The NCETM Maths Podcast Episode 78

I Can't Do Maths - Part 3

Julia Thomson: Hello and welcome to the NCETM Maths Podcast. I'm Julia Thomson [JT], Communications Manager at the NCETM, and this is the third and final part of my conversation with Professor Alf Coles [AC] and Professor Nathalie Sinclair [NS], in which we discuss some of the ideas in their book, *I Can't Do Maths! Why children say it and how to make a difference.*

In this episode, we answer some of your questions, which were shared on social media. If you've not listened to Part one and Part two, I would definitely start there. If you're still with us, then we'll jump straight back into the conversation.

Moving on to some questions from social media, because we had quite a lot of interest in the podcast on social media. So, @thatpedagogygeek asks, 'is this [maths anxiety] a problem specific to UK education? Why do you think it's less of a problem in Asia compared to the UK?'. I don't know whether maths anxiety is something which is a problem just in the UK or whether it's across the West?

AC: I'm pretty sure it's not it's not a UK-specific problem. UNESCO produced a graph of countries' attainment on international tests. And it was either against maths anxiety or enjoyment of maths on the other axis. I think Canadians enjoyed their maths more, compared to most countries that are attaining as well as Canada, which is also more than average. I think Britain was pretty much right in the middle of both those axes. So no, I don't think it is a UK-specific problem.

It's interesting, Asia, this is a very small sample, but we have Masters students coming from China. So, maybe over the 13 years I've been at Bristol, maybe about a hundred students, let's say, from China have come over. To a person, they've not enjoyed their maths education. I don't know whether they're anxious about it. I mean, that's a different question, but they've certainly felt it's been incredibly kind of exam-oriented and exam-focused and, in many cases, quite stressful.

JT: So that's interesting. So, there's anxiety and there's enjoyment, and some of our highest-attaining students might not necessarily enjoy maths because of the way it's been taught. So, there's still potentially room for improvement, even in those high-achieving nations.

AC: Absolutely. I mean, I think in some of Jo Boaler's research, she talks about the anxiety that can come from being in a top set in a secondary school, for instance, feeling you're not keeping up.

JT: Absolutely. So, this question, somebody posted it and there were lots of responses to this saying, 'I have this problem as well'. So, @jessiebig1 asks if you have any advice for teachers who are asked the question, 'When will I ever use this in real life?' when covering topics they probably won't ever use again.

AC: Well, one of the best answers to this that someone offered to me a couple of years ago was, you know, when am I going to need this maths? And the answer is now!

JT: It's frustrating, isn't it? Because when you think about other subjects, like, when am I ever going to need to know the date of the Peasants' Revolt, or when am I going to need to know how waterfalls are formed? We seem to ask this question of maths, it's almost like a, 'I'm finding this quite tricky, I'm going to say, when am I ever going to need this?'.

AC: I mean, I think just to add one more brief thing, I mean, I think there's a sense for me in which, if a student's saying that what they're really saying is, 'this is too hard', or 'I'm bored', or something like that. And it feels like if you're asking that question, you are not open to an answer to it. So, it's not clear to me that it's ever possible to really engage in that question. It seems to me the challenge is, how might I construct my teaching so that question doesn't arise.

NS: Yeah, I mean, I think the honest answer is twofold. One is that basically beyond grade six, you're not going to need the math. And we know that from a lot of research, except for in very specific careers. And the second part of that, but you're going to need it to pass an exam to get into a university so that you can have a good life.

I always like to think, what if it was art that was put in that role as a discipline? I think lots of people would find art abstract and then would say, 'when am I ever going to need this?'. And we'd have to say, you probably won't ever need this. But, you know, if you want to get ahead in life, you'll have to persist. So, I agree with what Alf said, is maybe focus more on how can you make it so that that question doesn't come up as often.

And I think, in the book, we talk about that, but I think we should also be realistic with students and expose them to the way mathematics has become this gatekeeping discipline. And, as a result, has really sort of alchemised into something that is very different from what mathematics actually is. So, this includes the focus on a lot of memorising and algorithms and right and wrong answers, which is very different from other ways you can imagine engaging with mathematical ideas.

So, similarly, if it was art, there would probably be a lot of practising of drawing really straight lines, you know, which is probably not what most artists think that art is about. So, I'm of two minds. I think it's really important that students understand the sort of socio-political role of mathematics in our society.

JT: Yeah, and I'm inclined to think that perhaps if we approach it in a different way, in some of the ways that you've suggested, asking questions and looking at the ways that maths can be used to solve real-world problems, that that makes it a bit more relevant to people.

NS: I mean, I think that's important too. I also, I'm really, I really like the work of the mathematician, Francis Su and his book *Mathematics for Human Flourishing*, where he looks at, 'what are the desires that we have as humans and how are they addressed in mathematics? And that could be about developing friendships. It could be about love. It could be about connections. So, all of those things are actually there in mathematics, and it doesn't only have to be about solving real world problems. You know, 90 percent of what mathematicians do has nothing to do with solving real-world problems. Every once in a while, there's going to be something that actually is helpful in the real world.

But it's also this other discipline of creating new objects, creating relations between objects, creating beautiful objects, all of that. And I'm not saying that that's what mathematics should just be about because of course it has this other real world application side of it. But I think if we go too much towards always thinking about how is it relevant to real world, in citing cell-phone plans, between two different cell-phone plans, that's also going to distort mathematics.

JT: So, there's nothing wrong with a teacher saying, you might never use it again, but it's worthwhile to explore it because it's something new and it's something worthwhile and interesting and have a go, sort of thing. You don't have to make excuses for it.

AC: Beautiful even. I mean, another take on it is it's like this really important bit of our cultural heritage, a bit like, kind of, Shakespeare plays. I don't think people are questioning why we're learning Shakespeare, even though you're not going to use that in your life.

JT: Yes.

NS: Except for if you're in a podcast with Julia and then you can!

JT: Oh, I don't want to interview anyone about Shakespeare! It's hard enough talking about maths! So, another question from @AJMagicMessage, he asks, 'what is the single biggest change schools could make to stop children thinking that they can't do maths?'. So, I suppose a way we could look at that is: if there's one thing that you could identify for schools to do or stop doing to make improvements, what do you think that might be?

AC: I mean, I think our book is quite explicitly not wanting to offer a single answer to that kind of question. I think it is complex. I mean, you know, one thing we touch on that is a single idea, it seems to be quite an important one, is to try and shift towards method or focus on methods rather than answers. And we touched on that.

I actually think particularly, given this is an NCETM podcast, I think the NCETM professional development resources are really great, and we've certainly got anecdotal evidence of schools that have wholeheartedly gone into them have, you know, really quite transformational things happening in some of their classrooms. But that requires a leap of faith, I suppose, to maybe put away some of the more prescribed schemes, and a commitment to make time for teachers to be able to work with those materials and have time co-planning and really thinking through their teaching. I mean, I think it's, 'the more, as a teacher, I can have really thought through the details and nuances of what I'm offering, the

more perhaps I'm able to try and get in touch with and offer some of these more creative aspects of the subject'.

JT: Okay. So, I've heard you state, in another podcast I was listening to, that the book is for parents as well as teachers. And we did have a question from a parent, actually, whose child struggled with maths. What can parents do to support their child if they're trapped in this web of dogmas? So, I suppose it is quite a web, and that's what you were saying, it is more complex than thinking it's just a single thing that you can change. So, what would you advise parents do? I know as a parent myself, sometimes you do feel a bit powerless about what your children are doing in school because you can't really influence it that much. That's a tough question!

NS: Yeah, it is a tough question. I think one way is to help their children see that the mathematics they're doing in school is not the only mathematics that's out there. And so, there's so many resources now on the internet. I really like Vihart ho has these beautiful doodling examples of mathematics showing where mathematical ideas sort of come from just from doodling and saying, 'oh, yeah, that happens to be like what you were learning in class today around linear equations, but you probably didn't get it that way'.

I think it helps students to see, 'I actually can be good at and interested in other aspects of mathematics'. It's just not what it is that they're doing in school. So, you know, the whole world of math doesn't become sort of narrowed down to just what it is that they're learning in school, which is often very numerical or are algebraic or symbolic.

So there's so much out there. I won't mention other resources but, you know, please feel free to contact us if you'd like some examples of that. So that, you know, later on if they're in architecture, design or medical imaging or all of these places that actually draw on more geometric, visual ways of thinking about mathematics that they don't sort of feel anxious.

But they say, 'oh, yeah, this is like the part I'm good at' and feel like they can be successful in those areas. I think Alf has also talked a lot about engaging kids in games. So, you know, on car trips or train trips or whatever. There's all sorts of really interesting games. I just bought a book called *Math Games with Bad Drawings*. That is a collection of really fabulous games that all have like a connection to really deep mathematics. But that are easy to do pencil and paper, fun, with kids of all ages, including grandparents and parents. And, I think, that can also be a low anxiety way to get kids sort of feeling confident about their own sort of capacity to reason and become interested.

AC: I think the sense of being playful in maths is so important. And I think children are often fascinated with big numbers and questions of infinity and things.

JT: That's really interesting. I've just finished recording a podcast with NRICH and they were talking about collaborative games and, also, the idea of high-ceiling, low-threshold games, which, you know, are accessible and not frightening, but you have the option to really go interesting places with them.

So, my final question, which is linked a little bit to your final part of the book. It's particularly pertinent given some of the conversations that are going on about maths at the moment, especially in the United Kingdom. Why is learning maths worth it? And why does being able to do maths matter?

AC: Just a small question to end up with.

JT: No pressure!

AC: I think, for me, we've kind of touched on some of these ideas. Nathalie touched on the 'maths as a gatekeeper' and this sort of political aspect of maths. There's an aspect in which society is saying to all students, and all parents and all teachers, that children have to learn maths and that is essential. And, whatever we think about it, that's the context in which children in school now are going to be growing up. I mentioned earlier one of my research interests around what climate change and so on means for maths education.

And it is really clear there. I think we saw it in Covid as well, that actually understanding what an exponential graph means or an exponential function does is actually really, really important. It's being able to understand graphs and data. Being able to communicate about these things. And then, you know, at a deeper level, being able to question some of the mathematical assumptions behind some of these models.

I mean, all these are clearly going to be really important skills for the future. It seems to me. And, also, to touch on another theme, I think we both would want to say that maths is this really beautiful subject that actually is really worth it for its own sake. And I do that think there's an element in which maths seems to hold quite a significant power in terms of how, as a learner, I think about myself. So, as well as it being sort of this very beautiful, satisfying subject, actually doing well in it is probably going to have knock-on implications for how I see myself more broadly as a learner.

JT: Definitely. Have you got anything to add to that, Nathalie?

NS: That was perfect. I think this combination, which is an awkward combination that I think is specific to mathematics, of being so powerful that it formats a lot of our society, and in technology and the stock market and surveillance and, you know, all of these things that we really need more people be able to understand how that's all working.

And make sure that we're all okay with how it's working, which I think we aren't in many cases, but if we don't know what mathematical decisions are being made we don't really know what alternatives there are, so I think we need to have that kind of educated understanding of mathematics.

And at the same time, mathematics can be so powerful for creating alternatives too, because mathematics isn't part of the real world. It gives us these ways of being speculative and imagining a different way of organising things, different structures that can sometimes get us

out of our normative assumptions about how things have to be. So, it's funny that it has this both very negative and positive, potentially at the same time.

JT: It's almost like maths is going to happen whether you like it or not. And if you're one of the people who can understand it, then that's a powerful thing really, because, I don't want to be too ominous, but there needs to be more people able to scrutinise and come up with different solutions, different ideas across the social spectrum, around the world.

AC: Absolutely

JT: Fantastic. Well, I've kept you for a long time. I've really thoroughly enjoyed the conversation. So, thank you so much for speaking to me today.

And that brings my conversation with Alf and Nathalie to a close. I hope you found it as interesting as I did and hopefully it's given you some food for thought and perhaps some ideas to tackle some of the challenges we can face when teaching maths and how to deal with some of those more awkward questions.

And if you'd like to read their book, it's *'I Can't Do Maths! Why children say it and how to make a difference'*. It's published by Bloomsbury and is available from all major book retailers. My copy is already out on loan to a friend. Links to some of the resources and books mentioned by Alf and Nathalie are in the show notes.

And if you're interested in teaching maths, and the wider world of maths, do take a look at some of our other podcast episodes. We really hope you enjoyed this episode. And, if you did, do share it with colleagues and make sure you like and subscribe wherever you get your podcasts. You can also follow us on Instagram @themathspodcast. Thanks for listening.