

Making Maths REAL

Working with parents to support children's early mathematical development



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A report for practitioners in early years settings

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Introduction

'Making Maths Real' has arisen as a development of the NCB Early Childhood Unit's (ECU) 'Making it REAL' early literacy programme.

ECU received funding from the DfE National Prospectus Grant (2013-2015) to deliver the 'Making it REAL' programme which sets out to support and improve the quality of early literacy work with families. The project uses an evidence-based approach to early literacy through partnerships with parents, inspired by the original 'Raising Achievement in Early Literacy' (REAL) project led by Cathy Nutbrown and Peter Hannon¹ and building on Lottery funded work in Sheffield and Oldham (2009-2012).

Working with eight local authorities and rolling out training nationwide, the 'Making it REAL' training and projects are designed to enable practitioners to use the 'REAL' approach to reach out to parents and families. 'REAL' uses an evidence-based approach to build parents' confidence and knowledge to support the early home learning environment. This approach has been shown to have a powerful impact on children's outcomes and on family literacy practices.²

The 'Making it REAL' project offers families a series of home visits and literacy events to explore key strands of literacy, using an underpinning framework. The ORIM framework³ is used to plan and reflect on how parents help their children's early literacy development by providing opportunities, recognising children's achievements, interacting and providing models of literacy use.

The ORIM framework has mainly been used to support early literacy; however, an Economic and Social Research Council funded project (2011-2012) enabled Cathy Nutbrown to work with practitioners to explore new uses of the ORIM framework. Examples of this work, including using ORIM to support work with visual images, the arts and digital literacy, can be found on the ORIM network website⁴.

The 'Making Maths REAL' project has, in part, been intended to explore answers to the question which has often been asked by practitioners and training participants: "Does this also work for maths?"

For the purposes of these materials, 'parents' are defined as all parents and family members who may be involved in the care of young children.

¹ Nutbrown et al (2005)

² <http://www.ncb.org.uk/ecu/making-it-real-2009-12>

³ Hannon, 1995, Nutbrown et al, 2005

⁴ <http://www.real-online.group.shef.ac.uk/index.html>

Developing ‘Making Maths REAL’

The ‘Making Maths REAL’ project was developed as part of the innovations strand of DfE funding for ‘Making it REAL’ literacy work. The aims were:

- to explore using the ORIM framework to enable parents to support children’s learning and development in early mathematics
- to trial some materials and approaches with children and parents
- to gather feedback on the success of the work
- to develop some practice examples that might be used as a starting point for future work.

The project commenced with a visit to the University of Sheffield in June 2013, to discuss ideas with Cathy Nutbrown and a group of experienced ‘Making it REAL’ practitioners. Ideas from that meeting were then shared with a group of practitioners from settings in the London Borough of Camden and around the country. Practitioners carried out work with children and families, which can be seen in the practice examples (see page 22). The age range of the children in the practice examples includes babies and those in Reception class, but the materials are intended to be most useful for those working with two-, three- and four-year-olds.

Evidence and impact

The work has been developed from the starting point of the evidence base of the ORIM framework, the REAL project and by a short review of the evidence base around early mathematics and early home learning.

The practice examples represent exploratory approaches to using the ORIM framework to support early mathematics, containing anecdotal accounts from practitioners of the perceived strengths and weaknesses of the approach. This was a small-scale exploration and so the ‘Making Maths REAL’ project work did not employ a formal research methodology, nor did it include formally measuring the impact of the work on children and families.

Research evidence

This section summarises what research evidence tells us about:

- why it is important for parents to support children's early mathematical development at home
- what key messages we can give parents about how to help children to develop their mathematical knowledge, understanding and skills
- whether there are any key messages to help parents support their children effectively in specific areas of mathematics
- what messages we can take from research evidence to inform our approach.

Why is it important for parents to support children's early mathematical development at home?

Supporting children's early mathematics at home is one aspect of a strong early home learning environment.

The Effective Pre-school and Primary Education Project (EPPE 3-11) followed over 3,000 children from pre-school to the end of primary education and beyond. Researchers found that playing with and learning numbers was one of seven key early home learning activities that were closely linked with children's attainment at age seven and at age eleven. (Sylva et al, 2010)

A strong early home learning environment is linked to future achievement in mathematics.

The EPPE study also found that a strong early home learning environment had a significant positive effect on children's mathematics attainment at age eleven. (Sylva et al, 2010)

Children's everyday experiences are rich in potential for mathematical development.

In all areas of mathematics (number, shape and space, measure and data handling) children bring into school a rich informal knowledge learned in everyday situations. (Aubrey 1994)

How might parents support children's mathematical learning and development at home?

Children using mathematics for a real life purpose

Children benefit more from practical experiences that use mathematics for a purpose than from abstract formal learning.

Children aged 2 ½ to 3 years old were more accurate in counting a set of objects in order to check their own estimate of a simple calculation task than when asked to count the same number of items without a purpose. (Gelman, 2006)

Adults using mathematics for a purpose

If parents and other adults are seen to use mathematics for a purpose, it supports young children's knowledge and understanding.

If adults are seen counting out loud for a reason (counting the numbers of children for dinner, say) children have more readily grasped the mental aspect of the activity that they see. (Munn, 1997 in Barber, 1998).

Making opportunities to play and learn with adults and other children

Using mathematics in language-rich social contexts support children's understanding better than abstract formal learning.

A detailed study of one child's number development through early childhood showed that social activities such as giving objects to other people offered more opportunities for learning than activities without a social context. (Mix, 2002)

Children in a toddler group were observed developing mathematical ideas in a social group without adults being present. (Bjorkland, 2012)

Reading books together

Reading and discussing picture books may present children with opportunities to develop their mathematical skills or discuss concepts and ideas.

Researchers observed pairs of parents and children reading a story book together and observed that, through conversation and dialogue, the children's mathematical learning was encouraged and supported as the parents provided strategies, asked questions, or provided information. (Anderson et al, 2004)

Are there examples of how parents might interact to support children's mathematical knowledge, understanding and skills in specific areas?

Parents can model the process of one-to-one correspondence when counting: saying one number name for each object.

Modelling one-to-one correspondence through counting was more successful than doing so through object-matching activities. (Thompson, 2008 in Evangelou et al, 2009)

e.g. "one (touches object), two (touches object), three (touches object)..." and so on.

Parents can help children to understand that the final number in a counting sequence represents the total number of objects. This is known as the 'cardinal number'.

Using a circular 'altogether' gesture at the end of counting a group of objects helps children to understand that the final number refers to the total set. (Suriyakham 2007 in Evangelou et al, 2009)

e.g. when counting five objects "...three, four, five (makes circular gesture)...five altogether."

Parents can value the marks or symbols that children might make to represent mathematical processes or ideas. This mark-making is a valuable aspect of their mathematical development.

Marks might include making symbolic marks to represent one item they are counting, their own versions of numerals to 'label' a quantity or making many marks to represent a large or unknown quantity.

(Worthington, 2007). **e.g. marks might look like lines, circles, dashes or non-typical letters or numbers.**

Children's confidence in counting up, counting down and then from starting points other than 'one' underpins their wider understanding of number and calculations.

Secure understanding of the counting words in order was found to be helpful when children were later taught strategies such as 'counting on' to solve addition problems. (Weiland, 2007) **e.g. counting up (1, 2, 3, 4...), counting down (...4, 3, 2, 1) and then, as they become more confident, from different starting points (3, 4, 5, 6...).**

What messages can be gathered from research evidence to inform the approach?

The research evidence therefore points towards the value of an approach which:

- focuses on the role of parents and the early home learning environment
- places mathematics in the context of everyday activities
- emphasises using mathematics for a purpose, for adults and children
- provides opportunities for discussion and interaction between adults and children.

The following sections explore how the ORIM framework might apply to mathematics and how to present the key strands or aspects of mathematics in the light of the above research evidence.



The ORIM framework

Opportunities, Recognition, Interaction and Model

The ORIM framework⁵ is based on the idea that there are four ways in which parents and families help their children's development. Teachers and practitioners can support parents by building on what they already do.

The ORIM framework has mainly been used in the context of supporting early literacy, but it is also possible to set out how it can be used to support early mathematics:

Opportunities for mathematics

Parents provide learning **opportunities** for children. They play, sing songs, provide practical experiences and take children out to experience other environments. They provide space and permission to use materials or objects. Practitioners can support and expand the opportunities that parents provide, by offering ideas and equipment.

Recognition of children's mathematical development

Parents **recognise** and value their children's achievements – they notice the small steps that children take in their early mathematical development. This might include knowing some number names, being interested in their age, recognising different shapes, spotting numbers on packaging or signs, making up their own signs and symbols or beginning to understand the different times of the day. Practitioners can support the process of recognition when they share development milestones with parents.

Interaction around mathematics

Parents **interact** with their children; they play and talk with them and let them join in real activities. Children enjoy being included in activities with a purpose. Parents and children can interact when weighing, measuring and counting food in cooking, or engage in pretend play around 'shops' or 'cafes'.

Models of mathematics

Parents **model** how they use mathematics in everyday life. When adults make their use of mathematics explicit, children are likely to want to copy or join in - as children like to do what adults (and older children) do. Adults might show children that they are counting the number of items that they need, or telling the time of the day by looking at their watch.

Opportunities, recognition, interaction and model might then be mapped against aspects or strands of mathematics to produce a grid which can be used to help plan and focus work for families.

⁵ Hannon, 1995, Nutbrown et al, 2005

Developing the strands of mathematics

The original 'Raising Achievement in Early Literacy' project⁶ identified four aspects or strands of literacy that might be useful when working with families: environmental print, books, early writing and aspects of oral language. It would therefore also seem helpful to similarly break down the large and complex area of mathematics to support work with young children and their families:

Possible approach: curricular

In this approach mathematics might be divided into strands based upon the areas of learning and development of the Early Years Foundation Stage (EYFS):

	Numbers	Shape, Space and Measures
Opportunities	<i>Practitioners might use this cell to plan work for families e.g. the opportunities that parents might provide for their children to extend their knowledge of number.</i>	
Recognition		
Interaction		
Model		

For example, the early learning goals for these areas are defined within the *Statutory Framework for the Early Years Foundation Stage*⁷ as follows:

Numbers: children count reliably with numbers from 1 to 20, place them in order and say which number is one more or one less than a given number. Using quantities and objects, they add and subtract two single digit numbers and count on or back to find the answer. They solve problems, including doubling, halving and sharing.

Shape, space and measures: children use everyday language to talk about size, weight, capacity, position, distance, time and money to compare quantities and objects and to solve problems. They recognise, create and describe patterns. They explore characteristics of everyday objects and shapes and use mathematical language to describe them.

Development pathways for these areas of learning are set out in detail within *Development Matters in the Early Years Foundation Stage*⁸.

⁶ Nutbrown et al, 2005

⁷ Dfe, 2012

⁸ Early Education, 2012

Possible approach: the ways in which children experience mathematics

	Environmental maths	Everyday maths	Stories, songs and rhymes
Opportunities	<i>Practitioners might use this cell to plan work for families.</i>		
Recognition			
Interaction			
Model			

In this approach mathematics would be divided into strands based upon the ways in which a young child might encounter and experience it in their everyday life:

Environmental maths: mathematics that the child might encounter and experience in packaging, labeling, signs, the built environment and the natural environment.

Everyday maths: mathematics that the child might encounter and experience through meaningful everyday experiences such as eating, drinking, moving, dressing and play.

Stories, songs and rhymes: mathematics that the child might encounter and experience through stories, songs and rhymes.

Curriculum elements of mathematics may be developed through each strand. For example, environmental maths might include a child encountering elements of number knowledge, calculation and shape.

Please see pages 16 to 18 for examples of using the ORIM framework for each of the strands of mathematics.

Comparison of approaches

The two possible approaches might be compared as follows:

Curricular	The ways in which children experience mathematics
<p>Advantages:</p> <ul style="list-style-type: none"> • Relates closely to the EYFS • May support parents in understanding practice within the setting. • Possible to map children’s progression in early mathematics due to materials provided to support the EYFS. 	<p>Advantages:</p> <ul style="list-style-type: none"> • The strands of mathematics relate closely to children’s everyday life and how they experience mathematics. • Easy to build into life and everyday routines. • The strands place the work in the context of the early home learning environment, rather than the setting. • The everyday context makes mathematics approachable and ‘demystifies’ the curriculum area.
<p>Disadvantages:</p> <ul style="list-style-type: none"> • Does not easily relate to how children experience early mathematics as part of their everyday life. • The strands may need to change as and when the EYFS is updated. • May lead to abstract teaching and learning rather than learning which is embedded in everyday life. • The curriculum focus detracts from the intention of supporting the early home learning environment. 	<p>Disadvantages</p> <ul style="list-style-type: none"> • Curriculum elements of mathematics are distributed across the strands, therefore it may be more challenging to map children’s progression in early mathematics.

Having evaluated the advantages and disadvantages of the two approaches, it was decided to develop the strands based around the ways in which children experience mathematics, as described above. The strands used for this approach were ‘Environmental Maths’; ‘Everyday Maths’ and ‘Stories, Songs and Rhymes’.

The three strands have been mapped against the ORIM framework (pages 16 - 18) and links are made to the practice examples, which can be found on pages 22 to 31.



Environmental maths

Opportunities

Parents provide opportunities for children to experience mathematics through the environment around them by:

- visiting different places outside the home, including parks, shops, public transport, play spaces, libraries, museums and leisure facilities
- drawing children's attention to quantities, numbers, patterns and shapes in the visual environment at home and outside
- visiting natural environments, including those with leaves, stones, twigs, bark or shells
- providing opportunities and permission to stop, look and talk about what children see.

Recognition

Parents recognise and value their children's mathematical achievements through the environment around them by:

- being aware of small steps that children might make, for example noticing that a child is beginning to recognise some of the numbers on the front of buses
- describing what the child has achieved: 'You recognised that those bricks are rectangles!'
- offering praise and recognition, such as a smile, a hug or saying 'Well done!'
- sharing achievements with other important people in the child's life.

Interaction

Parents interact to support their child's mathematical development through the environment around them by:

- actively engaging children in talking about quantities, numbers, patterns and shapes in the visual environment at home and outside
- engaging in mathematical activities alongside them e.g. spotting numbers on an advertisement, counting objects in a shop window
- describing what children are doing and reflecting (repeating back) what they are saying.

Model

Parents model mathematical ideas, concepts and skills through the environment around them by:

- explicitly modelling using mathematics for a purpose: 'I need to catch a number 29 bus so I am going to wait until I see the number 29 on that sign, then I know that my bus is coming'
- demonstrating specific mathematical skills e.g. counting the number of cars in a car park, then adding on one more when another one arrives.

Related practice examples:

'Nature Walk' (page 23), 'Bingo' (page 26) and 'Transport' (page 27)

Everyday maths

Opportunities

Parents provide opportunities for children to experience mathematics through their everyday life by:

- enabling them to freely access toys, play-equipment and safe household objects
- encouraging active participation and progression towards independence in eating, dressing, self-care and simple household routines
- going on visits to different places outside the home, including play areas and natural environments
- encouraging them to interact with other children and adults.

Recognition

Parents recognise and value their children's mathematical achievements in everyday life by:

- being aware of small steps that children might make, for example recognising that a child is beginning to talk about the different times of the day
- describing what the child has achieved: 'You are counting how many plates we need!'
- offering praise and recognition, such as a smile, a hug or saying 'Well done!'
- sharing achievements with other important people in the child's life.

Interaction

Parents interact to support their children's mathematical development in everyday life by:

- involving and engaging them in real tasks such as cooking, gardening or DIY
- engaging in mathematical activities alongside them e.g. counting spoons or comparing objects, describing and discussing something that has been seen
- describing what children are doing and reflecting (repeating back) what they are saying.
- taking part in children's play, responding to their ideas and supporting or extending their activities.

Model

Parents model mathematical ideas, concepts and skills in everyday life by:

- explicitly modelling using mathematics for a purpose: 'There are four of us, so we need four plates... I am going to count them as I put them on the table'
- Demonstrating specific mathematical skills e.g. touching one button for each number while counting.

Related practice examples:

'Shape it' (page 24), 'Snack Maths' (page 28), 'Playdough' (page 29) and 'Sandwich' (page 31)

Stories, songs and rhymes

Opportunities

Parents provide opportunities for children to experience mathematics through stories, songs and rhymes by:

- visiting the library or borrowing books from their early years setting
- reading high-quality picture books with their child each day
- enabling their child to freely access picture books when they are at home
- taking part in song and rhyme sessions
- sharing stories and songs in their home languages
- singing songs and sharing rhymes as part of everyday life.

Recognition

Parents recognise and value their children's achievements in mathematics through stories, songs and rhymes by:

- being aware of small steps that children might make, for example saying the number names alongside a parent in 'The Very Hungry Caterpillar' or beginning to touch the illustrations of the pieces of fruit
- describing what the child has achieved: 'You are saying the numbers with me!'
- offering praise and recognition, such as a smile, a hug or saying 'well done!'
- sharing achievements with other important people in the child's life.

Interaction

Parents interact to support their child's mathematical development through stories, songs and rhymes by:

- reading aloud to their child or singing alongside them, using expressions, actions or gestures to illustrate mathematical concepts
- discussing what happens in a story, song or rhyme, by encouraging the child to comment on what is happening and exploring the ideas together.

Model

Parents model mathematical ideas, concepts and skills through stories, songs and rhymes by:

- using mathematical language to talk about objects, characters or events in books. For example, for *Room on the Broom*, pointing out that 'one more' animal has got onto the broom and asking 'how many are there now?'
- demonstrating mathematical skills: for example, counting the pieces of fruit in 'The Very Hungry Caterpillar' by saying one number name as they touch each picture.

Related practice examples:

'Goldilocks' (p 25) and 'Sandwich' (p 31)

Project work

A group of practitioners was brought together in late October 2013 for a project meeting in the London Borough of Camden. The project group comprised six practitioners from five settings, including children's centres and private, voluntary and independent settings.

The purpose of the project work was to take forward initial ideas around using the ORIM framework for early mathematics and to test them in practice with practitioners, parents and children. The timescale for the project work was short, but each setting agreed to carry out activities with children, parents or groups of families. The project work was supported by a local authority officer from the London Borough of Camden and by a member of staff from the NCB Early Childhood Unit.

A project feedback meeting was held in December 2013. All settings were interested in continuing the work and incorporating it into their ongoing practice. A feedback survey was completed at the follow-up meeting, with results as follows.

Practitioners described the following positive outcomes:

- raising parents' awareness of how mathematics can be incorporated into everyday activities
- positive impacts on parental engagement within the setting
- raising parents' awareness of the breadth of mathematics beyond numbers and counting
- positive recognition of what parents are already doing with their children in their everyday lives
- increased awareness of mathematics amongst other practitioners in the setting.

Practitioners would have preferred:

- more opportunity to discuss and debate the strands of mathematics
- a longer timeframe.

Comments:

'It has strengthened my own knowledge of the ORIM framework and its usefulness for parents'

'Great impact in improving our services and close interaction with parents'

'...an acknowledgement of what they (parents) already do'

'Parental involvement has been more positive'

'Parents were surprised how they used maths in everyday life, in language, shapes and sizes.'

In order to gain a range of examples, some further project work was set up with practitioners in other parts of the country. Examples from this project work can also be seen in the practice examples, from page 22 onwards.

Working with parents

One finding arising from the project work was the range and diversity of approaches that practitioners used to work with parents during the mathematics project. This varied from setting to setting, in terms of how parents and children were involved, the timing of work and where the work took place.

This is supported by the work of Cathy Nutbrown and Peter Hannon (2011), who suggest that it is important to consider both the focus and location of work with parents. For example, inviting parents to come into the setting in order to become more familiar with practice is only one of four possible ways of working, as suggested in the diagram below.

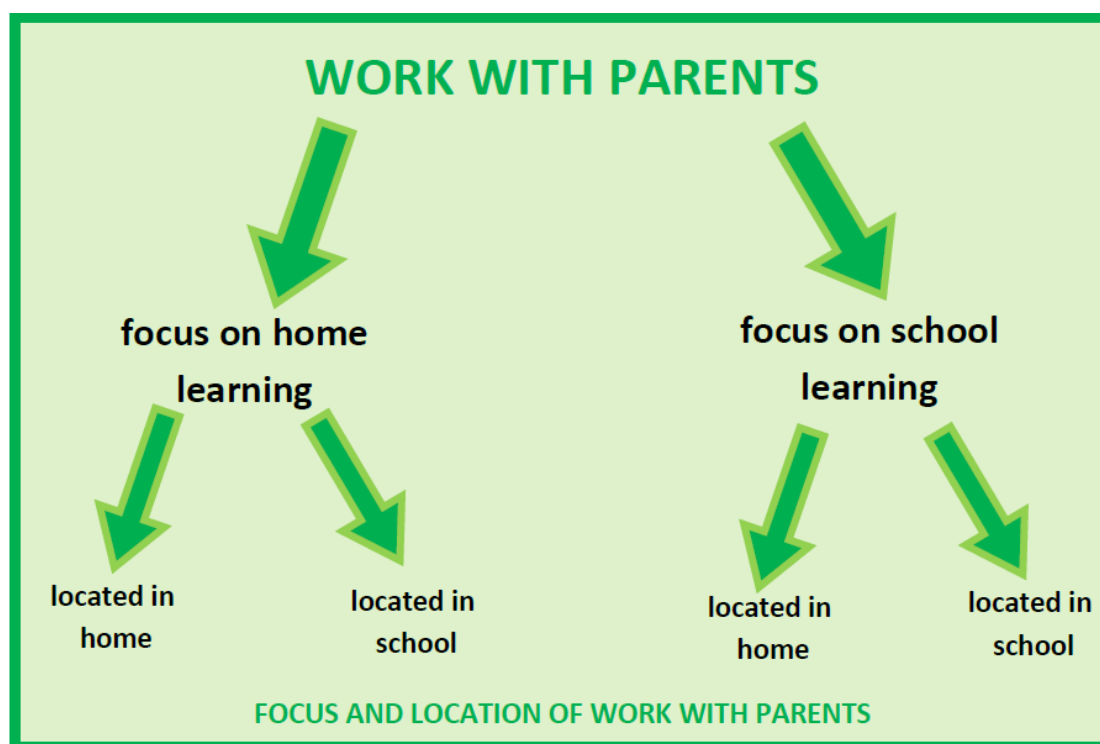


Diagram taken from *ORIM: a framework for practice* - Nutbrown and Hannon, 2011.⁹

The 'Making it REAL' early literacy programmes in Sheffield and Oldham (2009-2012) and the 'Making it REAL' literacy development projects in eight local authorities (2013-2015) involved both home visits and literacy events based within the setting or other venues. For example, a sequence of work with parents

⁹ Available at <http://www.real-online.group.shef.ac.uk>

might have begun with a family-learning literacy event within the setting, focusing upon a popular theme, story or topic. This would be followed by a home visit, where a practitioner might learn more about the child's interests and develop activities to build upon what they are already doing at home or carry out activities to prepare the children and parents for the next literacy event at the setting or elsewhere. The 'Making it REAL' project approach therefore successfully encompassed both a focus on home and setting learning, carried out in both locations.

The shorter timescales and limited budget of the mathematics project work meant that it was not practicable for settings to carry out home visits, but practitioners did develop a number of ways of working that enabled parents and children to engage with the approach both in the setting and at home.

How practitioners supported parents and children:

- integrating mathematics events for participating children and their parents into ongoing setting provision
- family-learning style events such as workshops or trips
- individual meetings with parents
- workshops or meetings for parents
- working with participating children during ongoing setting provision
- developing activity or resource packs to be taken home.

The approach to working with parents taken by each project setting is described and highlighted within the practice examples.

Practice examples

The following practice examples came out of the project work and are intended to provide ideas and suggestions to practitioners and stimulate thinking about how to use the ORIM framework to support early mathematics:

Nature Walk	Coram's Fields Children's Centre, Camden, London
Shape It!	Bluebells Nursery, Camden, London
Goldilocks	1a Children's Centre, Camden, London
Bingo	Thelwall Pre-school, Thelwall, Cheshire
Transport	Sidings Children's Centre, Camden, London
Snack Maths!	The Cavendish School, Camden, London
Playdough	Broomhall Nursery, Sheffield.
Sandwich	Glodwick Infant and Nursery School, Oldham



Snack Maths workshop at The Cavendish School, Camden.

Nature walk

Coram's Fields Children's Centre in Camden followed children's interests by taking a group of parents and children on a journey to collect natural resources.

'We began the work by talking to parents about the different areas of mathematics and noted that some parents were really surprised at how much maths is used without being aware of it, in all areas of everyday life.

'The children had said that they wanted to collect leaves, so in November we took them and their parents on a short walk to Mecklenburgh Square, which is a lovely enclosed square, tucked away in the middle of London. We gave them each a bag to collect their leaves and encouraged parents to draw out mathematical language such as 'light', 'heavy', 'large' and 'small'. One boy proudly reported that his bag was 'really heavy' and it turned out to be full of stones! The maths did not stop when we sat down on a picnic rug to have our snack – I overheard one parent asking her daughter what they should do to share out two croissants between three people.

'The trip was really enjoyable and, as well as the opportunities to talk about mathematics, it fed into other areas of the curriculum. We talked about the colours and shapes of the leaves and the ones we had collected were brought back to the setting and used in art work and collage.'



How practitioners supported parents and children:

- Centred on children's interests
- Information for parents combined with parent-and-child activities
- Follow-up work integrated into ongoing provision.

Shape it!

Bluebells Nursery in Camden invited parents to a workshop on shape.

'We began by talking about the different strands of mathematics and noticed that parents were quite interested in the breadth of mathematics, in that it is not just about numbers and counting. We also shared information about where shape fits in within the EYFS.

'The parents also responded well to the ORIM framework and we spent some time talking about different ways to present opportunities for spotting shapes, such as walking along the road. We also explained that modelling might just mean talking aloud as you are doing something, for example saying 'I'm cutting my sandwiches into triangles'. We then moved on to the practical activities, including shape songs, pictures and other play. One boy and his mother spent a long time working together on a shape picture, talking and carefully positioning the shapes together to make a castle, which was really lovely to see.

'The event was welcomed by the parents, one of whom commented: 'I realise that I spend time reading and counting with my children, but I don't talk about shape.' We realised that the work had quite a big impact the next day when a child opened up their lunch box and said 'I've got triangle sandwiches!', which led to all the children talking about the shape of their sandwiches and the different items in their lunchboxes.'



How practitioners supported parents and children:

- Integrated into day-to-day provision within the setting
- Information for parents combined with parent-and-child activities
- All children in the setting experienced the activities.

Goldilocks

1A Children's Centre in Camden worked individually with children and families in the setting's baby room.

'We decided to engage parents through one-to-one conversations and short meetings at the beginning and the end of the day. We talked about the way that we give babies and young children the opportunity to explore different textures, sizes and shapes within the setting and discussed ideas for what they might want to do at home. The work was related to our current theme book, 'Goldilocks and the Three Bears'. This was a really good opportunity to build positive relationships with parents and fitted in well with some other work we are doing.

'It also was a chance to discuss some of parents' own feelings and concerns around mathematics – some parents were asking questions about formal learning and others were surprised that we would consider their children ready for anything to do with maths. So it was useful to show that early learning about mathematics is part of what we are already doing with the babies and toddlers and that it is something they can develop in simple and really fun ways at home. It doesn't have to be anything scary or special, just a part of everyday life.'



How practitioners supported parents and children:

- One-to-one engagement
- Tailored to the needs of the parents of babies and younger children
- Supporting and building parental relationships.

Bingo

Thelwall Pre-school in Cheshire introduced a mathematics activity for parents and children to use at home.

‘We sent out a letter introducing the mathematics work and asking parents to have a go at a number-spotting bingo activity and give us some feedback. The response was very positive with parents saying how much they had enjoyed it, that it was fun, simple and didn’t take too long. We also had feedback that children had gone on to do more number spotting now that they have been prompted to start off by the activity.’

‘All the parents were keen to do more, so I put together some wallets with some simple number activities, stories and rhymes for the parents and children to use at home. The home learning activity packs have been a huge success with children and their parents: the children have taken them on outings, on holidays and to grandparents’ houses.’

‘We talked to parents about what they might want to do with the setting. They weren’t too keen on the idea of an environmental maths walk while the weather was so bad, but we did go on to complete an Easter egg hunt at our Easter Fair in the local area surrounding the pre-school. We decorated and laminated A4 sheets of paper eggs which we numbered and hid in the environment. The children then took a pen and paper and ticked off the numbers they found on their walk, returning to the pre-school for Easter egg rewards.’

Number Spotting Bingo

See how many times your child can spot numbers in the environment when you are out and about.

Tick the box to indicate a spot! Draw any other on the back.



How practitioners supported parents and children:

- Easy-to-access activity provided to all children and their parents
- Developed by sharing mathematics resource packs with families
- Plans to incorporate this into other activities within the setting.

Transport

Sidings Children's Centre in Camden carried out work on transport.

'We began by introducing the work at our regular parent/carer meeting, where we talk about what is happening at the centre and ask parents to contribute their views and opinions. We introduced the strands of mathematics and gave parents the opportunity to discuss and write down ideas for what they could do with children under each of those strands. We encouraged the parents to go away to try out one of those ideas and let us know how it went.

'The parents seemed to enjoy generating ideas under the strands and gave really positive feedback. They responded really well to the idea that mathematics doesn't have to be just about addition and subtraction and especially to the idea that it can be developed through ordinary, everyday activities that you can do at home. One parent said 'It makes me realise what you can learn without special toys that can be expensive.'

'We followed this with a maths walk for the children of participating parents. Two children, who had an existing interest in vehicles, went to the bus stop where they used a tally chart to make a record of various methods of transport. They also went to observe trains at the railway station, recognising the numbers on the carriages of the train and watching the arrivals board count down to the next train. Assisted by the discussions during the parents' workshop, one of the children then completed a tally chart at home and brought it back in to the setting.'



Photographs of the tally chart and the children during the activity.

How practitioners supported parents and children:

- Providing an opportunity for parents to engage with the materials
- Encouraging parents to generate their own ideas and approaches
- Following children's interests when arranging the activities, so that they easily translated to home.

Snack maths!

The Cavendish School in Camden carried out a 'snack maths' workshop with Reception-aged children and their parents:

'We had already developed the 'snack maths' session in our Reception class as a way of providing an everyday experience that allows a rich and meaningful context for mathematical thinking and development.

'We decided to use the opportunity of the project to try to get parents more involved. Working with blueberries, grapes, rice cakes, pieces of banana and other favourite foods, the children were given the opportunity to explore activities around addition, subtraction, difference and also measurement. We worked individually with parents and their children, demonstrating the particular kinds of interaction and modelling that might support children's learning. What was really interesting was that the children also took ownership of the activity and were often the ones doing the 'modelling'. I heard one child say: 'I am showing my mummy how to do it'.

'We felt that the session went really well and many of the parents commented on the benefits of using the fruit and how meaningful this was to the children. Another thing we have realised is that, as a setting, we send books home and generally put the teaching of literacy in the foreground of what we do with parents, but that this is the first time we have focused on how parents can support maths. We will definitely be continuing the work.'



How practitioners supported parents and children:

- Integrated into ongoing provision within the setting in an activity that can also easily translate to home
- Taking place in the context of a familiar activity, giving children confidence and high levels of engagement
- Giving children ownership of the activity and encouraging them to model techniques to their parents.

Playdough!

Broomhall Nursery in Sheffield carried out a workshop on making playdough.

'We started off by taking the children to the supermarket to buy playdough ingredients. This gave us lots of opportunity to look out for numbers on car registration plates, prices and signs. We also talked about the shape and size of packaging as we bought the ingredients.

'When we returned to the setting we gave the parents the opportunity to talk about what they already do to support their child at home. We also talked a little about the importance of their role in their child's learning and development. After that, all the children worked with their parents to make the playdough, using measuring equipment. We could hear lots of mathematical language such as 'how many', 'more' and 'less'.

'We found that parents were pleasantly surprised at what their child already knew and were pleased that so much could be got from a fairly simple idea. They also enjoyed the range of content, as I think they had expected it to be just about counting, but we spent time talking about using the correct language when talking about shape and measures.

'Following the session, each family was given the playdough recipe and a resource pack of cooking equipment from the session, with tips on how to use these to develop mathematical concepts at home.'

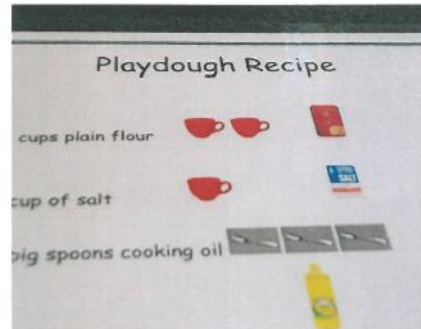
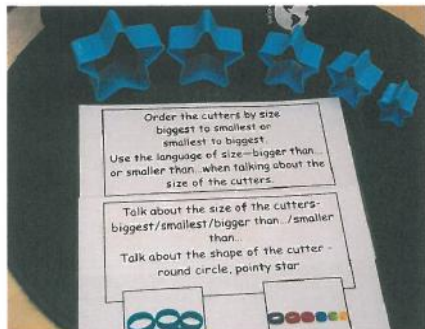
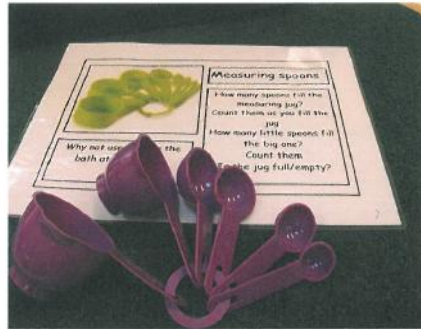
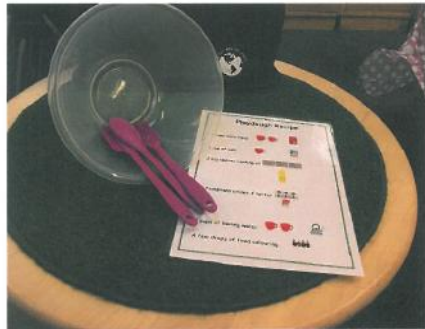


How practitioners supported parents and children:

- Family learning session with the opportunity for parents and children to work together on an activity
- Parents given opportunities to discuss what they might already do at home
- High quality resource packs provided to parents.



Contents of resource bag
to be given to each
family participant.



Resource packs given to parents during the playdough workshop at Broomhall Nursery, Sheffield.

Sandwich

Glodwick Infant and Nursery school in Oldham ran family learning workshops for parents and children.

'We began by sharing some story books with the parents, which were books that we thought could be particularly useful for working with numbers. We showed parents some different ways in which the story could be used to support the children's counting and number knowledge.

'The next thing we did was a mini number hunt within the setting, just as a warm-up. We then went off to the shop to buy ingredients for making sandwiches. While we were there we encouraged the children to look out for numbers on prices, signs and notices and gave them the opportunity to have a go at handling money. When we came back to the nursery we made the sandwiches together, encouraging the children to talk about shape, size and using other mathematical language.

'We had very positive feedback from the parents, several of whom commented that they would try to look out for numbers when they are out shopping. One mum commented that it was so nice that 'it doesn't have to be an hour every day and you can do easy things'.

'We are hoping to hold more workshops for all the nursery parents to attend and are thinking of setting up a workstation where parents can make resources to take home.'



How practitioners supported parents and children:

- Giving parents an opportunity to engage with the materials, alongside their children
- Exploring concepts in the context of the familiar activity of shopping.
- Providing the opportunity to attend workshops at different times.

Discussion

Positive outputs of the project work included:

- the opportunity to share and discuss the ORIM framework and draft strands of mathematics with early years practitioners
- sixteen episodes of work with children and their families across the participating settings, including family learning style workshops for parents and children, workshops or meetings for parents, activities or events for children and engagement via home-learning materials
- positive informal feedback from participating practitioners and parents, who also reported on the enjoyment and engagement of children
- plans in the participating settings for further work to enable parents to support young children's mathematical development
- interesting findings emerging from the project work around the variety of approaches used to work with parents.

Points for future development:

Further work might include:

- further examination of the strands of mathematics, their title, descriptions and what they cover to ensure that they are as useful as possible to parents, children and practitioners
- project work in early years settings to gather more feedback from practitioners on using the strands of mathematics and ORIM framework to support young children's early mathematical development
- evaluating the impact of using the ORIM framework on children's outcomes in early mathematics, for example by looking at children's stages of learning and development before and after project work takes place
- evaluating the impact of using the ORIM framework on parents' knowledge and confidence in supporting their child in early mathematics.

Resources

The resources on the following pages may be helpful for those planning work with children and families:

- Project planning
- ORIM framework: single strand of mathematics
- ORIM framework: multiple strands of mathematics
- Mathematical concepts in stories, songs and rhymes
- General resources
- References

Project planning

Who will we work with?

All children/groups of children/targeted children

What will we do?

Ideas for events, activities or targeted work in the home or setting

When will the work take place?

Possible dates and times that will work for our families and our setting

Where will the work take place?

Venue, public space, setting or at home

How will we encourage families to participate?

Thoughts around methods of communication or different ways of taking part

ORIM framework: single strand of mathematics

	Strand or area of mathematics:
O Opportunities	
R Recognition	
I Interaction	
M Model	

ORIM framework: multiple strands of mathematics

	Environmental maths	Everyday maths	Stories, songs and rhymes
O Opportunities			
R Recognition			
I Interaction			
M Model			

Mathematical concepts in stories, songs and rhymes

This is not an exhaustive list but may be a useful starting point for working with stories, songs and rhymes.

Number sequence	Author
<i>One, two, buckle my shoe...</i>	Traditional rhyme
<i>One man went to mow...</i>	Traditional song
<i>This old man...</i>	Traditional song
<i>'Engines, Engines': An Indian Counting Rhyme</i>	Lisa Bruce and Stephen Waterhouse
Counting	
<i>One Ted Falls Out of Bed</i>	Julia Donaldson and Anna Currey
<i>One, Two, Cockatoo</i>	Sarah Garson
<i>The Very Hungry Caterpillar</i>	Eric Carle
Size and Proportion	
<i>Goldilocks and the Three Bears</i>	Traditional tale
<i>The Enormous Turnip</i>	Traditional tale
<i>The Three Billy Goats Gruff</i>	Traditional tale
<i>The Bad Tempered Ladybird</i>	Eric Carle
<i>The Giant Jam Sandwich</i>	John Vernon Lord
Addition and 'More'	
<i>Room on the Broom</i>	Julia Donaldson and Axel Scheffler
Subtraction and 'Less'	
<i>The Shopping Basket</i>	John Burningham
<i>Five little ducks...</i>	Traditional song
<i>Five Currant Buns...</i>	Traditional song
<i>Ten green bottles...</i>	Traditional song

Days and Months	Author
<i>Jasper's Beanstalk</i>	Nick Butterworth and Mick Inkpen
<i>Solomon Grundy...</i>	Traditional song
<i>One Year with Kipper</i>	Mick Inkpen
Logic and Reasoning	
<i>Monkey Puzzle</i>	Julia Donaldston and Axel Scheffler
Opposites	
<i>Maisy Big, Maisy Small</i>	Lucy Cousins
<i>Kipper's Book of Opposites</i>	Mick Inkpen
<i>Opposites</i>	Robert Crowther
<i>How Big is a Pig?</i>	Stella Blackstone and Claire Beaton
Position	
<i>Where's Spot?</i>	Eric Hill
<i>A Dark, Dark, Tale</i>	Ruth Brown
<i>Each Peach Pear Plum</i>	Janet Ahlberg and Allan Ahlberg
Sequencing	
<i>We're Going on a Bear Hunt</i>	Michael Rosen and Helen Oxenbury
<i>Doing the Washing</i>	Sarah Garland
<i>Maisy Goes to Bed</i>	Lucy Cousins
<i>Here we go round the mulberry bush...</i>	Traditional song
Time of day	
<i>The Bad Tempered Ladybird</i>	Eric Carle
<i>Peace at last</i>	Jill Murphy

General Resources

NCB webpage for 'Making it REAL'

<http://www.ncb.org.uk/ecu/making-it-real>

Information about the ORIM Framework and REAL literacy work on the official REAL website:

<http://www.real-online.group.shef.ac.uk/>

Book of songs to support learning about number, calculation and shape - all set to well-known tunes:

Helen MacGregor, Ana Sanderson and Michael Evans - *Tom Thumb's Musical Maths*

Book for early years practitioners:

Linda Pound – *Thinking and Learning about Mathematics in the Early Years*

Resource sheets on maths and everyday life:

<http://nrich.maths.org/early-years> for PDFs including *Cooking, Number Rhymes, Shopping* and *Tidying*.

Leaflets for parents:

<https://www.early-education.org.uk/maths-everywhere> for the *Maths is Everywhere* leaflet.

<http://www.nationalnumeracy.org.uk/parents/index.html> for the '*We do Maths Everyday*' leaflet.

NCB 'Parents, Early Years and Learning' practice example for a family Maths Game Library:

http://peal.org.uk/media/3755/family_maths_games_lib.pdf

Series of picture books for position, shape, counting, sorting, pattern and size:

Karen Bryant-Mole - *Marmaduke's Maths*

National Literacy Trust home for songs and rhymes:

<http://www.wordsforlife.org.uk/songs>

Books and CDs of children's songs and rhymes:

BBC - *The Wheels on the Bus* music CD

Claire Beaton - *Mother Goose Remembers* book of nursery rhymes

Faustin Charles and Roberta Arenson - *A Caribbean Counting Book*

Usborne - *The Usborne Book of Nursery Rhymes*

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The Early Childhood Unit (ECU) at NCB works to sustain and improve services for young children through direct work with children's services and settings, and through its national networks.

ECU's mission is to promote young children's well-being, learning and development, and to remove barriers to these by providing support for the planning and provision of services for young children and their families.

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