

Support for Reception Year and Y1

by Helen J Williams

This guidance has been written to both support and stimulate you in thinking about the mathematics we offer our youngest children, now and going forward, as the schools return.

None of this is obligatory, we realise how much pressure schools and families are under.

We are writing this with the reception teacher in mind, who may be thinking about how best to support their children mathematically when they return to school. We hope that what follows could be also be useful to focus discussions with KS1 colleagues, maths leads, and head teachers to support decision-making for September 2020 regarding provision and transition issues, as these, our youngest children, return to school.

For supporting families with 'home learning', 'Learning Trajectories' has a useful area for learning at home: https://learningtrajectories.org/index.php/pages/sub_page/32
And see this <https://family.co> article by Helen Williams <https://family.co/blog/covid-19/helen-williams-maths-at-home/>

The websites referred to in this guidance might require registration, but all are free at the time of publication, June 2020.

Firstly, some important prerequisites.

What we have taken into account first and foremost in curating these materials, is **children's mathematical well-being for future learning**. In other words, what matters most is:

- building young children's *confidence*,
- their *willingness to have a go*,
- their *mathematical self-esteem and enjoyment*; and
- establishing *firm relationships with the adults* in school and with their families.

The Characteristics of Effective Learning and Teaching (CoELT) are statutory in the EYFS

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/858652/EYFSP_Handbook_2020v5.pdf

They epitomise well-being in learning and must be taken into account when planning mathematical teaching episodes. They have been taken into account when recommending materials. The three characteristics are:

- playing and exploring (engagement)
- active learning (motivation); and
- creating and thinking critically.

In particular, 'creating and thinking critically' lends itself to nurturing mathematical reasoning. There is a section for supporting CoELT later in this guidance.

None of this is about 'catching up'. Rather, it is about being aware that **missing reception and pre-school experience will not be plugged quickly, or by moving too fast**. It is equally as important this year to remember that all reception learning is based on the three Prime Areas of the EYFS (Personal, social and emotional development, Communication and language; and Physical development) and that mathematics can be built around these prime areas, as we have indicated in the tasks, below. Not all maths can - or should - be done sitting at a table!

Reception must continue to be built on established and effective reception practice and all areas of the statutory EYFS. It is equally important that reception experiences flow into year 1 for well beyond the first few weeks of year 1. This should apply at all times but particularly so this year. This means that reception and year1 staff need to discuss how to make mathematical transition as positive as possible, **and for year 1 to be as like reception as possible**; rather than the other way around.

For example, R and Y1 considering jointly:

- which mathematical teaching experiences have been successful in R and that we can *repeat* (and repeat in Y1)?
- what were the particular *features* of these successful episodes?
- how might we best *extend* these experiences, over time in R, and during Y1?
- how are our taught mathematical experiences in R successfully moved into *continuous provision*?
- how can we continue to use *continuous provision in Y1* to build our children's mathematical independence and to cement their understanding?
- how can we continue an *emphasis on the CoELT* through R and into, and throughout, Y1?

This 2020 short article (the list of authors takes longer to read than the article itself!) by, Sullivan, Bobis, Downton, Feng, Livy, Hughes, McCormick and Russo, is an interesting read in relation to all ages of pupil returning to school mathematics: https://www.researchgate.net/publication/341168177_Threats_and_Opportunities_in_Remote_Learning_of_Mathematics_Implication_for_the_Return_to_the_Classroom

Ideas of what to do in school

This article by Helen Williams summarises recent developments in our understanding of what is important in early years mathematics:

<https://impact.chartered.college/article/mathematics-in-early-years/>

It is helpful to think of early mathematics as being based on six 'Big Ideas', all of which are equally important:

- Counting and Cardinality
- Comparison
- Composition
- Pattern
- Shape and Space
- Measures

The early years area of the NCETM site is a good starting point for finding issues to discuss with colleagues about what is important in early years maths.

This podcast interview with Viv Lloyd of NCETM and Dr Sue Gifford (who some of you will know from her appearances at our Early Years Research Group meetings) is informative on how young children develop mathematical thinking: <https://www.ncetm.org.uk/resources/52709> .

To begin to think about the six 'Big Ideas', go here: <https://www.ncetm.org.uk/resources/52500>.

Sometimes it is difficult for those not trained in child development and early years education to recognise what is actually going on mathematically when they observe a R or Y1 group of learners. What follows are respected links to explore in relation to each of these six main areas. The **Erikson Early Math Collaborative** is a rich source for understanding early maths and for ideas for maths teaching based firmly on research: <https://earlymath.erikson.edu>. The "Why early math?" tab outlines their list of the 'Big Ideas' in early maths, which overlap with the six from NCETM, above. Their "Idea Library" tab contains lots of ideas for developing maths from ordinary day-to-day tasks at home: <https://earlymath.erikson.edu/ideas/>

COUNTING AND CARDINALITY

Watch this three minute video on counting: <https://earlymath.erikson.edu/movement-counts/> This task takes into account physical development and communication (two of the three Prime Areas). It is informing to hear what the teacher is listening for and how she pulls out the mathematics elements of the activity.

Cardinality (number sense) is the 'how many-ness' of a number, and *subitising* is key in developing this sense. Viv Lloyd's article explains subitising here: <https://www.ncetm.org.uk/resources/52560> You will find many ideas for developing young children's conceptual subitising on the Erikson site.

It takes children 3- 4 years to fully develop their understanding of the all the connections between *quantities* and *numbers*. Many and varied experiences in a wide range of contexts (outside, role play, dice games etc.) need to be provided over time for children to explore to cement their understanding. For example: a wide range of opportunities to count out a small number of discrete physical objects from a larger quantity, varying these in type, size and colour, (counting items on a worksheet or PPT

slide just won't do), counting movements, counting sounds (eg coins dropping into a piggy bank), counting continuous quantities (eg spoonfuls of sand); and so on. We cannot assume that if children can count reliably to 10, they can count above 10. The 'teen' numbers are the hardest to learn in English, as they are irregular.

COMPOSITION

How numbers are made from other, smaller, numbers – the necessary precursor for any calculating.

<https://earlymath.erikson.edu/the-hoop-game-simple-tossing-game/> Listen to how the adult helps the children attend to the composition of the total (in this case 3 and later, 5). This task could easily take place outside, and played with as a continuous provision maths task, with the adult intervening at times to build on the children's understanding of how a small number is composed. It could be bigger and involve water! Keeping the number of throwing items constant and talking about the 'outside' as well as the 'inside' amounts helps the children focus on composition. If this task is introduced without controlling the total number to throw each time, rather than working on understanding the composition of one amount (total), the children will be practicing their **cardinal** knowledge by counting how many they score 'inside' each turn, and maybe finding a way to record this informally.

PATTERN

From the "Maths with Parents" site: <https://mathswithparents.com> (you will need to register) watch this 3' video on building repeating patterns, and how the adult draws the child's attention to seeing and saying the unit of repeat:

<https://explore.mathswithparents.com/KWeb?startTime=1589902627338#slctd>

This short article by Dr Sue Gifford explains why pattern awareness is so important to develop: <https://nrich.maths.org/13362>

More pattern tasks can be found here: <https://earlymath.erikson.edu/why-early-math-everyday-math/big-ideas-learning-early-mathematics/big-ideas-of-pattern-number-pattern/>

SHAPE AND SPACE

"A number of studies have also shown that these abilities are not innate but teaching young children spatial skills actually improves their maths, including their number understanding and general thinking skills."

- Dr Sue Gifford explains here clearly why shape and space are so important in mathematical development: <https://nrich.maths.org/14544>

Doing jigsaws is an undervalued area of early years. Make time for regular, collaborative jigsaw play, discussing how we choose the pieces, their similarities and differences and why and how they fit or don't fit.

Lego and Duplo play is as useful for extending mathematical language and visualisation as expensive (and wonderful) large wooden block play.

Outside, children can be encouraged to plan and build large with crates, pipes and boxes, and to describe and maybe even to draw what they see from different viewpoints.

The DREME site <https://prek-math-te.stanford.edu> here gives ideas for exploring shape and space through story books: <https://dreme.stanford.edu/news/5-great-picture-books-learn-about-shape-space>

Remember, you can find many of these books read on YouTube if you don't have access to the hard copy.

MEASURES

Measures is applied number; number in context, and for that reason, very important. If we think of how pre-school children first meet number outside school, it is often in a measures context (their age, their height, distance, 'sleeps', etc). Interestingly, Davydov (Russian psychologist, 1930-1998) maintained that number should be first introduced in a measures context:

"Using this approach to teach number focuses on the impact unit has on the count or measure."

In other words, the small spoon takes more spoonfuls than the ladle to fill the bucket with sand.

Gradually, we can begin to extend children's vocabulary when making comparisons from "big" and "small", to "a little bigger/taller/fatter than"; "about the same length as.."; "a lot heavier than.." and so on.

This video from Erikson Early Maths is an example of the practitioner extending children's vocabulary: <https://earlymath.erikson.edu/comparing-capacity-at-the-sand-table-ideas/>.

The 'wrapping presents' task from Nrich early years makes perfect sense: <https://nrich.maths.org/13535> is good for talking about size and shape and also, accuracy – how accurate do we need to be for this to be successful? All measure is to some degree inaccurate.

In this video, building two block towers leads to using something to indirectly make a comparison of height. Observe how the practitioner asks questions in order the children decide how to do this: <https://earlymath.erikson.edu/measuring-a-block-tower-in-kindergarten/>

<https://learningtrajectories.org> is an excellent site (you will need to register) to dig into all the many stages of development (the "trajectories") in the various areas of maths. It is a site to dip into when unsure about how to build on what our children know.

The Characteristics of Effective Learning and Teaching

This table expands the three characteristics:

- playing and exploring (engagement)
- active learning (motivation); and,
- creating and thinking critically.

to illustrate what these might look like in our practice.

Characteristics of Effective Learning:	Contexts and teaching strategies
<p><u>PLAYING AND EXPLORING - Engagement</u></p> <p>Children investigate and experience things, and ‘have a go’</p> <p>Choosing ways to do things:</p> <ul style="list-style-type: none"> • Planning, making decisions about how to approach a task, • solving a problem and reaching a goal • Checking how well their activities are going • Changing strategy as needed • Reviewing how well the approach worked 	<p>Engagement Model: <i>What if ... ? I wonder ...</i> Making ludicrous suggestions, deliberate mistakes: <i>I think this is the tallest we can build these bricks.</i> <i>There isn't a piece that will fit there!</i></p> <p>Giving children the responsibility to solve problems Planning: <i>What might we do? What will we need? What shall we try (now)? How might we fill that gap? What will your maze/castle/road look like?</i></p> <p>Reminder of the problem: <i>Is this going to work, do you think?</i> <i>Do we need to start again?</i> <i>Is there a better way of covering this space?</i> <i>What about if we turn that around/upside down/replace that piece?</i> <i>Does it reach all the way?</i> <i>Can you describe what you like about it? Could we have done it a different way?</i> <i>What would happen if we tried using these bricks next?</i></p>
<p><u>ACTIVE LEARNING - motivation</u></p> <p>Children concentrate and keep on trying if they encounter difficulties, and enjoy achievements</p> <ul style="list-style-type: none"> • Being involved and concentrating • Keeping trying 	<p>Celebrate: Perseverance, <i>You are looking carefully at where to place each shape so that it fits. Can you find every tall block?</i> Alternative strategies, <i>So, you cut that out and it's a rectangle, not a square, what will you try, to make sure it's square this time?</i></p>

<ul style="list-style-type: none"> • Enjoying achieving what they set out to do 	<p>A range of solutions for problems, What shall we try and make? How...? <i>Why not give it a try and see what happens?</i> <i>Two houses! How is that different /the same as yours?</i></p>
<p><u>CREATING AND THINKING CRITICALLY</u></p> <p>Children have and develop their own ideas, make links between ideas, and develop strategies for doing things</p> <p>Having their own ideas</p> <ul style="list-style-type: none"> • Thinking of ideas • Finding ways to solve problems • Finding new ways to do things <p>Making links</p> <ul style="list-style-type: none"> • Making links and noticing patterns • Making predictions • Testing their ideas • Developing ideas of cause and effect 	<p>Welcoming all different responses <i>Big blocks, boxes etc: What will you make? Will it be ... symmetrical? ... big enough for you to fit underneath?</i> <i>How is this castle/ road the same/ how is it different, to this one?</i> <i>That's one roadway that reaches across the carpet. Can you make another? How will it be the same/ different?</i> <i>So that's not big enough, what will be the next thing to try, do you think?</i></p> <p>Modeling ... being puzzled <i>I don't know! This is tricky. I wonder how they made that house look like that? I wonder if we could make a house, but with more rooms?</i></p> <p>Encouraging several alternative strategies: <i>I wonder if ...</i> ... noticing patterns, ... making wrong predictions, ... having a new idea. <i>I thought that would fit there! Why not, I wonder?</i> <i>I think that looks a bit like this one because ...</i> <i>What do you think will happen if we use these long pieces?</i></p>

Finally

Here is Ofsted's definition of teaching from both the School (p80) and Early Years (p33) 2019 Frameworks, which would be useful displayed in every reception class.

<https://www.gov.uk/government/collections/education-inspection-framework>

***“Teaching should not be taken to imply a ‘top down’ or formal way of working. It is a broad term that covers the many different ways in which adults help young children learn. It includes their interactions with children during planned and child-initiated play and activities: communicating and modeling language, showing, explaining, demonstrating, exploring ideas, encouraging, questioning, recalling, providing a narrative for what they are doing, facilitating and setting challenges.*”**

It takes account of the equipment that adults provide and the attention given to the physical environment, as well as the structure and routines of the day that

establish expectations. Integral to teaching is how practitioners assess what children know, understand and can do, as well as taking account of their interests and dispositions to learn (characteristics of effective learning), and how practitioners use this information to plan children's next steps in learning and to monitor their progress." (DfE 2019)

What else?

Here are some useful sites not directly mentioned:

<https://creativestarning.co.uk> - maths outdoors for all ages.

<https://www.bloomsburyearlyyears.com> – early years site.

And really finally – don't think getting outside and playing ball is nothing to do with maths – read this article (Giles, Shire, Hill, Mushtaq, Waterman, Holt, Culmer, Williams, Wilkie, Mon-Williams 2018) where 'interceptive timing' is related to maths success!

http://eprints.whiterose.ac.uk/127194/1/Giles_Wilkie_PsycSci_IT_Maths_Manuscript_finalformat.pdf