MEI newsletter

Mathematics in Education and Industry

Innovators in Mathematics Education

March 2014

From the Chief Executive

- ► Curriculum change: AS/A level Maths and Further Maths
- ► Responses to national consultations
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Curriculum change

AS/A level Mathematics and Further Mathematics

The content of new mathematics A levels, for first teaching from September 2016, is currently being considered by the 'A level Content Advisory Board' (**ALCAB**), funded by the DfE to provide advice to Ofqual. The **ALCAB** subject panel for mathematics is chaired by Professor Richard Craster, Head of the Department of Mathematics at Imperial College, and includes Roger Porkess, my predecessor as MEI's Chief Executive. MEI staff are contributing to this work through regular interactions with the DfE, Ofqual and **ALCAB**.

Proposed content for the new mathematics A levels is likely to be presented for consultation in the autumn and MEI will publish its draft response well in advance of the deadline, so that we can review feedback on our response from teachers before final submission. As ever, it will be vital for individual teachers to submit their responses too.

The structure of the new mathematics A levels will be at least as important as the content. The overall thrust of the A level reforms is to move towards a linear structure, with all of the assessment at the end of the course. This process has already started with the removal of the January examinations.

There also seems to be a move to reduce the status of AS levels. It is planned that marks earned in AS levels will no longer contribute to overall A level marks and that students will no longer be expected to take AS levels as a staging point at the end of year 12, although the option to do so will continue.

The implications of structural changes must be considered very carefully. AS Mathematics and AS Further Mathematics are both very important qualifications in their own right to support future study and employment, and both have seen rapidly growing numbers in recent years.

The mathematics AS levels also fulfil an important psychological role, helping students to take the risk of embarking on demanding A level programmes in Mathematics and Further Mathematics by offering an honourable exit point at the end of year 12.

(Cont. on Page 2)

AS/A level Mathematics and Further Mathematics (*cont. from Page 1*)

It would be very unfortunate if changes to the status of AS levels resulted in reduced uptake of AS/A level Mathematics and Further Mathematics. I believe the status of the mathematics AS levels should be enhanced rather than reduced, and the option of taking AS Further Mathematics over two years, or in year 13 should be strongly promoted, particularly to support students aiming to study STEM subjects at university.

Please contact me and/or **Stella Dudzic** if you would like to share your views on the development of the new mathematics AS/A levels.

For other news about curriculum changes at KS4 and post-16, please see the **February 2014 Monthly Maths**, and the **curriculum change page** on the MEI website.

Responses to national consultations

Since our last newsletter MEI has submitted the following responses to national consultations:

►Ofqual consultation about A level regulatory requirements (January 2014)

►DfE consultation about KS4 English and mathematics (February 2014)

►Ofqual technical consultation about GCSEs in English and mathematics (January 2014)

►DfE informal consultation about characteristics of Core Maths qualifications (March 2014)

All responses are available on the **MEI website**.

MEI Conference, 26 – 28 June 2014

The 2014 MEI conference will take place at Keele University, sponsored by Casio. The conference is a great opportunity to gain new ideas and inspiration for teaching mathematics, as well as catching up with curriculum changes relating to mathematics and helping to inform MEI's policies for supporting and influencing mathematics education.

With around 80 sessions to choose from over the three days, the conference offers something for all teachers of secondary and post-16 mathematics at KS4.

The conference has three plenary sessions:

►Thursday: Professor Paul Hewett, Director of the Institute of Astronomy at Cambridge University

►Friday: Simon Singh, talking about 'Maths and the Simpsons'.

►Saturday: Tom Button and Charlie Stripp, on present and future uses of technology in teaching and learning mathematics.

This year, conference sessions include the following:

►Preparing for the new National Curriculum at KS3 & 4

►Critical Maths

►The pros and cons of using contexts in the teaching of mathematics

►Making Statistics Vital - helpful activities for S1 and S2

►Introducing problem solving into the KS4 classroom

►Making connections between A level Maths and the maths in STEM degrees

►Assessment for Learning with examples from GCSE and A level

►A full day of CPD for those preparing to teach the 'Introduction to Quantitative Methods

Many sessions include the use of technology to enhance the teaching and learning of mathematics.

This is only a small sample of what is available. To find out more, please see the **MEI Conference website**.

Charlie Stripp
Chief Executive

Email Charlie

Senior Team Mathematics Challenge 2013/14

The **FMSP/UKMT Senior Team Mathematics Challenge** regional heats took place during November 2013. Fifty-five heats across the UK were organised by FMSP Area Coordinators and Associates, and by the United Kingdom Mathematics Trust (UKMT), with sponsorship from **Rolls-Royce plc**.

The competition continues grow each year, and this year 1146 schools/colleges each entered a team of 4 students. Of these, around 190 schools/colleges were **entering the competition for the first time**. The **challenges and problems** produced for the STMC provide excellent materials to help schools/colleges to develop their students' mathematical problem solving skills. Past materials are available via the **FMSP** and the **UKMT** websites.

The FMSP supports mathematical problem solving in schools/colleges in a variety of ways, providing resources and problems for **KS4** and **year 12/13** students, organising **enrichment events** and **study support** for students, and delivering **professional development** for teachers.

The National Final of the STMC took place at the Camden Centre in London on 4th February 2014 with 59 teams, all winners from the regional heats, taking part. Hampton School (London) became the overall champions for 2013/14, with Alton College (Hampshire) in second place and Rainham Mark Grammar School (Kent) in third place. The prizes were presented by Dr. Peter Neumann, of Oxford University, who congratulated all the finalists on their outstanding achievements.

In addition to the STMC rounds, the finalists all produced a **mathematical poster** on the topic of *Ruled Surfaces*. In first place for the poster competition was The Grammar School at Leeds, runner-up was Queen Elizabeth's Academy (Crediton) and in third place was Queen Elizabeth's High School (Gainsborough).

Pictured above: The STMC Winners 2013/14 with Sue de Pomerai, Deputy Programme Leader of the FMSP, Dr Peter Neumann, and Karl Hayward-Bradley of the UKMT

Pictured above: The Poster Competition Winners 2013/14 with Sue de Pomerai, Deputy Programme Leader of the FMSP, Dr Peter Neumann, and Karl Hayward-Bradley of the UKMT

Kevin Lord
Central Coordinator (FMSP)

Email Kevin

Teaching Further Mathematics (TFM)

Teaching Further Mathematics (TFM) is an extended course for teachers of A level Mathematics who want to extend their subject knowledge and be better prepared for teaching Further Pure Mathematics. TFM is available as both an MEI certificated professional development course, focusing on subject knowledge and pedagogy, and as a Post Graduate Certificate in Teaching Pre-University Mathematics (one third of a Masters in Education) through the University of Plymouth.

As a result of enhanced funding for the Further Mathematics Support Programme, we are pleased to be able to increase the number of places for teachers on this successful programme of professional development.

Applications for TFM will open later this month.

Visit the **TFM webpage** for more details.

Sharon Tripconey
Central Coordinator (FMSP)

Email Sharon

Teaching Advanced Mathematics (TAM)

Here are just a few of the comments from teachers who recently completed the TAM course:

►*"TAM has developed everything about my teaching. The ideas shared, the confidence I have gained, the resources available to me, have all made me a more rounded teacher as well as someone who the department now looks to for guidance and leadership, particularly at A-Level."*

►*"I feel my teaching, and way I do things in all my classes have developed so much because of this course. I thought your lessons were fantastic and the way we analysed them afterwards really opened my eyes up to different methods used throughout lessons."*

►*"The TAM course has increased my enthusiasm and passion to teach Mathematics. It has also given me the confidence, reassurance and desire to continue to learn and develop within the teaching profession."*

►*"I have been able to inspire other members within the maths department to deliver more active maths lessons at KS5 thus having a positive impact upon the AS results."*

We are excited to announce that, following a recent decision by the DfE to continue to fund the TAM course, we are able to offer an increased number of 200 places on the Masters version of the course for 2014-15. TAM is run by MEI in partnership with universities from around the country and provides sustained, high quality professional development, focused on A level Mathematics subject knowledge and pedagogy.

The course includes the following elements and offers the opportunity to gain 60 Masters level credits, awarded the by host university:

►8 course days hosted at one of 8 different universities

►about 20 live online sessions focussed on subject knowledge enhancement in Core Mathematics

►2 developmental lesson observations conducted by subject specialists

►3 years' access to MEI's 'Integral' online resources

►the opportunity to participate in Applied Mathematics course days and online follow-up sessions

►unlimited email support.

The course costs just £600 but with a £1200 refund upon completion, as well as free Masters level credits; it is clearly excellent value for money! Applications are now open and the application form can be found, along with further information and frequently asked questions, on the **TAM web page**.

Simon Clay
TAM Deputy Coordinator

Email Simon

Professional Development for New & Aspiring Heads of Mathematics

"I really enjoyed meeting other people at the same stage in their career and sharing their experiences and ideas."

"Thank you very much for the very useful day… I am feeling much clearer about where I want to go … in terms of working towards the role of Head of Department … also helped me with other leadership roles that I currently have within the school."

"I am really looking forward to the rest of the course and having time to properly reflect away from school and really focus on what I need to develop in order to achieve my goals both personal and for a future department!"

These are just a few of the comments from participants following the successful launch of the MEI Heads of Mathematics course during Autumn 2013.

A few places are still available for the second cohort beginning in April 2014.

Head of Mathematics: Inspiring teaching, leading improvement and meeting students' needs is a sustained professional development course consisting of three study days spread through 2014 (April, July and October) supported by interim tasks.

During the course, participants will consider a whole range of relevant issues and work together to develop their ability to:

►articulate and embed a vision for teaching and learning mathematics;

►identify and optimise their leadership strengths;

►build, lead and motivate a team;

►ensure high quality teaching and learning;

►improve the student experience of learning mathematics; and

►lead and support the continuing professional development of their team.

Course fees are £500 and the course will be hosted at the NCVO in London. Further details and the online registration form can be found on the **Heads of Mathematics** course web page.

Please do pass this information on to anyone you feel may be interested and encourage them to contact either the **CPD Team** or course leader Debbie Barker if they have any questions.

Debbie Barker
Coordinator for CPD in teaching at Key S3 and KS4

Email Debbie

Simon Clay

Critical Maths: a Level 3 mathematical thinking curriculum

As I trial more of the resources for Critical Maths I am beginning to make some interesting discoveries. When trailing resources in a school or college, I will often demonstrate the approach we are attempting to develop by teaching the first session. One of the main features of Critical Maths is that the students discuss a question, but getting the discussion started is sometimes a challenge, particularly with a class that I don't know. However, I have observed that this task can be made easier if I ask for an opinion.

For example I was recently using a resource which examines the way in which percentages are used and abused when communicating information. On the train journey to the college, I noticed a newspaper with the headline "Why a skinful may give you skin cancer". The story quoted some medical research and stated that "even one drink a day can raise the chance of getting melanoma by 20 per cent". I began the lesson by asking the students think about three questions.

►Do you think the conclusions are true or false?

►Would this worry you now or in the future?

►What would you need to know to make an informed choice?

Most were satisfied that the conclusions were true, as the article stated that the research appeared in the British Journal of Dermatology. There were mixed feeling about how worried they would be. Some students began to question the 20% rise using their perception of the prevalence of skin cancer and the suggested alcohol consumption. Soon afterwards, one student commented that we would need to know "20% of what?" This led quite neatly into the third question.

I was able at this stage to explain and discuss the difference between relative increase and absolute increase. I used the example of buying two lottery tickets rather than one, and asked "by what percentage has your chance of winning the jackpot increased?" After some discussion we agreed 1 in 14 million to 2 in 14 million is a 100% increase. Most students could also see that even with two tickets the chance of winning the jackpot was still extremely slim.

I am finding that using a starting context which the students can relate to, then asking for an opinion before engaging with the mathematical structure of the problem, produces a much more open, interesting and fruitful discussion. In addition, the students often then feel more confident to then go on to tackle questions which require this level of thinking.

If you are interested in trying one of the resources with your students, please do email me.

Terry Dawson
Curriculum Developer

Email Terry

Core Maths

Core Maths qualifications are being developed to increase participation in mathematics post 16. They are intended for students who have succeeded in GCSE Mathematics and who would benefit from doing more mathematics post 16, but need a different approach and content to AS/A level Mathematics.

Funding is available for schools who want to apply to become early adopters of Core Maths from September 2014.

MEI is working on Core Maths qualification development with OCR, building from what we have already learned from our development of the new '**Introduction to Quantitative Methods**' qualification, and our work on the **Critical Maths project**.

Stella Dudzic
Programme Leader (Curriculum)

Email Stella

Strengthening maths skills during 16-19 Study Programme work experience

All students aged 16 to 19, whether following academic or vocational studies or a mixture, are now expected to follow a Study Programme tailored to their needs. Those who have not achieved grade C GCSE English and Mathematics or better are expected to continue to work towards that goal.

A key feature of these programmes is that students spend time on an activity that does not lead to a qualification. This often takes the form of work experience, which can be a great opportunity to practise using the mathematical skills they learned in the classroom in a practical way. It can also help learners to see how relevant maths is to their future working lives.

MEI has produced two guides to support and encourage integration between the maths study and work experience elements of Study Programmes (including Traineeships):

Maths at Work: Integrating work experience and maths provision in 16 to 19 Study Programmes (including Traineeships) is for curriculum planners, teachers, trainers and coordinators involved in planning and delivering the maths and/or work experience elements of 16 to19 Study Programmes.

It provides practical suggestions for ways in which providers can encourage learners and employers to enhance learners' mathematical skills during work experience placements.

It also suggests how maths teaching and learning can be contextualised using examples from the workplace. The guide includes examples of best practice from independent training providers, FE colleges, sixth form colleges and schools that have already established this kind of integration.

Maths at Work: A guide for employers offering work experience as part of 16 to 19 Study Programmes (including Traineeships) is designed for providers to share with employers who offer work experience placements.

It provides background to Study Programmes and the maths that learners may be studying, as well as offering practical suggestions for ways in which employers can help strengthen learners' mathematical skills during a work experience placement.

Both guides are available from the **MEI website**.

Janice Richards
Programme Leader (Industry)

Email Janice

Further Mathematics Support Programme

Following the announcement in December 2013 that the Department for Education is to provide substantially enhanced funding to MEI to continue and extend the work of the FMSP, working with the National Centre for Excellence in Teaching Mathematics and the Institute of Education, there are several new areas of work for the FMSP that I'd like to highlight.

►Alongside its general promotion of A level Mathematics and Further Mathematics, the FMSP will be working specifically to encourage girls to take up those subjects.

The FMSP's work to enrich students' mathematical experience at KS4 will be particularly relevant to this and this message will influence the design of FMSP mathematics promotion events.

►The FMSP will be working with university departments to promote mathematics across a range of disciplines and also to try to ensure that they continue to encourage the uptake of AS/A level Mathematics and Further Mathematics.

►The FMSP, through the Institute of Education, will develop a 5-day course on A level Mathematics teaching for trainee teachers. This will be piloted during 2014-15 and rolled out during 2015-16 and 2016-17.

The course will enable many more newly-qualified teachers to develop their knowledge of how to teach A level Mathematics before they take up their first teaching post. We hope this will lead to more teachers feeling confident to teach AS/A level Mathematics and Further Mathematics earlier in their careers.

►The FMSP, working with the NCETM, will be looking to play a key role working with and supporting the new **Mathematics Hubs**. These are a new development, coordinated by the NCETM. There will be around 30 Mathematics Hubs, spread around the country.

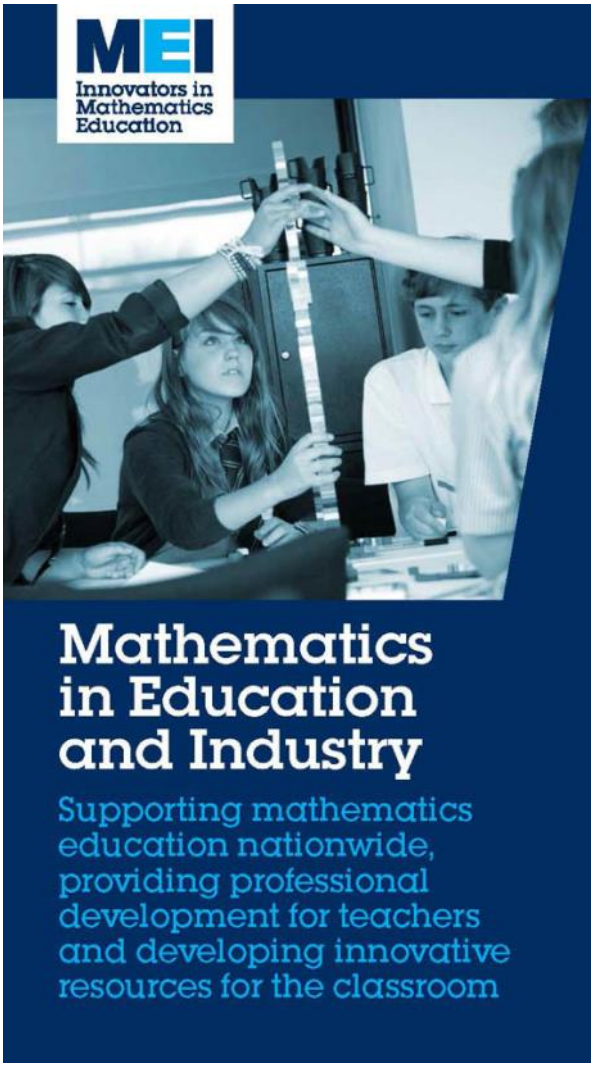
The Hubs will usually be coordinated by a Teaching School Alliance and will work to provide support for raising pupils' attainment in the mathematics across a geographical area, and across the age groups, from primary to post-16.

By working with the Maths Hubs the FMSP aims to ensure that more teachers and students can access FMSP support, that the FMSP can enhance the work of Teaching Schools and other mathematics stakeholders to improve mathematics education locally and nationally, and that the FMSP can make better use of available local expertise to support mathematics.

As ever, please check **furthermaths.org.uk** for more details of all of the activity of the FMSP and to contact the FMSP.

Richard Lissaman
Programme Leader (FMSP)

Email Richard



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Integral mathematics resources:	**integralmaths.org**
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About MEI

Mathematics in Education and Industry (MEI) is a membership organisation and a charity. Since the 1960s, MEI has worked to support mathematics teaching and learning. Any income generated through MEI's work is used to support mathematics education.

MEI emphasises understanding and enjoyment of mathematics and also highlights the importance of mathematics in industry and commerce.

MEI pioneers the development of innovative teaching and learning resources, including extensive online materials to support all major examination syllabuses.

MEI offers teachers of all GCSE and A level specifications a range of continuing professional development (CPD) courses, provides specialist tuition for students and works with industry to enhance mathematical skills in the workplace.

There is a network of MEI branches around the country, offering local support for teachers.

MEI's popular A level specification is administered by OCR, with MEI taking responsibility for the curriculum, and providing course textbooks published by Hodder Education.

MEI manages the government-funded Further Mathematics Support Programme, providing advice and support for teachers of AS/A level Mathematics and Further Mathematics in schools and colleges throughout England.