explored themselves and each other, using number concepts, such as using height charts, counting using hands and fingers, and playing competitive games such as who can run the fastest or the furthest. This notion of mathematics being a vehicle for play and competition was sometimes nurtured by parents, who facilitated such engagement by providing material resources such as times table posters near dining table to invoke discussion. One parent described how siblings would use everyday items in competitive games such as guessing the weight of food in jars.

The concept of time was also something parents tried to teach their children. Parents explained that their children had difficulties with time because of its different representations (e.g. digital/analogue; twelve-hour/twenty-four-hour; etc.). To overcome this complexity, parents either restricted talk about time to certain clock faces (such as only referring to analogue) or juxtaposed different clock faces (one parent described placing a digital and analogue clock side-by-side on her son's bedside table).

Theme 4: Motivation, self-esteem and hiding mathematics

Children's enthusiasm for mathematics influenced the extent to which they engaged in mathematics outside of school. For example, children who enjoyed mathematics at school sometimes tried to replicate school mathematics at home. Parents described children writing number bonds or playing with number lines when no homework was

set, and children sometimes asked parents for mathematics problems to solve. By contrast, children who had difficulties with school mathematics were described by parents as averse to talking about mathematics at home. When mathematics conversations where initiated by such children it was usually about seeking help with homework. As described previously, some parents who lacked mathematics confidence avoided supporting their children during homework time. However, other parents attempted to solve homework problems with their children and/or seek advice (e.g. from family members). In addition, parents sometimes described their attempts to support children's mathematical thinking outside of homework by explicitly bringing mathematics into everyday conversations and activities. This was sometimes done for remedial purposes - parents felt that their children required more input than the school was able to provide. Parents linked their children's achievement (or lack of) to their children's self-assurance, as one parent said:

> I honestly believe that performance is a link to confidence. So, if someone's confidence keeps getting knocked, "I can't, I can't, I can't", then she isn't flourishing […] to feel like they've achieved something is quite a big impact on their confidence.

When parents asked children to solve mathematics problems in everyday contexts it was hoped that children would "discover" that they could, in fact, "do maths" which in turn developed children's self-esteem and motivation to engage in mathematical thinking. However, not all children responded well to the introduction of mathematics outside of homework, as one parent described: "if you take on the role of teacher they lose interest". This realisation led some parents to prescribe activities which - although rich in opportunities for numerical reasoning - were not considered by children to be mathematics activities.

Conclusion

Our focus group findings have been the topic of this paper. What has been clear is that parents feel disempowered by shifts and updates to the National Curriculum insofar as the mathematical techniques which schools teach children do not resemble the kinds of mathematics that parents were taught when they were at school. Consequently, this creates an epistemological rift whereby existing parental knowledge is seen as somehow out-of-date, wrong and potentially detrimental to children's mathematical development (i.e. teaching children the wrong technique confuses children and results in low grades). Whilst some parents have the cultural, social and material capital to negotiate this epistemological rift safely and acquire the new knowledge currently privileged by schools (until the National Curriculum is updated again in 2014), others feel daunted by the task and even avoid facing up to it altogether. Parents spoke about wanting to understand how to teach their children mathematics, yet we would suggest that it is unrealistic for parents to take on the role of "teacher of school maths at home". Whilst schools can share their approaches to mathematics teaching in workshops with parents, the progression of children through the curriculum results in further training needs and perpetuates parents' reliance on workshops which can be costly and time-consuming. Despite expression of concern across our sample about parents' lack of subject knowledge, there was evidence that parents engaged in some form of mathematics on a regular basis. When parents reflected upon their everyday activities they began to share conversations and practices which can be understood as mathematical. They began to reimagine what mathematics was, where mathematics took place and how they could engage their children in mathematics: kitchens became

places to discover the role of temperature, time, ratio and portions, shops became places to instil the value of money (Could you find the cheapest beans?), to estimate bills and to workout change, and bathrooms became sites for time management (Hurry up! You'll be late for school!). These concepts, contingent upon everyday contexts, where discovered by some parents during focus groups, but others planned for such interactions using covert strategies. Mathematics became hidden, disguised so children did not recognise it and then reject it as something they only had to do in school. This interplay of different forms of knowledge (everyday mathematics vs. school mathematics, tacit vs. explicit), and different strategies for introducing mathematics (whether deliberate or hidden) suggests that mathematics can permeate the lived experiences of children and parents regardless of current trends in school education. We see our task as empowering parents to reflect upon and identify their pre-existing skills, help them discover ways of engaging their children in qualitatively different kind of mathematics, and help us (as researchers) to understand what has so far been missing from mathematics research: the tacit and situated nature of lived mathematics.

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