



Squeezed precariously in the short space between half-term and the Easter holidays, we bring you the fourth edition of the Primary Magazine this school year. In this issue, we hear from teachers devising ways to work with 'rapid graspers' – the children who 'get it' quickly – within a teaching for mastery approach, and we suggest some meaty (maths) reads, recommended as inspiring by teachers in our [most recent podcast](#).

Don't forget: all previous issues are available in the [Archive](#).

This issue's featured articles



[Keeping the Rapid Graspers Engaged](#)

In this article we look at providing for rapid graspers in a teaching for mastery approach and signpost a blog written by a Mastery Specialist in a London school, which gives some practical suggestions for providing extension that deepens rather than accelerates, for any children that finish work quickly.



[Books that primary teachers have found helpful in teaching maths](#)

Read any good books lately? Our recent [Twitter chat](#) and [podcast](#) have each brushed off some dusty classics and unearthed some new treasures. Here we provide a flavour to tempt you to delve further.

And here are some other things for your attention:

- [Girls can do anything they put their mind to – especially maths!](#) International Women's Day is 8 March – a great reason to read this interview from [National Numeracy](#) with Rachel Riley, co-presenter of Countdown, in which she busts some myths about gender and maths
- The England-China maths teacher exchange will continue to 2020 – funding has been [confirmed](#). If you would like to observe a Shanghai teacher next year, contact your [local Maths Hub](#)
- Year 4 multiplication table check: the DfE has [announced](#) that trials will soon begin in schools
- [Revised teacher assessment frameworks](#) for assessment at the end of KS1 for 2018/19 have been published by the DfE
- Following the completion of our [mastery professional development materials](#) for number, addition and subtraction in Year 1, all of the teacher guides and representations for this group are now available to download as a single zip file.

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Keeping the Rapid Graspers Engaged

The term 'rapid graspers' here refers to children who pick up the concept being taught, more quickly than their peers. This is not a re-wording of 'high attainers' or 'gifted and talented' because, with a teaching for mastery approach, no attempt is made to identify which particular children will be rapid graspers on any particular day or topic, recognising that children's aptitudes vary between topics and over time.

Thousands of teachers in England have now had the opportunity to see a Maths Hub 'Shanghai Showcase' lesson – that is, to see a primary maths teacher, from Shanghai, teach a lesson to a class of English school children, at a local school. Mostly observers are impressed by the intricacy of the lesson design, the depth with which concepts are broken down and the carefully crafted questions that characterise the Chinese 'teaching for mastery' approach. But sometimes, they are troubled by noticing children finish questions quickly and apparently being expected to sit and wait for their peers to finish before the lesson moves on.

Expectations and history differ dramatically between England and China. Clare Christie, maths lead for Ashley Down Schools Federation in Bristol, notices that "...although the standards are undoubtedly extremely high [in Shanghai], they don't seem as 'fussed' about making sure there is a little extra challenge for the highest attainers/children that pick the concept up quickly in that lesson".

Because of the cultural gulf between the two systems, it is imperative to identify how teaching for mastery can work in English classrooms. This is the challenge that has been taken on by the growing cadre of Mastery Specialists, and one of the big questions they face is how to extend children who complete work set quickly and are ready for more.

A headteacher, concerned about how teaching for mastery was being implemented in his own school, commented:

"15 shared into equal groups of three. Quick graspers do it in five seconds. Others take longer. Quick graspers do nothing while they wait so everyone can move on at broadly the same pace."

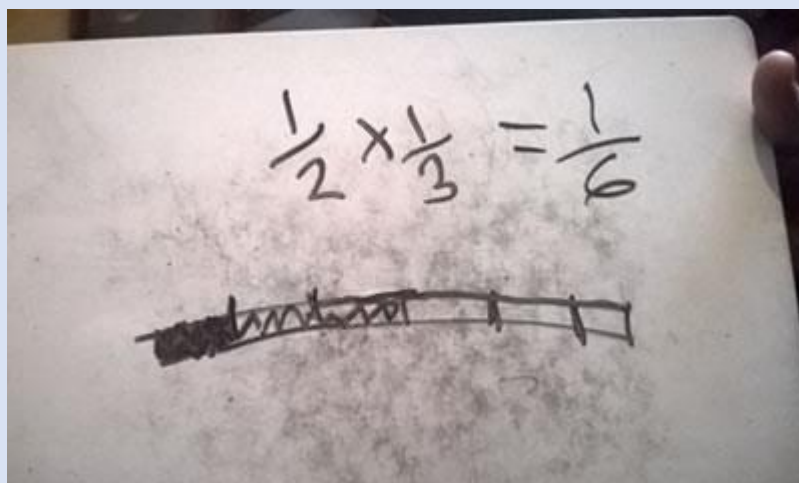
Kate Mole (Teaching for Mastery Lead for London South West Maths Hub, and Maths Lead for a federation of schools) identifies that teachers adopting a teaching for mastery approach have rapidly understood the need for a single learning point for each lesson, with the whole class working on the same content. She says:

"As practitioners leading on teaching for mastery, we deeply understand the approach and also know the damage that was, and can still be, caused by children not deepening their learning enough. We know the benefits of children working on the same content and can justify not 'pushing them on'. However, I can totally empathise that there are those times when you feel that there is an additional challenge needed for some children in our classes."

A Maths Hubs national project is researching this, and due to report at the end of the school year. Teachers are working together to develop understanding of how to provide opportunities in all lessons, for children to work more deeply than the age-related expectations. The project aims to share activities that encourage children to demonstrate depth in different areas of the curriculum, and also to report on how journals could contribute to building to a judgement of 'working at greater depth' at the end of the school year.

In the meantime, Mastery Specialists are devising solutions in their own classrooms. Nicola Ballantine (Y6 Teacher and Assistant. Head at Nonsuch Primary School, and a Primary Mastery Specialist for London South West Maths Hub) has written a useful blog, [Dive deeper with the 'high attainers'](#), that addresses the challenge in a very practical way, suggesting generic pointers that children can be encouraged to use to deepen their learning when they have 'finished':

If the class was engaged in a fluency activity, such as multiplying unit fractions, a student who completed the task early could then write a maths story which could cement a connection between the abstract algorithm and the real world, i.e. three friends each had $\frac{1}{3}$ of the $\frac{1}{2}$ of a cake left over from a party, $\frac{1}{3} \times \frac{1}{2} = \frac{1}{6}$. Next, if the reasoning task asked for the student to explain why the product of two fractions is smaller than the factors, they could extend their learning by drawing a pictorial representation, proving why this is true. Lastly, after completing a problem solving task requiring them to apply their understanding in a new context, they could then deepen their learning by demonstrating what they deem to be a common mistake, such as adding the denominators rather than multiplying them, and they could explain why this error sometimes occurs. By engaging in these deepening tasks, students are able to sit with their learning just a little bit longer, devoting more thinking time to understanding the structure of the concept as well as unpicking any of their own misconceptions.



[Read more](#) of Nicola's blog

Kate Mole points out that using this approach relies on 'winning over' those children that consider themselves high-attainers, to help them understand that they are being extended but through depth rather than by being given different work. A powerful way to do this, she says, is to give pupils the answer:

"Look, here's the answer – but the answer isn't the most important part, show me how we got there...now show me another way...now prove it. The answer is only the beginning."

She also says that winning over parents is critical. She recounts a parents' meeting where she began by asking who could divide fractions. Only a handful of parents put up their hands – which, when she assured them that they would all have been taught it at school, made her point: you can learn a trick (turn the second fraction upside down and multiply), but if you don't understand it conceptually, you won't remember it. She then went on to teach the parents, using manipulatives and images, to divide $\frac{4}{8}$ by 2 and then $\frac{3}{8}$ by 2, emphasising an understanding of what they were doing.

As a final point, Kate is keen to clear up a common misinterpretation of the National Curriculum requirement to teach fluency, reasoning and problem solving. These three elements should not be regarded as a hierarchy of difficulty, she argues, with some children only engaging in fluency work. Reasoning and problem solving should not be the 'extension work'. All children need to be involved in reasoning: it is important for understanding. Extension comes from reasoning and problem solving at greater depth.

And her response to the headteacher observing children divide 15 into three equal groups...? She points out that this difficulty is nothing new:

"This difficulty is not a result of teaching for mastery! It's actually just not great teaching! As teachers, we have always had situations where children answer quickly or finish sooner than other children. It is our job to have a question up our sleeve to enable them to continue to engage with the learning."

Instead of sitting waiting, these rapid graspers might have been asked:

"Can you make any other equal groups from 15? Can you use 15 cubes to make groups that aren't equal? Why are they equal? What are they not equal? What's the same, what's different about the equal and non-equal groups? How many different ways can you make equal groups from 15 - are there more than two? Can you convince me? How do you know? Can you write me a definition of what equal means?"

Further reading around this issue:

- The 2012 report [Raising the Bar](#), from the [Advisory Committee on Mathematics Education \(ACME\)](#), explains the importance of depth over acceleration for able mathematicians
- In his 2012 paper, [Nurturing able young mathematicians](#), Tony Gardiner explains the importance of providing a rich curriculum for all, of not attempting to identify particularly able mathematicians early, and of encouraging rich, deep study in order to master core curriculum topics, rather than accelerating apparently able students through the curriculum at a superficial level.



Books that primary teachers have found helpful in teaching maths

Read any good books lately? That's not a question you'd automatically expect to lead to the response:

'Yes, I have, actually. It was a book about maths teaching.'

But that's exactly the thrust of most of the responses we got when, in a [discussion](#) on Twitter recently, we asked teachers what books had helped them do their maths-teaching job. In the space of an hour, around 40 books were mentioned. And what a variety! Some were published before John Travolta went down with *Saturday Night Fever*. Others barely off the printing press. Some were very subject-specific: packed with maths. Others addressed generic teaching matters but were nevertheless enjoyed and valued by maths teachers.

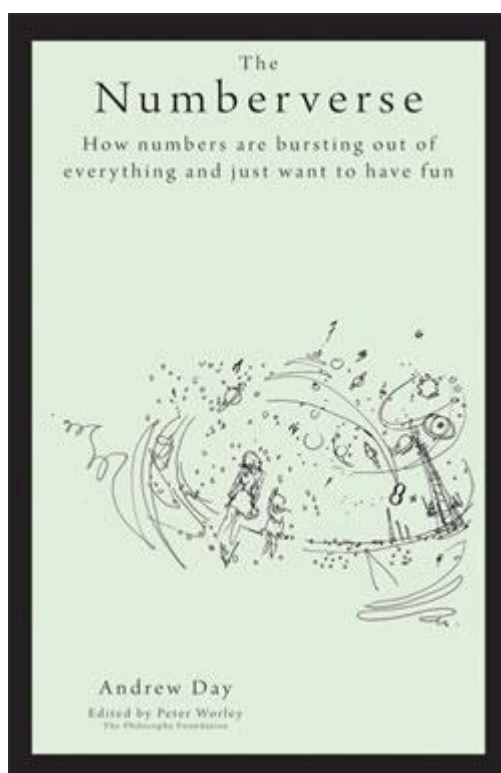
A few weeks later we devoted an NCETM podcast to discussion of some of the books mentioned, and on [that podcast's page](#) on our website, you can find a list of all books mentioned in the webchat and the podcast.

Among the list there are plenty of examples found useful by primary teachers, so why not have a browse through the [Twitter chat](#) or have a listen to the [podcast](#)?

To whet your appetite, though, here are three books mentioned, for different reasons, as of interest, and use, to primary teachers.

The Numberverse by Andrew Day (2014)

Recommended by Laura Tullock, deputy head at a primary school on Tyneside, and also the Teaching for Mastery Lead for the Great North Maths Hub



"It's just a book that's full of hidden gems and you can dip in and out and not have to read very far to get practical ideas. In the first 15 pages, I've got about 30 post-it notes to go back to. The tag line is *How numbers are bursting out of everything and just want to have fun* and what really attracted me to it, when it was suggested I read it, was that it's all around engaging children with numbers, and strategies to make children curious about maths and enjoy maths.

"It also gives lots of tips for teachers about what to do and say when teaching a class. The bit that really resonated for me was this situation: when you pose a problem to a child and the answer that comes back doesn't quite match the problem that was posed. The example it gives is two missing numbers that added together make ten ($\square + \square = 10$), and the question is: how many ways can you fill in the boxes with numbers? And a child finishes their work with $5 + 5 = 10$. But there's obviously more answers. The book talks about the idea of anchoring a problem, and it's a really simple technique that's really changed my practice. You just repeat the question to the child. You're not saying to the child 'go back and look at this' and not telling the child where they've gone wrong. You're simply saying to the child (in this example) 'and how many ways can you fill in the boxes with numbers?' And you keep repeating that, which allows the child to improve their answer, and it also stops other children in the class who might be listening going off on the wrong track. I found it a great way of building independence with children and keeping them on task with a problem."

Making Numbers by Rose Griffiths, Jenni Back and Sue Gifford (2016)

Recommended by Martyn Yeo, teacher and maths lead at an infants school in Nuneaton

"A really easy simple book, that you can just dip into., It helps you understand manipulatives in the classroom. It's not just for the younger children. It starts off with numbers from zero to 12; then it moves up to 200 and over. If you are working in a primary school, you are able to use manipulatives throughout the school. For me it's changed the way I've looked at some of the ways I teach things."

Starting Points by Banwell, Saunders and Tahta (published 1972 and 1986 - currently out of print)

Recommended by Mary Pardoe, a former teacher, now maths consultant/adviser, with more than 40 years' experience in the world of maths teaching



“The book is not intended to be read through from start to finish...it’s a collection of starting points (to lessons or activities) and indications of a few of the roads that can be taken, which give opportunities for pupils to frame their own problems.

“The book helped me because it gave me, through the examples, lots of ideas about ways I could start lessons and the sorts of questions I could ask that would prompt pupils to come up with ideas and be creative.

“There’s one example called *Counting Out* and it’s about having six pupils sitting in chairs in a row, so the whole class can see what’s happening. Then any sort of counting out rhyme is chanted (e.g. one potato, two potato, three potato, four), the teacher pointing to a pupil, one by one along the line, on every stress of the rhyme. The last person that you point to, at the end of the rhyme, stands up. And keep doing the same rhyme, until there’s only one pupil still sitting down (the winner!) and you note where that person is sitting. And then you ask the class questions such as: ‘Would the same person have won if we used a different rhyme?’ Or ‘If we’d used the same rhyme, but started with a different pupil, what would have happened?’ You’re getting the pupils to conjecture. And then you can get them to begin to generalise.”

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