



The summer rolls on, the classrooms get hotter, and the last Secondary Magazine of 2017-18 pings into your inbox. In this edition, look ahead to 2018-19 and the direction **your** professional development might take – which Maths Hub Work Group will you join next year? And find out how a school on the Yorkshire coast is just on the verge of taking up teaching for mastery – where will they start?

Don't forget that all previous issues are available in the [Archive](#).

This issue's featured articles



[Interested in high-quality professional development? Join a Maths Hub Work Group for 2018-19!](#)

Collaborate, communicate and create to make CPD really work for you and your students! Here we give a brief overview of the national programme of professional development run by the Maths Hubs Network next year, including what is on offer, what is a Work Group, and how you can get

involved.



[Teaching for mastery: is it for my school?](#)

The teaching for mastery programme is now being rolled out widely in the secondary sector in 2018-19, causing many schools to wonder what teaching for mastery might be able to offer them. We visit one school in Bridlington where a Mastery Specialist has just begun training, to find out how a school starts out on this journey.

And here are some other things for your attention:

- If you are looking ahead for September, these may prove useful:
 - for **curriculum planning**: the [NCETM Secondary Assessment Materials](#) can help with exemplification of 'mastery' and 'mastery with greater depth'; NRICH's curriculum mapping document, linking all their resources to the secondary curriculum, is available on [this page](#).
 - for **policy writing** have a look at our [Secondary Marking Guidance](#).
 - for **planning individual or departmental professional development**: make sure you have checked out all the fantastic [Work Groups available from the Maths Hubs next year](#), and the Advanced Maths Support Programme (AMSP)'s [sustained professional development courses](#) for those teaching maths at A level.
- In our [latest podcast](#), three secondary teachers discuss CPD – what they have experienced during their careers, how it has been part of their career progression, and what makes 'the perfect CPD'. Listen to them talk about collaboration within maths teams, and how peer-to-peer support enables effective professional learning
- Do you know what's expected of students at KS2 now? See if you can distinguish between KS2 and GCSE questions in this [quiz](#) from the Mathematical Association. A good one for a department meeting perhaps...
- The team at Cambridge Mathematics discuss [Can we get every student to love maths?](#) in the TES (free login required) and suggest that the [curriculum framework](#) they are developing might be a beginning.

- [Global Schools](#) are running a project with a group of maths teachers, to trial and create resources aimed at using maths to address global social justice issues. If you would like to get involved or find out more, contact hannah@leedsdec.org.uk.

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Interested in high-quality professional development? Join a Maths Hub Work Group for 2018-19!

Collaborate, communicate and create to make CPD really work for you and your students.

In 2018-19, hundreds of Work Groups will take place across the country, forming a network of national projects which offer maths teachers subject-specific professional development. Work Groups are free or minimal cost, with funding sometimes available to offset costs to schools of releasing teachers. Any secondary maths teacher can be part of this exciting initiative.

So, what's on offer?

The 35 Maths Hubs across England are running 14 different projects, meaning you can develop your practice in a range of areas, including:

- support for reasoning and problem-solving at GCSE
- teaching for mastery
- providing continuity from Y5 to Y8
- developing A level teaching.

Locally-based Work Groups of teachers from a number of schools meet regularly to discuss, observe and often plan together, around agreed project outcomes. In between meetings, you'll explore your project focus both in your own classroom and across your school. All teachers – from NQTs to heads of department and assistant heads – will find something to develop their practice. There are also dedicated projects to support TA maths subject knowledge.



Why should you join?

Collaborative, hands-on learning develops your professional expertise and can also give you ideas to try out in your classroom practice straight away. Professional development which combines the input of experts and the exploration of verified research increases the chances of any new pedagogical approaches you adopt having a positive impact on your students. You will develop knowledge, have the chance to share best practice with colleagues, and contribute to and draw from a national network of ideas and resources.

What will be the outcome?

Being part of a Work Group means you will:

- meet and collaborate with colleagues from other local schools to share best practice
- take away ideas to help your students become more confident mathematicians ready to tackle GCSEs and A levels
- get input and guidance from a local leader of maths education (LLME)
- develop your own classroom practice and that of your colleagues
- be part of a national network of teachers working together to improve the way maths is taught and learned.

What do others say about this professional development?

Don't just take our word for it that this is fantastic CPD! Other teachers who have been involved in Work Groups through Maths Hubs have experienced the benefits for themselves.



As part of his Work Group, Martin Willan (Second in Maths at Outwood Academy Easingwold) commented:

'The open classroom experience with discussion before and after is an excellent model of professional development.'

Megan Bailey (Maths Teacher i/c KS3 Maths at St Marylebone School in London) agrees:

'To anyone considering joining a Work Group, I could not recommend it enough. It is arguably the best continual professional development you can get. Being able to collaborate across schools is so valuable.'

Gabby Veglio (Head of Maths at The Kingston Academy in Surrey) has seen department-wide benefits:

'My department are keen to keep collaborating in Work Groups to share practice that develops deeper mathematical knowledge in our students.'

How can I get involved?

Joining is easy. Simply visit www.mathshubs.org.uk/find-your-hub and find your local hub. Get in touch with them and they will be happy to add your name to a Work Group starting in Autumn 2018. To first see details of all the projects and make your choice, visit www.mathshubs.org.uk/what-maths-hubs-are-doing.

So, what are you waiting for? Visit the [website](#) now and get involved. We look forward to seeing you at a Work Group in 2018/19!



Teaching for mastery: is it for my school?

“Teaching for mastery? Is that something for shiny, high-achieving schools?”

“Teaching for mastery? Is that one of those initiatives to help failing schools to get out of a hole?”

Actually, teaching for mastery is something for all sorts of schools.

What is teaching for mastery?*

How many maths teachers enter the profession full of ideas of making maths accessible, of helping students to really understand how maths works? And how many of them are left wondering ‘where did it go wrong for this student’, when faced with Y10s who still fundamentally don’t understand fractions, or who want to repeat, memorise and then misuse the mantra ‘two minuses make a plus’. There are many such teachers in all sorts of schools, all over the country.

One such teacher is Wendy Smith, a maths teacher with experience in many roles in school – from Head of Department to Assistant Head, and now working as an AST, after deciding that her interest was primarily in classroom practice. She now works at Headlands School in Bridlington, on the Yorkshire coast, and this year joined the NCETM/Maths Hubs’ Secondary Mastery Specialist programme.



We visited Headlands on a windy Wednesday in June. An ordinary school: a timetable full of spaces left by Y11 and Y13, some classes out on trips and residentials, and other classes doing revision for end of term tests. We were lucky enough to get into one of Wendy’s lessons where general revision was replaced by her taking her Y10 students right back to the basics of trigonometry, to embed an understanding she felt they hadn’t achieved the first time. The full ordinariness of the school was evident as we approached the classroom to find that someone had been sick all the way down the corridor, with all the reaction of excitement, disgust and noise you’d expect from students moving between lessons at such an inopportune moment.

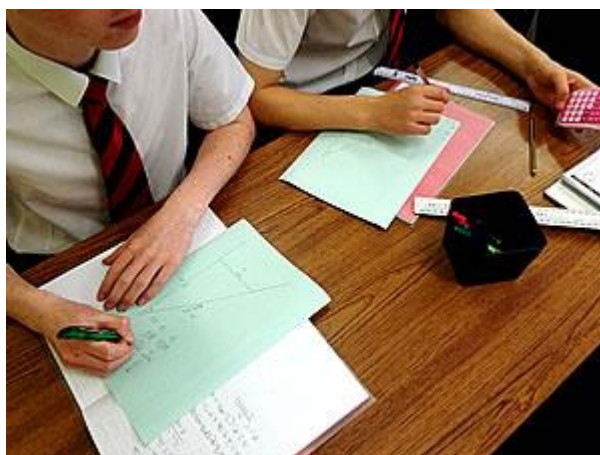


Headlands, an 11-18 school of around 1200 students, is one of two secondary schools in Bridlington. Although Ofsted said the school 'requires improvement' (January 2018), this does not seem to be a reflection on the maths department where learning is described as "more effective", and "lessons are often characterised by teachers' high expectations and their incisive questioning that probes pupils' understanding, redirects thinking or tackles common misconceptions."

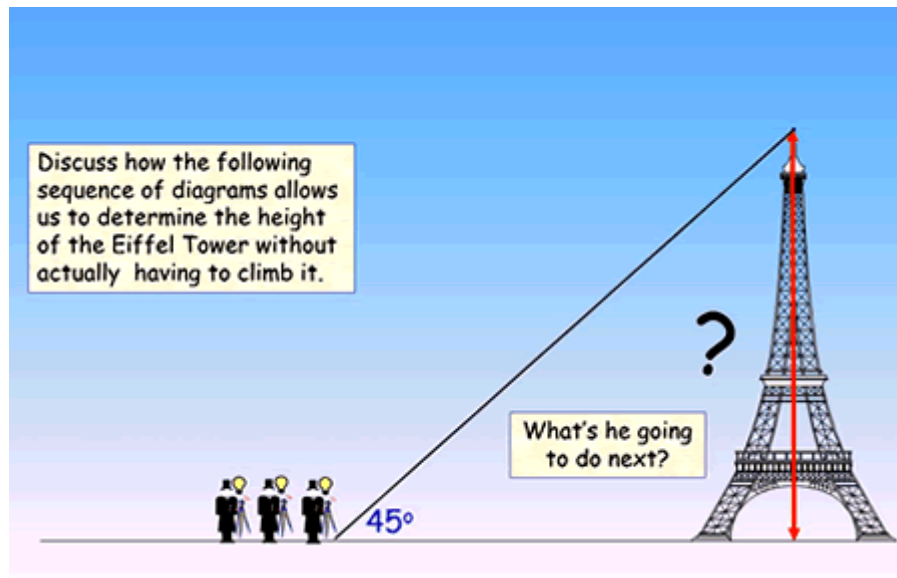
So the head of department, Rob Fraser, is not particularly looking for a new initiative or a way to fix things. The impetus for a teaching for mastery approach, has mostly come from Wendy who has had an interest in teaching for mastery for the past seven years, and has some experience of success in using the bar model and other pictorial models in a previous school. She describes the Mastery Specialist training as 'the CPD I have been waiting for', and feels that a mastery approach may be able to offer her students a deeper understanding than using other methods she is used to.

Following the first two-day residential of her national training, Wendy has been particularly struck by the impact of breaking teaching into very small steps and embedding each step more deeply before moving on to new content. Back at school, she is experimenting with this in her own classroom, and working out how it can be incorporated into a new scheme of work for Y7 from September.

The Y10 lesson that we observe begins with each student creating their own right-angled triangle with an angle of 30° , measuring each side and working out the ratios for pairs of sides. The ensuing discussion focuses on why these are the same for all the students' different sizes of triangle, with students making connections with enlargement and similarity work they have done previously.



Wendy then spends some time focusing on the right-angled isosceles triangle and how the ratio of one between the two shorter sides can be used to determine heights (e.g. of towers) in real life:



What is striking about this, is not the tower-measuring context, which is probably used in every classroom in the country, but how her use of the 45° triangle illuminates the power of trig by eliminating any need for calculation. How frequently are students distracted from understanding mathematical structure by trying to get their heads round calculations too early?

Students then work out opposite and hypotenuse lengths on a number of 30° triangles, using 'sine $30^\circ = \frac{1}{2}$ '. Wendy is aiming for them to understand the mathematical structure of trigonometry before they get caught up in trying to work out which ratio to use, what order to press the buttons on the calculator, and where on earth the resulting long string of decimals comes from. These complications, for a student that doesn't really understand what a trigonometric ratio actually is, can quickly turn into a confusing series of rules and procedures to memorise.

When students later begin their independent practice, they start only with problems involving the sine ratio. Wendy says:

"Teachers worry that spending so long on the sine ratio means that they will run out of time, but what I find is that once students have understood the concept of trigonometric ratios, and applied it to a range of problems using just one trig ratio, the other two fall into place much more quickly and easily, so time is made up, and understanding is better."

The Mastery Specialist programme expects participants will spend the first year trying things out in their own classroom, gaining a confidence with a new style of teaching, and an idea of how best to apply changes in approach to the context of their own school. Later, specialists are encouraged to support their department in making more sweeping changes, possibly to schemes of work, resourcing, groupings and teaching style. Wendy is planning on overhauling the current Y7 scheme of work to allow for a common starting point for all classes, and more substantial periods of time on each topic to allow for small steps.

What difficulties does she anticipate? Wendy is aware that many of the staff in the department know very little about teaching for mastery and that some may be unsure or sceptical about making changes. With

this in mind, for the first year, she has asked for volunteers to try out the new scheme of work with her, and is planning to run this concurrently with the old scheme of work for those that feel more comfortable with it. A manageable handful of staff are joining her, and Wendy is aware of the need to provide well thought-out plans and resources to support those that may not yet be confident to create their own. She is hoping to get support with the challenge of finding good quality resources from Cohort 1 Mastery Specialists, now with two years' experience behind them. As the school embarks upon this process, we will be keeping in touch with them to see how it's going.

When considering adopting a teaching for mastery approach, teachers often get the opportunity to visit classrooms where the approach is already established and working. It may be more difficult to ascertain the steps taken to reach this point, and the understand how difficulties are overcome. We hope to keep in touch with Wendy and follow the experience of Headlands School, to better understand the process of making this sort of change.

Want to find some ideas for embedding multiplicative reasoning skills throughout KS3, that will support KS4 teaching of trigonometry? Read the [conversation between two teachers](#) in the previous Secondary Magazine.

On 26 June, the weekly Twitter [#mathscpdchat](#) discussion had teachers discussing how they approach teaching of trigonometry. Read a summary [here](#).

* **Footnote:** What *is* teaching for mastery?

Few teachers get into maths teaching to teach rules and procedures to be learned without a real understanding, but how many of us find ourselves delivering just that, in desperation, to Y11s in the run up to their GCSE? Teaching for mastery offers something different – the aim being that students really understand and embed concepts, being given the time to build a deep understanding rather than a superficial procedural one. In this way, understanding of new material can be built on solid foundations. Rather than re-teaching concepts year after year, as with a spiral curriculum, having a strong relational understanding reduces the need for this. You can find out more about teaching for mastery here. Many of the ideas you will recognise as long-established 'good teaching', but much of it is counter to the prevailing pressure of recent years to move students on to the next level as quickly as possible.