
Downloaded from: http://insight.cumbria.ac.uk/id/eprint/3285/

Usage of any items from the University of Cumbria’s institutional repository ‘Insight’ must conform to the following fair usage guidelines.

Any item and its associated metadata held in the University of Cumbria’s institutional repository Insight (unless stated otherwise on the metadata record) may be copied, displayed or performed, and stored in line with the JISC fair dealing guidelines (available here) for educational and not-for-profit activities provided that

• the authors, title and full bibliographic details of the item are cited clearly when any part of the work is referred to verbally or in the written form
• a hyperlink/URL to the original Insight record of that item is included in any citations of the work
• the content is not changed in any way
• all files required for usage of the item are kept together with the main item file.

You may not

• sell any part of an item
• refer to any part of an item without citation
• amend any item or contextualise it in a way that will impugn the creator’s reputation
• remove or alter the copyright statement on an item.

The full policy can be found here.
Alternatively contact the University of Cumbria Repository Editor by emailing insight@cumbria.ac.uk.
Changing Teachers’ Beliefs through the Whole-Class Approach of a Mastery Maths Programme

Pete Boyd & Andy Ash

pete.boyd@cumbria.ac.uk
aash@ourladyofpity.co.uk
‘mastery’ as philosophy

‘...under appropriate instructional conditions virtually all students can and will learn well most of what they are taught’

Block & Anderson 1975

‘mastery’ as belief

The more you practice, at the edge of your current attainment, the smarter you get...

Dweck 2006
mastery approaches to maths

• Whole class approach
• Focus on core skills and knowledge
• Exploring contextualised problems
• Dialogue rich classrooms
• Authentic real world problems
• Use of concrete materials
• Mathematical variation
• Teachers believe that virtually all children can and will learn and succeed in maths
Basil Bernstein’s Rules for transforming knowledge:

distributive
recontextualising
evaluative

**school maths = real maths**

1. Authentic tasks...
2. Make it more open...
3. Make it an inquiry...
4. Add a visual component...
5. Problem first then technique...
6. Accept all ideas for critique...
7. Ask pupils to convince and reason...

Jo Boaler (2016) Mathematical Mindsets
Deep Learning Alliance

- Anchor task: exploring, structuring, journaling
- Reflect and refine: using the text book
- Practice: mathematical variation extending thinking
**metacognition & self-regulation**

Are powerful drivers of learning (EEF Toolkit)

1. During whole class exploration of a well-designed anchor problem ask: to what extent is my framing of learning promoting metacognition?

2. In developing journaling ask: to what extent have I taught my pupils to effectively communicate their thinking? Are they thinking critically?
<table>
<thead>
<tr>
<th>Toolkit Strand</th>
<th>Cost</th>
<th>Evidence Strength</th>
<th>Impact (months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feedback</td>
<td>£££££</td>
<td>ltd ltd ltd ltd</td>
<td>+8</td>
</tr>
<tr>
<td>Meta-cognition and self-regulation</td>
<td>£££££</td>
<td>ltd ltd ltd ltd</td>
<td>+8</td>
</tr>
<tr>
<td>Mastery learning</td>
<td>£££££</td>
<td>ltd ltd ltd ltd</td>
<td>+5</td>
</tr>
<tr>
<td>Peer tutoring</td>
<td>£££££</td>
<td>ltd ltd ltd ltd</td>
<td>+5</td>
</tr>
<tr>
<td>Collaborative learning</td>
<td>£££££</td>
<td>ltd ltd ltd ltd</td>
<td>+5</td>
</tr>
<tr>
<td>Small group tuition</td>
<td>£££££</td>
<td>ltd ltd ltd ltd</td>
<td>+4</td>
</tr>
</tbody>
</table>
our collaborative R&D project

- Seven teacher researchers
- Classroom video stimulated recall interviews
- Collaborative analysis

How is involvement in the mastery maths project influencing teachers’ orientation towards maths and their expectations for children?
professional inquiry: video
...for me it’s the idea of that mathematical fluency coming out, the shift from the old style didactic teaching with the teacher stood at the front saying, ‘here is the rule of the day’. The children are gaining ownership of emerging rules, the mathematical rules are coming almost through the children’s exploration, they are not explicitly being taught...
It’s revolutionised my teaching. My subject knowledge is beyond anything it ever was. I enjoy maths, I have an enthusiasm for maths and I think the depth of rehearsal I go through for my lessons, I would never, ever have had that freedom or time to do it if I didn’t have the textbooks...
planning

• Teachers come to ‘trust’ the textbooks and place high value on the texts and teacher guidance
• The pedagogy is built in to the text books...the text books come out half way through the lesson
• Teachers feel they are learning about maths and how to teach maths
• The books could easily lead to dull lessons if you try and teach traditionally with them...
...it is more about that facilitating learning. You’re presenting the children with an opportunity, they come out with the outcomes themselves; the reasoning themselves. There’s even less of a need for the children to be ability grouped...
• Setting or grouping is in tension with the underpinning beliefs of a mastery approach...

• Explore mixed pairs activity...random, high-low, personalities...and zoning...

• Consider a phased approach to moving away from grouping by prior attainment...
...I think with maths you’re continually learning. You’re learning different ways; you’re learning different methods. I know when I was at school it was all about conventions...so I think you’re always learning and your intelligence is not capped...and it’s a case of you are always learning, you’re increasing the amount of intelligence you have in maths...
intelligence

• Systematically and collectively, in intention and in practice - stop labelling learners
• Work on collective teacher awareness of mindset theory and teacher expectations
• Work on the multidimensionality of maths...domain specific mindset means that cultural beliefs about maths are just as important as beliefs about intelligence

Let’s consider the work of a mathematician: She first has to pose an important problem, then map out a mathematical approach, she will probably collaborate with others on ideas, and engage in...a zig-zagging process of conjecturing, refining counter examples and proving. She has to form a mathematical model, apply methods, draw diagrams, connect ideas, reason about connections and communicate in different forms. The work is multidimensional.

https://www.youcubed.org/open-creative-mathematics/
• External knowledge
• Subject specific
• Time and rhythm
• Classroom experimentation
• Congruence within training
• Shared sense of purpose
• Collaboration and trust
• Proactive leadership
Mastery Maths CPD Resource

• Two video lessons using Maths No Problem!
• Including debriefing discussion with the teachers
• With our reflections and ideas on mastery maths professional development
• Open access online...
Changing Teachers’ Beliefs through the Whole-Class Approach of a Mastery Maths Programme

Pete Boyd & Andy Ash

pete.boyd@cumbria.ac.uk
aash@ourladyofpity.co.uk


