

The Everyday Maths Project

Empowering parents of primary school pupils to support their children's maths learning, through the mathematics they use in everyday life.



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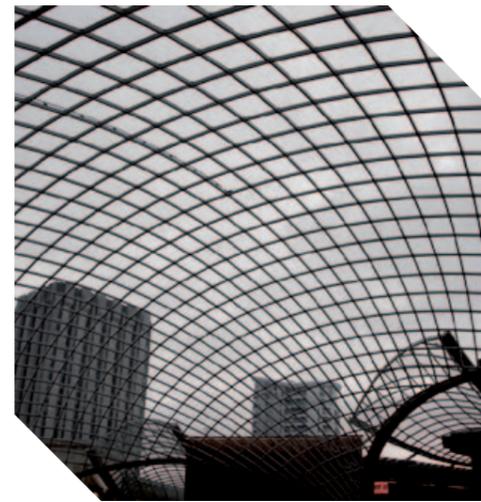
Background to the research

This project aimed 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.

Teachers and parents recognise the importance of children's mathematics learning, in terms of its role in children's future opportunities in work and further study. Previous research has shown that family life can be a valuable source of mathematical knowledge and learning, but one that is frequently undervalued and under-recognised as such by both teachers and parents.

Most parents are motivated to help their children with their learning of mathematics, but do not feel that they have the confidence and/or knowledge to do this effectively. Parents, however, have much experience using mathematics, albeit often in ways that are different to those seen in the classroom. Children's participation in the everyday mathematics of the family is an important source of mathematics learning.

The project was based in primary schools in Bristol, and involved an investigation of parents' motivations and attitudes towards their children's mathematics learning, and of their own uses of mathematics, followed by workshops designed to empower parents to reflect upon and share their social and cultural funds of knowledge relating to mathematics with their children.



Project outcomes and impacts



Workshop discussion:

Where is the maths in choosing a biscuit?

One group of parents were talking about the maths involved when children are offered a biscuit from a selection. Children may choose a biscuit according to size, surface area, shape, colour, volume, weight, or density of biscuits. There are opportunities to talk about the differences and relationships between these qualities.

Sometimes a choice is made based on how rare a biscuit is - the rarer the biscuit, the more valuable or desirable it may be, which in turn introduces concepts of supply and demand. How many biscuits are in a pack? How many biscuits have been eaten so far? How many people want to eat the biscuits? Who do I have to share the biscuits with? This also relates to probability - what is the likelihood of the biscuit being there later if I don't eat it now?

Focus groups with parents across 16 schools found that:

- ✎ Parents often struggle to help their children with school maths. This is sometimes because they feel they do not have enough knowledge of mathematics, or because they are not familiar with the methods that the children have been taught to solve problems, or because they are unsure of the best way to teach their children - particularly when children struggle with classroom mathematics, or do not enjoy mathematical tasks.
- ✎ Parents do not often value the diversity of mathematics that takes place in the home: examples discussed during focus groups were generally limited to basic arithmetic within the contexts of money, cooking and time.
- ✎ Parents said that they wanted regular information from schools about what their children were learning in maths, the ways it was being taught, and how they could help at home. In effect, parents seemed to be saying that they wanted to be trained as maths teachers.
- ✎ Discussions about maths were dominated by school maths, which means that parents felt excluded from their children's maths learning and worried about introducing home-maths talk.



Workshops with parents resulted in the following outcomes:

- ✎ Over the course of the workshops, parents became much more positive about discussing maths with their children than they had in the focus groups. In the focus groups, parents spoke a lot about frustration. As the workshops progressed, parents spoke about the things they did with their children, and understanding ideas together.
- ✎ Discussing activities such as finding a rope swing, playing Jenga, whittling wood, and swimming helped parents think about possibilities for conversations with their children. These kinds of activities were really important in terms of allowing parents to think about mathematics as a way of experiencing the world.
- ✎ Parents began to realise that they could ask questions about the world with their children, and did not always have to know the answer. They began to see maths as a way of exploring ideas. A key finding across the workshops was that once parents let go of the idea of needing to be the expert, or needing to know the right answer, then home maths-talk became much easier to engage with.
- ✎ Parents wanted to define maths at the start of the workshops, but struggled to do so. They then realised that it was ok to be uncertain. This allowed parents to explore ideas that crossed boundaries with science, geography, history, or economics, for example.

If children have to share biscuits they may be thinking about subtraction, division, and fractions, particularly if there are not enough biscuits to go around, or if the amount of biscuits they can have is limited. The relative size of a chocolate layer to a non-chocolate layer – or the ration between them – may be an issue! Children may prefer the flavour of smaller biscuits, but may take a larger biscuit if they are hungry. Some children may estimate the number of biscuits in a packet (e.g. by feeling them in the shop) and compare the weight and size of the packets. Parents may be interested in the biscuits' nutritional information and the amount it costs to buy a packet – and if children know the price of biscuits they may prefer the more expensive ones.

The intervention

Workshop discussion: Where is the maths in going for a walk and finding a rope swing?

One parent went for a walk with their child and found a rope swing hanging from a tree. This gave rise to opportunities to talk about what makes the rope swing from side to side - introducing ideas about forces, vectors and weight. There were also opportunities to talk about the difference between precise mathematical models taught in the classroom and the differences people experienced in the real world.

Estimation could be introduced (e.g. the gap between the floor and rope at different points in the swing) and potential talk about how kinetic energy is converted during the movement of a swing. Parents and children can make use of concepts and measurements to come to an understanding of the world even if they do not

Parents participated in four hour-long workshops, held over four months, and facilitated by researchers from the University of Bristol. The workshops aimed to:

- ✦ explore the kinds of activities parents did with their children in everyday life
- ✦ discuss the kinds of maths that was involved in those activities
- ✦ think about how that maths could be introduced into conversations with their children.

The focus of the workshops were not about school maths. The workshops focused on what parents ordinarily do in their everyday lives, and thinking about the concepts involved in that. These included ideas such as probability, risk, modelling the world, prioritising, categorisation, as well as arithmetic.

Recruitment of parents to participate in the workshops was an important part of the project. We put posters up in schools, gave out flyers and spoke with parents in the playground, and held a pre-workshop meeting to explain to parents what the workshop was about.



How research was carried out

✦ Prior to the workshops, parents of children in Year 3 in 16 schools took part in a total of 19 focus groups. Discussions covered parents' level of confidence and perceived ability in mathematics, their experience of doing mathematics with their children out-of-school, and their interactions with school about mathematics. This enabled us to understand how parents felt about maths, prior to starting the workshops. Participating schools included a wide range according to size of school, percentage of children eligible for free school meals, percentage of children with English as an additional language, percentage of children with special educational needs, percentage of children achieving a level 4 or above at Key Stage 2 in English and Maths, and the relative affluence of the area. While we did not explicitly collect demographic data from parents, those attending were from a wide range of countries, with vastly different educational and employment experiences.

✦ A series of workshops was run for parents in each of four primary schools. The workshops were audio recorded and transcribed. Analysis focused on the way in which parents spoke about maths, and about their relationship with their children and maths, and how this developed over the duration of the workshops. Participating schools included one in a mainly Somali community, one in a relatively affluent white middle class area, and two in relatively deprived areas of the city with diverse ethnic intakes.

✦ This research project was funded by the Nuffield Foundation.

do the sums. For example, parents and children can talk about the relationship between different forms of measurement in relation to rolling down a hill (how the speed of a roll is related to the gradient and size of the hill). There was talk about the time it would take to get back home. Surveying the land and identifying landmarks helped people gauge how far they had come, and how much further they had to walk. Because the route back home was downhill the child estimated that it would be quicker to get back. This introduced ideas around time and distance and the relationship between different natural objects in the environment. There was also talk about perspective and relative height; how tall is the tower? How much taller is the tower than the tree? How much taller is the tree than me?).

Project outcomes



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The outcomes of the project suggest that:

- ✦ There is great potential in children's home and family life for activity to support children's mathematics learning. An understanding of ways in which mathematics is used out-of-school can help improve children's attitudes towards mathematics and to help children understand the value and relevance of mathematics in a variety of contexts.
- ✦ Parents and the wider family should be encouraged to explore the mathematics that is involved in family life and activity, and to share this mathematics with children. Children need regular support in order to recognise the mathematics in the world around them, and parents are often the best people to provide this support.
- ✦ Schools should be encouraged to engage with parents in ways that value parents' existing knowledge and skills. An emphasis on classroom mathematics content and methods can discourage parents from supporting children's mathematics learning.
- ✦ Parents do not need extensive mathematical knowledge to support their children's learning. Discussion of interesting questions, and talk about ways that mathematics can help us with everyday activity, can be more useful than knowing a correct procedure or answer.