Mastery with Numicon

How does Numicon help you ensure mastery of skills?
What do we mean by mastery?

There are generally four ways in which the term mastery is being used in the current debate about raising standards in mathematics:

**Achieving mastery**
Mastery of particular topics and areas of mathematics, which involves knowing ‘why’ as well as knowing ‘that’ and knowing ‘how’.

**Teaching to mastery**
A set of pedagogic practices that keep the class working together on the same topic, whilst at the same time addressing the need for all pupils to master the curriculum and for some to gain greater depth of proficiency and understanding.

**A mastery curriculum**
One set of mathematical concepts and big ideas for all. All pupils need access to these concepts and ideas and to the rich connections between them.

**A mastery approach**
A set of principles and belief. This includes a belief that all pupils are capable of understanding and doing mathematics, given sufficient time.

The National Centre for Excellence in the Teaching of Mathematics (NCETM) has published guidance on key features of the mastery approach.

Find out more about these features found in *Numicon*. 
‘Effective mastery curricula in mathematics are designed in relatively small carefully sequenced steps, which must each be mastered before pupils move to the next stage’

The Teaching Resource Handbook contains thirty Activity Groups with long- and medium-term planning charts that show the recommended progression through the Activity Groups.

The long-term plans have been carefully designed to scaffold children’s understanding so that they are able to meet the challenges of each new idea.

Focus Activities within the Activity Groups model how to present and develop learning step by step.

Careful progression is built into every Activity Group, and across the whole teaching programme, helping children to become fluent through deep understanding and practice.
Concrete and pictorial representations of mathematics are chosen carefully to help build procedural and conceptual knowledge together. Exercises are structured with great care to build deep conceptual knowledge alongside developing procedural fluency.

Numicon develops procedural fluency by using a visual, practical base to develop conceptual understanding and fluent recall. The concrete-pictorial-abstract approach is at the heart of Numicon.

Numicon uses a wide variety of structured materials such as pegs and counters, Numicon Shapes and number rods to explore and communicate about number relationships. This helps children to reason mathematically, using spoken language alongside concrete and pictorial representations to explain and justify.

Opportunities for whole-class, paired and individual practice activities are included in every Activity Group to give children the opportunity to apply their procedural knowledge, deepen their thinking and develop their mathematical conversations with others.
Lesson design

‘Lesson designs set out in detail well-tested methods to teach a given mathematical topic... and also set out related teacher explanations and questions to pupils.’

The Teaching Resource Handbook details for each Activity Group: its educational context, key mathematical ideas, learning opportunities, assessment opportunities and important mathematical vocabulary.

Each activity is broken down into step-by-step instructions, modelling how to explain each specific learning point.

Assessment opportunities signal key information to ‘look and listen’ for. This indicates how much of the focus activities children have understood.

Activity Groups have been extensively trialled in the classroom, so the learning opportunities listed come from real classroom experiences.
Teaching methods

‘Pupils work on the same tasks and engage in common discussions. Concepts are often explored together to make mathematical relationships explicit.’

Mathematical conversation is an essential aspect of all Numicon activity, between teachers and children and between children. The use of apparatus also supports this conversation.

Opportunities for whole-class, paired and individual practice activities are included in every Activity Group to give children the opportunity to build on their knowledge, deepen their thinking and develop their mathematical conversations with others.

The educational contexts in each Activity Group spell out links and relationships between topics as do the activities themselves.
Pupil support and differentiation

‘Taking a mastery approach, differentiation occurs in the support and intervention provided to pupils, not in the topics taught, particularly at earlier stages.’

The first Focus Activity in each Activity Group is a ‘low threshold’ activity allowing all children to engage with the work.

Focus activities then build progressively to a ‘high ceiling’ that provides challenge and allows for differentiation within the same topic.

Within the medium-term planning, there are Milestones (summary statements) of what children need to master before they move on.

The regular Milestones help teachers reflect on each child’s achievements and decide whether further support and practice is needed.
Productivity and practice

‘Fluency comes from deep knowledge and practice.’

The practice and discussion section of each Activity Group encourages children’s confidence and fluency with the mathematics they are learning.

Whole-class, small group, paired and independent practice suggestions are included to provide a range of challenges for children.

Explorer Progress Books offer children the chance to try out the mathematics that they have been learning in each Activity Group, setting the mathematics in a new or different context.
Professional development and training of teachers

- NCETM-accredited Numicon CPD programmes supports schools to successfully implement the Numicon approach and transform mathematical teaching and learning.

- Participants experience how Numicon’s concrete, pictorial and abstract approach to mastering mathematics can be achieved through successful use of structured apparatus.

- Bespoke INSET programmes or one-day workshops develop teacher subject knowledge, pedagogy and practice and lead to sustained improvement in schools.

Find out more about Numicon Professional Development
Further mastery support from Oxford University Press

Teaching for Mastery: QUESTIONS, TASKS AND ACTIVITIES TO SUPPORT ASSESSMENT

- Written by the NCETM in conjunction with the Maths Hubs programme
- Provides assessment support for mastery in maths for Years 1 to 6
- Draws on both UK and international research to allow teachers to assess their pupils’ depth of understanding.
- Download from Oxford Owl. You’ll need to be registered – it’s free!

Mastery with Numicon
Mastering Mathematics

- Professional development handbook from Dr. Helen Drury.
- Explains the key elements of the mastery approach, drawing on international research and real UK examples.
- Complete with key questions for individual reflection, and an action plan for maths leaders.
- Watch videos from Dr. Helen Drury on Oxford Owl. You’ll need to be registered – it’s free!
Further mastery support from Oxford University Press

Mastering Mathematics Pathway

- Find everything you need to implement mastery, with the help of our Mastering Mathematics Pathway, developed by experts Professor Mike Askew and Dr. Helen Drury.

- Pathways helps leaders follow a four-step process to deliver effective school improvement, with editable tools and resources:
  1. Audit
  2. Strategic Planning
  3. Take Action
  4. Evaluate Impact

- Subscribe to School Improvement Pathways to get started with the Mastering Mathematics Pathway. You’ll also get access to 20 other Pathways and all of our Professional Development & Best Practice videos.

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