

# The NCETM Maths Podcast Episode 84

## Secondary Maths: Inside the EEF Practice Review

**Julia Thomson:** Hello and welcome to the NCETM Maths Podcast. I'm Julia Thomson from the NCETM Communications Team. In this episode, I'm inviting you to listen in to a conversation between Dr. Jen Shearman [JS], the NCETM's Director for Evaluation and Impact, and Carol Knights [CK], the NCETM's Director for Secondary Maths, as they discussed the [Education Endowment Foundation \(EEF\) Secondary maths practice review](#). The review aims to understand what the current pressures, priorities and practices are when teaching maths in state-funded secondary schools in England.

If you're a secondary maths teacher or head of department, you might be thinking that you know only too well what the pressures and priorities are, but the review does highlight some common themes and some of the impactful strategies and approaches schools are adopting, which may be interesting to teachers and school leaders.

Carol and Jen were keen to explore its findings and recommendations through the lens of the NCETM and Maths Hubs' professional development work. I hope you enjoy the conversation, and I'll hand you over now to Jen and Carol.

**JS:** Hello, my name's Jen Shearman and I am the Director for Evaluation and Impact at the NCETM.

**CK:** And my name's Carol Knights. I'm the Director for Secondary at the NCETM. Jen and I are going to have a conversation now about the EEF's Secondary maths practice review, which was released in June 2024. So, Jen, I'm going to ask you about the review in general. Tell us a bit about the background.

**JS:** It was commissioned by the EEF, the Education Endowment Foundation, who are all about commissioning and evaluation of projects that have the potential to make a positive difference to education of all children, but particularly of disadvantaged children.

In this case, they commissioned Sheffield Hallam University to write a report looking at the practices that teachers are already doing in the classrooms and the professional development that they're experiencing, in order for them to be as good a maths teacher as they can, with a view of perhaps evaluating some promising projects or some things that are perhaps under represented at the moment in professional development.

They did a mixture of data collection for the review. First of all, they did a literature review of relevant evidence, including reports that lots of teachers will have already read about maths education. They also did some primary research: they sent out a survey, they ran some focus groups, and they asked for specific contributions from experts including the NCETM and representations from Maths Hubs. There was good representation from us, and we certainly recognise some of our feedback in the final report. In relation to findings, it is a weighty tome of about 90 pages, and they grouped the findings into four areas.

The first area was around teacher skills and expertise. They acknowledged what we already know: that there is a shortage of maths teachers, but also that there is an inequitable

distribution of maths teachers across our schools. The second thing they talked about is the targeted interventions for specific groups of pupils that are already happening, and saying that schools are trying lots of things, some of which are perhaps more successful than others due to particular barriers and challenges.

The third thing they looked at is impactful practices: they were looking at what teachers are using in their maths lessons to make sure that learning happens in all their classes. And They also asked teachers what they would like more professional development on, in order for their practices to be more impactful.

The final area of findings was related to programme engagement or engagement by teachers in continuing professional development - what kind of CPD teachers were doing and what were the barriers and challenges for them engaging with CPD.

So, there are the four areas of findings, but let's delve a bit deeper. I think the first one is about the elephant in the room: we know there's a national shortage of maths teachers. What did the report say about that, Carol?

**CK:** You're absolutely right there, Jen. We know that we've got a lack of qualified maths teachers, and in schools they have to make decisions about where to deploy these teachers. Perhaps unsurprisingly, what schools are doing is deploying them in Key Stage 4 to work with exam classes. The knock-on effect of that is that the lower-attaining groups and the younger groups, particularly those in Year 7, are being taught by non-specialist teachers.

Also, they're quite often taught by multiple teachers. I know from timetabling myself that a timetable is often built with Year 7 as the lowest priority: they're the classes that end up with multiple teachers, which doesn't really serve these low-attaining and younger students particularly well.

If we look at what's happened at Key Stage 2, one of the impacts of COVID has been particularly on disadvantaged students. So, if we look at age-related expectations in 2022/23, 73% of students met age-related expectations. But when you look at the two different sub-cohorts, for advantaged students, it's 79%, whereas if you look at disadvantaged students, it's only 59% of students who met age-related expectations.

What's happening is that these students who are really quite needy mathematically are coming into Year 7 and not being taught by math specialists. So I think, as a nation, that's something that we need to think about. At school level, we need to think about putting a little bit more priority on some of these students coming into Year 7 so that they have specialist teachers. Obviously, we can't magically create math teachers from nowhere, but I know that with the NCETM, one of the things that we do is we have a Specialist Knowledge for Teaching Mathematics (SKTM) Programme for non-specialist teachers.

In the short term, that's something that schools can take advantage of to support those non-specialist teachers to develop their skills. Another programme we have, because we recognise this, is [Securing Foundations in Year 7](#), so we're looking for that to have an impact on these particular students as well.

**JS:** The report discusses the problems and the challenges and does open a door for things that could be done to help children despite those challenges, and it's great that we've

already got the Securing Foundations at Year 7 project to help Year 7s, and we've got the [Non-specialist SKTM Programme](#) to help those maths teachers who are teaching outside of their specialist area.

**CK:** One of the things that had a real negative impact was COVID, which affected our disadvantaged students far more than it did the more advantaged students. So, this gap we know at Key Stage 2 widened again, although it had closed slightly in the years preceding 2018; once COVID had hit that gap widened again. So, it's really important we support these disadvantaged students.

**JS:** Absolutely. One of those gaps has appeared due to the difference in language development between students who are more advantaged and those who are less advantaged, and COVID is one of the reasons why that is exacerbated at the moment.

The report specifically mentioned the importance of mathematical talk as well as talking mathematics, and teachers who contributed to the report said, 'We recognise this is important and we want to develop our practice in this area'. Can you tell me a little bit more about that?

**CK:** The first thing I'd like to do, actually, is read a short sentence to you, which says 'The quality of talk and communication is central to engaging mathematically'. So, students, or anyone else, need to be able to think mathematically and have the language to engage with mathematics. I know our primary colleagues use stem sentences and key vocabulary as part of teaching for mastery. It's really positive to see that that's also feeding through into secondary.

Quite a lot of secondary teachers reported that they were using key vocabulary and stem sentences, but this is just one part of mathematical talk. There are other strategies beginning to take hold, things such as making sure that students can talk to a partner before contributing to a class discussion or a class debate about something, is a really powerful tool.

In October 2024, the Oracy Commission released a report called [We Need to Talk](#), which sets out a range of strategies for oracy and it's great that the NCETM and Maths Hubs have been looking at this for the last few years in relation to mathematics. I think it's sometimes thought that maths is not such a linguistic subject, but actually it absolutely is, because if we want to have thinking and reasoning and problem solving, students need language.

As I've said several times already, it's the most disadvantaged students who are again at a disadvantage here, because quite often when they come into education back in primary and Early Years, they have lower-level linguistic skills so, they're less able to engage and to think mathematically.

It's really important that we offer them those opportunities and make sure that everyone has the opportunities to have that language support, and to think and to reason.

**JS:** Thank you. You talked about mathematical talk as being really important in children's ability to reason and solve problems.

Problem solving tends to come up in these reports and - spoiler alert - this one is no different. What did this report specifically say about problem solving? Because I think there are some good news stories here.

**CK:** Absolutely. the biggest headline for me is that 89% of teachers reported that integrating problem solving into all or most topics was either very or extremely important. Teachers recognise the importance of including problem solving in everything. It's not just a separate bolt-on thing: it should be a part of teaching. However, the thing that I think we would want to work on a little bit is that, quite often, it was at the end of a topic or a sequence of lessons, either as extension material or specific questions that it was used.

This is where the slight concern comes in, and it echoes what we saw in 2023 from Ofsted's [Coordinating Mathematical Success](#) report, that quite often problem-solving is left until the end, so, it's the higher attaining students, the students who finish quickest, that get onto the problem-solving questions.

In the case of the lower attaining students, or the students who work at a slightly slower pace, they don't have those opportunities to think and reason. So what we would want to see is to have an even higher profile of problem-solving, making sure that it's in every lesson, to some extent — it doesn't have to be a big problem to solve — but the chance for all students to have the opportunities to think and reason and solve problems is really, really important.

It's really positive that problem-solving has got a high profile and that teachers feel it's a really important aspect of mathematics.

**JS:** I think you've repurposed a John Mason quote about this haven't you, Carol?

**CK:** I have, yes. Sorry John Mason if I've got this wrong, but I think the quote is that '[A maths lesson without the opportunity to generalise isn't a maths lesson](#)', and I'd quite like to say, 'A maths lesson without the opportunity to solve a problem isn't a maths lesson', because surely that's the point of what we're doing.

We want students to be able to transfer their understanding to a novel situation. I'd like to pick up on one other thing that came out about problem-solving: in some schools they felt it was quite important to have specific problem-solving lessons. I think that's an interesting one, because if students don't know how to solve a problem, then actually having a focus on the strategies that we use with problem-solving can be a really powerful thing to do, as long as that's then incorporated into lessons as a matter of course, rather than only being in standalone lessons.

**JS:** It's about getting that balance right, isn't it? Students need the domain-specific knowledge, in order to be able to answer any problem, but they also need some confidence, and they also need some specific techniques about how to approach something unfamiliar and break it down into chunks and kind of work their way through a really knotty problem.

It's about getting that balance right. I'm sure our mastery approaches, to sequencing the curriculum really carefully and thinking about the mathematical tasks within a lesson, are really helping there. Another one of our [Teaching for Mastery Big Ideas](#) is about representations and manipulatives.

You and NCETM colleagues have echoed past reports that say they are really underused in secondary: are things changing, Carol?

**CK:** They are - and this is a really, really pleasing thing to note, which is that at least 70% of classes have used bar models, so there isn't this distinction between higher and lower attainers.

At least 72% of higher attaining classes, as defined by EEF, and 83% of lower attainers actually experience bar models. What's not clear in the report, and I think it was probably a step too far, was the frequency of use. So although these classes have experienced the use of bar models, we don't know how frequently they use them, but it's really positive.

I think it's great because a few years ago, maybe ten years ago, I don't think bar models or double number lines or ratio tables would have appeared in many of these sorts of reviews, so it's great to see it there. And I think what we would want to see, and what we advocate through our [Teaching for Mastery Programme](#), is that departments have the judicious use of manipulatives and representations, so that students see something in Year 7 and it's built on in Year 8 and then again in Year 9, not pushing that representation beyond its useful limits, but making sure that that all students experience the same set of representations, so that there's that familiarity.

I think that's quite important, I think that's fantastic news, that it's on people's radar, to use manipulatives and representations. There's still this tension [about] whether to use with higher or lower attainers. There is a tendency that more lower attaining students would use manipulatives rather than higher attaining students.

And I wonder whether that's because, in some cases, they are used to solve a problem rather than being used to understand the structure of the mathematics. Obviously that's a journey, that you learn to use a manipulative, and you use it to understand the mathematics and to start with you might use it to help solve a problem, but actually you want to shift away from that.

So maybe it's that the higher attainers move away from using those supports a little bit sooner.

**JS:** I don't think I've got there yet, Carol. I still use bar models all the time.

**CK:** Let me just disabuse that idea of that impression (which I probably have) which is that it's not that you then obviously put it to one side and never use it again, but it's there as a tool for you to use. But perhaps higher-attaining students don't need to have recourse to use those again quite so frequently as the lower-attaining students might do.

**JS:** I really liked your reflection that Table 14 in Appendix 2 in the report lists all the different representations and then gives some statistics about the percentage of teachers who responded used them, but some of those might not even have been listed if the report was ten years ago.

I perhaps algebra tiles, ratio tables, other things that are really part of the everyday maths teacher vocabulary, just wouldn't have been mentioned in the past. That's something to celebrate, that's something to think about.

**CK:** I'd like to come back to you now, Jen, and just think about the NCETM and Maths Hubs.

Obviously, we're quite big players in the secondary profession development arena for mathematics. So, across the report, to what extent was our work recognised?

**JS:** I am delighted to say that our voice was really strong in the report. Yes, we were asked to contribute to it, but that doesn't necessarily mean that our voice is strong, but it absolutely was in this report.

I'm sure everyone will be rushing out to do a kind of 'find-word' count and the NCETM is mentioned 50 times, with Maths Hubs being mentioned 23 times, which is really good. We are cited as 'very important providers of maths professional development'. I'll give a quote, 'It places an increasing role in supporting and developing subject knowledge and sharing expertise across schools', which I think is really fantastic.

A couple of our projects were specifically mentioned. The teachers really liked the [Non-specialist SKTM Programme](#). Interestingly, they liked it if it was completed as a twilight session. I don't know how I feel about that: teachers busy teaching all day and then engaging in some professional development.

That's something for me to think about, but that is what the contributors to the report were saying that they found manageable. The second project that was specifically mentioned was our [Years 5 – 8 Continuity Work Groups](#), where teachers talked about that as one model that the challenges of transition between key stages were being addressed. So yes, we mentioned both generically and specifically.

**CK:** That's really brilliant. I'd just like to pick up on that Years 5–8 Continuity Work Group and NCP, because I think that what we offered to teachers there is a different model for transition. So quite often transition is about the pastoral transition.

Quite often, transition is about pastoral transition, whereas with Years 5–8 Continuity, they will explore together some sort of coherent bit of mathematics, whether looking at multiplicative reasoning, or whether looking at oracy, something they actually focused on, or algebraic reasoning, and thinking about how that develops across those years.

Genuinely working together and collaborating was a really new model, a new way of working for many of these teachers. It started quite small, but it's now grown to quite a substantial programme. So really great to have that mentioned. And what did it say, Jen, that might actually influence our work in the future?

**JS:** This report was written to look back. It was commissioned to find out what teachers are doing now and have done in the past, but with a view of what could we do more of in the future, and what could we do differently in the future, and I've picked out three areas that I feel are really important for us.

I think the first area is that we need to make sure that, across the NCETM and the Maths Hubs, we design professional development with the knowledge that there is a shortage of teachers and make it as manageable as we can. Unfortunately, this situation is not going to go away, so the report gave a few suggestions.

Collaborative professional development within an individual school department was seen as a really strong way forward. Getting everybody in that department to work together on an area of subject-specific development, which develops subject knowledge across the department and minimises the resource implications for travel and release time.

It makes it better for schools: there's a quote there that says, 'Whole department models for professional development may be more implementable than those focused on individual teachers'. So, our approach with the Mastery Specialist Programme and Work Groups is something that we can build on in this area.

The second area that I think is really interesting, is that current secondary school structures and cultures are not yet designed to narrow achievement gaps. In fact, in lots of ways it's designed to widen them, so there's a section about lower prior-attaining children not even having equal access to the secondary curriculum.

At Key Stage 3, they are more likely to have non specialists so perhaps they make slower progress in Key Stage 3, and by the time they get to Key Stage 4, decisions are made quite early about tiers of entry. So if you're not in the top few sets, you don't even get access to the higher topics in the curriculum, which immediately limits children's potential.

Children from disadvantaged backgrounds are more likely to be in schools with the most challenges, so the current system is designed to widen these achievement gaps. The report does call for targeted interventions that are especially effective for children from disadvantaged backgrounds, which includes looking at homework and making sure it's effective, making sure that there is some consolidation.

We would perhaps call that the intelligent practice, the work on mathematical talk and oracy, and integrating problem solving kind of into all lessons, so all children have the opportunity for that. The third bit is about how professional development can be implemented with fidelity, so that all maths teachers who want to engage in some professional development will get an equitable experience, and the impact will be just as good as at the school next door.

They think about that in three ways: they have this phrase called 'manualisable', I think that means that professional development can't be complicated to lead or engage in. It's got to be really obvious, really simple, straightforward and fit into a busy teacher's day. It's got to be effectively quality-assured to ensure that teachers have an impact from the PD they're experiencing, and it needs to be replicable, so it can be led across lots of different schools and lots of situations. And the end bit for me, that I'm going to celebrate, is that if you've ever read a report, they always end by saying 'more research is needed in this area'.

Spoiler alert number two: this report is no different, but it specifically suggests that future research in this area could be undertaken in collaboration with the NCETM and [MEI](#), so let's look at what our hundreds of teachers are doing anyway and let's think about how to make it even better for them, which is a big, big win for me.

Any big wins for you, Carol? What does the report say most to you and your team?

**CK:** I think the first thing I'm going to recognise is that we've had an impact. It doesn't say it specifically, but I think the fact that we mentioned, was it 50 times plus 23? So 73 times...

**JS:** I'm not counting Carol!

**CK:** ...across the report. I think that's testament to the hard work that has gone in from lots of people in Maths Hubs over the last ten years. But I think there are some things that are bubbling up. So, there're things about teacher professionalism.

So, there are things about teacher professionalism, so there's a mention of how important it is that professional development is subject-specific and it's personal to the teacher and it's right for that teacher. And I think at the moment, there's kind of an increased - I'm going to say - lack of autonomy, an increased lack of autonomy for teachers to make decisions, either about what professional development they engage with, and for how they teach in the classroom and what they teach. Quite often, decisions are taken higher up in the school or in the MAT about what lessons are going to look like, the order of content and that kind of thing. When I think the teacher on the ground - working with the students on a day-to-day basis - is best placed to make a decision about what's right for these students.

Steve Wren from Ofsted would say, 'Why this, why now? Why are you teaching this particular thing, to this group of students, at this time?' I think that that leeway to deviate from the scheme of work or the curriculum or from the slides that are supposed to be used, whatever it is, that's really important.

It's what's happening in the classroom, but also with profession development: If teachers have an interest in or recognise there's an importance of mathematical talk, then we should try to help schools to try to enable them to attend some professional development, looking at that particular thing.

Anyway, thank you very much, Jen. I've really enjoyed talking to you.

**JS:** What a great conversation. Thanks, Carol.

**Julia Thomson:** And thank you for listening. As usual, we'll include a transcript of the conversation and links to everything discussed by Jen and Carol in the show notes. If you're interested in maths education, don't forget to follow us on your podcast app and click on the notification bell so you don't miss new episodes.

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