MEI
Annual Review
2017–2018

Mathematics Education Innovation

From the Chief Executive

Welcome to this review of MEI's activities for the academic year 2017–18.

After 13 years, and having received funding from successive governments throughout that period, the Further Mathematics Support Programme (FMSP) came to an end. The programme started with an MEI pilot project funded by the Gatsby Charitable Foundation from 2000 to 2005. From 2005, MEI was funded by the then DfES to set up a national 'Further Mathematics Network' (FMN) to support increased participation in AS/A level Further Mathematics of state school students. This later evolved into the FMSP, with a wider remit to include support for AS/A level Mathematics provision.

The FMN/FMSP work has been hugely successful. In England, over the life of these programmes, annual entries for A level Mathematics increased from fewer than 48,000 to over 90,000, and for A level Further Mathematics from fewer than 6000 to over 15,000. At the same time, the proportion of state-funded schools and colleges offering A level Mathematics that also offered A level Further Mathematics rose from 40% to 70%. For both A level Mathematics and A level Further Mathematics, the proportions of state-educated students taking these qualifications has never been higher.

Some really excellent news in 2018 was that MEI won the contract for and launched the successor programme to the FMSP, the Advanced Mathematics Support Programme (AMSP), which continues and widens the work of the FMSP and also, very importantly, provides support to increase participation in Core Maths qualifications. Core Maths is aimed at students who have succeeded at GCSE Mathematics, but who do not aspire to further study in strongly mathematical fields. Students of Core Maths learn how to apply maths and data analysis in context, developing skills that are vital in other areas of study, in future employment, and in becoming effective citizens. Core Maths numbers are growing with nearly 7000 students taking the qualification in 2018, an increase of 27% on the previous year. The potential for growth is huge; well over 250,000 students who achieved a grade 4 or above in GCSE Mathematics in 2017 took no maths qualification at all post-16. I would argue that the majority of these students would have benefitted greatly from taking Core Maths; our challenge over the coming years is to develop the capacity in schools and colleges to enable them to do so.

In addition to the growth of MEI's work through the AMSP, our work in the leadership of the National Centre for Excellence in the Teaching of Mathematics (NCETM) and the coordination of the Maths Hubs programme has also expanded. The NCETM's Teaching for Mastery approach for maths (outlined later in this review), which is delivered through the Maths Hubs, is becoming increasingly well-established in primary schools and work is now expanding into secondary schools at Key Stage 3. The success of the Maths Hubs has led to the network growing, with extra provision in regions of greatest need. MEI's deep involvement across these programmes makes it possible for us to ensure they are working well together, supporting and enhancing each other's work to improve maths education.

These developments mean a significant expansion of MEI's government-funded work, supporting maths education at all levels from early years through to A level.

Alongside its involvement with government-funded contracts, MEI has maintained its innovative work. This includes developing the use of technology to enhance teaching, learning and professional development in maths, and also exploring how to improve the experience of GCSE Mathematics resit students, both of which projects support the recommendations of the Smith review [1]. Other work includes investigating ways to improve pupils' transition between primary and secondary school maths.

[1] Smith, A. (2017). Report of Professor *Sir Adrian Smith's review of post-16 mathematics*. Department for Education.

The new AS/A levels in Mathematics and Further Mathematics were taken for the first time this summer. Our examination specifications for the new maths AS/A levels and for Core Maths, delivered through OCR, continue to provide qualifications that reflect MEI's philosophy of developing deep, connected mathematical understanding in ways that highlight both the beauty and utility of maths.

MEI has never been busier and the year ahead will be even more challenging. To help deliver and manage this increased activity, we have expanded our staff considerably, including the appointment of a Deputy Chief Executive, Dr Vanessa Pittard.

The academic year 2017–18 was one of considerable development and growth for MEI. At the start of 2018–19 we are in a stronger position than ever to pursue our mission to improve maths education for all our young people, benefitting them as individuals and the country as a whole.

Charlie Stripp MBE, FIMA
Chief Executive, MEI

Who we are

MEI is an independent national charity committed to improving maths education.

We support the teaching, learning and assessment of maths. We do this directly, through partnerships, and by informing and advising on national policy relating to maths education.

We aim to develop understanding, confidence and enjoyment in using maths by encouraging the engagement and participation of students and by supporting and inspiring teachers.

Our people

We employ a highly-committed team of staff. Our maths education specialists have considerable classroom experience and deep expertise in the teaching and learning of maths, based on research and on good practice. They are located throughout England, which facilitates our engagement with teachers and students both locally and nationally. These colleagues are supported by a dedicated team of administrative, finance and technical staff working at our office in Trowbridge, Wiltshire.

We have eleven trustees who are also directors of the charity. Their career backgrounds include senior positions in school and university education and in business, and they bring a wealth of experience to our organisation. They are committed to ensuring our corporate governance is strong and our work is true to our values.

In addition, we have an Advisory Panel of external independent experts who provide us with strategic advice.

Our members

Our work is supported by our members, and by schools and colleges that have registered with us, free of charge, as MEI Educational Associates.

Top: Members of MEI staff welcoming delegates to MEI Conference 2018.

Above: Peter Bossom, MEI Trustee, talking to a delegate at the MEI Conference.

We aim to develop understanding, confidence and enjoyment in using maths by encouraging the engagement and participation of students and by supporting and inspiring teachers.

We have a rich network of relationships with beneficiaries, partners and other stakeholders, and we collaborate with other organisations, including the government, to extend the reach and impact of our work.

Our work

Our support for maths education includes: developing curriculum specifications and schemes of assessment; providing professional development opportunities for teachers; and publishing teaching and learning resources, including *Integral*,® our online teaching and learning platform. We also provide tuition and support to students.

Most of our work relates to the maths education of 11–18 year-olds, addressing both academic and vocational pathways, and including maths in other subjects. We also support the teaching and learning of maths in primary, adult and higher education. Through our involvement in the leadership and management of the NCETM, we provide additional support for maths teaching at all levels, from early years through to post-16, and help to coordinate the national Maths Hubs Network.

Most of our work is in England, but we also contribute to improving maths education across the UK and internationally.

Who we work with

We have a rich network of relationships with beneficiaries, partners and other stakeholders, and we collaborate with other organisations, including the government, to extend the reach and impact of our work. Many examples of these relationships are described in this review.

We have strong connections with the national maths education community and with other Science, Technology, Engineering and Mathematics (STEM) organisations.

Left: Bernard Murphy, MEI Programme Leader for Teacher Support.

Above: Cath Moore, AMSP 11-16 Student Support Lead and GCSE Professional Development Lead, presents a problem-solving session for teachers.

Below: Catherine van Saarloos, AMSP Core Maths Support and Development Coordinator (left) and Alistair Bissell, AMSP Level 3 Maths Professional Development Coordinator (centre) engaged in discussion with teachers.

The maths education environment

The government's reforms to educational policy continued to have a widespread and significant impact on maths education.

Government-funded programmes

During the year, the government continued to fund large-scale programmes designed to improve maths education. These included:

- the National Centre for Excellence in the Teaching of Mathematics (NCETM)
- the Maths Hubs programme
- the Further Mathematics Support Programme (FMSP)
- The Advanced Mathematics Support Programme (AMSP), from 1 May 2018

The NCETM aims to ensure that all teachers of maths have easy access to high quality continuing professional development. MEI works with Tribal Education to manage the NCETM, and plays a key role in the NCETM's leadership. Charlie Stripp, MEI's Chief Executive, is also the Director of the NCETM; other MEI colleagues provide strategic and operational leadership for NCETM's secondary, primary and system leadership work.

The Maths Hubs programme is a school-led initiative, coordinated at a national level by the NCETM. It brings together maths education professionals in a collaborative network of 35 Hubs to develop and spread excellent practice. As well as providing leadership for the Maths Hubs programme, MEI staff have supported the programme by contributing to national projects and local strategic boards, and delivering workshops and professional development courses.

The FMSP was funded to support schools and colleges in improving participation in, and teaching of, AS and A level Mathematics and Further Mathematics. It also provided Further Mathematics tuition for students when their schools and colleges could not provide it themselves. The FMSP was developed by MEI and has been managed by MEI since its inception in 2005[2]. Some residual support was provided by the FMSP until September 2018, with many of the teacher and student support services transferring to the Advanced Mathematics Support Programme (AMSP) from May 2018.

Advanced Mathematics Support Programme

Several of the recommendations of the report of Professor Sir Adrian Smith's review of post-16 maths education[3] have now been implemented and are starting to take effect. Notably, these include the continuation of national support for Core Maths, and for AS/A level Mathematics and Further Mathematics. This support will be delivered by the AMSP, which is the successor to the FMSP and the legacy Core Maths Support Programme.

We were delighted that following a competitive tendering process the contract to manage the AMSP was awarded to MEI, working with support from Tribal Education. The programme commenced on 1 May 2018 and will initially run over two years. As well as providing national support for all state-funded schools and colleges in England for Core Maths and for AS/A level Mathematics and Further Mathematics, the programme will have a strong focus on developing teachers' skills and improving progression in schools and colleges in the twelve DfE Opportunity Areas[4], and in other areas where progression rates to advanced maths education are low.

Advanced Maths Premium

In November 2017, the government announced a new funding premium to stimulate growth in participation in the advanced maths

Above: Kevin Lord, AMSP Programme Leader, Charlie Stripp, MEI Chief Executive and Stella Dudzic, Curriculum Programme Leader, delivered a plenary session launching the new Advanced Mathematics Support Programme live streamed from the MEI Conference 2018.

[2] The FMSP was then known as the *Further Mathematics Network*.

[3] Smith, A. (2017). *Report of Professor Sir Adrian Smith's review of post-16 mathematics.* Department for Education.

[4] The twelve DfE Opportunity Areas were selected from areas identified by the Social Mobility Commission as having particularly poor social mobility.

The Teaching for Mastery approach for maths continued to be widely disseminated to primary and secondary schools in England through the work of the NCETM and the Maths Hubs.

qualifications[5], which include Core Maths, and AS/A level Mathematics and Further Mathematics. Commencing in 2018–19, schools and colleges will be able to claim an extra £600 per year for each additional student, above a baseline, studying an eligible qualification. A student studying AS/A level Mathematics and Further Mathematics will be counted twice in the same year.

Maths teaching for mastery

The Teaching for Mastery approach for maths continued to be widely disseminated to primary and secondary schools in England through the work of the NCETM and the Maths Hubs. The approach is based on the way maths is currently taught in the Far East, particularly in Shanghai. It is centred on whole-class teaching, with an emphasis on developing deep learning, connecting mathematical ideas, and employing careful questioning and discussion. The approach is underpinned by the belief that by engaging positively with maths, all children can develop their understanding. This strongly echoes MEI's philosophy of how maths should be taught. Over the past year this approach has gained considerable traction in primary schools, and enhanced government funding means that it can now be disseminated into secondary schools at Key Stage 3.

GCSE Mathematics curriculum change

The second cohort of students to take the new GCSE Mathematics qualifications, graded from 9 to 1 rather than A* to G, sat their examinations in the summer of 2018. The UK 2018 summer results[6] for the new GCSE Mathematics qualifications showed very similar proportions of candidates aged 16 achieving grade 4 and above (70.9%) as achieved grade 4 or above in 2017 (70.7%). The structure of the examination papers meant that grade boundaries for grades 4 and 7 on the higher tier (~20% and ~55% respectively), and grade 4 on the Foundation tier (~55%) remain very low. We are concerned that this has the potential to reinforce negative views of maths and discourage students from choosing maths post-16. We believe the situation should be carefully monitored to try to establish the impact of the paper structure on post-16 maths uptake. Amending the examination tiering system could resolve this without compromising standards. We have argued this before and will continue to do so.

Post-16 level 2 maths

Students aged 16–18 who have not achieved a grade 4 or higher in GCSE Mathematics are required to continue to study maths, working towards achieving at least that level of mathematical knowledge. Those who achieved grade 3 in GCSE Mathematics at the end of Key Stage 4 are required to resit it.

The number of candidates aged 17 and over resitting GCSE Mathematics in the UK decreased from 179,945 in the summer of 2017 to 172,291 in the summer of 2018, while the level 2 pass rate for those resitting fell from 26.5% to 23.7%[6].

Above: Teachers exploring the use of reasoning in the Key Stage 3 and 4 classroom.

[5] Level 3 maths qualifications for students with a good pass at GCSE (grade 4 or above).

[6] Source: JCQ (2018).

The potential annual cohort for Core Maths is over 250,000 students, and a key aim of the AMSP is to encourage many more schools and colleges to offer these qualifications.

There is a widespread view amongst practitioners and providers that there is a need to review the government's GCSE Mathematics resit policy. MEI continued to advocate[7] that a new 'mature' GCSE Mathematics qualification is required to meet the needs of this group of young people—one that focuses on those aspects of GCSE Mathematics most relevant to their current and future needs.

Meanwhile, the review of Functional Skills Mathematics qualifications continued. These qualifications are often taken by students who achieved grade 2 or lower in GCSE Mathematics at the end of Key Stage 4. The introduction of the revised qualifications is scheduled for 2019.

GCSE Statistics

GCSE Statistics focuses on how statistics are used in real life and is a particularly useful preparation for students taking A levels in subjects, such as Psychology, that involve handling data and interpreting statistics. First teaching of the AQA and Edexcel reformed GCSE Statistics specifications commenced in September 2017.

Core Maths

Core Maths qualifications were first assessed in 2016. These level 3 qualifications are intended for students who have achieved grade 4, or higher, in GCSE Mathematics, but who are not taking AS or A level Mathematics. Studying Core Maths enables the development of the skills students need to apply mathematical understanding to the problems they will encounter in their other courses, further study, and future life and employment. Two of the six Core Maths qualifications available—the *Level 3 certificate in Quantitative Reasoning (MEI)*, and the *Level 3 certificate in Quantitative Problem Solving (MEI)*—were developed by MEI and are administered by the OCR awarding body.

The number of students taking Core Maths in the UK increased by over a quarter from 5376[8] in 2017 to 6849 in 2018[9]. However, the potential annual cohort for Core Maths is over 250,000[10] students, and a key aim of the AMSP is to encourage many more schools and colleges to offer these qualifications, leading to a strong rise in entries. The growing participation in Core Maths does, however, present a staffing challenge at a time when there is a serious shortage of specialist maths teachers[10,11]. The AMSP will work to address this shortfall by providing professional development courses and teaching and learning materials designed so that more teachers, including non-maths specialists, are equipped to start teaching Core Maths.

Top: Studying Core Maths enables the development of the skills students need to apply mathematical understanding to the problems they will encounter on other courses.

Above: Tom Rainbow, AMSP Core Maths Support and Development Coordinator.

[7] See also: MEI. (2016). *MEI position paper on the 2015 reform of GCSE Mathematics*.

[8] These figures are based on awarding body statistics published on 17 August 2017 and updated with City and Guilds data published on 23 August 2017.

[9] These figures are based on awarding body statistics published on 16 August 2018.

[10] Smith, A. (2017). *Report of Professor Sir Adrian Smith's review of post-16 mathematics.* Department for Education.

[11] Sibieta, L. (2018). *The teacher labour market in England: Shortages, subject expertise and incentives*. Education Policy Institute.

2017–18 was the first year in which the reformed AS and A levels in Mathematics and Further Mathematics were taught.

AS and A level Statistics

First teaching of the reformed versions of these qualifications, which are offered only by the Edexcel awarding body, commenced in September 2017. The first AS examinations took place in 2018 with 254 candidates. The first A level results will be available in the summer of 2019.

AS and A level Mathematics and Further Mathematics

2017–18 was the first year in which the reformed AS and A levels in Mathematics and Further Mathematics were taught. The differences between these and the previous versions are significant and have had a major impact on teaching and learning.

AS qualifications have been decoupled from A levels, and all assessment takes place at the end of the course. There is greater emphasis on problem solving, reasoning and modelling, and a requirement for the use of technology to permeate teaching and learning. The content of AS and A level Mathematics is fully defined at a national level and includes pure maths, mechanics and statistics. For A level Further Mathematics, half the content has been fixed at a national level. The content of the remaining half varies between specifications, with a wide range of options available.

The UK's 2018 A level Mathematics entry numbers[12] were encouraging. Despite an overall reduction of 2.0% in entries for all A levels, A level Mathematics entries rose by 2.5% from 95,244 in 2017 to 97,627. A level Mathematics entries as a proportion of total A level entries rose slightly to 12.0%, and Mathematics continued to have the highest entry of any A level subject. There was also a small improvement in the gender balance, with entries for boys increasing by 2.1%, and entries for girls by 3.1%.

UK entries[12] for A level Further Mathematics were steady at 16,157, compared with 16,172 in 2017, and A level Further Mathematics entries as a proportion of all A level entries remained steady at 2.0%. There was a small shift towards more girls taking the subject, with entries for boys decreasing by 1.3%, and entries for girls increasing by 3.1%.

UK entries[12] for AS Mathematics declined by 49.5% from 160,450 in 2017 to 81,051, and entries for AS Further Mathematics declined by 34.1% from 27,980 in 2017 to 18,426. These figures compare favourably with an overall reduction in entries in England for all AS levels of nearly 60%[13]. The key driver of this decline has been the decoupling of AS levels from A levels, meaning AS results can no longer contribute to A level results. AS Mathematics and AS Further Mathematics entries each decreased at similar rates for boys and girls.

The vast majority of students taking A level Mathematics in summer 2018 took the legacy qualifications in the final year they were available; however, a small number of candidates took the new Mathematics A level. Ofqual worked with awarding bodies to ensure that the small

"I got an A in my AS Level and I am really proud of it. The tutoring was extremely helpful and was done perfectly, so thank you."

[12] Source: JCQ (2018).

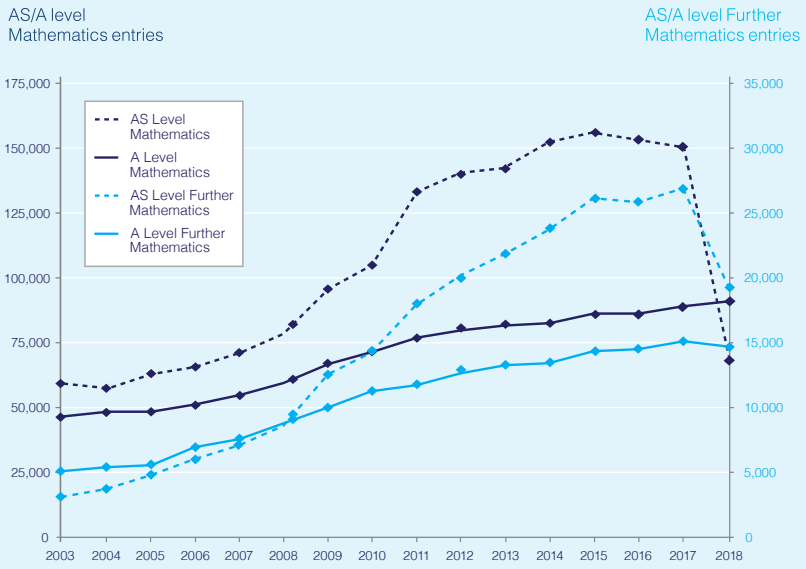
[13] Ofqual. (2018). *Report - summer 2018 exam entries GCSEs Level 1_2 AS and A levels.*

cohort of students taking the reformed maths AS and A levels were not unfairly disadvantaged by being the first to sit the new qualifications; there was also the expectation that, since those taking the A level examinations had been entered at the end of Year 12 and most of these would be planning to study AS/A level Further Mathematics, their results would be skewed towards the top grades.

It was encouraging that there were small improvements in the gender balance for entries to AS and A level Mathematics and Further Mathematics. The AMSP will focus on increasing participation by girls in an effort further to improve this. Currently female students make up just over 39% of A level Mathematics entries, and just over 28% of A level Further Mathematics entries.

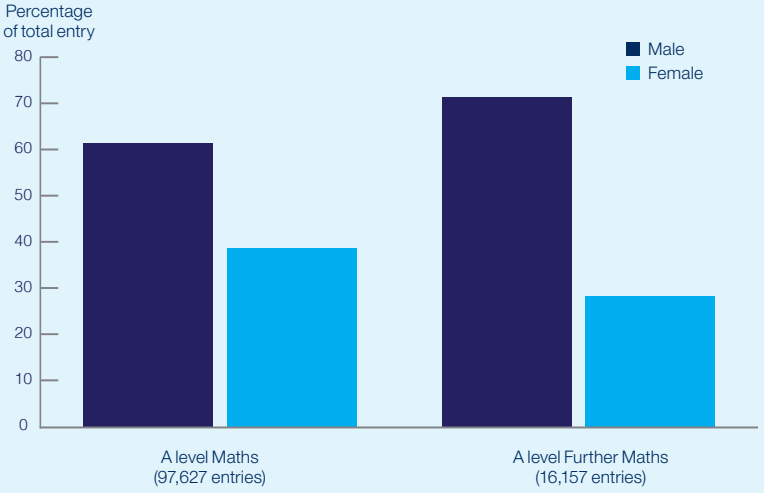
While maths A level entries remain healthy, current funding constraints mean it is difficult for state-funded schools and colleges to offer Core Maths and AS/A level Further Mathematics. Furthermore, many schools and colleges have restricted the number of A level subjects a student may take to three[14,15]. MEI is concerned that tight post-16 education funding, combined with the decoupling of AS and A levels, is already having a negative impact on the numbers of students studying AS and A level Further Mathematics. Further Mathematics is especially at risk as it is usually taken as one of four A level subjects. We hope that the introduction of the Advanced Maths Premium funding will help to alleviate the trend, and we will continue to monitor the situation closely.

AS/A level Mathematics and Further Mathematics entries in England



Source: JCQ

2018 A level Mathematics and Further Mathematics entries by gender



[14] MEI. (2018). *Investigating the impact of curriculum and funding changes on Level 3 mathematics uptake.*

[15] Lee, S and Lord, K. (2017). *Transition into Higher Education: Universities influence on school/college provision for AS/A level Mathematics and Further Mathematics.* IMA and CETL-MSOR 2017: Mathematics Education beyond 16: Pathways and Transitions Conference.

We believe strongly that regular engagement with high quality professional development is essential for sustaining an effective and well-motivated teaching workforce.

Following the decoupling of AS levels from A levels, it is to be expected that students intending to take A levels will not usually be entered for the corresponding AS levels, and that entry numbers will therefore reduce. However, it is important that the maths AS levels are recognised as valuable in their own right. Significant numbers of students who do not intend to complete the maths A levels would benefit from choosing to take the maths AS levels and should therefore have the opportunity to do so. We hope that the Advanced Maths Premium will also encourage all schools and colleges to continue to offer AS Mathematics and AS Further Mathematics.

Teacher shortages

The national shortage of well-qualified teachers of maths at all levels continued to be a major concern. In 2018, the government's training target for secondary maths teachers was missed by 21%; only 46% of secondary maths teachers held a relevant degree; and only 50% remained in state-funded schools five years after starting[16]. The need for teachers of maths is increasing, with student numbers rising and more maths being studied post-16 at all levels. The government has implemented new schemes to attract more people to teach maths. While MEI supports these and other recruitment initiatives, the retention of teachers is paramount. We believe strongly that regular engagement with high quality professional development is essential for sustaining an effective and well-motivated teaching workforce. MEI's work through the NCETM and the AMSP helps to ensure such professional development is available. However, it is crucial that teachers are granted time out of the classroom to participate in such opportunities, to reflect on their practice, and to share ideas and collaborate with others. MEI will continue to develop its work in this area, including through the use of online technology, to help maths teachers access professional development.

[16] Sibieta, L. (2018). *The teacher labour market in England: Shortages, subject expertise and incentives.* Education Policy Institute.

Below: Sue de Pomerai, Deputy Programme Leader of the FMSP, provides help whilst leading a Mechanics session.

Highlights of the year

2017–18 was a significant year for MEI; it included the end of the FMSP, which MEI had managed since 2009, and the start of its replacement, the AMSP.

FMSP

In 2017–18 the FMSP achieved all the success criteria for the key performance indicators set by the DfE. The FMSP produced support plans for each of the twelve government Opportunity Areas and targeted additional resources and support in these areas, liaising with the DfE Opportunity Area delivery teams and Maths Hubs.

The FMSP contract ended on 30 April 2018, and was succeeded by the AMSP.

AMSP

MEI was awarded the DfE contract to deliver the AMSP in May 2018. We have now recruited additional staff and put in place the management structures and arrangements with partner organisations to enable the effective leadership and management of the programme.

The AMSP offers all the support that the FMSP offered for AS/A level Mathematics and Further Mathematics and, very importantly, also provides extensive support for Core Maths, building from the work of the Core Maths Support Programme.

NCETM and Maths Hubs

The impact of the NCETM and the Maths Hubs increased significantly. By the end of 2017–18 over 2700 primary schools had engaged with the NCETM's Teaching for Mastery programme for primary school maths, disseminated through the Maths Hubs. An initial cohort of Secondary Teaching for Mastery Specialists was trained and ready to begin working to embed Teaching for Mastery approaches in secondary schools at Key Stage 3. At post-16 level, the AMSP and Maths Hubs have developed plans to work together to support advanced maths teaching. They will jointly run teacher Work Groups across England to develop teachers of Core Maths, enhance the pedagogical skills of A level Mathematics teachers, and build teachers' skills and confidence in embedding the use of technology into AS/A level Mathematics teaching.

> "A level teachers love the Further Maths Support Programme, and it's clear to see why. It has actively supported us for many years, having a direct impact in our classrooms."

Support for teachers

MEI's support for teachers is extensive. It is effected through MEI's involvement with large-scale programmes, complemented by its own rich and varied programme of professional development. In these ways we support those teaching maths in early years through to post-16, including the advanced mathematical problem-solving skills required for entry to some of the most prestigious STEM degree programmes at leading universities.

MEI's courses address curriculum change, subject knowledge, pedagogical practice, departmental leadership and curriculum enrichment. Our offer includes online sessions, to ensure all teachers can access support, through to in-depth sustained courses with a blend of face-to-face and online sessions.

Following the first teaching of the new maths AS and A levels, which commenced in September 2017, we supported teachers of *all* specifications through the transition as they engaged with the new content and approach. We worked in partnership with other organisations to have greater reach and impact. Casio sponsored the continuation of an extensive programme of professional development and we worked with Hodder Education to complete the development

Top: Professor Sarah Hart wraps up her MEI conference plenary on Escher and Coxeter with a very special hyperbolic tiling.

Above: Charlie Stripp, MEI's Chief Executive, welcomes delegates to the 2018 MEI conference.

MEI introduced the *MEI Staffroom*, an online space where teachers using the OCR(MEI) specifications can access extra resources, support from MEI experts, and interact with a network of experienced teachers.

of a series of textbooks and revision guides to underpin high-quality teaching of the new qualifications. For the first time, digital editions of the textbooks can be linked to *Integral*, providing a valuable new facility for both teachers and students.

MEI also provided specific support for the OCR(MEI) AS/A levels in Mathematics and Further Mathematics. Coinciding with the move to the new maths A levels, MEI introduced the *MEI Staffroom*, an online space where teachers using the OCR(MEI) specifications can access extra resources, support from MEI experts, and interact with a network of experienced teachers. The *MEI Staffroom* is also the gateway for accessing professional development for the OCR(MEI) specifications.

In 2017–18, over 600 teachers participated in MEI's range of extended courses, more than ever before. These courses are designed to help teachers progress into teaching maths at levels they have not previously taught. They include *Teaching GCSE Mathematics* (TGM), *Teaching A Level Mathematics* (TAM), *Teaching Further Mathematics* (TFM), *Teaching Mechanics* (TM) and *Teaching Statistics* (TS). During the year, we added *Teaching Discrete Mathematics* (TD) to the range. Elements of discrete maths form

"Thank you and all the others at MEI for the training that I went through on the TAM and TFM courses which ultimately led to my master's degree. Although it was a long haul, it was certainly well worth the effort."

optional content for all of the new A level Further Mathematics specifications, and there are many teachers who are new to teaching it.

Our ongoing work with Stoke-on-Trent colleges to help improve results for students resitting GCSE Mathematics has been well-received, with teachers reporting that increasing the use of problem-solving activities with students in class has led to greater confidence when tackling exam-style questions.

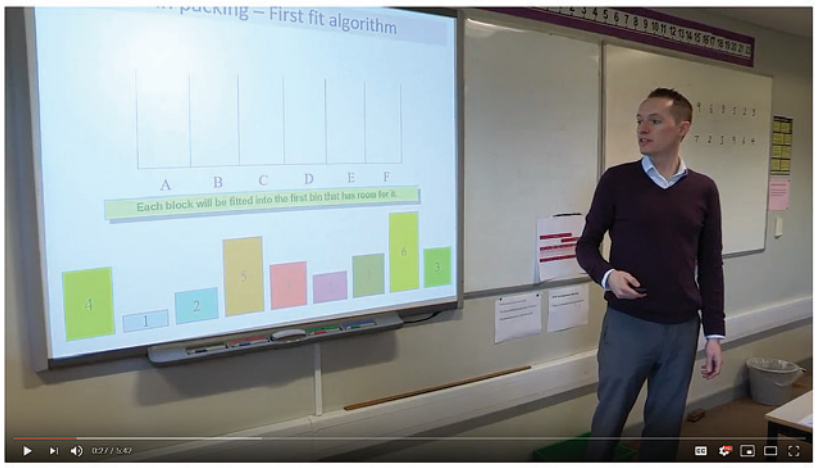
Towards the end of 2017–18 MEI joined an NRICH Key Stage 2–3 project, which focuses

Above: Casio has continued to support MEI's work through sponsorship of our annual conference and a programme of professional development.

Top left: The MEI Staffroom is an online space where teachers using the OCR(MEI) specifications can access extra resources.

Top right: Teaching GCSE Mathematics course–MEI's sustained professional development for teachers new or returning to teaching secondary maths.

Over 60 active teacher networks across England met on average three times per year.



on the development of understanding of multiplicative reasoning from Year 6 to Year 7. The project draws on materials developed by MEI to support an intervention in which Year 10 students mentor Year 7 students.

In June 2018, MEI was awarded a contract with the Northern Ireland Education Authority to provide professional development for teachers under a programme funded by a European Union initiative to support peace and reconciliation. The aim is to bring together pupils from primary and post-primary schools in different communities for shared educational activities and it will involve MEI working in partnership with FunKey Maths, which will supply the Times Table cards around which the professional development is based.

Alongside these activities, the FMSP organised a large number of professional development courses for teachers of A level Mathematics and Further Mathematics, and GCSE Mathematics, ranging from one-day courses to sustained courses, teacher network meetings, and online professional development; over 1200 teachers took part in these courses. Over 60 active teacher networks across England met on average three times per year. The FMSP organised four regional one-day events to support the provision for, and develop the teaching of, Further Mathematics. A total of 165 teachers attended these events.

The FMSP produced three new suites of short videos, exemplifying good practice in teaching aspects of A level Further Mathematics and GCSE Mathematics. The videos focus on discrete maths, further pure maths, and enhancing the learning of GCSE Mathematics. Each set of videos is accompanied by resources and guidance on using them.

In June 2018, the new AMSP ran four Core Maths conferences which were well-attended. They attracted positive feedback, with many teachers volunteering to provide feedback on the Core Maths resources we are developing.

Research

MEI continued its input to a research project, funded by the Education Endowment Foundation and managed by the Association of Employment and Learning Providers, to investigate the impact of the effective use of contextualisation in the teaching and learning of resit GCSE English and Mathematics. The pilot programme of support for six post-16 vocational learning providers, which included professional development, support and resources, concluded in the spring of 2018.

Left: Andy Tharratt, NCETM Assistant Director for Level 3 Maths (AMSP), leading a post-16 planning forum for Maths Hubs Level 3 Leads.

Above: FMSP PD Video, featuring AMSP National Coordinator Toby Rome demonstrating the use of practical activities in teaching Discrete Maths.

"The course really suited my learning style and fitted in well with my teaching commitments. I really enjoyed all of the sessions - I'm still using many of the ideas in my lessons!"

In December 2017, MEI conducted a major survey of schools and colleges in England to investigate the impact of curriculum and funding changes on the uptake of advanced maths qualifications. Over 500 responses were received. MEI published a report[17] summarising the results in March 2018. The key findings provided a useful early indication of trends. It suggested that for the Year 12 cohorts of 2016–17 and 2017–18:

- AS/A level Mathematics uptake had reduced in about half of the centres
- AS/A level Further Mathematics uptake had remained stable
- Core Maths uptake had increased

The results of the survey also suggested that, following changes to funding and the reform of GCSEs and AS/A levels, some schools with sixth forms and colleges had changed their policies:

- some institutions increased the GCSE Mathematics grade they required for entry to AS/A level courses in Mathematics and Further Mathematics
- nearly half of institutions offered Year 12 students on A level programmes the opportunity to study only 3 A level subjects
- AS levels were not generally offered in about half of the institutions

MEI remains concerned that over the next few years these actions could have a detrimental impact on the uptake of the advanced maths qualifications. The work of the AMSP and the introduction of the Advanced Maths Premium have the potential to address these concerns, but we must remain vigilant as there is a danger that the excellent gains in participation in AS/A level Mathematics and Further Mathematics since 2003, and the future success of Core Maths, could be put at risk.

[17] MEI. (2018). *Investigating the impact of curriculum and funding changes on Level 3 mathematics uptake.*

> "Fantastic conference – a really enjoyable experience. Opened our eyes to Core Maths and rejuvenated my enthusiasm for teaching."

MEI's annual conference

MEI's annual three-day conference for teachers of maths was held at Keele University in June 2018. Over 240 delegates joined in an extensive programme of stimulating sessions and plenaries, social activities, a large exhibition, and many other opportunities to share ideas and be inspired. The feedback from delegates indicated they had found the experience highly valuable.

Student support

The majority of MEI's direct engagement with students in 2017–2018 was arranged through the FMSP. Tuition support was provided to 209 students of AS and A level Further Mathematics, much of it delivered online.

The FMSP also produced over 1000 short video lectures to support the teaching of Further Mathematics. These videos covered all the topics for at least one route through all four Further Mathematics specifications for AS and A level. The videos were freely accessible to schools and colleges registered with the FMSP, and will be freely accessible to those that register with the AMSP.

An important aspect of the FMSP's work has been to improve Key Stage 4 students' experience and confidence in maths so that more of them choose to continue to study it post-16. During the year, the FMSP continued to provide enrichment and extension activities together with information and advice about further study and careers. This included a range of enrichment events attended by over 11,000

Top: Drawing graphs on balloons at the MEI Conference 2018.

Above: Headline sponsor Casio UK's Head of Marketing, Tim Gould, welcomes delegates to the Conference Dinner.

This new version of *Integral*, which also includes a new user interface and new interactive resources, proved popular with teachers and students.

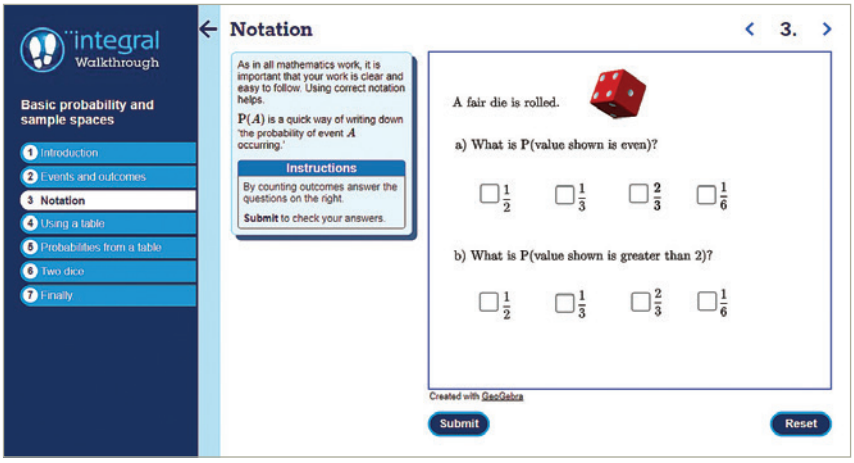
students. Further to engage students during this key period of their education, for several years the FMSP has organised *Year 10 Maths Feast* events; in 2018 the FMSP organised over 90 events, with almost 1000 teams of four students participating.

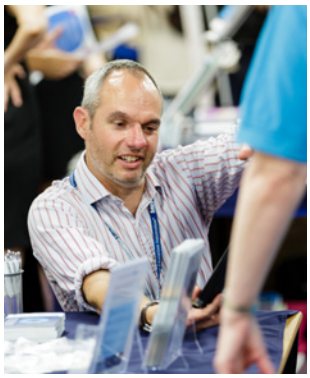
The FMSP also continued to provide enrichment activities for maths A level students. These included the *Senior Team Maths Challenge* (STMC) competition, organised in collaboration with the United Kingdom Mathematics Trust. Over 1300 teams of four 16–19 students participated, which is the largest entry for the competition to date.

Demand remained high for regular support for the STEP, AEA, MAT and TMUA[18] examinations, required by several leading universities. MEI continued to provide online courses and resources to support Year 13 students preparing for them. In addition, the FMSP provided regular problem-solving support and help with preparation for university maths entrance tests to over 700 students at local classes. In the summer term, the AMSP delivered the *Problem Solving Matters* programme for Year 12 students intending to take the MAT and/or TMUA. Over 300 students participated in this programme in 2018. In addition, in 2017–18, over 1000 students in Year 12 or 13 attended FMSP enrichment events to raise their awareness of the requirements of STEP, AEA, MAT and TMUA examinations and receive information about progression to university. These courses and events help to ensure that all students can access the expert support they need to gain places on the most prestigious STEM degree programmes.

Resources

Over the last few years, MEI has invested considerable effort in the revision of *Integral* for the 2017 maths A levels. By the end of the academic year, the majority of the content had been completed. The remaining topics, which are for the second year of the A level Further Mathematics course, will be completed early in 2018–19. This new version of *Integral*, which also includes a new user interface and new interactive resources, proved popular with teachers and students and the number of school/college A level subscriptions grew by more than a third.





Top: An example of an Integral 'Walkthrough'.

Above: Richard Lissaman, MEI's Online Resources Coordinator.

> "I think Integral is the best value-for-money A level resource by far"

We continued to work closely with Hodder Education on the joint development of a series of Hodder Education textbooks, versioned for each specification of the 2017 maths A levels. By the end of the academic year, the series had been completed, and all of the textbooks will have been published by the end of September 2018. Digital editions can be linked to *Integral*, providing valuable additional facilities for users. Jointly developed AS Mathematics revision guides were also published during the year,

[18] The STEP (Sixth Term Examination Paper), MAT (Mathematics Admissions Test), and TMUA (Test of Mathematics for University Admission) are admission tests; the AEA (Advanced Extension Award) in Mathematics is a qualification.

With the award of the AMSP contract in May 2018, we commenced work on the development of an online teaching and learning platform for Core Maths.

Left: OCR's Mathematics Subject Specialist Neil Ogden discusses the OCR(MEI) A level specification with a maths teacher.

Right: One of MEI's many topical Tweets, which provided maths in context to our 15,000 followers.

and A level Mathematics revision guides will be published early in 2018–19.

In addition, we developed a Cambridge International version of *Integral*. This links with digital versions of Hodder Education's textbooks for the Cambridge International maths AS and A level syllabuses, and will be available for subscription in 2018–19.

In partnership with OCR, we developed online resources, versioned to support each of the OCR (MEI) AS and A level specifications. They are due to be completed early in 2018–19 and will be hosted on the OCR website and available free of charge to schools and colleges that teach these specifications.

With the award of the AMSP contract in May 2018, we commenced work on the development of an online teaching and learning platform for Core Maths. This will host free resources supporting 130 learning hours for students. It will be trialled in 30 schools/colleges before its release later in 2018–19.

Communication

Throughout the year, we continued to build engagement in MEI's offer to teachers through social media. The number of MEI Twitter followers increased by 24% and the number of MEI Facebook likes increased by 8%. There were more than 3400 subscribers to the FMSP Revision Videos YouTube channel with more than 750,000 views, and over 900 subscribers to the MEI YouTube Channel with more than 175,000 views.

MEI continued to monitor and evaluate its activities, and to disseminate information about them to academic audiences. We made several contributions to academic conferences

Left: Tom Button, MEI's Mathematics Technology Specialist, was one of the session leaders at the British Congress of Mathematics Education (BCME) conference.

Below: Alison Hopper (right), MEI's Primary Mathematics Specialist, has contributed to academic conferences and publications on developing continuity in maths across Years 5 to 8.

and associated publications, including the delivery of ten sessions at the British Congress of Mathematics Education conference, which is held every four years. Several articles were published in a variety of academic media, including proceedings of national conferences, professional bodies' membership publications and in professional journals.

Financial review

MEI Statement of Financial Activities for the Year Ended 31 March 2018
(Incorporating an Income and Expenditure Account)

Extract from audited accounts

	Unrestricted funds £	Restricted funds £	Total funds 2018 £	Total funds 2017 £
INCOME FROM:				
Donations and legacies	68,139	–	**68,139**	69,232
Other trading activities	387,215	–	**387,215**	307,338
Investments	192	–	**192**	1,418
Charitable activities				
Curriculum and Resources	107,221	–	**107,221**	144,796
Teacher Support	508,133	276,792	**784,925**	702,328
Business Development and Communication	–	–	**–**	–
Further Mathematics Support Programme	–	5,090,269	**5,090,269**	5,264,060
Total income	1,070,900	5,367,061	**6,437,961**	**6,489,172**
EXPENDITURE ON:				
Raising funds	35,713	–	**35,713**	56.106
Charitable activities				
Curriculum and Resources	529,572	–	**529,572**	518,324
Teacher Support	349,995	276,792	**626,787**	596,727
Business Development and Communications	72,539	–	**72,539**	82,539
Further Mathematics Support Programme	–	5,102,924	**5,102,924**	5,238,929
Total expenditure	987,819	5,379,716	**6,367,535**	6,492,625
NET INCOME/(EXPENDITURE)	83,081	(12,655)	**70,426**	(3,453)
Gross transfers between funds	6,476	(6,476)	**–**	–
Net movement in funds	89,557	(19,131)	**70,426**	(3,453)
RECONCILIATION OF FUNDS				
Total funds brought forward	929,546	355,721	**1,285,267**	1,288,720
TOTAL FUNDS CARRIED FORWARD	1,019,103	336,590	**1,355,693**	1,285,267

In 2017–18 a surplus of £70,426 was recorded compared to a deficit of £3,453 in the previous year. Total income was marginally down at £6,437,961 (2016–17 £6,489,172) and total expenditure was down at £6,367,535 (2016–17 £6,492,625).

2017–18's improved financial performance reflects:

- a significant increase in revenue from MEI's online teaching and learning platform, *Integral*, as a result of investment in resources to meet the new maths A level specifications
- continued effective management of costs
- MEI's ability to generate new income streams

The income and expenditure account continued to be dominated by the FMSP which accounted for 79% of total income and 80% of total expenditure.

The Balance Sheet remained in very good shape. Total Reserves at 2017–18 year end were a healthy £1,355,693 (2016–17 £1,285,267). Unrestricted reserves (those reserves that may be applied at the discretion of trustees to further MEI's charitable objectives) were £1,019,103. Restricted reserves (those reserves that can only be applied for specific purposes) were £336,590 and relate exclusively to the FMSP. The level of reserves is consistent with MEI's Reserves Policy. Cash flow remains a key focus and was well managed throughout the 2017–18 financial year.

MEI's governance framework remains robust and effective, with sound internal controls. ISO 9001 and ISO 14001 certifications were maintained.

This financial statement is only a summary of the information in the charity's full financial statements (on which the auditors gave an unqualified report).

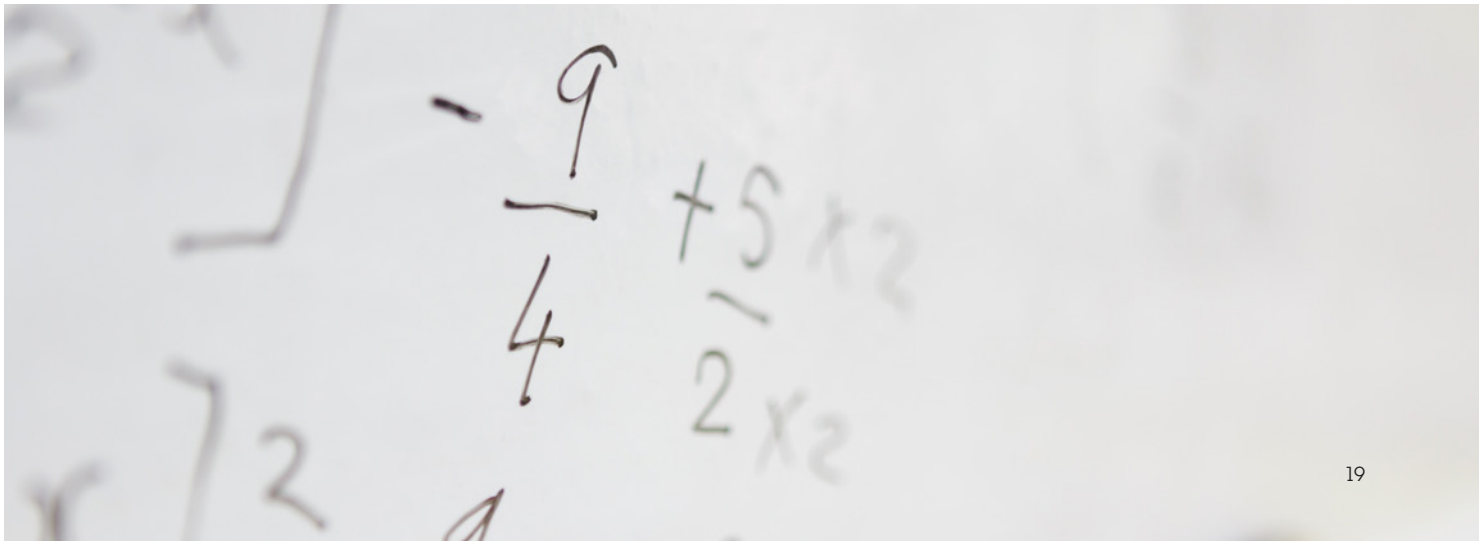
The full statutory financial statements, including the trustees' report and the unqualified auditors' report, can be obtained from:

MEI
Monckton House Epsom Centre
White Horse Business Park Trowbridge
Wiltshire BA14 0XG

The full financial statements were approved by the Board of Trustees on 29 June 2018 and have been submitted to the Charity Commission.

Malcolm S. Grubb.

Malcolm Grubb
Finance Director, MEI



Looking ahead

MEI's top priority in 2018–19 will be the successful implemention of the new AMSP. With our track record, we are confident we have the necessary expertise and partnerships to meet this significant challenge.

Our longer-term vision is to move towards the situation where all students choose to study maths to the age of 18. In addition to providing direct support for all post-16 maths, we will work towards achieving this vision through improving the quality of maths curricula and teaching, and ensuring young people have good experiences in maths pre-16, including in primary education.

Get involved

We welcome your involvement, and there are several ways in which you can keep in touch with us and support our work.

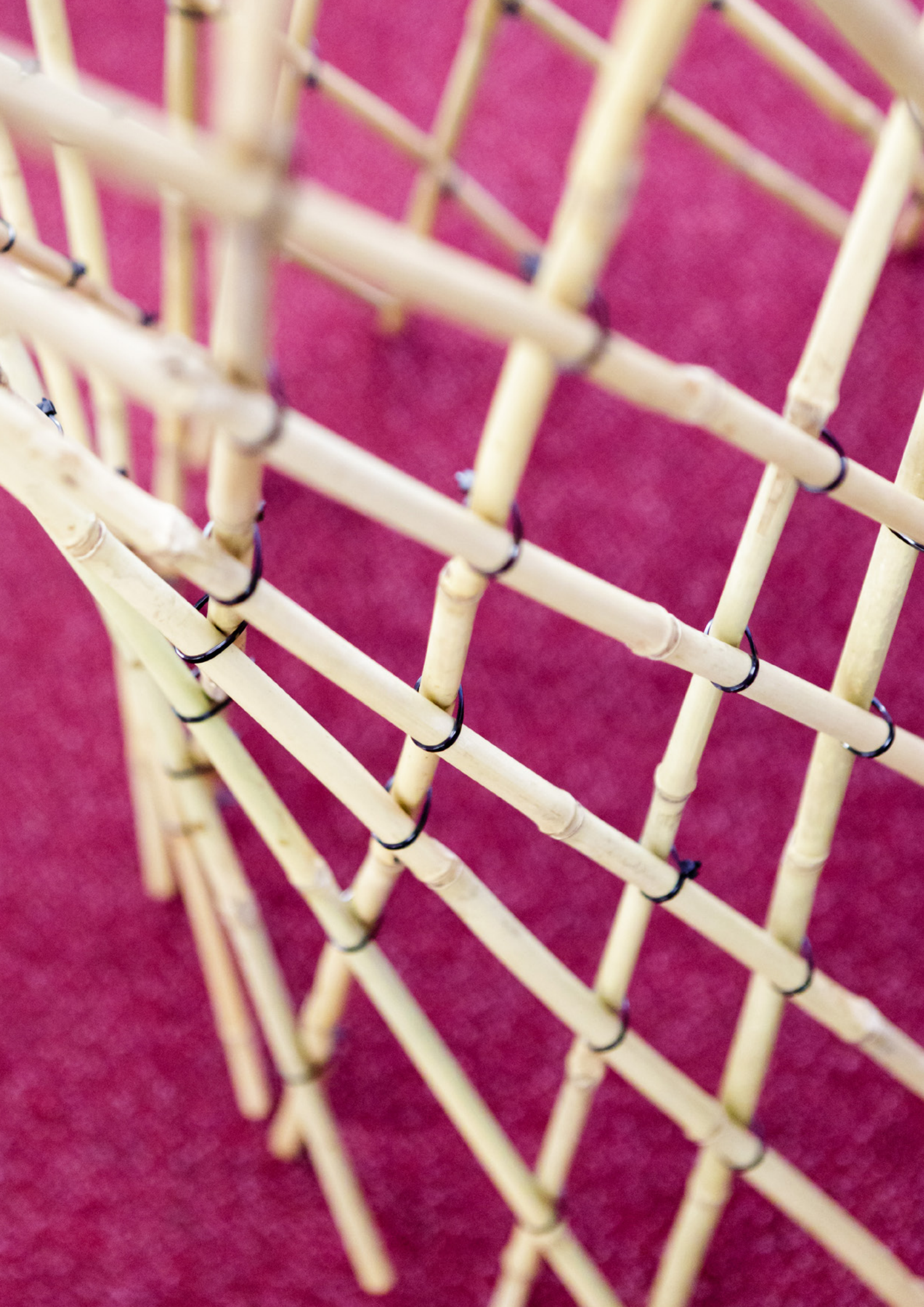
Education providers can register with MEI free of charge as Educational Associates, and receive regular communications, including topical teaching and learning resources. You can also sign up with the AMSP to be kept informed of the programme's new developments, and/or register for free access to teaching and learning resources.

If you are interested in contributing to our work to improve maths education, please consider becoming an individual member of MEI. Benefits include voting rights, regular communications, and discounted fees for our annual conference.

If you are an employer, there are several ways in which you can support us. You could offer a presenter or venue for an AMSP student event, provide an example of how you use maths in your workplace to share with teachers and students, or sponsor our activities. Importantly, you can help young people to make the best decisions for their future employment by simply providing clear messaging about the maths skills you want your employees to have.

You can follow MEI on Twitter and Facebook, and subscribe to our YouTube channels.

To find out more, please visit: *mei.org.uk*



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Charity number: 1058911