

#mathscpdchat 8 June 2021

Twitter chat
Tuesday 8 June 7-8pm


Join us for #mathscpdchat
with Hannah Stoten HMI,
Steve Wren HMI and
NCETM

We'll be discussing Ofsted's
mathematics research
review.



This Ofsted-hosted #mathscpdchat opened with a general question:

 **Ofsted**  @Ofstednews · Jun 8 ...
What do you think of the report: [gov.uk/government/pub...](https://gov.uk/government/publications/research-review-series-mathematics) #mathscpdchat



Research review series: mathematics
A review of research into factors that influence the quality of mathematics education in schools in England.
gov.uk

 **Ofsted**  @Ofstednews · 17h ...
Good to hear - which phrases in particular? #mathscpdchat

 **Director of Maths** @DirectorMaths · 17h
Replying to @Ofstednews

I read it more as a review of good practice and what works rather than "what an inspector is looking for". I'm a bit of a curriculum geek and there's a couple of phrases in there that I will be using with my team as we look at our next phase of development #mathscpdchat



Director of Maths @DirectorMaths · 17h

...

Replying to @Ofstednews

This is a great one to start off with. I honestly believe there is no such thing as THE perfect curriculum. Each should be tailored to the students in the school. Own your curriculum and develop your curriculum. #mathscpdchat

The evidence presented here supports careful consideration of sequencing and content that makes a mathematics curriculum a guarantee of long-term learning. Useful facts and efficient and accurate methods are ideally paired within a topic sequence. Strategies for solving problem types are then best taught and learned once pupils can recall and deploy facts and methods with speed and accuracy. When planning curriculum content, teachers also need to prioritise 'forward-facing' knowledge. This goes beyond important facts of number. It includes the mathematical methods that pupils will take with them on their journey. The ideal aim is for pupils to attain proficiency, not just collective moments of understanding, familiarity or experience. This will help pupils to develop motivation in the subject.

The ideas and issues that were then discussed resulted in a chat that addressed the following recurrent themes. We have included screenshots of a few contributions within each theme.

The research behind the report



Ofsted @Ofstednews · Jun 8

...

Good question - have a look at the principles paper, we've set that out here:
[ow.ly/sfXf30rKcz8](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/614442/principles-paper.pdf) #mathscpdchat
[twitter.com/ZoeMNye/status...](https://twitter.com/ZoeMNye/status/1498444444444444444)

Zoe Nye @ZoeMNye · Jun 8

@Ofstednews #mathscpdchat thank you for this opportunity. how did you choose what went into your reading list and what stayed out?



Ofsted  @Ofstednews · 21h ...

We outline how we selected research here - there were also rigorous quality assurance processes [gov.uk/government/pub..](https://www.gov.uk/government/publications) [#mathscpdchat](#)



Ruth Trundle @RuthTrundle · 21h

@Ofstednews #mathscpdchat What was the mechanism for assessing the quality of the research referenced? Did you have a minimum standard?



Helen Drury @DrHelenDrury · 17h ...

Replying to @Ofstednews

In the principles paper you say "the research review will also include information from: the Education Endowment Foundation". Is there much overlap with [educationendowmentfoundation.org.uk/news/eef-publi...](https://www.educationendowmentfoundation.org.uk/news/eef-publications/)?



EEF publishes new review of evidence on Maths teaching | News

Using calculators in maths lessons can boost pupils' calculation and problem-solving skills, but they need to be used in a thoughtful and ...

[educationendowmentfoundation.org.uk](https://www.educationendowmentfoundation.org.uk)

Problem solving



Ofsted  @Ofstednews · 17h ...

There is a focus on problem solving, in particular the strategies pupils need in order to solve different types of problems [#mathscpdchat](#)



Richard Harvey-Swanston @RHarveySwanston · 17h

Replying to @Ofstednews

I was also surprised not to see more focus on problem solving or mathematical representation.



Professor Smudge @ProfSmudge · 19h ...

But what about problem solving as way in to learning new mathematical content?



C Handyside @handyside_c · 19h ...

Replying to @ProfSmudge and @Ofstednews

Yes, this was something I learnt from the Shanghai exchange and we implemented it very well into a Teaching for Mastery framework.



Ofsted  @Ofstednews · 19h ...

That can be more effective with expertise...and of course experts are drawing upon their knowledge of a range of problem types [#mathscpdchat](#)



Professor Smudge @ProfSmudge · 19h

Replying to @Ofstednews

But what about problem solving as way in to learning new mathematical content?



Professor Smudge @ProfSmudge · 18h ...

Replying to @Ofstednews

No, I was thinking of problems that draw on pupils' intuitive ideas and that reveal a range of approaches as well as misconceptions.



Mary Pardoe @PardoeMary · 19h ...

Replying to @ProfSmudge and @Ofstednews

There are some examples of good practice where students solve unfamiliar problems to move their learning forward in the Ofsted report 'Mathematics: made to measure' (report is here:

[assets.publishing.service.gov.uk/government/upl..](https://assets.publishing.service.gov.uk/government/uploads/))

For example ... [#mathscpdchat](#)



Prime practice: a substantial problem that linked new and previous learning

The problem was on a new topic, to find an area enclosed by two curves expressed in polar coordinates (as illustrated). The problem had multiple steps but was not broken down for the pupils by the teacher. The pupils thought out and discussed their ideas, realising that to solve the problem they had to sketch the curves, find where they intersected, figure out how to find the area, and then calculate it.

At each stage of the problem the pupils' prior learning, though sometimes rusty, was brought into play, but for a purpose. Learning in this lesson made good links with new and earlier learning and the pupils had to think very hard for themselves.



Director of Maths @DirectorMaths · 21h



At a KS4/5 level many students struggle with "method selection". Tasks such as Same Surface Different Deep can help with this but we need to be prepared to address the root cause of the issue. "Interventions" need to be targeted and not just more of the same [#mathscpdchat](#)

The importance of a curricular approach

Analysis of proficient mathematicians' problem-solving shows that their thinking is highly organised. It draws on a well-connected knowledge base of facts, methods and strategies that have been used to solve problems with a similar deep structure before. [\[footnote 91\]](#)

Successful problem-solving is therefore not just an activity but an outcome of successful learning of the facts and methods, and their useful combinations as strategies. Conversely, if a problem-solver does not have conditional knowledge, they are more likely to be distracted by the surface features of problems. [\[footnote 92\]](#)


Early Years and Key Stage 1



Ofsted  @Ofstednews · 17h ...

Have a look at the principles paper: ow.ly/7xVv30rKcvL - the review addresses reception to KS4



Dr. Helen J Williams  @helenjwc · 17h

Replying to @Ofstednews

Good evening. Please can you clarify which parts of the report are relevant to EYFS, KS1, KS2, KS3 and KS4? #mathscpdchat



Ofsted  @Ofstednews · 19h ...

We set this out here: ow.ly/eanj30rKcH8 #mathscpdchat - the purpose of the review was to set out a conception of quality from reception onwards



Sue Cowley @Sue_Cowley · 19h

Replying to @Sue_Cowley and @Ofstednews

Given that well over 90% of children use their funded hours, why does the report completely ignore PVI? #mathscpdchat

A contributor tweeted this useful image:

Conversion Table of USA Grades to School Years

| Age in Years | USA Grade | England and Wales | Scotland and Northern Ireland | Republic of Ireland |
|--------------|-----------|-------------------|-------------------------------|---------------------|
| 4/5 | K1 | Reception | Primary 1 | Infants |
| 5/6 | K2 | 1 | Primary 2 | Senior Infants |
| 6/7 | 1 | 2 | Primary 3 | 1st Class |
| 7/8 | 2 | 3 | Primary 4 | 2nd Class |
| 8/9 | 3 | 4 | Primary 5 | 3rd Class |
| 9/10 | 4 | 5 | Primary 6 | 4th Class |
| 10/11 | 5 | 6 | Primary 7 | 5th Class |
| 11/12 | 6 | 7 | Secondary 1 | 6th Class |
| 12/13 | 7 | 8 | Secondary 2 | 1st Year |
| 13/14 | 8 | 9 | Secondary 3 | 2nd Year |
| 14/15 | 9 | 10 | Secondary 4 | 3rd Year |
| 15/16 | 10 | 11 | Secondary 5 | 4th Year |
| 16/17 | 11 | 12 | Secondary 6 | 5th Year |
| 17/18 | 12 | 13 | Secondary 7 | 6th Year |

Mathematical 'talk'



Ofsted  @Ofstednews · 18h

We talk about questions, explanations being clear, dialogue and balance of discussion [#mathscpdchat](#)



Laura Heywood @laura_heywood_ · 18h

@Ofstednews #mathscpdchat It is disappointing to see that a quick search of the term 'talk' across the entire research review yields no results. How does the research review encourage the role of dialogue in the classroom?



Mary Pardoe @PardoeMary · 18h

Replying to @Ofstednews

The Ofsted report 'Mathematics: made to measure' also expressed concern about pupil-pupil 'talk'. (Report is here: assets.publishing.service.gov.uk/government/uploads/) [#mathscpdchat](#)

Ofsted

It remains a concern that secondary pupils seemed so readily to accept the view that learning mathematics is important but dull. They frequently told inspectors that in other subjects they enjoyed regular collaboration on tasks in pairs or groups and discussion of their ideas, yet they often did not do so in their mathematics lessons, or even expect to do so.



Laura Heywood @laura_heywood_ · 17h

...

NC for maths 'The quality and variety of language that pupils hear and speak are key factors in developing their mathematical vocabulary and presenting a mathematical justification, argument or proof.' How is this reflected in the review?



Ofsted @Ofstednews · 19h

...

We agree - and we do talk about the importance of mathematical vocabulary [#mathscpdchat](#)



Laura Heywood @laura_heywood_ · 19h

Replying to @PardoeMary and @Ofstednews

NC for maths 'The quality and variety of language that pupils hear and speak are key factors in developing their mathematical vocabulary and presenting a mathematical justification, argument or proof.' How is this reflected in the review?

Representations



Richard Harvey-Swanston @RHarveySwanston · 20h

...

Well I have lots of questions after tonight's [#mathscpdchat](#). Here's my first: Why do we use mathematical representations? Simple, I know, but I'm interested in how we answer this question differently.




Sharon Malley @mathsmumof2 · 20h

...

Replying to @RHarveySwanston

A representation e.g. a bar model can show us a range of associated facts and allow us to build our understanding from it. [#mathscpdchat](#)

 **Mr Mattock FCCT NPQSL** @MrMattock · 18h ...

Helps pupils make sense of mathematical concepts, gives them something to think about in relation to the concept that isn't just abstract symbology. Reveals and allows manipulation of the structure underlying the concept, and therefore allows recognition of the same structure...

1 ↻ 3 ↗


 **Mr Mattock FCCT NPQSL** @MrMattock · 18h ...

...in different places through their journey in mathematics.

 **Siobhan King** @siobhanjking · 20h ...

Replying to @RHarveySwanston

Because comparing and translating between representations is what builds a deeper and increasingly secure understanding of underlying concepts.

 **Helen Drury** @DrHelenDrury · 5h ...


Replying to @RHarveySwanston

In National Curriculum - 'Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas.'

Attitudes to maths and maths anxiety

 **Ofsted** @Ofstednews · 18h ...

Interesting to reflect on the role of cultural factors here [#mathscpdchat](#)

 **Ruth Trundle** @RuthTrundle · 18h

@Ofstednews [#mathscpdchat](#) the review suggests a positive attitude is the result of success yet the research (TIMSS, Values and Variables etc.) actually suggests poor attitude is associated with high attainment - how is this possible in such a review?

 **Dave Bowman** @Maths4ukplc · 17h ...

[#mathscpdchat](#) Maybe more emphasis on how we can create a positive community that reduces maths anxiety would help our learners.




Ofsted  @Ofstednews · 19h ...

The review talks about engineering success and inclusivity rather than relying on 'natural ability' [#mathscpdchat](#)



SteveLoMMXXI @MaxTheMaths · 19h

@Ofstednews .. it would be lovely to have an answer to this question. 
Thank you [#mathscpdchat](#) twitter.com/maxthemaths/st...



Marc Hayes @mrmarchayes · 21h ...

Replying to [@Ofstednews](#)

Great to see the focus on ambition for all and expectation that the curriculum can enable all children to be successful [#mathscpdchat](#)



Professor Smudge @ProfSmudge · 19h ...

Replying to [@mrmarchayes](#) and [@Ofstednews](#)

But it seems that those who are deemed to have had relatively limited experiences of maths are to be given an extra heavy dose of narrow, uninspiring, impoverished maths. An odd path to success!



Marc Hayes @mrmarchayes · 19h ...

Is there any reading you would suggest for alternative ways of achieving success? I'm really interested by this debate though see the procedural focus as opening doors to richer maths, rather than rerouting completely: a bit like scales and arpeggios in music etc



Professor Smudge @ProfSmudge · 17h ...

Maths isn't really like that [I hope!].

Perhaps read about RME (eg Gravemeijer) or Japanese approach to using problem solving (Akihiko Takahashi)



Marc Hayes @mrmarchayes · 9h ...

Thanks! I guess what maths is 'like' depends on personal experiences. I don't mean that in a contentious way, but there will always be competing approaches which might lend themselves to different preferences or conceptualisations of what maths is like.



Marc Hayes @mrmarchayes · 9h ...

And I think the spirit that everyone can be involved with maths, however they conceptualise it, can only be a good thing. Thanks again for the suggestions - I hadn't heard about the Japanese approach so will be sure to look that up



Chris Dyson FCCT #AntiRacist @chrisdysonHT · 20h

...

Replying to @JenniferRead6 and @Ofstednews

Now we use #XTables as the essential tool at my school. A really traditional method BUT it works. Get you knowledge of XTables and maths becomes easy. We are Top 1% and one of the most deprived schools in the UK #mathscpdchat



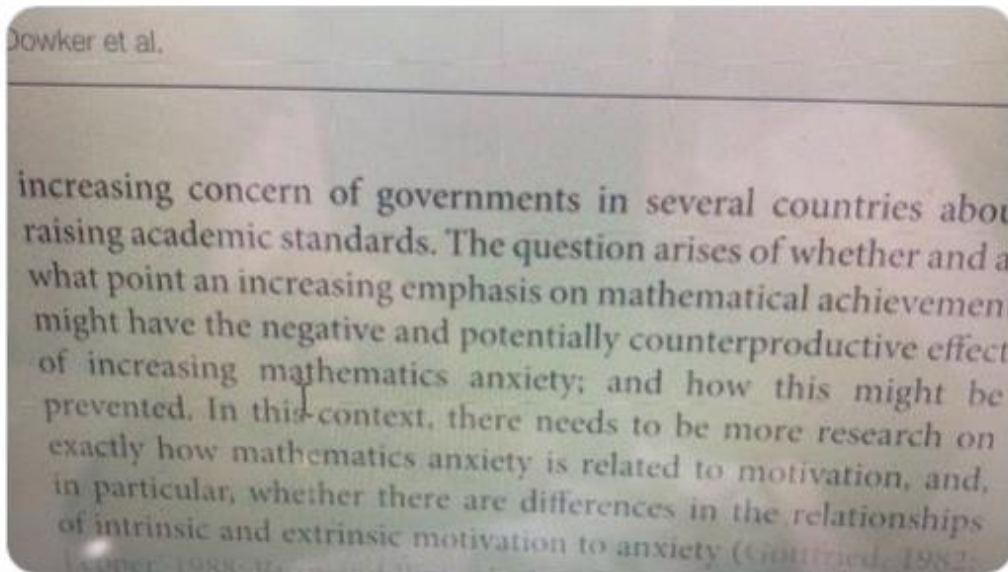
Timetables Rock Stars
[youtube.com](https://www.youtube.com/watch?v=...)



Jennifer Read @JenniferRead6 · 20h

...

That's not what the research says. This paper by Dowker et al. considers 60 years of maths anxiety research. They don't conclude with 'just learn your tables and you'll be fine.' That seems a very unsympathetic view.
#mathscpdchat



Chris Dyson FCCT #AntiRacist @chrisdysonHT · 21h

...

I am running a school everyday. I took one of the worst schools in the country and changed it through Times Tables. I don't see that as unsympathetic but as fact. I have over 1000 visitors a year watching how XTables took us to the Top 1% of schools

parklandsprimary.org.uk/inspire-maths/

Practice and knowing mathematical facts



Ofsted  @Ofstednews · 19h

...

Thanks! We agree with this excellent point [#mathscpdchat](#)

 **Sharon Malley** @mathsmumof2 · 19h

I am impressed with this part, hopefully this will encourage people to slow down, revisit and connect areas of learning rather than rushing through 'topics' [#mathscpdchat](#)

Balancing new learning and rehearsal of learning

A moment of understanding does not guarantee long-term learning. Pupils benefit from studying worked examples in addition to practising solving similar types of problems. [\[footnote 106\]](#)

Therefore, teachers need to balance introducing new content with pupils' need to spend time revisiting content. [\[footnote 107\]](#) There should be space within the curriculum for planned consolidation. Pupils should not be rushed through content.

This is easier if the mathematics curriculum focuses on core content early and leaders prioritise and value consolidation. Minimising off-task behaviour may also help to maximise the amount of time available for retrieval, rehearsal and consolidation of learning. Pupils who do well tend to have spent more time on the subject. [\[footnote 108\]](#)



Ofsted  @Ofstednews · 18h

...

In the review we talk about the bi-directional learning process in that understanding develops through practise [#mathscpdchat](#)

 **Richard Harvey-Swanston** @RHarveySwanston · 18h

Replying to @Ofstednews

Last thing from me. I thought your point about the importance of children knowing key facts rather than relying on derivation is important but similar points have been made in the past and misinterpreted as need for facts first, understanding after /1



Richard Harvey-Swanston @RHarveySwanston · 18h

...

Replying to @RHarveySwanston and @Ofstednews

- which the statutory Y4 tests compound. I wonder if a more nuanced message is needed here for pri tchs and thought the joint pri MA/ATM paper on mult bonds might be useful to you - bit.ly/3w4kL1f /2



Richard Harvey-Swanston @RHarveySwanston · 18h

...

Replying to @Ofstednews

Yes and I did see this - but as someone who has written and spoken about this I thought it important that as authors in a position of considerable power you should be aware of the desperate readiness for this to be misinterpreted.



Richard Harvey-Swanston @RHarveySwanston · 18h

...

Apologies for not being clearer first time around!

This tweet represents the general feeling of contributors at the end of the chat:



Director of Maths @DirectorMaths · 21h

...

Plenty of food for thought in tonight's [#mathscpdchat](#) thanks to @Ofstednews.

Links shared during the chat

[Research review series: mathematics](#) which is a UK Government publication written by Hannah Stoten HMI and Steve Wren HMI. It explores the literature relating to the field of maths education. Its purpose is to identify factors that can contribute to high-quality school maths curriculums, assessment, pedagogy and systems. It was shared by [Ofsted](#)

[Principles behind Ofsted's research reviews and subject reports](#) which is a UK Government publication dated 30 March 2021. It was shared by [Ofsted](#)

[Improving Mathematics in Key Stages Two and Three: Evidence Review](#) which is a report written by Jeremy Hodgen, Colin Foster, Rachel Marks and Margaret Brown, and published by the Education Endowment Foundation (EEF). It was shared by [Helen Drury](#)

[Mathematical knowledge for teaching problem solving: Lessons from lesson study](#) which is a paper by Colin Foster, Geoff Wake and Malcolm Swan. They draw on data from a problem-solving-focused lesson-study project to highlight and exemplify the mathematical knowledge needed for teaching problem solving. It was shared by [Terry Pearson](#)

[Mathematics: made to measure](#) which is an Ofsted report based predominantly on evidence from inspections of mathematics between January 2008 and July 2011 in maintained schools in

England. It draws attention to serious inequalities in pupils' experiences and achievements, and includes examples of best practice that help avoid or overcome the inequalities and weaker practice that exacerbates them. It was shared by [Mary Pardoe](#)

[The Teaching and Learning of Multiplication Bonds](#) which is a Position Statement from the Joint ATM-MA Primary Group (the Association of Teachers of Mathematics and the Mathematical Association). It was shared by [Richard Harvey-Swanston](#)

[Teaching Adolescents to Become Learners](#) which is a report from the UChicago Consortium On School research. The report summarises research on five categories of noncognitive factors that are related to the academic performance of adolescents. It was shared by [Dave Bowman](#)

[Nix the Tricks](#) which is 'a guide to avoiding shortcuts that cut out mathematical concept development' by Tina Cardone and the online math community known as the MTBoS. It was shared by [Gemma Scott](#)

[What I've learnt from using Stick and Split](#) which is a YouTube video by [Jennifer Read](#) on her experiences of using Stick and Split. It was shared by [Jennifer Read](#)

[Timetables Rock Stars](#) which is a YouTube video by Parklands Primary School. It was shared by [Chris Dyson](#)