

# Summary for volunteers, parents, brothers and sisters, ...: Numeracy for all to lower primary

## Why do volunteer and family support for numeracy matter?

All the evidence suggests it is almost impossible to overestimate the importance of children's early experiences with number, pattern, shape and space, and the language associated with those: those working with pre-school and primary children in formal or informal settings, at home or in the community, have a very significant influence on what children can later do, and on their attitudes to these areas (see for example <https://www.gov.uk/government/news/graham-allen-launches-second-report-on-early-intervention>). Provision for pre-school care and education, though, and the age ranges it covers, vary enormously around the world. Children can learn to be numerate in any of these systems. We do, know (Sim et al., 2018) that in any system, parents, families and friends have a **very important** role in talking with children, and helping them to develop everyday knowledge, skills and confidence.

Whenever community provision for young children begins, it is important that it builds on the knowledge and skills children bring with them from home. Most evidence supports fairly informal, play-centred provision when children first move away from home, but with knowledgeable teaching/support that focuses on deliberate development of opportunities to build up social and practical skills, experience listening and talk, observation and discussion of the environment, and early work to recognise and enjoy the role of sounds, letters, words and numbers. This is the way that children build up meaning with mathematical ideas, and it lays a firm foundation for their later school learning. They benefit from songs, stories and rhymes that are part of their cultural heritage, and from talking about those. If there are books available, they can learn better about the functions of the written word, and patterns of following text, turning pages, and links with the spoken word. These experiences are all central foundations to children's later learning and cannot be rushed (OECD, 2018). Only when children have those basic tools, are they ready to take advantage of more formal learning. In situations where pre-school experiences have been mixed, or there is conflict, these are the important areas on which to focus initially. Links to the international research underpinning recommended provision for children before they start formal schooling include <http://www.earlyyearsmatters.co.uk/our-services/school-and-nursery-support/early-years-adviser/birth-to-three-matters/> and <https://foundationyears.org.uk>.

Numeracy, that is, a confidence and ability to use mathematics, is an essential life skill, yet many young people across the world do not use mathematics well. In most areas of the world, memorising mathematical facts and procedures used to be considered the most important approach for most learners, but now that globally, many jobs use machines to do those tasks, it is increasingly important that learners come to understand and make links with the mathematics they are learning, as well as knowing some basic facts and procedures.

This can be challenging for adults, who might have been brought up to concentrate on rote learning, but almost all adults have come to understand basic numeracy, and have a role to play in helping children achieve good foundations. Probably the most important, is their own interest and confidence to talk with the child about these things. Older people might feel their authority is being threatened, but the meaning-making approach can, rather, build on the experience and deeper understanding that teachers and family have. If there is something older people do not understand, there is a very important part to play in showing children we none of us know everything -but we can find out. One of the most important approaches is presenting a positive attitude towards mathematical ideas, which we know promotes more effective learning. Children need to know that they can make sense of such ideas, but it might take effort, and that once they do, it will be very empowering for them – in everyday life, and in employment and opportunities in adult life.

## What is a numerate child?

- Children develop at different rates, but before children can engage effectively with very much formal maths, they need **basic understandings based on lots of experience and talk**, that has built up confidence around a range of areas.
- Numeracy includes a **good, flexible understanding of number** and the uses of number in everyday life, including of parts of wholes (half an orange, fair sharing, biggest/smallest piece, more/less...).
- It includes an awareness of and creativity with **patterns of different sorts**, including pattern and shape in local crafts and building traditions.
- They talk about **where things are** (on top of, above/behind, to the right of...) with increasing precision.
- Numerate children understand **relative size** of objects or groups (bigger than, shorter than, heavier than, more/fewer...), and are beginning to grasp the meaning of **informal and formal units of measurement**, including locally used units (as long as 3 of my handspans, about a metre high, 3 cups of rice, 2 baskets of mangoes...), of **money** or other exchange (familiarity with coins and other ways of paying, working out cost of shopping and whether a shopping list is affordable, and if not, prioritising until it is) and of **time** (morning/afternoon, he'll be home in about an hour, next week, names of days and of people's ages, awareness of the seasons....).
- They talk about **2- and 3-dimensional shapes**, and properties of objects (what is the same about them, what is different? Can you find another leaf that looks like this? Can you find one that's a bit smaller?), and can follow 1- and 2-step (and later, more) directions to go and find something.
- They begin to work with ideas of **distance, direction, of speed** and their relationships with time. ('Do you think we'll get home before we need lunch, if we walk very fast, and which way do we need to go?')
- Numerate children can **role play** a variety of everyday tasks, and of jobs they see being done, where these ideas are used, such as in cooking or preparing the plates and eating tools needed for a family meal.
- They enjoy their expanding understanding of these ideas, including of increasingly big numbers, and are confident to use them to tackle everyday or play situations, and to **solve puzzles** posed by others or by themselves.

## So what can non-specialist family or volunteers or adult helpers do to support the development of young children's numeracy?

- **The foundations of learning for numeracy are interest in and talk about, these areas of mathematics.** This can begin even before children can talk themselves, but is needed at all stages. It does not need specialist knowledge of maths or of teaching, but an interest in the child and their thinking about the world.
- **'Number sense' is fostered through informal play** with outdoor activities, dance, games, songs, construction activities with natural and, if available other resources, and routines. This does not focus on learning by rote, but on frequent use of numbers in talk, and counting and labelling sets of items with numbers 1 to 10, as well as ordering: first, second, third etc. This builds up over several years, in everyday talk and tasks. ('Can you give me two bananas?' 'Can you put out one each?'), but again, such talk can usefully begin before children are ready to use it for themselves, so that they start to see the usefulness of that talk.
- Ideally, family and volunteers **involve children in everyday activities** that include counting, matching, sorting, and measures, such as cooking, planning a trip to town, sorting dirty or clean washing, shopping, ... and talk about those as they are happening, including regularly asking for, and using, estimates of what's needed.
- Family and volunteers use **language with lots of mathematical words** about number, size, shape, position and location,...and which supports noticing and talk around all sorts of pattern.... They use words from all of the above sections, in naturally occurring ways, and encourage children to do so for themselves.
- **They use naturally occurring resources** such as stones, leaves, bottle tops, buildings, bicycles, cars and mopeds, football games, cooking and crafts... to help children count, make patterns, talk about position and distance, notice similarities and differences,... **and to notice, recognise and talk about the use of symbols** around them, for instance on the number plates, or on mobile phones, or...
- They encourage children to develop their creative and critical thinking, and use of mathematical words, through **rhymes, songs, games and stories** with and without books, maybe encouraged also to make up their own stories.
- Adults and older children use available resources to engage young children with **puzzles and games** that involve taking turns, and often ideas of number and of size.
- They encourage **role play** of such situations, or of the jobs children see being done, helping children use mathematical vocabulary of number, shape and space, pattern, measure, time and money, connected with those.
- They support children's **sense of confidence and curiosity** around such ideas, and of enjoyment and satisfaction in engagement with them (Gifford, 2014).
- They **listen to children actively**, responding with questions such as 'what do you think?' or 'what would happen if?' or 'how many do you think he needs? Why?' that help children to think further, rather than just answering, correcting or silencing them.
- Where there are books available, family and volunteers show children that there are **links between the words, symbols and ideas** involved, by pointing at the relevant parts of the book. They show children how to write some of the important words or numbers, and encourage children if they want to copy that.
- They show children how to **persevere** with trying to solve a puzzle, **how to find out new information** by thinking hard for themselves or asking others who know more, and perhaps

encourage children to **begin to record number and pattern**, including in their own way, using any available tools.

*Once children begin school,*

- Family and volunteers can usefully **continue this good work**, but also talk with children about the number, shape and space, and measure work they do in school.
- As they get older, children will **expand the range of number** they work with, to include fractions, decimals and percentages, as well as bigger whole numbers, ideas of zero, and even negative numbers. **Understanding place value** is very important and is the foundation for much later number work, so that they know 57 is made of 5 tens and 7 ones, whereas 132 is made of one hundred, 3 tens and 2 ones.
- Family and volunteers helpfully show that school work is valued, and ask children to **explain representations** visitors might see on school walls that are not familiar (perhaps 'number lines' or 100-squares' or 'tables squares'), or **ways of writing down calculations** that have changed since older people learnt them.
- They encourage children to **make sense of the maths** they are doing, to think about when they might want to use it, or when it might be useful in adult life, and
- **Encourage children to ask** their teacher, family or friends if there are things they do not understand.
- They continue to encourage children to **expand their range and use of mathematical words** and known facts, and to **enjoy puzzling** out problems.

*This booklet is based on the findings of the following reports:*

Gifford, S. (2014) A good foundation for number learning for five-year-olds? An evaluation of the English Early Learning 'Numbers' Goal in the light of research, *Research in Mathematics Education*, 16:3, 219-233

OECD (2018). *Lessons from Research about Quality in Early Childhood Education and Care* <http://www.oecd.org/education/engaging-young-children-9789264085145-en.htm>

NCETM (2008) *Mathematics matters* National Centre for Excellence in the Teaching of Mathematics. Available at <https://www.ncetm.org.uk/resources/12491>

Sim, M., Bélanger, J., Hocking, L., Dimova, S., Iakovidou, E., Janta, B. & Teager, W. (2018) *Teaching, pedagogy and practice in early years childcare: an evidence review* <https://www.eif.org.uk/files/pdf/teaching-pedagogy-and-practice-in-early-years-childcare.pdf>