

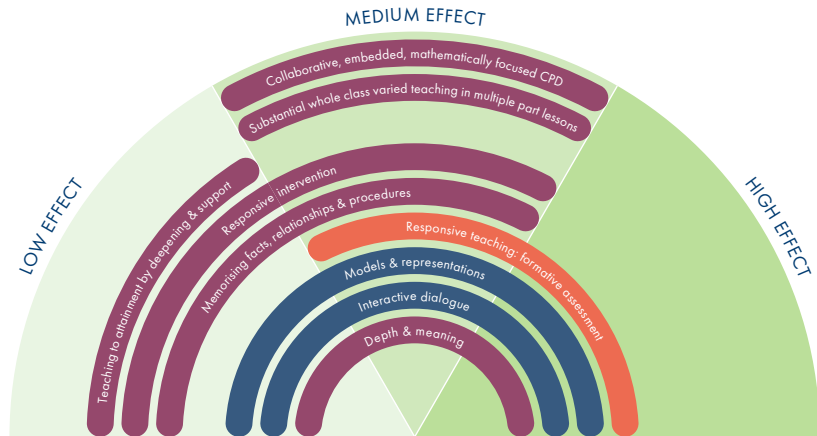
TALKING POINT:

WHAT DOES RESEARCH SUGGEST ABOUT THE ISSUES AND EVIDENCE AROUND 'MASTERY' IN MATHEMATICS IN ENGLAND?

IN SUMMARY

- 'Mastery' is used to mean multiple different things in research, practice and policy
- Looking at different aspects of 'mastery' separately rather than conflating them may be useful to teachers
- Some suggested areas of effectiveness include: good quality CPD; formative assessment; interactive dialogue; models and representations; substantial whole class teaching in multiple part lessons; and teaching for depth and meaning
- The limited evidence on applying East Asian mastery approaches in England indicates a positive effect on attainment
- Considering PISA outcomes and importing approaches grounded in different contexts may ignore the effects of cultural and social issues specific to each jurisdiction; Western models of successful mathematics teaching as measured by PISA outcomes also exist
- Engaging with mastery approaches can boost the confidence and mathematical understanding of teachers, particularly those who are less comfortable teaching mathematics

Summary of evidence for elements of teaching related to mastery in mathematics



Alignment to the evidence base

- Mixed
- Somewhat aligned
- Closely aligned

(Adapted from Boylan et al, 2019)

1

In England, the term 'mastery' has recently become associated with East Asian mathematics – for example, the National Centre for Excellence in the Teaching of Mathematics (NCETM's) Teaching for mastery¹. However, the word is used in lots of different ways² with different, but overlapping, implications for pedagogy. One of these ways was promoted by Bloom as early as 1968³ and is called 'mastery learning'. 'Teaching for mastery', promoted by the NCETM and influenced by Shanghai and Singapore practices, is relatively new – the NCETM referred to mastery approaches in 2014⁴ and 'teaching for mastery' by 2016¹. The research evidence is varied both in terms of the amount and the quality of evidence for different schemes, textbooks, materials and practices that are referred to by the word 'mastery'⁵.

IMPLICATIONS: Teachers should be aware that 'mastery' has multiple meanings and is not used consistently in policy, practice or research

'A mathematical concept or skill has been mastered when ... a person can represent it in multiple ways, has the mathematical language to be able to communicate related ideas, and can think mathematically with the concept so that they can independently apply it'

Drury, 2014, p.9

'Teaching for mastery approaches can enable all pupils (with only a tiny proportion of exceptions) to succeed in maths'

Charlie Stripp,
NCETM Director

2

Different features of East Asian mathematics teaching have been promoted by different organisations under the 'mastery' label, including: greater whole-class interaction between teacher and students; more responsive intervention so the whole class progresses together; slowing down the curriculum pace to study mathematical concepts and meaning in more depth; a greater use of models and representations; and more careful choice of examples and practice tasks⁶. Of these, the elements with the strongest evidence of effectiveness (and closest 'distance' from the definition of the element in the classroom to the definition in the evidence base) are shown on the infographic⁵.

IMPLICATIONS: Schools and teachers should consider the separate evidence for specific practices in particular, rather than several brought together under the heading of 'mastery'

Some of the elements of 'mastery' that are suggested as most effective are: responsive teaching; models and representations; teaching for depth and meaning; interactive dialogue; formative assessment; and substantial whole class teaching in multiple part lessons, although evidence for effectiveness is often mixed

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A randomised controlled trial of the Mathematics Mastery programme (based on Singaporean mathematics) found modest gains at the end of Key Stage 1 (pupils aged 6-7) and smaller gains for Year 7 pupils (aged 11-12)⁷. Other schemes, programmes and textbooks based on East Asian approaches have not been evaluated as rigorously. An evaluation of schools participating in the exchange programme with Shanghai looked at those schools that had implemented East Asian practice. It similarly found a lack of strong evidence either to support or undermine the effectiveness of elements of mastery when used in England but did identify an overall slightly positive effect for schools that most consistently adopted mastery practices⁶ and the effect was slightly higher in Key Stage 1. This may be due in part to the benefits of mathematics CPD for KS1 teachers, who may be less confident or qualified in mathematics⁸. Supporters of mastery approaches argue that over time greater gains will be seen.

IMPLICATIONS: Most 'mastery' approaches in mathematics teaching are yet to be rigorously evaluated

The limited evidence that has been collected so far on the early application of East Asian maths teaching in England indicates a potential for small increases in attainment

Evidence suggests slightly greater gains of implementing East Asian 'mastery' maths teaching at KS1 than KS2

4

Ideas and evidence from Singapore and Shanghai have strongly influenced 'mastery' in England. Although Singapore and Shanghai are ranked highly in PISA in mathematics⁹ it is not clear how attributable this is to teaching methods alone. For example, Chinese pupils who are educated in other countries also do better in maths on average than other pupils and research suggests this is because of family and cultural factors¹⁰. It is also important to recognise that there are Western education systems that are very successful in international tests — for example, Finland, Ontario in Canada, and Massachusetts in the US¹¹.

IMPLICATIONS: East Asian teaching approaches may be more successful in the West when attention is paid to cultural and social issues

Western models of successful mathematics teaching as measured by PISA outcomes also exist

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It is also important to consider what primary teachers who are implementing East Asian or mastery teaching approaches say. Primary teachers in particular report an increased confidence in teaching mathematics and understanding of the subjects⁶.

IMPLICATIONS: Engaging with mastery approaches can boost the confidence and mathematical understanding of primary teachers, particularly those that are less comfortable teaching mathematics

Lucy Rycroft-Smith & Mark Boylan (Sheffield Hallam University), 2019

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