

Maths Hubs Programme Annual Report

2021/22

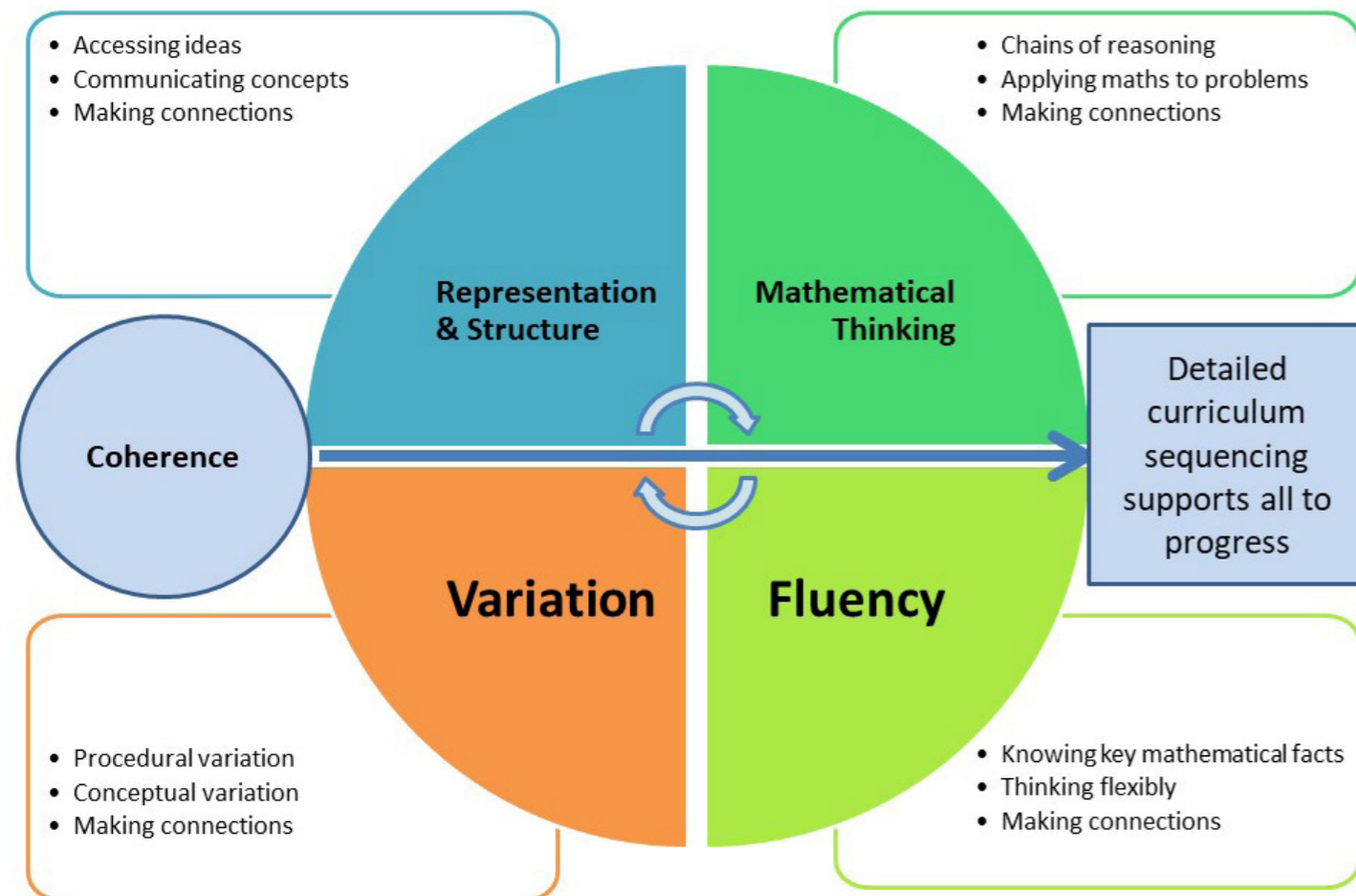
Contents

- 1 Introduction
- 2 Primary schools
- 4 Secondary schools
- 6 LLME: Local Leaders of Mathematics Education
- 8 SKTM: Specialist Knowledge for Teaching Mathematics
- 10 Post-16 institutions
- 11 RIWG: Research and Innovation Work Groups
- 12 Maths Hub Leadership

A year of progress and innovation

Teaching for Mastery

All work reflected in this report is underpinned by the [principles of teaching for mastery](#) and the, [Five Big Ideas](#) behind them, represented in the diagram below.



We are both delighted to be able to introduce the first of our new Maths Hubs Programme Annual Reports, focusing on the work in 2021/22.

Maths Hubs provide significant support to schools in England, and we hope the report conveys the wide scope and reach of the work.

The year was again very challenging for schools as they addressed the continuing impact of the Covid-19 pandemic, not least on mathematics. So we were particularly delighted to reach a new milestone for the programme – working with over 50% of the schools in England within one academic year. This was partly due to the way we started to adapt our work with schools, for example often providing a blended approach of face-to-face and online work.

In 2021/22, the programme has continued to develop and innovate including: the important new Mastering Number Programme in primary schools (see page 2); new support work for subject leadership in the secondary phase, at both school and trust level (see page 4); and new development programmes for Early Career Teachers (see page 8). This is all backed up by our ongoing research and innovation activity (see page 11).

All Maths Hubs' work depends on partnership. Maths Hubs continued to work in very close partnership with the NCETM in 2021/22, and began fruitful

collaboration with other new system leader partners such as Teaching School Hubs. We are also very grateful for the continued sponsorship and investment by the Department for Education, without which none of the work would have been possible. However, perhaps most of all, we value the partnership with the thousands of schools, their leaders and teachers, who collectively make up, and lead, the Maths Hubs Network.

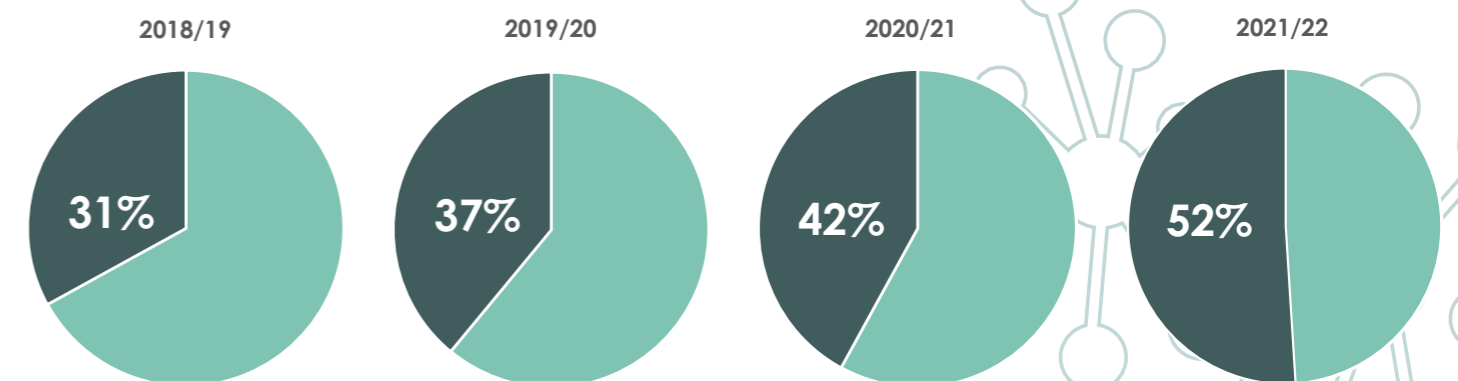
Thank you to all our partners.



Kathryn Greenhalgh
Maths Hub Lead and Chair of the Maths Hubs Council



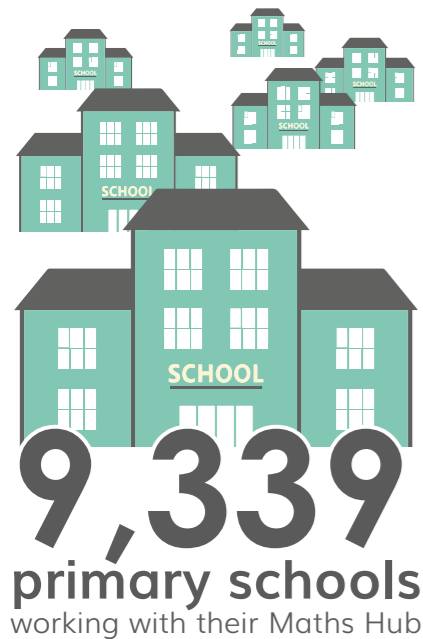
Charlie Stripp
National Director, NCETM



Growth of schools' involvement in the Maths Hubs Programme

Primary schools

In 2021/22, the number of primary schools working with their Maths Hub reached a new record, with over 9,000 schools engaged in one or other Maths Hub project.

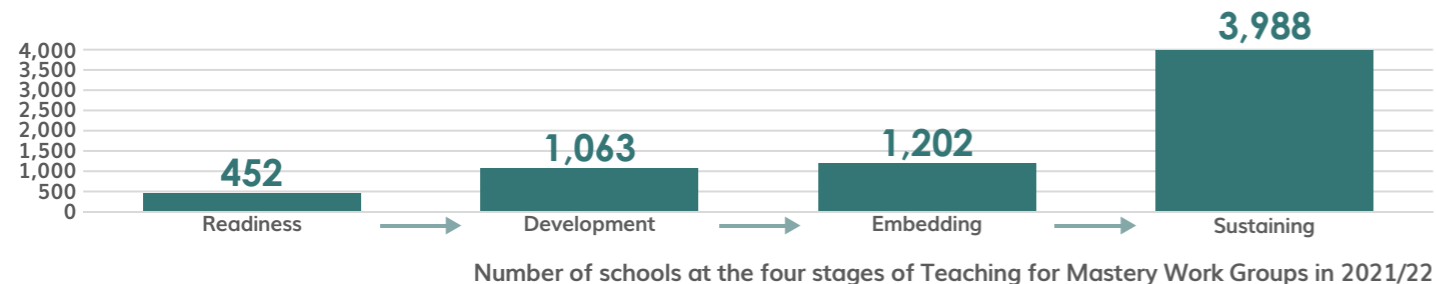


More than 6,500 of these schools (see bar chart below) participated in Teaching for Mastery Work Groups, led by a Mastery Specialist working for their local Maths Hub. Schools were at various stages of development, from the initial 'Mastery Readiness' stage through to 'Sustaining' further down the line (see bar chart below).

A growing trend this year has been the participation of schools from Multi-Academy Trusts (MATs) as the relationship between their maths leads and the local Maths Hub has strengthened.

For each school – typically – two lead participants work with colleagues from other schools in the Work Group throughout the year, and then work with leadership back in the school to improve the teaching of mathematics. In some groups, schools receive further support through visits from the Mastery Specialist. The expectation is that schools will continue to work with their Maths Hub in order to sustain the continuous improvement.

The foundations that pupils build in Reception and Key Stage 1 are crucial to their long-term mathematical development, so 2021/22 saw the introduction of a major new initiative (see below) to support leaders and teachers in strengthening fluency with number.



// We introduced Mastering Number in our school and the children are already reaping the rewards. The sessions are providing them with the tools to not only visualise, but articulate good number sense. In turn, this is having a positive impact in the rest of maths lessons as the children are becoming confident mathematicians. //

Cath Hudson
Maths Lead, South Petherton
C of E Infants & Pre-School

New in 2021/22: Mastering Number

A new feature for 2021/22 was the Mastering Number Programme, which began in 5,000 schools. Under the programme, teachers in Reception, Year 1 and Year 2 run short, daily sessions on number for ten weeks every term. The aim – assuming schools repeat the sessions in successive academic years – is that children leave Key Stage 1 with fluency in calculation and confidence and flexibility with numbers. Teaching resources, session plans and guidance are provided centrally by the NCETM.

The abacus-style rekenrek is used in many of these sessions.

As well as equipping pupils with the number fluency they'll need to handle maths in Key Stage Two, the programme is a powerful source of professional development for the teachers, since it deepens their knowledge of how children build understanding in the early years of primary school. Feedback from teachers, in emails and forum posts, on the impact on pupils was overwhelmingly positive.



Spring Hill Community Primary School

A transformational year of Mastery Readiness

School size: Two-form entry

Disadvantage: 26% Pupil Premium

Year engaging with Maths Hubs: First

Local Maths Hub: Abacus NW



After a few turbulent years, a new headteacher arrived at Spring Hill Community Primary School and – based on her experience of working with the Maths Hub in a previous role – signed the school up for the Mastery Readiness Programme. Under this programme, schools, guided by a local leader of mathematics education (see page 6), build the foundations for long-term improvement in maths. Particular attention is given to developing a vision and culture of maths learning, positive mindsets among pupils, subject expertise among teachers and arithmetic proficiency among pupils.

By the end of the year, there'd been a transformation, with a range of new practices embedded in teaching, including:

- Higher expectations on all pupils
- Abandoning the use of 'ability' grouping in maths lessons
- Use of small steps in teaching new topics
- Stem sentences planned into lessons
- New mathematical vocabulary explicitly taught
- Greater emphasis on times tables in KS2.

Through participation in the Work Group, teachers have made links with counterparts in local schools at a similar stage of development. By the end of the year, teachers had started to develop a new maths curriculum bespoke to the school.

In parallel, the Reception and KS1 classes participated in the Mastering Number Programme in 2021/22, the impact of which was immediately noticed by the Year 1 teachers in the 2022 autumn term.



// I can see that the children coming up have definitely got a better basic number sense than they've had previously. //

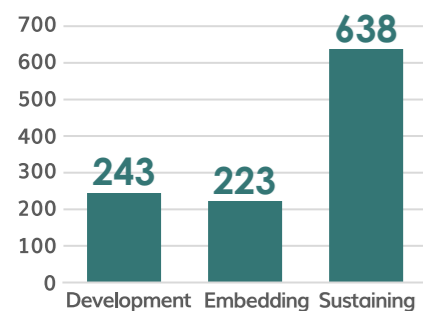

Sarah Gibson
Year 1 teacher

case study



Secondary schools

In 2021/22, the number of secondary schools working with their Maths Hub continued to grow, approaching 2,000 schools participating in Work Groups and programmes.

1,725
secondary schools
working with their Maths Hub

Many secondary schools are now engaging with teaching for mastery: some at a developmental stage; others sustaining the approach in their departments. Once schools reach the sustaining stage, they are encouraged to remain part of an ongoing Work Group of schools that work together to refine and improve their teaching of mathematics.

Secondary schools were also able to participate in mastery-related Work Groups. These support mathematics departments in addressing a particular aspect of their practice, which helps them to align this aspect of their work to mastery principles, such as developing mathematical thinking for GCSE, planning for curriculum coherence from Year 7 to Year 11, or ensuring continuity from Year 5

to Year 8. The project addressing the latter aspect saw the number of Work Groups increase to over 150 in 2021/22 and provided the setting for primary and secondary colleagues to work together to consider how to improve continuity for pupils across the primary to secondary school interface. They were also able to draw upon the professional development elements of the NCETM's *Checkpoints* resources to shape and support Year 7 teaching.

Leadership of mathematics in secondary schools is vital in supporting improved outcomes for pupils and so 2021/22 saw the introduction of two new initiatives (see below) to support subject leadership in both schools and trusts.

New in 2021/22: Supporting maths leadership

In 2021/22 all Maths Hubs, for the first time, introduced two separate opportunities for those in maths-specific leadership positions to work with colleagues in similar roles in secondary settings. Establishing shared understanding of the principles and practices of teaching for mastery was an ever-present theme.

- In the first project, secondary heads of department (HoDs) collaborated in Work Groups – one in each hub area – jointly led by the hub's Secondary Assistant Maths Hub Lead and a colleague with long-standing leadership experience in a school or college department.
- In parallel, secondary maths leads at Multi-Academy Trusts (MATs) were brought together in a national group once a term, with online communication and collaboration in between. In one element of the work, coaching triads worked together on developing a maths-specific vision for their trusts.

Feedback from participants in both projects was highly positive. In addition, immediate impact from both these projects has been seen in significant numbers of departments from participants' schools signing up for Teaching for Mastery Work Groups in 2022/23.



St Crispin's School, Wokingham

The embedding of a mastery curriculum

School size: An 11-18 school with 1,280 students

Disadvantage: 11% Pupil Premium

Year engaging with Maths Hubs: Third

Local Maths Hub: Möbius Maths Hub



In 2021/22, the school refined the implementation of a mastery curriculum, during a year when they continued to be supported by Möbius Maths Hub. A key shift was splitting the department into two teams: one each for Year 7 and Year 8, each teacher having two parallel classes in one year group and none in the other. The two groups started collaborative planning meetings after school on alternate Tuesdays,

working on a new scheme of work, based on mastery principles. This has had the dual benefits of reducing teacher workload and increasing the consistency of teaching.

In the summer 2022 GCSE maths exams, the school scored its highest ever percentage of results at Grade 4 and above (88%) and also at Grade 7 and above (37%).



// Lesson observations have shown that having shared mastery lessons, mastery planning and continual CPD in fortnightly meetings has led to the embedding of mastery elements in all year groups. In particular, this was seen in the form of variation theory in teachers' choice of questions, interleaving of previous taught skills through lesson activities, the use of physical manipulatives and pictorial representations.

I've been working with many of these teachers and observing their lessons for over 13 years, and I'm now seeing a notable change in their practice. The environment, ambience and general buzz of learning in their classrooms has been amazing to see.

I would really recommend all departments to switch to mastery as it has made learning more 'sticky' and we are already seeing more resilient, adaptable students. //

Katy Prince
Head of Department



// The department invested time and effort in quality professional development, which helped them become more confident in planning for progression. They regularly reflected on the effectiveness of their approaches, and the scheme of work was further developed. //

Wiola Czekaj
Mastery Specialist
Möbius Maths Hub

// The school has designed a broad and ambitious curriculum which ensures pupils make good progress in learning. This is seen in many subjects but is particularly strong in English, mathematics and science. Many subject leaders have thought about the order in which they teach subject content, so that pupils can build on previous knowledge. //

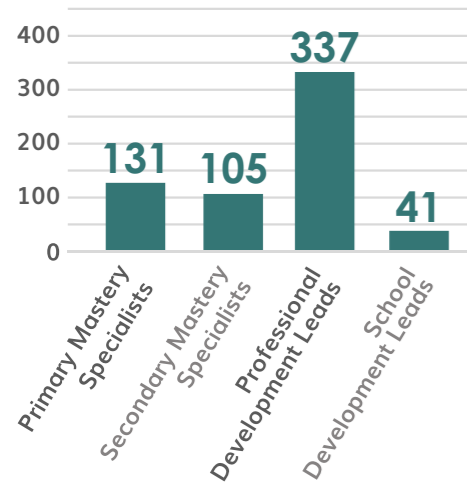
Ofsted inspection report
May 2022



case study



LLME Local Leaders of Mathematics Education



Numbers starting development programmes in 2021/22

1,573
active LLME leading work in Maths Hubs in 2021/22

In order to carry out their work, Maths Hubs identify, develop and support local leaders of mathematics education (LLME). The LLME work together as part of their Maths Hub team to support schools and colleges across their area. In 2021/22, there were over 1,500 active LLME leading Maths Hub activity, including Work Groups, programmes, and communities.

All active LLME are supported by being a member of their Maths Hub's own LLME Community. These professional learning communities provide a setting for a range of collaboration and support, either as a whole community, or in sub-groups. LLME continue to develop their expertise in leading maths curriculum and pedagogy, in leading maths professional development, and in leading maths school development.

As LLME change roles within schools or move to a different school, they may no longer be able to lead Maths Hub activity. Also, some LLME may need to have a break from Maths Hub work before returning to lead further activity. Maths Hubs therefore continue to review their capacity annually to identify future LLME development needs. To support new LLME to develop in their role, the Maths Hubs Programme continues to provide Mastery Specialist Programmes and Professional Development Lead Programmes. Because working with leadership in schools is a key aspect of the LLME role, 2021/22 saw the introduction of a new programme (see below) that helps LLME support school-wide and trust-wide development in maths.

New in 2021/22: School Development Lead Programme

The NCETM School Development Lead Programme was created to give expert leaders of maths, who are leading change in maths in a school or group of schools other than their own, the opportunity to collaborate together and really focus on the effectiveness of their role. Participants in the first year have included those with previous experience of developing maths leadership capacity and those

who are new to the role.

Specifically designed to enable leaders of maths school development to enhance subject and senior leadership capacity and capability in the schools and Multi-Academy trusts (MATs) they support, the programme has provided regional support through workshops (face-to-face and online), practice development

activities, and an online community.

Participants have planned, led and evaluated a school development initiative, strengthening their knowledge of the evidence base that underpins school development and change management.



// The School Development Lead Programme has profoundly impacted my thinking in terms of leading school development. I have learned important lessons about communicating a compelling vision, agreeing and revisiting goals, and creating the right culture in a school. //

Tom Isherwood

Assistant Maths Hub Lead (Primary) for East Midlands West Maths Hub



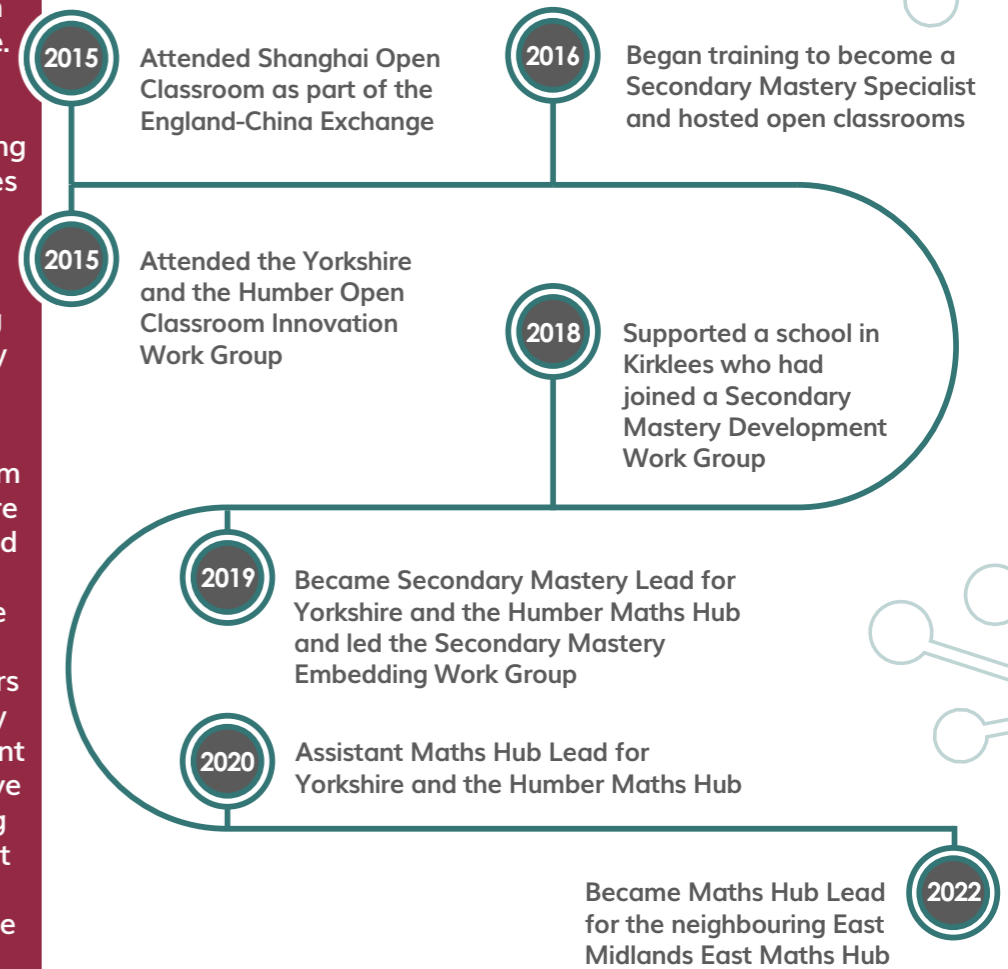
Rachel West

Maths Hub Lead at East Midlands East Maths Hub

My route to leadership in maths education

// Being part of the Maths Hubs Programme has been an absolutely incredible experience. From observing the Shanghai teachers in 2015 to becoming Maths Hub Lead is not something I ever imagined. The experiences I have had have allowed me to become a better teacher: I now have a much deeper understanding of the teaching of maths, and I can confidently apply this knowledge in my classroom.

The support I have received from the leadership team at Yorkshire and the Humber Maths Hub and the knowledge I have gained from the LLME community, the central NCETM sessions, and from collaborating with teachers and experts across the country has been invaluable. When I went into teaching, I never would have dreamed that I would be doing the role I am today. It is a great role and it's brilliant to know that I am helping to improve the teaching of maths across the country! **//**

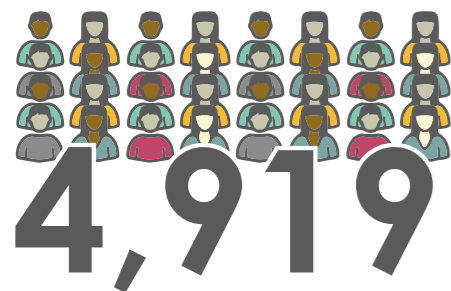


Cross-phase working at LLME community events

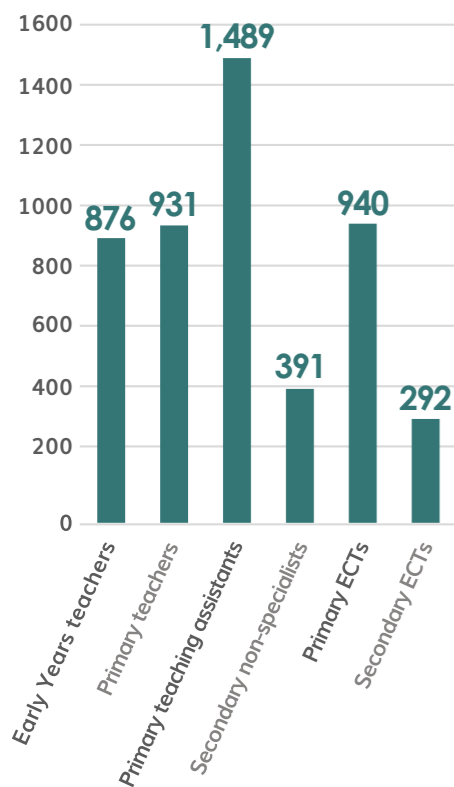


SKTM Specialist Knowledge for Teaching Mathematics

2021/22 saw the suite of SKTM programmes grow again. There are now seven different SKTM programmes, with participants in Early Years, primary and secondary phases.



classroom practitioners participating in SKTM programmes



// This programme has deepened my understanding of the representations and given me new strategies that I can use with my students in the classroom. //

Emily
Secondary Non-specialist Teachers SKTM Programme participant

Maths Hubs continue to work with a range of partners to ensure there is effective initial training and professional development of new teachers of maths in primary and secondary schools (and other maths classroom practitioners), so that they have the specialist knowledge for teaching mathematics (SKTM).

The Maths Hub SKTM programmes are sustained professional development programmes that combine a series of workshops led by local leaders of mathematics education, with independent work carried out by participants in their own settings. Established programmes have continued to support Early Years practitioners, primary teachers, and primary teaching assistants.

Early career teachers and secondary non-specialist teachers are two important groups that particularly benefit from the intensive support provided by SKTM programmes, so 2021/22 saw the introduction of three new Maths Hubs programmes (see below) aimed at teachers in these groups.

Another dimension of the work includes Work Groups that brought together representatives of ITT providers, and schools engaged in supporting ITT, to work on refining and developing the maths aspects of their programmes. In 2021/22, over 180 ITT providers were participating in the Maths Hub ITT Work Groups.

New in 2021/22: Extending the reach of SKTM

Added to the SKTM suite in 2021/22 were three new programmes:

1. Secondary Non-specialist Teachers
2. Primary Early Career Teachers (ECTs)
3. Secondary Early Career Teachers.

All the programmes are designed to support teachers to develop both subject knowledge and pedagogy for teaching maths.

The Secondary Non-specialists Programme supports those teaching maths in a secondary school for whom maths is not their first subject. It replaces the earlier TSST programme.

The programme has allowed hundreds of secondary maths departments to strengthen their teaching by equipping non-specialists with the subject knowledge, pedagogical knowledge and confidence to teach maths. Participants and their schools have reported that both lessons and departmental planning time have seen evidence of the benefits of participation in the programme.

The Primary and Secondary ECT programmes are for teachers in the early part of their careers; local communities of ECTs are formed to collaborate and share practice, as well as benefiting from expert input.

Communities of Primary Early Career Teachers in Origin Maths Hub

At Origin, the first year of the Primary Early Career Teachers (ECT) SKTM Programme has seen real impact across the hub region.



In 2021/22, Early Career Teachers (ECTs) in the primary phase took part in a new programme designed to support their maths teaching in the first years of their career. Focusing on both subject knowledge and pedagogy, primary ECTs in Coventry, Solihull and Warwickshire participated in face-to-face sessions, then put their learning in to practice in the classroom. Activities included:

- Choosing a focus pupil to understand how they make progress in maths
- Observing a pupil in lessons to unpick their understanding
- Taking part in triad discussions to explore the impact on pupils of the teacher's planning.

The feedback about the programme was very encouraging. 100% of participants said the programme would better equip them to do their job, with the same number saying they could identify pupils who had benefitted from their improved knowledge as a result of taking part in the programme.

Participants enjoyed the collaborative elements of the face-to-face sessions, fully engaging in the tasks. They also took part in observing model lessons together, having the opportunity afterwards to discuss the maths and reflect on their own practice as a result. All participants reported that they had learned something new that they would implement in their own classrooms.

// This has provided insight into key mathematical concepts, which has benefitted the children that I teach. I have been able to improve the way that I communicate and articulate core concepts. My children's accurate and consistent use of mathematical vocabulary verbally and in written responses has really improved this year. //



// The content was relevant and useful. Activities were brilliantly resourced, enjoyable and useful. I feel enthused and excited to implement what I have learned. //

Alastair Snook
Teacher at St Lawrence Primary School, Warwickshire



// This has given me an increased confidence when teaching maths, as well as new ideas for supporting children with their maths learning. //

Jordan Haslam
Teacher at The Canons C of E Primary School, Warwickshire

case study



// It has improved my confidence in the subject and helped me see the connections. //

Rebecca Gittings
Year 6 teacher at Broad Heath Primary School, Coventry



Post-16 institutions

In 2021/22, schools, colleges and other post-16 institutions worked with Maths Hubs to develop effective teaching for A level, Core Maths and GCSE resit.

// Really enjoyed the sessions and activities. The Work Group Lead led excellently and was genuinely inspirational in getting my head around the different ways of looking at these topics. //

Participant
Supporting Post-16
GCSE Resit
Work Group

Maths Hubs offer activities to help teachers in school and college departments with the range of teaching required for students after they leave Year 11. In 2021/22, there were Work Groups for teachers to collaborate on developing pedagogy for teaching A level and Core Maths, as well as a programme of a more introductory character for teachers new to Core Maths. In addition, there were Work Groups for teachers with groups of students on GCSE resit courses.

New in 2021/22: New to Core Maths

In 2021/22, a new SKTM Programme launched: New to Core Maths. Aimed at teachers in secondary schools and post-16 colleges who are in the first two years of teaching the qualification, it supports participants to develop the specialist knowledge required to teach the course, and increases

their confidence in planning lessons which meet the needs of the diverse groups of students taking the qualification. New to Core Maths is one of the three projects that involves a direct working partnership between the Maths Hubs Network and the Advanced Mathematics Support Programme (AMSP).

Leeds City College

Embedding Core Maths into the curriculum

At Leeds City College, most students take vocational courses, and Core Maths is offered alongside BTECs and other similar qualifications. In 2021/22, three staff from the college took part in a Developing Core Maths Pedagogy Work Group, and realised that Core Maths content could be based around what students were studying in their vocational lessons, allowing maths to be understood in a real context.

The Work Group enabled those staff teaching Core Maths to take a new approach to lesson planning, and they began to research BTEC course units to see how they could 'implement Core Maths into them, to better design lessons that fit in with students' main qualifications'. More widely, staff teaching Core Maths developed a growing confidence to 'advocate for Core Maths in other departments', and have suggested a policy where Core Maths is a required qualification for all those studying engineering and motor vehicle courses.

As the college continues to develop the role of Core Maths in the curriculum, they are keen to continue working with the Maths Hub.

case study



RIWVG Research and Innovation Work Groups

Research and innovation – trying out ideas with the potential to improve maths learning – is part of the work in all 40 Maths Hubs.



// The research and innovation work done in Maths Hubs is invaluable to the programme as a whole. Collectively, the work is a vital testing ground for ideas emerging from around the network, that have the potential to refine and improve our core work. //

John Westwell
NCETM Director for System Leadership

In 2021/22, there were 911 schools participating in 108 separate Research and Innovation Work Groups (RIWG), gathering and sharing evidence in a wide variety of areas, covering both classroom practice and professional and school development models. The common objective is to find new or different approaches that will develop or enhance our established programmes and projects run on a large scale in every Maths Hub every year.

On this page, we profile three examples of this work.

1 Secondary Teaching Assistants (TAs)

Focus of work

Teaching assistants in secondary schools often lack the specialist (maths-specific) knowledge to maximise the learning impact when they work with individual or small groups of students. This can be particularly critical in the early secondary years, when some students have a weak basis of the key mathematical knowledge and understanding necessary to see them through to GCSE and beyond. This Work Group explored ways in which existing NCETM professional development materials, allied to teaching for mastery approaches, could be used to develop the confidence and competence of TAs in this area.

Influence

Work by RIWGs in 2021/22 strengthened the evidence base for enhanced support for secondary TAs. Informed by this, centrally-designed resources will now be tested in seven different Maths Hubs to improve the specialist knowledge of secondary teaching assistants.

2 Spatial reasoning in Key Stage 2

Focus of work

The place of spatial reasoning within maths teaching – though key to wider mathematical understanding – received lower priority in many schools due to disruption caused by the pandemic. This partly motivates attempts in these Work Groups to develop ways in which KS2 pupils can acquire, or improve on, this skill. Among new teaching approaches trialled were: greater attention to the language and gestures used by teachers; a concentration on deeper conceptual understanding of geometry; and the use of rich tasks to help children visualise.

Influence

The network-wide SKTM programme for primary teachers has now been enhanced with the addition of a spatial reasoning pathway, based on the findings of, and materials developed by, these Work Groups.

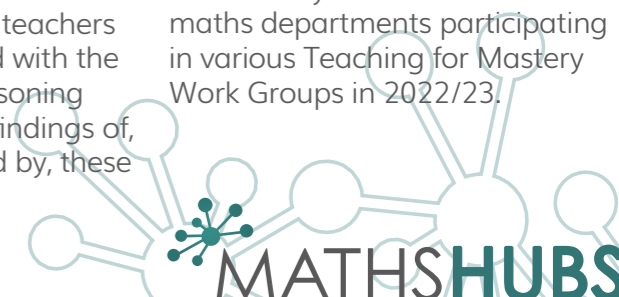
3 Oracy

Focus of work

The ability to articulate mathematical thinking and reasoning is a crucial tool for pupils to make progress, and one that pupils from disadvantaged backgrounds often struggle to acquire. These Work Groups explored teaching strategies that explicitly develop pupils' oracy. Examples (of strategies) include using stem sentences to reason about fractions, and using dual coding, where images are associated with words or phrases.

Influence

Strategies that proved successful in 2021/22 are now being used in the termly update sessions with Secondary Mastery Specialists, so that they can be shared with maths departments participating in various Teaching for Mastery Work Groups in 2022/23.



Maths Hub Leadership

Leading a Maths Hub involves a collaboration between the Maths Hub's Leadership Team, the Lead School, and the Strategic Board. Each Maths Hub strives for dynamic strategic leadership focused on improving maths education in their area.

Each Maths Hub has a Lead School, which appoints the core Maths Hub Leadership and Management (MHLM) Team. This team leads a wider group of local leaders of mathematics education to support improvements in maths education in schools across the Maths Hub region.

Lead Schools have the commitment and the expertise

to fulfil this complex system leadership role. On occasion, a Lead School will step down from the role, but the work of the Maths Hub continues with a newly-appointed Lead School and existing LLME.

Strategic Boards comprise individuals in leadership positions in a range of institutions operating in the hub area.



A meeting of the London North East Maths Hub Strategic Board.

New in 2021/22: New Lead School for Solent Maths Hub

Thornden School in Eastleigh took over as the Lead School for Solent Maths Hub, following on from seven years of effective service by Mary Rose Academy in Portsmouth.



Maths Hub Leadership and Management Teams

Each Maths Hub has a Leadership and Management Team made up of a leadership group from across the Maths Hub area, and an operational management group that provides the back-up support for all the Maths Hub activity. Following a review in 2021/22 of the capacity required in these teams, given the scale at which Maths Hubs are working, it was recognised that it was important to strengthen the role of the operational management group.

The Maths Hubs Network

In 2021/22, the 40 Maths Hubs in the Maths Hubs Network continued to work together and in partnership with the NCETM in a variety of collaborative events, including:

- National and regional project workshops for LLME, to support the planning, delivery and evaluation of the different 2021/22 Maths Hub projects
- Maths Hub Forums, which brought together people in the different Maths Hub leadership and management roles to share practice, discuss new developments, and provide support in fulfilling their roles
- The Maths Hubs Council, a representative body, which considered the strategic and operational direction of the programme.



275+

Maths Hubs
Network events
(face-to-face
and online)

Useful Links

The Maths Hubs Programme

[About Maths Hubs](#) – details about the programme and what a Maths Hub is

[Types of professional development offered by Maths Hubs and the NCETM](#) – explanation of Work Groups, programmes and communities

[Professional development projects run across the Maths Hubs Network](#) – details of over 30 projects available through Maths Hubs and the NCETM

Get involved with your hub

[Find your hub](#) – find your local Maths Hub

[Map of hub areas](#) – see which hubs cover which areas of England

[List of all 40 Maths Hubs](#) – if you already know your hub, contact them

Teaching for mastery

[Mastery Explained](#) – evidence and exemplification of mastery

[Mastery Materials](#) – resources to help teachers develop mastery in their schools and classrooms

[Mastery Magnified](#) – case studies and interviews from schools that have embraced mastery

Professional development resources

[Curriculum prioritisation](#) – a term-by-term framework to support planning and teaching primary maths

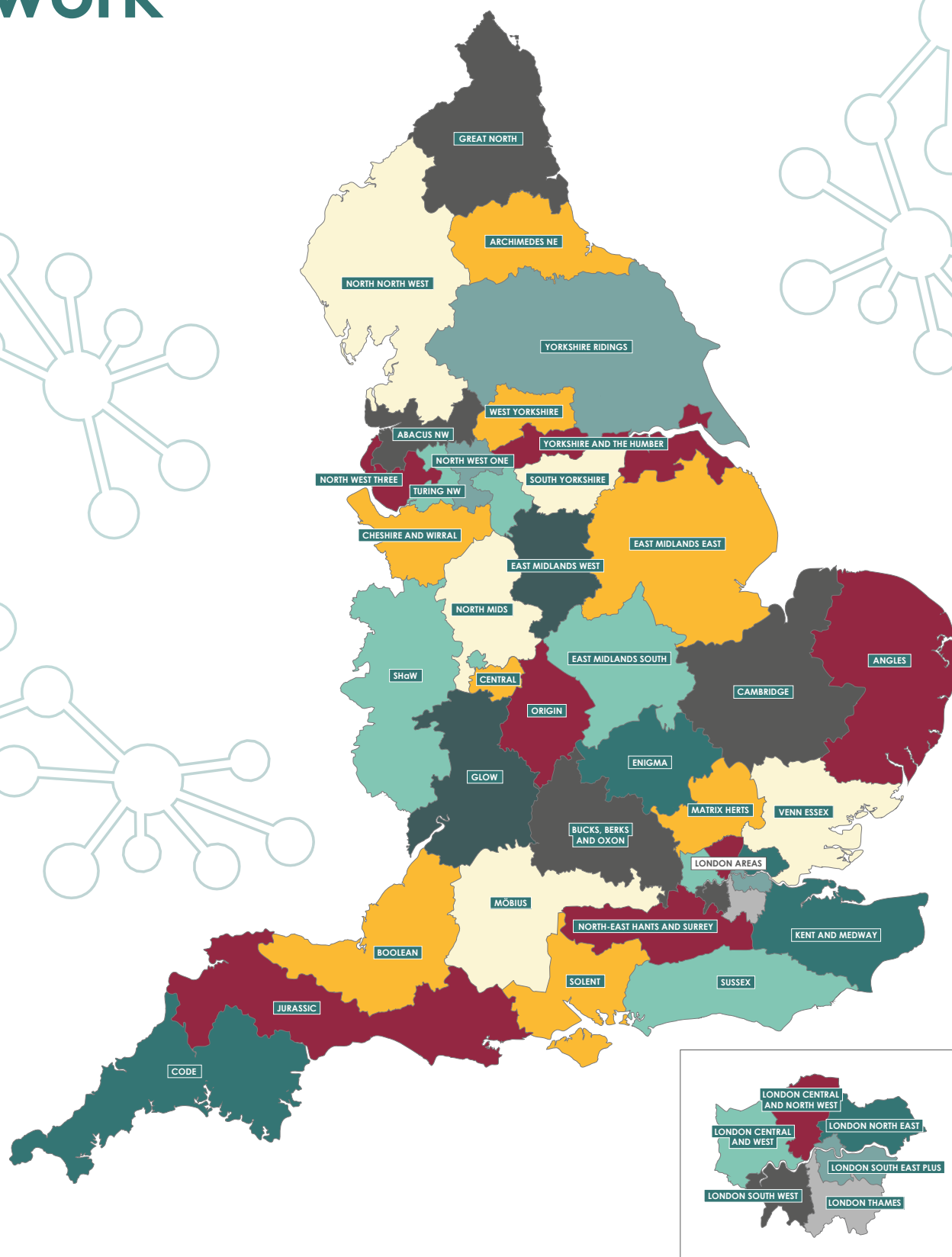
[Checkpoints](#) – diagnostic activities to help assess students' prior learning for KS3

Other useful websites

[NCETM](#) – the National Centre for Excellence in the Teaching of Mathematics

[AMSP](#) – the Advanced Mathematics Support Programme

The Maths Hubs Network



The data within this report has not been analytically assured or certified by the Department for Education.