



Developing Mastery Approaches to Maths: Teacher strategies and beliefs

A Research & Development Project

LED Research Centre

Seven teacher researchers contributed significantly to this research project, they are Lucy Evans, Ann Kirk, Rosie Ross, Paula Spenceley, Vicky Stout, Adam Vasco and Keri Williams. The Director of the Deep Learning Teaching Schools Alliance, Andy Ash, was a co-researcher. The LED Research Centre based research mentor was Pete Boyd. The R&D project was funded by the Deep Learning Teaching Schools Alliance with additional funding for scholarly time from the University of Cumbria.

The Focus

Developing mastery approaches to maths is partly about raising children's attainment in maths, but it is about much more than that. It is about changing expectations of who can succeed in maths, changing ideas about what 'school maths' consists of, building the confidence of teachers and children so that they feel they are becoming mathematicians, and addressing social justice issues by not labelling (generally working class) children as strugglers in maths.

This two year R&D project focused on the changing classroom strategies and beliefs of seven teacher researchers based in seven schools that are part of a wider ongoing Deep Learning Teaching Schools Alliance curriculum development project implementing the Maths - No Problem![™] text book based Singapore Maths scheme. Maths - No Problem![™] is based on the official text book scheme in Singapore, which is now a top performing nation in international maths tests. Singapore developed and refined their text book scheme in order to catch up, join other South Asian countries at the top of the international league table, and eventually surpass them. The Maths - No Problem![™] scheme for England was adjusted to meet requirements in England and has been judged by the government to meet the relevant criteria and map to the National Curriculum.



The Research

In this project we used video of lessons, including a short interview with two pupils afterwards. Teacher researchers were then interviewed whilst viewing the lesson video, able to fast forward, pause and rewind to highlight key moments and comment on them. These stimulated recall interviews were audio recorded and transcribed. Additional sources of data included a focus group of the teachers which engaged in particular with the influence of the scheme text books. Two sessions of collaborative analysis involving the teacher researchers helped to make the analysis more contextually and socially robust and represented our effort to co-create knowledge between researchers and practitioners.

The Key Findings

The analysis showed teachers adopting the classroom strategy of 'exploring' a single problem through whole class teaching with the teacher promoting dialogue using buddy discussions and facilitating whole class interaction. The teachers found that their planning, with the support of the text book and teacher

guidance, became more focused on developing maths knowledge. They showed signs of abandoning previous commitments to in-class grouping and saw this as not needed within a mastery approach. The teachers expressed changing expectations of children and showed signs of developing a growth mindset within the domain of maths, both for themselves and for their children. They came to see maths as more multidimensional, meaning that it involves a range of skills, including questioning, creativity, collaboration and deep thinking (Boaler, 2016) and is much more than merely speed and calculation.



The Implications for Practice

The implications for practice include:

- Introducing a mastery approach text book scheme involves changing teacher beliefs as well as strategies and will require considerable care and determination by school leaders
- Teachers feel that the use of this text book scheme (including teacher guidance) may be supporting their subject knowledge development during the planning process
- Adopting a mastery approach may help to break down embedded beliefs about the nature of maths, about the need for setting or in-class grouping, and about malleable intelligence in maths

The Outputs and Impact on Practice

The teacher researchers gained professional learning from the project and were able to directly apply this in their classrooms. The R&D project helped to inform the wider project which was aimed at raising children's attainment in maths. The project outcomes have been presented at four conferences to researchers, teachers, teacher educators and head teachers. This study did not set out to measure the impact of the scheme on children's attainment as measured by test results. It aimed to provide insight into the experiences and voices of teachers.

The outputs include **two open access research journal papers** but these are not yet available. Links to the two papers will be uploaded when they are finally published:

Boyd, P. & Ash, A. (2017 in press) *Mastery Mathematics: Changing teacher beliefs around in-class grouping and mindset*.

Boyd, P. & Ash, A. (2017 in press) *Teachers framing exploratory learning within a text-book based Singapore Maths mastery approach*.

An open access CPD resource focused on implementation of Maths – No Problem!TM including two professionally filmed lessons demonstrating the use of the scheme in classrooms. The CPD resource is available [here](https://goo.gl/VuUcWw) (<https://goo.gl/VuUcWw>).

Finally, we found that Jo Boaler's book 'Mathematical Mindset' was a really helpful source of research-informed professional guidance on teaching maths and we strongly recommend it to all teachers interested in developing mastery approaches:

Boaler, J. (2016). *Mathematical mindsets: Unleashing students' potential through creative math, inspiring messages and innovative teaching*. San Francisco: Jossey-Bass.

If you have read this far and are interested in critically considering mastery approaches in maths in your school or alliance, then please get in touch with us at LED Research Centre. We are keen to pursue further research and development with teachers in this area of work. LED@cumbria.ac.uk pete.boyd@cumbria.ac.uk