

That figures

Supporting babies' maths development is the focus of this first part in a new series by *Judith Dancer*

I am writing this exciting new series about mathematics at the start of a new year, and this is often a time for reflection. I have been thinking about the way that I was taught mathematics at school.

My story begins at primary school when I was lucky enough to have engaging, interested adults, who provided me with dough, clay and plasticine and gave me endless opportunities to build with wood and cardboard and explore assorted fabrics and materials.

I was immersed in creative activities, cooked and baked, grew things and spent hours involved in vigorous outdoor play and sports and indoor board games. What I didn't realise at the time was that all of these fantastic experiences helped me to understand many mathematical concepts.

Then I progressed to secondary school and was told I was extremely lucky to be taught by the head teacher, who was a gifted and talented mathematician. But was I lucky? Sadly, no. Yes, the head teacher was an excellent mathematician but, unfortunately, she wasn't actually a very good maths teacher.

She had a vast amount of mathematical knowledge, but she didn't share it effectively and she didn't make it meaningful or relevant. Consequently, I lost all my confidence in and enthusiasm for mathematics.

Many of you will have had similar experiences of maths 'teaching', some of you may have been put off maths much earlier, at primary school. It really is a very common experience. There are many good maths teachers, but sadly there are also mathematicians who find it hard to teach maths. Even more sadly, there are many

primary school teachers and practitioners who lack confidence in their own maths learning, so find it difficult to support the learning of others.

I was lucky because I had a wonderful dad, who was able to help maths make sense, restoring my confidence and pleasure in maths. But not everyone has a close family member, or family friend, who can fulfil that role, and many of us reach adulthood believing that we're no good at maths.

A shared belief

Many early years practitioners share this belief, and this, alongside a lack of qualifications in mathematics, can lead to early years environments that do not provide high-quality maths provision. As an All Party Parliamentary Group report on mathematics in the early years pointed out in 2014, 'Too many early years settings fail to provide young children with a good start to their maths education'; and, 'The quality of maths learning varies substantially in early years settings and this often depends on the qualifications and attitudes of the practitioners.'

The report called for better training for early years practitioners, including learning about brain development in number ability. However, I firmly believe that all early years practitioners can become experts in supporting young children's early mathematical development. You don't need to have a degree in maths or a maths A level in order to understand how children learn about maths in the early years.

I know that if we concentrate on what the children are like and what they know, can do and are interested in – rather than what we think they should become, or do, at some later



Creative activities such as playing with dough help children to understand mathematical concepts

date – then we can support them to remain confident and enthusiastic mathematicians.

Even if we lack confidence in maths ourselves, we can ensure children see maths as an integral part of everyday life and meaningful and relevant to them. We all need to be positive about maths, or our own anxieties will impact children's mathematical learning.

MATHS LEARNING: BABIES

So let's consider the very youngest children, in the baby room. Let's think about what they are like, what they do and what they are interested in. Early years practitioners working with babies often get to know the children very well and can plan resources, experiences and their own interactions with children to support all learning, including mathematical development.

During the earliest years, babies and young children are exploring, investigating and developing their understanding of the world around them. Sometimes, parents and practitioners underestimate what babies are capable of mathematically. For example, even very young babies are already sensitive to differences in number – they notice the difference between two and three.

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MORE INFORMATION

- For our maths series by Carole Skinner and Sheila Ebbutt, visit: www.nurseryworld.co.uk/mathematics-in-eyfs
- Bennett, E and Weidener, J (2011) *Everyday Maths Through Everyday Provision*. Routledge
- Dancer, J (2015) *Mathematics in the Early Years: A handy guide to supporting the development of children's mathematical skills*. PACEY
- APPG for Maths and Numeracy (2014) *Maths and numeracy in the early years*
- Skinner, C and Stevens, J (2013) *Foundations of Mathematics: An active approach to number, shape and measures in the early years*. Featherstone
- Stevens, J (2013) *Development Wheel: A Guide to Mathematics*. KMMD Publishing

Practitioners can build games into everyday practice:

- Choose toys that babies are already interested in; for example, three colourful teddy bears. Sit or lie on the floor with the baby, somewhere you are both comfortable, and play with the baby and the toys. Then put all three bears under a pillow case or piece of coloured fabric. Take just one bear out and show baby – how do they react? Are they looking around for another bear? Are they excited? Play the game again, taking out another bear and finally uncovering all the bears. Remember to stop before the baby loses interest.
- Play the game with other objects and sometimes use objects that are the same; for example, three identical puppets or three red cars. On other occasions, use objects that are similar, such as three wheeled toys of different sorts, like a bus, a car and a truck, or small, medium-sized and big cars. Sometimes, use three objects that are completely different – such as a ball, a car and a teddy.
- As the babies get older, help them to cover up and hide the bears or other objects themselves. Use fabric, pillow cases, even a duvet cover. Introduce the idea of hiding things behind your back – try hiding two objects and pulling out just one. Watch what happens if you hide two objects, and then pick up another one from the floor behind you and produce three ➤

If a familiar adult shows them three soft toys that they are interested in, then puts the toys out of sight and produces just two, the baby will move their eyes or head to look around for the missing toy. This only works for one, two or three objects but also applies to sounds – babies discriminate between two and three drum beats or shaker sounds.

What can we do?

So, if babies are already sensitive to changes in number, how can practitioners build on this? Young children are often very interested in 'hiding' games – hours can be spent playing 'peek-a-boo', with an adult hiding their face behind their hands, then smiling, laughing and saying 'boo' as eye contact is restored.

EYFS MATHS AT A GLANCE

Numbers

- Numbers in order
- Counting
- Recognising numerals
- Adding and subtracting

Shapes

- 3D shapes
- 2D shapes
- Position, direction, movement
- Pattern and symmetry

Measures

- Length
- Weight
- Capacity
- Time

Throughout this series, these elements will be explored

alongside lots of practical ideas for appropriate experiences for babies, toddlers and young children.

Aspects and early learning goals

Practitioners need to remember that the early learning goals for mathematics are expectations for the end of the Reception year. Babies and very young children need environments and experiences that are appropriate to their current needs and interests.

Numbers

Children count reliably with numbers from one 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.

As *Development Matters* (EYFS non-statutory guidance) states, it is important to remember that: 'Children develop at their own rates, and in their own ways. The development statements and their order should not be taken as necessary steps for individual children. They should not be used as checklists. The age/stage bands overlap because these are not fixed age boundaries but suggest a typical range of development.'

– what does the baby do? Is there excitement and laughter?

- As babies begin to handle things more and more, introduce boxes and bags to hide things in too – ‘post’ items into a large box together, then empty out some of the contents, or all of the contents. These sorts of experiences can be used alongside ‘posting box’ shape activities, experiences with feely bags and boxes and stacking toys.
- Play games with sound-makers too – make three noises with a shaker, then two, or beat different drums twice, and then once. As the babies grow, encourage them to make noises with percussion instruments also. Don’t forget that our bodies are great sound-makers – play clapping games with small babies and introduce stamping games with toddlers.

Other concepts

Although these experiences will clearly build on a very young baby’s understanding of number, it is obvious that they also explore other mathematical concepts too:

- Things that are ‘the same’ and things that are ‘different’.
- Things that are different sizes – some that are small and some that are bigger.
- Things that are different shapes – some that are cuboids (like a dice), some that are spheres (like a ball) and some that are irregular 3D shapes (like a car or teddy).
- Things that are different colours – some that are red and some that are blue (but don’t get too worried about colour names; colours are only one way of sorting objects!).

Playing together

The most important aspect of all of these experiences is that one baby and a familiar adult (or, at the most, two older babies) have fun playing together and that the adult uses appropriate mathematical language alongside everyday language.

At this stage, practitioners can use number names, colour names and shape names, alongside descriptive words about size such as ‘small, small, smallest, big, bigger, bigger’, so that babies hear and become familiar with these words as well as nouns (naming words) such as ‘car’, ‘ball’, ‘cube’ and ‘teddy’.

With babies, the emphasis is on the introduction and modelling of the use of vocabulary, but not an expectation

that babies and very young children will repeat words like ‘square’ and ‘circle’, ‘red’ and ‘blue’ or repeat ‘one, two, three’. Learning by rote is inappropriate and unhelpful. Babies and young children learn by doing, and learn well with adults who are co-players and enjoy being with them.

Numbers and Shape, Space and Measures

The EYFS identifies two aspects in Mathematics – Numbers and Shape, Space and Measures. Babies don’t distinguish between ‘maths learning’ and other sorts of learning, and we shouldn’t either. Most appropriate experiences support both aspects of mathematics, as well as other Prime and Specific areas of learning.

Some experiences that support babies’ mathematical understanding:

- Walking around indoors and outdoors with baby in your arms.
- Moving baby in different ways – gently up and down and from side to side.
- Providing interesting objects for baby to reach for, grasp and explore.
- Encouraging movements through floor-based play.
- Introducing finger rhymes and games such as ‘round and round the garden’.
- Using number rhymes during everyday routines such as nappy-changing.
- Giving babies lots of ‘tummy time’.
- Providing things to make marks or noises with.
- Supplying things to put objects in or under – fabric, bags, boxes.
- Providing things for babies to go inside and under – large boxes, blankets and tunnels.



Practitioners should use mathematical vocabulary without expecting babies to use it themselves

- Providing bricks and blocks to build up and knock down together.
- Giving babies opportunities to see things from different perspectives – looking up while lying on the floor, or down from a bridge.

Key points to remember

The experiences that a baby has are absolutely crucial for future development and life. Babies need to feel safe, secure, loved and valued and form firm attachments with important people in their lives.

When we are supporting babies’ mathematical development, we need to remember that, ‘All areas of learning and development are important and inter-connected’ (EYFS Statutory Framework, paragraph 1.4). We should not try to ‘teach’ maths in isolation or by rote.

We need to ensure that we are interacting appropriately with babies at all times – talking about what we are doing and why, using mathematical vocabulary for babies to hear, but not yet expecting them to use the words themselves.

These early experiences need to be pleasurable, enjoyable and positive for babies. They need time and space and enthusiastic adults to share practical, hands-on early mathematical experiences with them – clapping, making noises, moving around, responding to rhythm, rhymes and songs, building things up and knocking them down, hiding things and finding them, exploring indoors and outdoors and looking at things and talking about them together. These high-quality experiences will provide the firm foundations for all later mathematical experiences. ■

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MATHS IN OUR DAILY LIVES

We are interacting with numbers, shape, space and measures all the time in our daily lives. It’s worth reflecting on our own ‘everyday’ maths, as this helps us to explore mathematical ideas in a more meaningful way with young children. Think, for example, about how you use one element of measures – time:

- Is there time to pop to the bank before work?
- How many hours do you need to pay for in the car park?
- How long will the pie take to cook in the oven?
- How long before the train leaves?
- How much longer before the film finishes?
- How much longer can you lie in?

We all use measures, including time, every day. But sometimes we don’t realise how much maths we understand and use.