

The NCETM Podcast Episode 70

Maths4Girls

Hello and welcome to this new episode of the NCETM podcast. We've taken a bit of a break over winter and now we are back with a new series of podcasts.

My name is Beth Goodliff [BG]. I'm the NCETM Senior Comms Manager, and I'm here with a group of four fantastic women today to talk about a topic that's very close to all of our hearts, which is getting girls involved with maths, loving maths, and understanding the importance of maths in their lives and careers.

I'm joined today by Mina Gerowin [MG], Alison Rowan McEwan [ARM], Lou Hoskins-Staples [LHS] and Noshin Begum [NB].

If you'd each like to introduce yourselves and tell us a little bit about who you are and the work you do, so our listeners can get a sense of who's going to be talking today. Mina, would you like to go first?

MG: Sure. I am American, as you can hear. I studied political economy, went to law school and then went back, after working as a lawyer, to business school. I was consulting and a friend said 'help me start a fund at a hedge fund'. I said I didn't want to watch TV screens again all day long (I'd been an apprentice summers during university in Basel, at the Stock Exchange). He called back and said, but I'm your friend and I need help. So I went and did it. And after I retired (because I'm probably the oldest one on this podcast) I spoke to a friend about why I couldn't hire women at the hedge fund, either for the trading desk or for the investment analysis - it's two separate jobs.

BG: Fantastic. An amazing experience that you've had so far that's brought you to this place. Brilliant. Thank you.

Alison, could you tell us a little bit about your background and your experience?

AR: Of course. I'm Alison Rowan McEwan. I'm the executive director at Founders4Schools. Founders4Schools is a key education charity that uses technology to connect people from the world of work and educators. The reason why we do this is we all really passionately believe that young people need to be better prepared about what happens in the world of work and what opportunities are out there for them, and as much as teachers try their hardest to provide that and have the remit to do that, they're not the experts and there's no way that they can possibly keep on top of everything that's going on out there in the world of work. The people who are doing the jobs are the ones that know, so we encourage role models from the world of work to go into the classroom and to talk to young people about what they do.

Within that, we have a flagship project that's called Maths4Girls. We're here to talk about that today because we genuinely think that that's something that is really, really important, not only to the young girls who are deciding what they're planning to do in the future, but having more girls who are better educated in maths will only help the entire economy and everybody, and hopefully lead them to more successful and better-paying careers in their future.

BG: Perfect. Thank you. And Noshin, could you tell us a little bit about you and your role in Maths4Girls?

NB: Sure, I'm Noshin Begum. I work as a marketing and communications lead at Maths4Girls. I come from a very tech-focused background so I know the importance of maths. Throughout GCSEs I always knew that maths is going to be super important. However, I didn't take maths at A level and I do think that's kind of what led me to Maths4Girls because I knew when I was at GCSE age I wasn't really encouraged to take maths or even IT or accounting – those types of subjects were very heavily 'for boys'. When I grew up, luckily, my parents were very encouraging to for me to study computer science, and when I was doing my degree I started to realise that if I'd done maths A levels it would have been so much easier at uni doing computer science.

I was having to learn a lot of things on my own outside of uni, so I definitely feel like that's kind of what led me to Maths4Girls because I know that there's a lot of girls out there who may have been in the same situation that I was in, and I really want to help encourage and inspire girls by showing them that maths is a girls' subject too. And that's kind of how I fell into Maths4Girls with Alison and Mina.

BG: Brilliant. Thank you. And I can see Lou nodding at the idea that maths is absolutely for girls. Lou, could you tell us a little bit about your work in the area of Maths4Girls please?

LHS: Yeah, I feel very privileged: I work with two Maths Hubs and a good number of teachers cross-phase, so I'm working with teachers who teach pupils up to the age of 18 from 4 or 5. The two Work Groups that I've got have a real mix and that's been really interesting. The majority of the teachers are from the primary sector, which is superb, because though we initially planned more secondary, we've ended up with strong interest because those teachers are noticing the difference in girls' attitudes as well as attainment, most of the attitudes the girls attain certainly reasonably highly, but they don't see themselves as mathematicians. So the projects where I'm working with teachers so that we can hopefully start to turn that around.

BG: Fantastic. Thank you very much. We'll hear a little bit more about some of those Work Groups and some of that research a bit later.

We're going to get back now to the start of Maths4Girls. Mina mentioned that it's something where she was very passionate about it when she couldn't hire people.

Could you tell us a little bit more about the work of Maths4Girls to date and some of the impact that you think that's had on girls' attitude to maths?

MG: Well, we put it up on a founders' platform and then one has to do lunch. I invited Sherry, the founder of Maths4Girls, to lunch, told her what I'd like to do, but I needed her platform. She was agreeable and we set it up and then we needed volunteers to go to the schools.

Initially they were from the industry I was from (finance in the city) but it wasn't meant to be just for finance – it was more 'can we get our hands on volunteers?' because we wanted to tell girls about their careers and then the role models – there will be two or three in an encounter in a school, live.

After they've told them about their careers, they'll discuss 'how do I use maths in my career, and why do I need it?'

And then the girls get to ask questions of these people, and then just as we were getting going, Covid happened. So we actually went on Zoom, which was good in some ways because it meant we reached a far wider audience that they know, and it's really to show girls here are all these careers, depending on where you're from, you didn't know existed.

It grew from 600 something in the pilot to now where we've had 25 girls, 11 to 14. And that was chosen because of my friend Shirley Conran and her maths anxiety trust, that this is the age when girls decide against maths. So we wanted to show them, now look what maths can do for you, and it's before you do your GCSEs, because girls do as well or better than boys in their GCSEs, and then they don't take either A levels or Core Maths or even T level maths unless they absolutely have to.

NB: Mina's story about how Maths4Girls was founded says 'it's possible to me!' I just want to put this really cool statistic out there: a school pupil-voice survey with Year 10 after one single Maths4Girls encounter showed that 83% actually raised their optimism about the future and 78% cited a positive impact on the well-being and sense of belonging just from one single Maths4Girls encounter, and that is so amazing if I'd had that experience.

Just after my GCSE, I definitely think my journey, my academic journey, would have been different. So it definitely shows the power of putting these professionals into these school environments and just inspiring these young girls and showing the power of maths in daily life is the main thing.

BG: Lou: is there any evidence that – I'm going to ask a controversial question here – that girls just aren't as good at maths as boys are?

Or is this absolutely a myth and there should be no reason why they wouldn't be taking maths beyond GCSE?

LHS: There's absolutely no reason that's clear, and even if there were, it would be unhelpful to female students. The economic potential for women to earn – these are careers that are generally much better paid.

Mostly from what I could see, this is an aspirational thing. There's a very large UNESCO report that's probably had the strongest impact on me and my thinking. So no, there's no reason it would, it's an unhelpful argument.

And there are reasons that we could look at as to why girls may not have certain skills because they aren't developed.

But that's quite different, and part of my work with teachers is to support them to support their students to develop some of the skills they may be missing.

BG: So there's no reason that those barriers can't be broken down and the girls can be encouraged to do maths?

LHS: None, none whatsoever. And internationally, though in large parts of the world, there are fewer girls taking mathematics, there are areas in the world where more girls take mathematics because other skills are valued more highly for the male students. So that's a really interesting thing as well. There's no reason whatsoever.

BG: So in in terms of... we live in an age now where so much is digital, so much is data-led and data-driven and girls and boys are going into careers where maths is so crucial and so important to underpin the knowledge and the skills that they're going to have to use in those careers.

Alison, what's your understanding of, or what would you say to a girl who said, well, why is it important that I need to do maths beyond GCSE?

ARM: Because, despite the fact that the girls are often doing better at maths at that age, their choice not to continue doing it means that their wage, the overall lifetime earnings, is significantly lower than male earnings, and that is partly or primarily down to the fact that the higher-paid jobs that are available out there require maths to be able to access them.

So as you mentioned, some of the data-driven stuff, the technology, but it's basically the entire STEM-type jobs – science, technology, engineering, maths – but also the senior jobs in the other areas that they're not thinking of, that they need those maths skills to be able to even apply for those jobs or get past interview stages for those jobs, and by not choosing them, they're talking themselves out of what can be some really fantastic careers out there. They are not male careers by any means at all, but a report out recently starts out saying that by the year 2025 for every one female working in technology, there'll be 115 men.

Do we really, in our future, want our entire life decided by men when technology is so important to us? It's just crazy: it's not even just the pay – it's how you see the world or how the world interacts with you and it's been led by men.

One of the reasons why that is, is because not enough females are going into those types of jobs to be able to make the difference and get in to study science, industry, engineering, all of them. We are crying out for girls to come and join their industries and they're really struggling to get enough of them and to make a big change to the numbers and it's such a shame.

And I think as well that there is often an under-appreciation that lots of jobs that might be considered more female (for example, hairdressing, healthcare, these sorts of sectors) you actually do need really good strong maths skills to be able to do those jobs well, and that's just not talked about as much. I mean it should just be one of those things that you do, you might not love it As Mina said, I know I wasn't in love with maths, I did it up

to Higher because I'm from Scotland, but it is just so vitally important. It should just be one of those things that you do to help prepare you for what comes next.

MG: Yeah. And I would say the other thing is about role models: if you can see it, you can be it.

Yet in many places they're unaware that these careers exist, or that the step to them is the maths. You're not going to be an engineer, you're not going to be doing research, you're not going to be doing things you wouldn't have thought about – construction.

BG: So I know from my own experience of teaching, that sometimes when students in front of you ask about careers and how they're going to use your subject in careers in the future, you maybe don't know all the things that it could open up and that it could do for the students in front of you.

What you're able to provide at Maths4Girls is people who can come and illustrate those careers, who can support teachers, educators and the children in the classroom to understand a bit more about how maths fits into those careers and the future.

Noshin, could you tell us a bit about how schools can get involved in that, how teachers can get these people to either be face-to-face in the classroom or online to talk to their students about these kinds of careers?

NB: Definitely. The Maths4Girls platform makes it really simple for educators, teachers, schools to just go on our website, click Create an event, and in under two minutes you can see our whole database of amazing volunteer speakers from a range of industries, who all use maths as part of their day-to-day roles.

You can then choose which speakers you want to invite. You can filter the speakers by topic based on industry and on company location.

You can do the events in person or online and then you send it in and that's it. You just wait for the RSVP from the amazing speakers and then you have your first Maths4Girls event.

BG: And is this something that's available to all phases, or there something that works for primary, secondary, post-16? Who can get involved in this?

NB: So primarily it's focused on children aged 11 to 14 years old, but we do have the capacity where you can choose your classroom size, classroom age, just so that the speaker can tailor what they're talking about for that target audience, the room size, and even for the topic area.

BG: As well as this work that Maths4Girls are doing, Lou, I know that there's on-the-ground work with people in Maths Hubs to develop a greater understanding of Maths4Girls and STEM.

Could you tell us a little bit about your work in this area, because there's a lot of intersection between the work that you're doing with classroom teachers and this promotion of a positive attitude to maths for girls.

LHS: So initially we begin with the conversation with teachers and our own aspirations. Where did we start? Why are we teachers, several with a good strong maths background, not knowing about career opportunities?

We bring that in. We extend that conversation. One of our participants talked about her own daughter, who wants to do an apprenticeship. She wants to do a STEM apprenticeship. She went to an apprenticeship open day.

She was introduced to apprenticeships in girl-friendly roles: the only one that would even vaguely use mathematics was accountancy and finance.

Now, at university, she didn't go down an apprenticeship route studying astrophysics. It wasn't suggested to her that she could have gone into an engineering apprenticeship. It was a parent who's also a teacher, who was upset that her own daughter had had that experience. We also talked about when pupils have the choice to make their own placements.

Problems are often exacerbated in those from lower socio-economic backgrounds, and one of the teachers in the school had, before coming to the meeting, looked at her register. The vast majority of the girls were going to nursery-school placement; the ones who'd chosen a vaguely STEM-facing thing were going to see if they could get some work in a vet's.

So at least we've got something, but the vast majority of the boys were going to work as mechanics in the car garages and some of the girls had placements in nail bars etc.

The lack of aspiration of those young women was really quite stark, so that big conversation, how can we then draw that in?

So we highlight the work of Maths4Girls, we talk about opportunities getting in speakers and then bring in a little bit. The Work Groups are not research-heavy, but it is research and innovation. We give them reading so they have things. We share friendly versions when new things come out, there's the mathematics pipeline that's come out of the University of Nottingham. So we would share that with them, talking about times when girls seem to drop off, when we notice the difference and what we can do to address that.

The teachers: some of them have described it as quite a steep learning curve for them as well – they came because they were interested.

The question you asked is there something different in the brain? Nothing that's been established. There isn't a maths brain. There isn't an English brain.

Self-belief has been hugely important, so that girls don't ever really see themselves in those careers. There's maths anxiety: if teachers are nervous, more females have maths anxiety, so the teachers then tend to play it safe so they don't take risks. Then their girls don't take risks.

And lots and lots that just rolls on. So this sort of opportunity, we know it starts quite early in primary school and I noted Noshin saying 11 to 14, and I'm thinking, yes, I've got some, we got 10/11 year olds, it would be really great to get Maths4Girls in talking about that. More confident teachers in schools as well, so these teachers are going back to school with projects they can run, that they're designing for themselves to really show girls that they can succeed.

BG: What are some of the next steps, Lou, for the work that you've been doing? You obviously think it's possible for attitudes to change and for girls to be more positive about maths. What's next on the agenda for you and the work that you're doing?

LHS: I ran some pilot projects with North North West Maths Hub and did some work with Cumbria Local Authority and their Specialist Leaders of Education for maths previously. But what I'm hoping this year the teachers have designed their own very small research project. They're trying something out in their classrooms, they're sharing with each other, so in the summer they'll do a celebratory event – I'll capture that so I'll be able to share it nationally. And I'm hopeful then that we can share that more widely, so that other schools can get involved, other teachers can see actually, even if it's a small change, it's the beginning of that small change.

One teacher's already talked about the fact they're rolling this out across their school – they've tried it in a couple of classes. It's a primary school, but they want teachers working on projects capitalising on girls' strengths – they're good.

In PISA, in, I think 2015, they tested collaborative problem solving. Girls come out really strongly in collaborative problem solving, so this school have used collaborative problem solving to develop girls' spatial awareness. So they've done a spatial awareness project, an area of deficit for girls, capitalising on a girls' area of strength. It's been hugely successful. The girls are talking about maths in the playground. There's real excitement. So I want to be able to celebrate that and bring that to other teachers so they know that they can do it too.

I'd quite like to find some young women who are studying STEM subjects as well, who can talk to these girls. So they're hugely close in age, and so they can talk. The only ones I've managed to find are all teachers' children, and I'd quite like to find some who aren't, because there's that difference in aspiration. Whatever background

you come from, you can choose these careers. So I've got some lined up, but I haven't managed to get any who aren't teachers' children.

The two regions I work in are very different as well, and for me, with the research background interests here, I'm quite interested. Birmingham is a very densely-populated area and whereas the North West is much more spread, the region is far more rural. But we know that in certain ethnic minorities, girls' education is valued less. So some of my teachers have got girls from particular communities that they're working with to try and raise that profile, and the rural girls, likewise, the aspirations can be really, well, Alison you want to speak...

ARM: Just to follow on with Mina about getting role models, the role model aspect is massively impactful when it comes to helping young people decide what they want to do going forward.

Prior to working with Founders4Skills, the job that I did was based within a college that had all these trade apprenticeships that you're talking about and some of the lower level tech roles and interestingly the best-performing people on those courses tended to be the girls, and it's because there were so few of them that if they were going into those jobs or those industries, they had to be really sure they wanted to do it, that they had to have the passion about it, and as a result they were just head and shoulders above the majority of the rest of the course. They were just so successful and through the work that we were doing with that, one of the things that we helped facilitate was very much getting those girls to go back into schools and talk to them. And that's one of the reasons why as part of Maths4Girls we're trying to build relationships with apprenticeship providers like AQA, which runs a lot of the kind of tech digital apprenticeship training across the UK to try and encourage those apprentices to go back to talk to young people in schools as part of their training because it is vital and important, and it is about understanding that it's not necessarily the cleverest girls in the class, that that's the route for them, which could often be the way. It is genuinely something that everybody should be thinking about to help with their future career aspirations because it is just, it is that important, it really.

BG: But changing the attitudes of the girls in the classroom of the teachers – of everybody – there are so many factors involved, aren't there? And that all the work that's happening with Maths4Girls is one of the things that can absolutely contribute to helping these girls understand that matters to them and that they can and will be successful at it.

Just before we wrap up then, for the teachers who are listening, who may be primary, secondary, post-16 teachers, they could be in any phase...

If you could give them one piece of advice about encouraging the girls in front of them to feel like confident mathematicians, what would it be? Alison, what would you say?

ARM: Well, definitely to second what Mina has just said, but I would also say maths teachers – in fact they're very passionate about their subject, they love it – but sometimes it may be seen as a little bit of a drier subject than maybe some others. So I think really making it clear the real-world application for how this is used and why, really answering that question, why do I need to learn this? Why it's important to them, and that it is very much for the career. But there are lots of other reasons why maths is just so important to everyday life.

BG: Absolutely. Thank you. Go on Lou.

LHS: And I would add, often female students need to see a purpose in what they're doing. So for teachers to create a learning environment that engages girls, to find out working independently on a set of exercises isn't just engaging for our girls, to find opportunities to create that climate in the classroom.

BG: To make that application enable those girls to see how this maths is going to be useful to them in the future, yeah.

And Noshin, what would be your piece of advice for the teachers out there?

NB: I feel like this is a major problem, but what Maths4Girls has done is try to create a simple solution where teachers and educators in schools can really take advantage of all the amazing females out there, female professionals out there who are using maths in a range of industries. I just want to say that one single

Maths4Girls encounter actually boosts girls' perception of the importance of maths by 15 percentage points. So we know this works. All we need are more teachers, schools and educators to create these free events in person or online. I think it will change, I think it will change the numbers.

BG: Absolutely. It's been such a positive experience in speaking to you all. It's been so wonderful to hear about the impact that Maths4Girls is already having the work that's happening out there in Maths Hubs.

And if people listening are interested in getting involved, search Maths4Girls, go on their website, sign up, have a look at the people who can very quickly arrange a visit to your school or an online session with the girls in your school. If you want to get involved with research and innovation Work Groups with your local Maths Hub, go to the NCETM website. Go and find your hub. There are opportunities out there.

It's been an absolute pleasure to speak to you all today. Thank you so much. And we will have some more new podcast episodes on the way soon. Hope you've all enjoyed this. Thank you very much for listening.