



Numeracy for Life Committee

Corrected oral evidence

Thursday 5 March 2026

10.55 am

Watch the meeting

Members present: Lord Agnew of Oulton (The Chair); Baroness Alexander of Clevedon; Baroness Bull; Baroness Garden of Frognal; Lord Hampton; Baroness Hamwee; Lord Hannett of Everton; Lord Massey of Hampstead; Baroness Spielman; Viscount Stansgate; Lord Stevenson of Balmacara.

Evidence Session No. 1

Heard in Public

Questions 1 - 16

Witnesses

[I](#): Professor Hannah Fry, Professor of the Public Understanding of Mathematics, University of Cambridge; Bobby Seagull MBE, Mathematics teacher, Ambassador, National Numeracy, and Fellow, Academy of the Mathematical Sciences.



Examination of witnesses

Professor Hannah Fry and Bobby Seagull.

Q1 The Chair: Good morning everybody, and for those of you listening remotely, welcome to the first public oral evidence session of the Numeracy for Life Committee. We are very pleased to welcome our two witnesses, Professor Hannah Fry, Professor of Public Understanding of Mathematics at Cambridge University, and Bobby Seagull, mathematics teacher, author and broadcaster. Thank you both very much for making your time available today.

I will ask the first question and then everyone will come in with their own questions. We want to wrap up by noon, so both questioners and answerers should be mindful that we want to try to keep to that timetable, particularly if you are only committed to midday. Each Peer asking a question needs to declare any interest they have before they ask their question. I am starting and I have no interests that are relevant to this Committee.

How does the cultural approach to numeracy and a level of acceptance of being unable to do maths impact attaining numeracy skills and what needs to be done to change this mindset? Let us start with Professor Fry.

Professor Hannah Fry: I think the answer is significantly. A key point here is that this appears to be a problem that is worse in the UK than elsewhere. In terms of low numeracy skills, 57% of people of working age are considered to have low skills, which is below average for an OECD country. I think that the cultural surrounding has to be part of what is contributing to that. I am speaking from my own experience, having visited places like Singapore, which have extremely high numeracy skills. The difference is that in places like that and like South Korea, there is an attitude that mathematics and numeracy more generally is something that everyone can be good at if they work hard at it. In the UK, however, it feels much more as though being bad at maths is an indication of your overall level of intelligence—that unless you are somehow able to see a page of maths that you have never experienced before and immediately get it, that speaks to your overall ability to do anything.

I think that is part of the reason people shy away from mathematics because if they find it difficult, that indicates something. I think people believe that they should be born to do this, otherwise it is not for them. I do not think that is ultimately true. I do not think that the evidence bears that that is the case, but I think that is the overall attitude we have in this country.

It is very rare to find an adult in this country who is ambivalent about mathematics or numeracy skills more generally. Everybody is either in the love-it camp or in the absolutely-detest-it camp. There is no one



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sitting on the fence, which is strange because for children, that is not the case. No child is born into the world with a visceral hatred of this subject, so I think that we form those opinions during the education that we give to our children.

I like to think of it as an unstable equilibrium, which is maybe a bit of a mathsy way to explain it. I think that what happens is that someone falls a little bit behind, then finds the next bit a bit more difficult, then it gets worse and worse and worse and suddenly they are in a class where they have no idea what is going on—there is a blizzard of stuff happening around them, they are completely lost and they just give up.

Bobby will speak to this much better than I do, but I think people leave school with a genuine maths trauma that makes them not want to engage with this subject in any form whatsoever. When they come across moments in their adult life that need simple, basic, practical numeracy skills—not mathematical skills such as trigonometry or Euclidian proof—the education service, by being focused on trigonometry and whatever else, has ended up letting them down. They leave school without the ability to tackle stuff that is useful.

Bobby Seagull: Yes, how not to be a schoolteacher—perfect words.

My background is that I have been a secondary teacher and sixth form teacher for about a decade. I was a lead in a school and then ran CPD for teachers. In the last couple of years, I have focused on primary maths teaching. I have seen a range of students from five to 18. Eighteen year-olds are smart; six-year-olds can be smart sometimes unless they stick a pencil up their nose.

The statistics tell us that 3% to 7% of the population have what is known as dyscalculia, which is a genuine learning difficulty with maths. As educators, teachers, we have to find workarounds to make sure that those people are accommodated. However, results in school and beyond show, about one-third of 16-year-olds do not get the grade 4 requisite to progress on to further study. In the adult population, as Hannah mentioned, National Numeracy worked out that roughly one in two adults have the numeracy skills that we would expect from an 11-year-old primary school child. If you go out in the street, that will be one in two people, and that is really shocking.

An example of a question that National Numeracy asked people is, if you have £9, work out 10% and 5% of it. You can use a phone calculator to find that 10% of £9 is 90p and 5% is 45p, yet one in two adults struggled with that question.

There is clearly some sort of breakage in the system where people are going through the system and feel that they are not a maths person. This talks to that badge of honour that Hannah mentioned. If I am at a party and mention that I am a mathematician or a maths teacher, often people will look at me and go, “Oh, I need to go to the bathroom” or they will



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run away from me. If on the other hand I said, "Oh, I am a literature professor", they might say, "Tell me about Shakespeare, tell me about Machiavelli and his histories".

In the UK, and perhaps in the West generally, this does go back quite far. In the 1580s, there was a poem about Elizabethans struggling with mathematics. It went something like "Multiplication is vexation, division bothers me—" and so on. So back then, 400 years ago, there was maths anxiety; it is not a new thing. What is happening in the UK now? Hannah talked about how in places like Singapore, Shanghai and Korea, there is an attitude that if you work hard, you can become competent at maths.

In the 1950s, CP Snow, a research scientist turned novelist, gave a lecture and talked about the two cultures, the scientists and the humanities and said that there was a growing mutual incomprehension between the two. If we are to solve problems in the world, we need the scientists, mathematicians, and the arts and humanities to work together but in this country and in the West, we are too quick to say, "Oh, you are a maths person, you are an arts person".

Speaking to my own family story, my parents are from Kerala in South India and they moved to London in the late 1970s. Now pretty much all my cousins in India are better mathematically than my cousins in the UK and that is not because of the gene pool, we all have the same ancestry. It is because the attitude in India is different if you are struggling with maths in school. I was good at maths at school. My teachers would say to my dad, "Mr Seagull, your son must be a maths genius". My dad would say, "I have seen him at home, he is not a maths genius, he is okay". In India, if you are doing really well at maths, it is often, "Who is your tutor? What extra work are you doing?". They assume that mathematics competence is due to the effort put in. Of course, we know the real world and that there is a bell curve of competence. Some people are geniuses, off the scale, but to be competent on a day-to-day basis has nothing to do with that; it is to do with attitudes, the pervasiveness of attitudes and how they impact our ability to engage with the subject.

The Chair: That is a very helpful start. Thank you very much.

Q2

Baroness Alexander of Clevedon: Yes, thank you, a really interesting start—that it is about application, not attitude. Can you talk to us about the key numeracy skills that are needed throughout life? As a Committee, we are trying to look at the whole lifespan and the key numeracy skills needed throughout life. Where do you think we may be failing to reinforce them in later life?

Professor Hannah Fry: The statistics about where these skills end up letting adults down are pretty shocking. They show for instance that 25% of people would be deterred from applying for a job if it stated in the advert that numbers were a requirement. There is also evidence that people who have type 1 diabetes end up with worse glucose control if they have low numeracy skills. There is all sorts of evidence about people



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who are going through cancer treatment being confused about what the various treatment opportunities are.

Bobby may have seen more evidence on vaccine hesitancy and scepticism but speaking from my own experience I did a programme with a number of people who were refusing to be vaccinated during the Covid-19 pandemic. There was an emotional aspect to that too, of course, but I think a lot of their confusion stemmed ultimately from poor numeracy skills and understanding what the statistics meant.

More broadly, there are issues around misinformation which are only going in one direction, perhaps an inability to read graphs properly and distinguish good, solid information from manipulative information. Then there is navigating the financial world. People with low numeracy skills end up getting caught in bad financial deals with high interest debt and misunderstand the impact of compound saving. There are untold ways in which poor numeracy impacts adults, but we also see parents who are anxious about supporting their kids through education. This is something that happens and it has an intergenerational effect.

Bobby Seagull: National Numeracy, which I am an ambassador for, defines numeracy as the ability to have the confidence and competence to use maths and numeracy to help you to make decisions on a daily basis. There are two parts to that. There is the competency side, which is about whether you can do the arithmetic and understand how maybe a spreadsheet is put together. Then there is the confidence piece, which is where attitudes really leach into. We start at school and we end up in the adult world, but in school, it can start with parents. Barclays did a report—I was in the House of Lords in one of the Committee rooms for this—on parental confidence and how it impacts the confidence of children. They found that one in six parents had reported low confidence in numbers and that means that 2.1 million children grow up in households where there is some intergenerational negativity.

From my own experience as a teacher at parents' evenings, the child will be sitting there, and Mum or Dad will look at their son or daughter and say, "Don't worry, Emily or Edward; I couldn't do maths either". It is passed down. There is an attitude there where parents think if they cannot do it, it goes down to the child. That obviously leads to issues where, as Hannah mentioned, adults rule themselves out of opportunities because they think, "Oh, I am not a maths person". Pro Bono Economics together with National Numeracy came up with a research finding that poor numeracy can cost the UK anything up to £25 billion per year. It clearly has a huge impact on people.

As a mathematician, I love students exploring the beauty of mathematics. Some of them are going to become mathematicians, some of them may work in actuarial sciences or research. The vast majority of people, however, need the key skills, the core bits of numeracy, for example estimating and proportional reasoning. An everyday example is



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that everyone has to cook. I am not a good cook, but if I have a recipe to feed three people and I have six people I need basic doubling.

Another example is percentages and ratios. These are skills that 11 and 12-year-olds can use every day in school but when adults or young people apply them to the real world, looking at student loans or thinking about applying for a mortgage, they make poor decisions because their numeracy challenges them. That is the financial piece, financial numeracy. I speak to many parents of students and ask them, "What is the number one thing you wish you had left school with?" and they will say that it is being competent and understanding maths and money.

I have friends who are mathematicians who say, "Bobby, we cannot denigrate maths; maths is pure". Of course it is, but for a lot of people—the one in two adults who cannot work out 10% of a number—we need to make sure that we offer them a curriculum in school and beyond that makes them feel that maths is their friend, not their enemy.

Q3 **Baroness Bull:** I am going to come back to early years but before I do that, you talked about the cost to the economy and Pro Bono Economics. Are either of you aware of any research into the economic cost to society of people who are not in education, employment or training, or of people who fall into the justice system because of lack of numeracy skills? I wondered if we could put that on the record.

Bobby Seagull: I do not know the exact statistics, but I do a lot of work about reading in libraries and at some stage I will be visiting some prison libraries. The literacy and numeracy skills of repeat offenders and people who end up in prison are significantly below the average. There is clear correlation, if not causation; there seem to be links between numeracy and life chances. If you do not get a maths qualification at age 16, that closes pathways and opportunities.

Q4 **Baroness Bull:** Thank you. I will go back to the question I was intending to ask about early years. You have both spoken a little bit about this, but we know that numeracy gaps appear before age seven and we also know from UCL research that primary teachers tend to lean towards subjects in which they are confident and—guess what—the maths anxiety cycle has played out in teachers too.

Have you had any thoughts about what could be done in the early years—low-cost interventions that would put numeracy alongside other things? We tell parents that they need to talk to their children, read them stories. Would you like them to be doing something else? I do not want to lead the witness.

Professor Hannah Fry: With reading stories, this is something I would like to see. It is something that I plan to do at some point in the future; I would like to create storybooks to be read that improve numeracy skills. That is on the future to-do list for me.



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A key thing is partly how the whole of culture, the whole of society, ends up feeding into the general attitude that we have. One way around that attitude is to give people a reason to care because I do find that, when people are motivated to find the answer, rather than just expected to do maths for the sake of it, the whole game changes. Going back to the Covid pandemic, before the pandemic, I was trying so hard to make all of these programmes to engage people in all these mathematical ideas and finding it extremely difficult. As soon as the pandemic hit, I could even get in a taxi, and somebody would be quizzing me on logarithmic graphs. As soon as people are motivated to care, then all of a sudden, everything changes.

There is one organisation that I admire; it is called Numberfit. It recognises that if you make the numeracy skills part of a bigger picture—part of a game—kids who previously were really struggling to motivate themselves can become engaged. Numberfit goes into schools and plays games with children. The children are running around, sorting puzzles. They are doing arithmetic and because it is up, it is active, it is team sports and it includes an element of competition—without it being “here are the clever kids and here are the kids who are struggling”—it engages kids in a much greater way.

That idea of people needing a reason to care applies more broadly, because our culture tells them this is not for them and I think that applies across the spectrum. Giving people a reason to care is I think at the very heart of everything. All of the work that I do is trying to find the reason why people might care.

Q5 Baroness Bull: Can those Numberfit games be played by parents outside school?

Professor Hannah Fry: Yes, they can.

Also, Robert Eastaway, a friend of ours, has written a book called *Maths for Mums and Dads*. It is a massive seller, which demonstrates the appetite among parents who do not have the numeracy skills themselves but want to impart them to their children. I am struggling to think of an example from that book off the top of my head, but Robert Eastaway does things that are not just like, “Okay now here is how we sit down and learn the times tables”.

When I was growing up, my mum would say things to me like, “We are going to walk to town. I want you to work out the way to get there that crosses the least number of roads, right, and let us work it out, let us do this different route”. We were counting all the time. It is about embedding it in games and embedding it in real life, because it is when it is embedded in real life that people are really struggling.

Bobby Seagull: By coincidence, on the way here, I was in Westminster Hall, and there was a teacher there with a group of young children. She said, “Oh, Bobby Seagull?”. The children had watched some of my primary school activities. I had a little chat with the children and I asked them,



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"You know, I am going into the House of Lords; what should I tell them about maths?". One of the children said to me—I told Hannah this—"Oh, we should cancel maths" and the teacher laughed. The she said what Hannah said about making it engaging, making it fun and making it have games.

Interestingly, though there is a contradictory piece of research from Maths Horizons. I think they are giving evidence, possibly next week. They may say that maths does not have to be engaging, research shows it has just got to be structured. But, as a teacher in the classroom, if children or adults are not engaged by something, they naturally turn off. We all know that when someone is having a conversation and it becomes dull, even with the best will, you turn off to it.

So I think it is about the engaging piece. Cambridge University has done some research that shows that financial attitudes are formed by the age of seven, so we need to make sure that we get in as quickly as possible with young people so that they have a positive attitude to mathematics. I have seen that many teachers in primary schools are teaching 10, 11, 12 subjects, so it is a huge burden, and for many of them perhaps maths was not their specialism when they were at secondary or sixth form.

I have done things on a localised level that I can imagine being scaled up. When I was in my local secondary school, I used to go into my feeder primary schools once every half term for a morning and work with the teachers and do some talks with the students. A regular visit from a maths specialist who is connected to the school can help uplift. A primary teacher can say, "Mr Seagull's coming in next week. We can ask him about fractions".

The second thing that we have done is run parent workshops. Hannah told the story about her mother asking about that journey. These things sometimes can happen if parents naturally engage, but schools and society do not do enough to engage parents with their maths education. Again, in my schools, occasionally in primary schools, once a term we will bring parents into the school and will tell them about the things that they can do at home to help engage. When you are cooking, tell them about the recipe; when you are planning a journey into work, look at the timetable; or even, if you are looking at a holiday and checking the exchange rate, for the year sixes, you could look at how an exchange rate works. It is about making sure that you get parental buy-in because children cannot work in isolation, neither can teachers, neither can parents. It requires a joined-up approach.

Another example is that last year on World Book Day, I dressed up as Arthur. It is an American cartoon. I am sadly not dressed up as anything for you today but World Book Day is such a cachet—children, reading, libraries and stories. If you ask most parents, they will say "Yeah, I will read to my children tonight". How many parents, even really engaged ones, say, "I will do some sums", or "I will practice some arithmetic"? Not many. So again, like Hannah's idea, we could have some system where



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we encourage schools and parents to say, “maybe every night has a mathematical story”. I do not know what it is really. Maybe when Hannah’s books are out, they will be the ones I recommend. That is the engagement piece that has to be done with parents and schools so that children are really at the centre of it.

The Chair: Amanda you had a supplementary.

Q6 **Baroness Spielman:** I did. I am Amanda Spielman and I will declare, though I am not sure I need to, that I am a director of GEMS Education in the UAE.

You both touched on the importance of application in real-life context. Hannah, I think you also touched on some rather disappointing views of findings of research on gamification more generally in education—that it is generally not leading to the hoped-for benefits. Can you unpack a little how to draw the line between what is valuable and what may be glamorous but ultimately not particularly valuable?

Bobby Seagull: Taking the secondary landscape, about one in eight to one in seven lessons for maths are taught by non-specialist math teachers. I have been at schools where sometimes they have had PE teachers doing the Year 7 and Year 8 maths lesson because they can at least marshal students into being well behaved. Clearly there is an issue about recruitment.

As for gamification and edtech, generally my perspective—I think you will find that it is the same for most teachers—is that education should still be focused on the relationship between the teacher and the young person. Why are children motivated? Sometimes children may not like the subject, but they are motivated because that teacher makes them want to come into lessons and work hard. There is definitely a piece about how AI technology and gamification can ease the burden on teachers. For example, the burden of marking can be quite overwhelming for new teachers and there are ways of making sure that when students submit work, it can be marked in the early stage by games, and so on.

In the classroom, I always think that there should be that human interaction, but gamification can be used outside school. However, there are some examples of good things that work, for example Times Table Rock Stars. I sometimes wear the t-shirt in the gym; it is a cool t-shirt. Many students will play times table games and because of that they have that that core skill. For young people to be competent in numeracy, they have to have that baseline—number bonds to 20, basic times tables. I know we have computers and AI, but we had the calculator in the 1960s and we had Google in the 2000s and our numeracy issue has not disappeared. I think gamification can help but it is not the Messiah that it is pointed out to be.

Q7 **Viscount Stansgate:** Welcome to you both. I am going to go out and buy a copy of *Maths for Mums and Dads*. When I buy it I am going to find a way to adapt it for grandparents because I have two grandchildren and



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I intend to do what I can to try and get maths in reading stories. If I am lucky, I might do it on Sunday night.

I should add for the record that I am the President of the Parliamentary and Scientific Committee although it is not a financial interest.

I was going to ask you about the impacts of low numeracy skills, but you have already covered some of this already so can I ask you how it has changed over time? We are living in a much more digital world. If you were in this room 30 years ago, you would not be giving quite the same answer that I hope you will now as to how it has changed and the challenges that those changes bring. Then I will have a supplementary after that. How have these barriers and the impact of low numeracy changed over time in your view and how is it going to develop in the future?

Professor Hannah Fry: I think that seismic changes are coming with artificial intelligence, but I think that that does not make the question of the issue of low numeracy go away. If anything, it probably exacerbates it a bit. Having critical thinking skills and particularly having a good grounding in understanding uncertainty is going to be key. Algorithms are not deterministic; they are not giving you answers that are absolutely the only way of seeing something. Having a way of seeing doubt through a numerate lens adds to the critical thinking skills that we are going to need in future.

I do not have historical data, forgive me, on the impact of low numeracy skills on the economy.

Bobby Seagull: I do not have any data on that either. Regarding the UK's numeracy and Hannah's piece on critical thinking, there is something known as the PIAAC, which is the Programme for International Assessment of Adult Competences. Between 2011 and 2023, the UK did tick upwards, so there was some improvement. Sometimes there is doom and gloom around GCSE assessments but even our PISA scores from 2018 to 2022 showed a slight upward tick.

However, the problem I find with maths and numeracy—obviously there is AI technology—is that we need people to have a number sense. I will give you one anecdote from my school teaching and then a wider example about the scale of numbers and money in the world. A few years ago, I was doing an example where I got children to work out the average heights of children in class. I put up all the heights on the board—157, 173—and one of the children quickly shot his hand up and said he had the answer. He showed me his calculator and said the average height is 2.7 metres. I said, "Are you sure?". He said, "It is here, it is here, it is on the calculator". Nowadays I guess the equivalent of that would be hallucination where AI tells you something, but you do not have the faculty to challenge it.

This is where sometimes numbers in the media with finance get thrown about and we lose a sense of the scale of them. Here is a good example



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that I have often used with students, and it is a classic one that mathematicians use. I tell students, "Imagine you are counting one number per second. How long would it take to count to a million seconds" and we work it out. It is about it is about 12 days. Then I ask them, "Okay, so a million seconds is 12 days; what would a billion be?". They say, "Maybe like 30 days, maybe a few months", but actually a billion seconds is 30 years. If you go into a trillion seconds, that is 30,000 years. That is longer than the span of humanity. Yet, these are numbers that we hear in the media—£1 billion, £1 trillion. These are large numbers that AI technology will not necessarily help us understand.

As a society, we need to make sure that people are given that number sense. It will not mean that they can immediately do the calculations, but we can have that step back. I have had parents at school evenings say, "Mr Seagull, I have seen this payday loan. One was offering that I have to pay 40% and another one said 30%; the 40% one sounds good doesn't it?". I say, "You realise that 40% is worse", but it is because they do not have the number sense. That is where it is not just about competence, but the confidence piece related to it matters.

Professor Hannah Fry: On the billion/trillion point, there was an amazing study where they had a number line and said, "Okay, this this is zero and this is a trillion. Mark on this line where a billion would sit". They worked out the average response and basically people thought it was maybe a quarter of the way. Of course it is 1,000th of the way; it was basically at zero. I think you are right that, especially as the world starts to throw all of these numbers around, having number sense is incredibly important.

Q8 Viscount Stansgate: Is there anything you want to add to what you consider the main barriers to achieving numeracy skills to be, apart from what you have told us so far? Is there anything else you want to add about barriers to draw our attention to?

Professor Hannah Fry: Yes and it does in some ways link to your previous question about looking back through history. The maths curriculum has been designed very much with the idea of creating excellent mathematicians and it does that very well. We are very good in this country. We have this perfect pipeline that leads all the way through to Cambridge University and beyond. We punch so far above our weight in mathematical prowess. We are really good at it. However, that really lets down, as Bobby said, the vast majority of people. There is this great drop-off that happens when kids go into secondary school. There is anxiety in the transition to secondary school. When you ask kids, "How many of you dislike mathematics?" the response is about 23% at age 10 and that goes up to 50% at age 14.

There is also the way the curriculum is designed. Bobby and I were talking about this in the corridor outside. Some of the stuff that is in the curriculum for GCSE is basically based on 2,000-year-old geometry problems, circle theorems for example. I have lived my entire life as a



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mathematician and have never once come across a circle theorem in the wild. The only time I have ever seen it is when it is being bashed over the head at these poor kids who are like, "What on earth is going on?". You do not need to teach these kinds of geometric proofs as though they are the ultimate important thing to kids who then cannot go on and take 10% of nine. It is just astonishing to me. The model that we have for English is a really good one to look at because we have separated out English literature, the total joy and beauty of that subject, from English language—the fundamentals that you really need to be able to survive. It seems to me that we should separate out these two as well. There should be mathematics and numeracy.

Bobby Seagull: I think in Scotland, in the 1980s and 1990s, they had separate arithmetic. I cannot speak for England, but Scotland used to have something like that.

Professor Hannah Fry: When we say arithmetic, in my mind it instils a little bit of horror. When you say arithmetic, it is be quick, be fast, be accurate, but I think what we are talking about is something a little bit different. It is about careful, considered, critical thought and number sense—a deep understanding of what these numbers are doing, what they mean and how they might impact and affect you.

Bobby Seagull: On the barriers, I will just quickly add to that point about maths being a race and about speed. This is one thing in our culture that detracts from real mathematicians, and people who actually can handle maths and use data, being produced. Because of how our schooling system is set up—I can understand it at GCSE and A-level, but not at the end of primary going into secondary—it is about who can get it done the quickest. But real maths is not about who can do it the quickest; it is about who can do it diligently. I would rather get the correct solution taking the twice the time than get an incorrect answer in half the time, which is what tends to happen.

Some of the key barriers are the shame and stigma. As a teacher, I would like to think that one of the reasons I am a competent teacher is because I never make any of my students ever feel embarrassed about being bad at maths. It is definitely changing in our culture. Twenty or 30 years ago, I remember in my school that there were some teachers who would tell people things like, "You are an embarrassment to our school" because they could not do a times table. I think there is still an element of people feeling that way—maybe it is internalised—but they feel ashamed about being bad at maths. I think we should remove that and say, "Okay, maybe you are not good at maths yet". I think I have heard you once mention something like that, Hannah, maybe on "The Infinite Monkey Cage". We can change that culture—that stigma and shame.

Another barrier is about role modelling because obviously I always think that you cannot be what you cannot see. I recently became one of the founding fellows of the Academy for the Mathematical Sciences, which has a "Maths can take you anywhere" campaign, using examples on its



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website of people who have become space scientists, statisticians and working in medical health care. More of these examples could be distributed and shown to young people.

A third point about barriers is that a lot of effort is focused on school but once you leave school, where is the provision for adults who are struggling? This may come into our conversation later. That is one of my bugbears about our education system; we help kids till 16 or 18 but once you in the real world of work, it is up to you.

Finally, there is still regional inequality in the UK. Look at Teach First and maths teaching. A lot of teachers, the workforce, end up in the big cities such as London, Manchester and Birmingham, but if you go to coastal regions and other places that are not employment magnets, you will probably find that inequality in maths is a lot worse. There is the example of the East Midlands. In the UK about 17 million adults have poor numeracy skills but 1.7 million of them are in the East Midlands alone, which shows you the inequalities of the regions.

Viscount Stansgate: Thank you very much. It is particularly nice to see our witnesses debating with each other.

Professor Hannah Fry: Collaborating.

Bobby Seagull: Collaborating, yes.

Q9 **Baroness Garden of Frognal:** One of my daughters did Kumon with both of her children and they both now have economics degrees and are holding down excellent jobs, so that was probably a good start in life.

Bobby has asked my question but not answered it. What provision is there for people later in life who want to improve their numeracy skills? I think also there is a huge need to try to associate the subject. I mentioned last week that when I was teaching there were children doing cookery exams who were lousy at maths but, when we went to watch what they had done, they had worked out timings, weights, measures, costing and everything, because they were really interested in it. So the trick really is getting maths linked to something they are interested in.

Anyway, what a provision is there for non-mathematical adults?

Professor Hannah Fry: I could not agree with you more that motivation is so central. Bobby, who works with National Numeracy, is better placed to speak to this, but there are of course opportunities, courses and so on, to improve adults' numeracy skills. However, I just do not see how taking yourself to go and do a course on numeracy skills without that motivation would work; I do not see where the motivation would be.

There are things like "Money Saving Expert", where you start with the objective—you start with the motivation. Martin has done an incredible amount for numeracy in this country. It is targeted and it is specific, but it is absolutely phenomenal.



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Then is also work in a similar vein that David Spiegelhalter, my colleague at Cambridge University has done, trying to help people understand breast and prostate cancer diagnoses. He has created tools that will help people work through that uncertainty. This is, again, an ambition for me for the future, but I would like to see more of that sort of thing: building tools that are specific to the environment and specific to the motivation—the reason people have to care and use it—where you improve skills through those means rather than the generic skills alone.

Bobby Seagull: You are spot on, Hannah. In recent years, there was a programme called Multiply. The Government invested, I think, about £500 million over three years. It was essentially targeted at those people in the workforce who did not have a grade 4 or C-equivalent, so not deemed to be mathematically competent for further use. The aim of the programme was to increase people's confidence before they took a qualification. National Numeracy, the charity, worked with many adults through Number Confidence Week and numeracy days to help boost adult provision.

Now this is a slightly controversial idea. If you are a trainee teacher, you have to pass a numeracy and literacy test. Many of my friends are primary teachers and I know it pained them, but eventually it meant that they felt equipped. Imagine—this is me putting an argument out there so that people slowly step in this direction—if every employer had to have every staff member being numerate and literate and you could not hire someone if not. Obviously then, I am sure you would have businesses going, "You are putting more red tape on our businesses", but imagine there was a universe where employers had to make sure that their staff were numerate.

Many employees are really good at well-being. In my 20s—I will not reveal my age; actually, we are only eight days apart—I was a trader at Lehman Brothers and then a trader at Nomura and a chartered accountant at PwC. In the City back then, in the mid-2000s and early-2010s, well-being was not an idea. They would just say, "You have got to tough it out and bear it out; things are difficult and it is up to you". Now, in pretty much all workplaces, well-being, mindfulness and time off if you are having difficulty with your mental health, are accepted practices—practices that, if a business did not have them, you would say it was an appalling business. Yet with numeracy, we are not there. Imagine in 10 or 15 years, Hannah and I come back here and saying, "oh, yes, look what happened, employers now work with their staff". There is definitely an employer piece there, whether it is carrot or stick, on numeracy.

Q10 Lord Hannett of Everton: You have partly anticipated my question. You have good way of thinking ahead.

Your presentations and your answers are very interesting. Before I go to my specific question, my previous life was representing low-paid workers in the workplace and Bobby has just touched on aspects of the workplace. When lifelong learning was introduced, I saw people who,



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because they had an interest in a subject, all of a sudden flourished. As explained, the image of mathematics is quite daunting for many people. One of the things I regularly heard from lots of employers when I was doing national negotiations with some of our largest companies was the frustration of having people with a lack of basic skills. They wanted to promote these people into positions that required numeracy or other skills, but they could not do it.

Do you have any information—particularly, if you want to build on that point, Bobby—about what employers could do? I honestly believe most people when they leave formal education still have a thirst, a hunger for further development, but the environment and the encouragement have to be there. Could you specifically address what employers could do or tell us if you have any information of good examples?

Professor Hannah Fry: I do not know if I have any good examples.

Bobby Seagull: The big picture is that at GCSE two-thirds get a qualification, yet two-thirds of adults are not numerically competent. This may be a flaw of the GCSE one-day exam. It is a couple of days at age 16. I know some students will do the GCSE then say, “Phew, I will never have to look at a percentage again”. I am not going to come up with a new exam system in 30 seconds but there is an issue where we allow children to get a qualification but actually the skill is not really there. Imagine young people taking driving tests, coming out the centre and they passed, saying “Thank God, I will never have to reverse park again in my life”. That is not functional for our roads.

The maths qualification from schools should be much more about a skill that encourages people to have a lifelong skill, almost like you can keep stepping up this ladder as you progress. Obviously in school there are grade numbers from 1 to 9 but imagine a system where you can keep upgrading your numeracy skills. Employers could support that and again the incentives could be pay rises, promotions and all those sorts of things, but there definitely needs to be something beyond the school numeracy connection.

Lord Hannett of Everton: You do not know of any specific examples. But I think you were making a recommendation that employers could do more.

Bobby Seagull: Yes.

Professor Hannah Fry: Yes, I think so.

Baroness Bull: May I ask a really short supplementary? In the adult numeracy space, who might the other stakeholders be? Obviously, there are the charities. Are there other stakeholders we are missing that could be interacting with adults and providing these learning opportunities? We have done employers; you have mentioned prisons. Is there anybody else we should be thinking about as potentially contributing?



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Professor Hannah Fry: At Cambridge University we have a project called NRICH, which is used to support maths teachers around the country by providing materials for students. With the idea that teachers themselves struggle with their own numeracy skills, this is thinking of additional examples. It has all sorts of packs of information for the students. I do not know whether you have ever used their stuff, Bobby. It is absolutely amazing.

Bobby Seagull: Yes.

Professor Hannah Fry: NRICH has an incredibly rich understanding of what works, what helps students, what helps different people at various levels of numeracy.

There is just this great big gap. That knowledge exists. I have spoken to NRICH about potentially making some kind of service for the parents of kids to help parents support their children through that process, based on all the knowledge and information that they have. I think that there is a big gap here; I really do.

Baroness Spielman: Chair, may I ask my question?

The Chair: Just a short one. I am mindful of time.

Baroness Spielman: I think my question fits well here so may I ask it?

The Chair: Fair enough.

Q11 **Baroness Spielman:** I am picking up on things that both of you have touched on in those answers. You have been talking about a really important point, Mr Seagull, about how much teaching it takes and how much practice, to consolidate some mathematical knowledge to the point that it is a skill that can be fluently applied. I am really interested in your thoughts on how long, after the first time that somebody reaches a point of being able to do something, you have to carry on teaching and practising it to have a chance of sustaining that knowledge a decade later?

Linked to that, what should we be doing with adults to stem the decay of unused skills over time, especially in a world where the counterparts of satnav are reducing the amount of mathematics that many of us use in our everyday lives?

Bobby Seagull: This probably speaks to how our memory works in general. Has anyone ever come across the Ebbinghaus curve? It is a forgetfulness curve. I can just try to draw it. Essentially, you have time on one axis and memory on one axis. Essentially it says that when you first get a new bit of information, if I tell you some fact—I do not know; say Salvador Dali designed the Chupa Chups logo—you will all remember it but over time that will disappear. Most of us will forget it. Some of us will still remember. If I told you again in a week's time again, you



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remember it immediately and then the degradation will be less acute. Then if I tell you again another time, it is that same thing with repetition.

Sometimes students say, "Sir, we did this last term, we did this last year". Repetition eventually moves something from the short-term memory into your long-term memory. That is where people have skills like knowing how to cook and how to drive. It is not like I am going to wake up one day and think, "How do I boil an egg?", because I have done that so many times. Numeracy is no different.

I am someone who has taught in the state sector, but I had a scholarship for my A-levels to Eton College—from a council estate to Eton College. What I notice is that if you compare the state and private sectors, when students in the state sector come back in September, they are further behind where they were in June. This is because over the summer they have not really encountered much maths or science. It is not that people in the private sector are doing maths and science every day, but they are doing complementary activities. I am not saying take away the summer holiday or reduce it, but there is something about that gap—those six weeks—and making sure that young people have something to do, whether it is extra-curricular or working in libraries.

Then thinking about adults, I saw my notes here that in Australia—I have not looked into the full details—there is something known as integrated workplace learning where they embed literacy and numeracy training into workplace settings. There are other countries that try to embed it. It has to be regularly drip fed. It cannot be, "Oh, we have done it now". Every year or every 18 months, there needs to be some recurring check-in.

Professor Hannah Fry: You can tell Bobby is a great teacher, mocking up a graph from nowhere.

I also think that we are missing one part of the story here, which is the idea of it being actually quite fun. I am just thinking about "Countdown" as a silly example. What an amazing way to keep an incredible number of people having extremely sharp mental arithmetic skills. It does not feel imposing. It does not feel like, "Okay, now you are forced to do this very boring thing". It is just something that is like fun and playful and light.

There are those little moments. Sudoku does not actually involve very much maths at all, but there are these little things, which I think people keep their hand in with. Those are the things that I am thinking of. In my job, that is what I am trying to do. I am trying to find the little nuggets of joy, the little nuggets of fun and playfulness, that you can attach to these much more mathematical ideas. They are hard to do. I will be honest; they are hard to do. But I think that there is scope for those sorts of things to have a role in this.

The Chair: I am sorry to say that we are going to run out of time. If we have a bit of time at the end, by all means come back in.



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Q12 Lord Hampton: I am also going to declare my interest as a state secondary school teacher in design technology, which has quite a lot of maths in it. I am also a trustee of the Elephant Group, an educational charity.

I was going to ask about the national curriculum, but I think you have given it quite a kicking so far, and the barriers—that it is designed to produce excellent mathematicians, there is a big drop off at secondary school and we are teaching 2,000-year-old geometry. Given that we have just had a curriculum review and that we will not have another one for another 10 years, is there any way that you could see that we could do a bolt-on? They are talking about enrichment and about bringing in citizenship and things. Could you plan immediately, without any warning at all, an enrichment that could go into schools that sits alongside the national curriculum and that gets students interested?

Professor Hannah Fry: Yes. Going back exactly to the point that we were talking about earlier about motivation being this really central part of it, I have always thought that it does not totally make sense why math sits over there on its own, in this corner over there, and you have history and geography and everything else over here, because actually there are all kinds of ways to embed numeracy skills and mathematical thinking into every single aspect of the curriculum. If you are interested in law, for instance, you could collect data on legal cases and draw graphs of how much we cared about property versus the person over time. You can use it in geography; there are untold ways to embed this stuff.

The question that students ask over and over again is, “What is the point of this stuff? When am I ever going to use it?”, and this is the problem that we are finding ourselves in. They get to adulthood and they do need to use it and then it is not there. Why are we not embedding it and interweaving it right from the get-go? We need enrichment programmes that involve not maths for the sake of maths, not numeracy for the sake of numeracy, but maths as the key. What I love most is when you can make it feel as though the maths is the key that unlocks the next step of the story, basically. That is the very BBC way to explain it—the TV way, I should say. That is it: you start with something that is interesting and weave the maths into it.

Bobby Seagull: I am going to completely agree with Hannah here—Professor Fry, I should say. With schoolteachers, we always call them Mister and we are not allowed to call you by your first name in school.

I will give you one anecdote and then an example. Sometimes in secondary staff rooms, you will get encounters where there will be a maths teacher and a geography teacher chatting. The geography teacher will say, “Oh, Mr Seagull, we were doing bar charts, but your children claim they have never done it before”. I will say, “But we did it last term”. It is because the way children—I guess all humans—learn is that we compartmentalise. We think: okay, this is a maths lesson, I am going to learn about graphs and pie charts. When we go into geography or



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science, we think, “Oh, that was maths; it is not geography”. The nature of our subjects is quite siloed but learning really comes to life when it is integrated.

In some of the schools I have worked in, I will sit down with the English department and look at *An Inspector Calls*, and say, “Can you use a graph to show the tension building up and falling in the plot?”. In history, for example, there is a really lovely anecdote about Florence Nightingale. In the 1850s, she was trying to encourage parliamentarians to send money to have better hospitals. She told them, “When there are better hospitals, people are less likely to die” and she explained it to them. They said, “Oh, it seems okay”. She thought, “Ah, I need to persuade them with data” so she created what was called a polar chart, of which the modern version is a pie chart, showing that most deaths in the Crimean War were not on the battlefield, but were due to infections from wounds not being treated properly. Suddenly you get the story of how history links to the creation of a pie chart, which actually impacts political decisions. Young people can see education is connected, not siloed.

In schools, if you are a teacher and your objective is to get X number of kids to get a GCSE grade 4 you may just focus on your silo. Connection requires upper thinking from the likes of head teachers—maybe Ofsted, Amanda—to say, “Make your teaching more integrated”.

Baroness Hamwee: I was going to ask about weaving mathematics into other lessons so if there is anything more that you would like to say to illustrate that, please do. I also wondered about the NRICH programme and whether you might be able to send us some material.

Professor Hannah Fry: Yes, absolutely. Yes, I will. It is excellent.

Q13 **Lord Massey of Hampstead:** Thank you very much, both of you, for your insights. I have found them very interesting and they really chime with my own experience. I declare my interest as chairman of a financial institution in the City, an employer of quite a lot of people and looking after 40,000 clients. Therefore, financial education has always been hugely interesting to me, and I think it is obviously very important for society.

In your opening remarks, Hannah, you talked about people who are turned off maths very easily. In my case, as I mentioned in this Committee before, I am very numerate but once we went into algebra and geometry I was like, “What is this for?”, so I am one of those people.

I have a couple of things to ask you. I will go into adult education later but before that, I would like to hear your views about how much of our numeracy problem in this country stems from early life, essentially from school, versus the inability to pick up later? One of the things we are discussing is how much of our time we should spend on the school aspect, some of which is very hard to change, versus later life and what you could do to make up for lost ground in adulthood. Hannah, your view



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about motivation is quite interesting. How do you get that done?

Then if you look at the schooling issue, the problem may be curriculum, but also it is so important how maths is taught. As you two have identified, good teaching is just enormously important. Can we find enough really good teachers? Can we train them? How practical is that? That is one question.

The question I am supposed to ask is about what steps we can take to improve adult numeracy. There are a few questions in one there. I would be very interested in your views.

Professor Hannah Fry: We have to be a little bit realistic here because this is something that is going to take generations to address. This is not something that there is a quick fix for because, as you say, if you focus all your attention on young people, you still have the parents of those young people who are still part of the problem. You still have the cultural dislike of the subject, which is part of the problem, so we have to acknowledge that this is going to take some time.

On teachers, by the way, Bobby absolutely is the person to speak to this one. To directly answer your question about how much we should split it, it is so hard to answer, but you must start with education. You have to start with when you have a captive audience, effectively, because there is such a dislike of this subject in this country that this is not a situation of build and they will come. I think we have to go to where people are, either in education or employment, or through things like "Money Saving Expert", which is where people will come because they have a reason to come.

Bobby Seagull: I will speak to two things; one is about the mindset, and one is about teaching recruitment.

First mindset: a professor in America, Jo Boaler, built on the work of Carol Dweck. Carol Dweck came up with the concept of growth mindset which essentially says that your maths ability is not fixed. Earlier in this conversation we said that too many people in this country think that their maths ability is fixed, and they think that for the rest of their lives. Maybe there are pieces to be done working with incredible influencers like Hannah on their socials to get the message out there to adults that actually you can improve your maths ability. Our brains are still neuroplastic at any stage in our lives, so there is something about that mindset piece.

The second thing is about teachers. In the last few years, there have been cuts in mathematics departments in some universities. The top Russell Group were academically protected but the likes of Brighton, Huddersfield, Hull, Kent, Kingston, Leicester, Aston, Birkbeck and Oxford Brookes have had their maths departments shrink. Looking at where the majority of teachers come from, they do not necessarily come from the Russell Group because their graduates are drawn towards City careers,



consultancy and actuarial sciences. Teachers come from the middling universities. It may be that they have a passion. It may be that people who have had a bit of struggle with maths themselves are better teachers because they know what it is like; they empathise. In the last three, four or five years in the UK, there has been a quiet closure of some of these departments, and I think that will have a knock-on impact in five or 10 years. Then there will be an even further reduction in the number of maths teachers. There will always be an issue in maths with qualified graduates being drawn towards other careers, but this is storing up an issue that I think will come to bite us significantly.

Q14 Lord Massey of Hampstead: Is there specific training for maths teachers?

Bobby Seagull: There is obviously the PGCE course, but students are drawn to that from the pool of maths graduates. If we are losing maths departments in this pool—I do not know what they call the middle, post-1992 universities—that is a problem. Their graduates are three times more likely to become teachers. Eventually we will have the knock-on impact of fewer teachers—fewer in big cities, fewer in small areas—and then we will have this issue of worsening cultural attitudes because school students are being taught by a PE teacher and not by a maths graduate.

Lord Massey of Hampstead: I had not thought of that before. It is a good point.

Baroness Hamwee: Can I follow that up? Should there be a move to recruit people who have not come from a maths background to teach maths? How should we be pushing that forward?

Bobby Seagull: There are organisations that can help. There is an organisation called Now Teach, founded by Lucy Kellaway, formerly a brilliant writer for the *FT*. She left her finance journalism career to become a teacher, and her programme is about people who had a first career somewhere and change into teaching. The pool of teachers will usually come from younger people, in their early 20s, but I think there is a growing number of people nowadays who become dissatisfied with their corporate careers; they have they paid off their mortgage, and they are looking for something else. The Government need to try to find ways of supporting organisations that are trying to encourage leavers or people who change careers in their 30s and 40s.

Baroness Hamwee: I am aware of Now Teach, but I was thinking of younger people who go into teaching and may think, "History is my passion" and possibly encouraging them to teach maths. That goes along with the young teachers who find themselves having to teach maths even though they might not want that.

Bobby Seagull: I can speak about an incredible anecdote from Australia on this. A man called Eddie Woo is one of Australia's leading maths



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teachers and influencers. When he applied for teacher training, he had applied to become an English teacher, but English was oversubscribed. They said to him, "Mr Woo, would you like to become a maths teacher?". He said, "I am not good at maths. I really struggled with maths", but actually that meant that he was the perfect example. He has become one of the leading math teachers in Australia and that is because he came from a position where he empathised with students. I do not think this is something which has been picked up that much within education circles, but there is definitely a point about people who have a passion. Maybe they have an interest in maths, but they struggled with it. I think they make the best teachers in general.

Q15 Lord Stevenson of Balmacara: I declare my interest. I have no relevant interests to this topic—not that I am not absolutely fascinated by it.

We have talked a bit about AI. You have rightly pointed out the absurd situation where we trust it without knowing how it works or what it does deep down, but is there not a bit of a quandary there? If I had to get some kids interested in something, I would be using AI to do it because they find it fascinating and engaging. If you could find a way of using AI constructively, what do you think it would be?

Professor Hannah Fry: Oh, I think there are all kinds of ways that AI can support making maths more interesting for kids.

Going back to the idea of motivation, now the really good models are mathematically more competent than they were. There was a point in the past where they could do phenomenal things but probably could not do 10% of nine, but that appears to be changing now. I think Google's Gemini is particularly good at this now it has a deeper understanding of the workings of mathematical ideas. You can go in and say, "I have a kid who is fascinated by football", or some other subject, "create a problem in this arena, set against this background that they have an interest in". In terms of making the motivation highly personalised for the individual child, I think loads can be done there.

There are a number of different projects going on in this space, but Google is doing some really interesting work on creating AI that is particularly focused on acting as a personal tutor for an individual. It would test the person on their weaknesses and reinforce, again and again, the bit that the student finds the hardest. It is absolutely hyper-personalised and tailored to exactly what the student needs and wants. There is all kind of good and exciting stuff that could happen in that space.

Bobby Seagull: Data literacy is obviously such a universal key skill now, whether you are looking at personal finance tools or understanding your health care. Everyone needs to understand how to use data but there are a couple of omissions in the recent curriculum review. The Joint Mathematical Council and the Royal Society pointed out that data



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education was not discussed in the maths curriculum and that it omitted the role of maths in that. Maths and data are highly interconnected so we cannot expect young people to be equipped for the world of AI and data if we are telling them it is not part of maths. There is a connection. It could be bolted on later but currently there is no mention of data literacy in the maths curriculum.

Q16 The Chair: Thank you very much. We have two minutes left and I have a wrap-up question if you can stay a moment or two longer. I know Amanda Spielman wants to come in, but I am conscious of time.

Just to bring all these strands together, if you were to make one recommendation to the Government on how we could improve numeracy for life, what would it be? I would like to hear one from each of you please.

Bobby Seagull: I am a big fan of reading and libraries. I am quite proud that I got my MBE for services to public libraries, not maths. That saves the OBE and CBE for maths in future.

I mentioned that is that this year is the National Year of Reading. Last night I was at the Caffé Nero book awards, and they had a segment on the value of reading. The whole country's getting behind it—football clubs, musicians, Dua Lipa has a book club podcast—and there is huge national attention on reading. A lot of our conversation today has been about attitudes and how our attitudes need to improve and that can lead to better competency.

Imagine something like World Book Day but a national year of numeracy and every single organisation—every premier league club, every pop star, every soap star, every influencer—would engage in numeracy. Again, that is not a fixed solution but at least it pushes it. That yellow box is moving too slowly; let us give it a great big whack. So, I am thinking of a national year of numeracy.

Professor Hannah Fry: My recommendation goes back to something that we mentioned earlier. Bundling everything into one single qualification, saying "this is maths" and using that to try and train exceptional mathematicians, while also giving people fundamental numeracy skills, is trying to do too many things all at once, and therefore leaving quite a lot of people behind. For me, the recommendation would be about separating maths out and following the English language and English literature model.

The Chair: You do not think that would stigmatise those who do not do upper maths or higher maths.

Professor Hannah Fry: No, I think calling it numeracy maybe will make it seem like you are being a bit like grammar schools and comprehensive schools. I think everybody should do the English language version of maths. It should be maths and data skills or whatever it might be. The other one—the one that is there to train mathematicians that includes



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pattern recognition and beautiful geometric proofs that I absolutely love—should be available of course and maybe even all students should do it, but we are tarnishing the really important stuff with the brush of the very high-end mathematical beautiful proof stuff.

The Chair: We have we have managed to finish on time, which is always an achievement, so thank you for helping us with that. I am most grateful to you both for joining us today. You are both clearly passionate about the subject and your energy fills the room, which is very important too.

I have been in your shoes on these Committees over the years. If you go home and think, “Why didn’t we tell them this, that or the other?”, do feel free to come back with any supplementary material. I am particularly interested in any case studies of things that have worked in various places. We are not in a position to recommend to the Government to spend a whole lot more money and do another one of those programmes that Bobby mentioned—the one that has just ended—

Bobby Seagull: Multiply.

The Chair: Yes, Multiply, and half a billion quid; the money is not there. I am very interested, however, in examples. Maybe there is an outstanding adult education college in a part of the country that we have not heard about—anything like that. I am a great believer in trying to take best practice and, as Bobby said earlier, trying to break the silos down and spread these ideas. I will leave that to you but thank you both very much indeed and I am sure we will keep in touch.