

MEI Insights 6:

The Further Mathematics Support Programme

by **Kevin Lord and Stephen Lee**

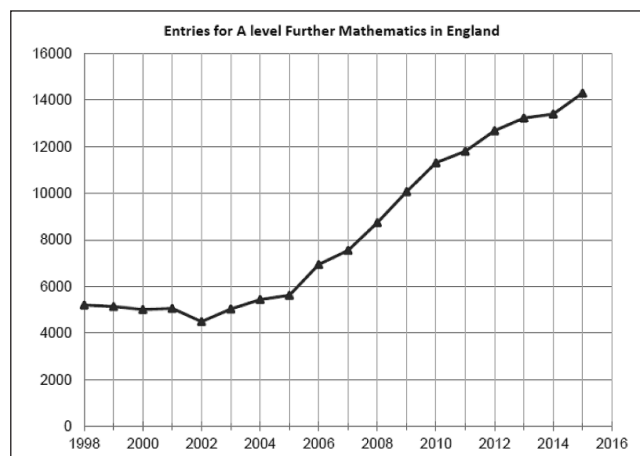
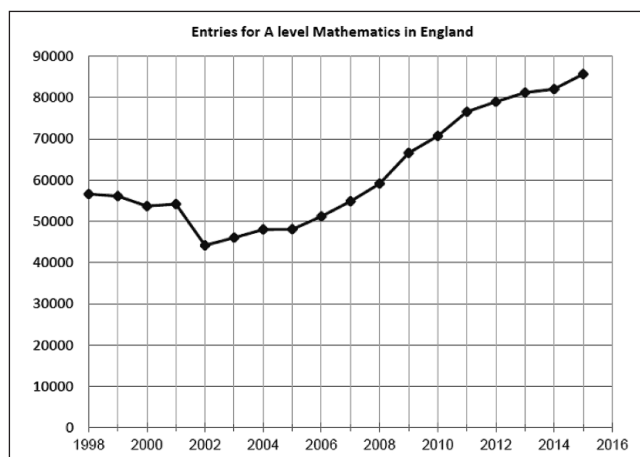
Introduction

Mathematics in Education and Industry (MEI) is an independent charity, committed to improving mathematics education. Over the last decade the organization has tripled its staff numbers to its present size of about 50 employees – this is primarily down to the creation, development and expansion of the activities delivered through the Further Mathematics Support Programme (FMSP). This, the sixth article in the MEI Insights series, will consider the work of the FMSP and how it is in a position to support teachers and schools during a period of considerable curriculum development.

Background

Following the Curriculum 2000 changes to A levels the number of students taking A level Mathematics and Further Mathematics dropped dramatically. Further Mathematics disappeared from the curriculum in the majority of state-funded schools and colleges. Universities were forced to make changes to their entry requirements and adapt their first year courses to accept students with only A level Mathematics qualifications.

In 2000 MEI received funding from the Gatsby Charitable Foundation to set up a distance learning/learning support project, which was known as Enabling Access to Further Mathematics. The aim was to provide access to Further Mathematics tuition to any student who would benefit from this, through a collaboration of schools, colleges and universities, and by making use of new technology. During this successful pilot project the Integral online resources for teaching A level Mathematics and Further Mathematics were developed. MEI pioneered the use of online tuition for A level students, using the Integral resources, providing expert tuition to isolated students who would otherwise have been unable to take Further Mathematics. From 2005 the Department for Education provided funding to MEI to manage the Further Mathematics Network, which became the Further Mathematics Support Programme in 2009.



The number of students taking A level Further Mathematics has almost trebled since the programme was rolled out nationally in 2005. The number taking AS Further Mathematics has risen even more sharply. These increases have predominantly come from the state-educated sector, see Lord and Stripp (2015). In 2004–5 less than 40% of the state-funded A level Mathematics providers in England had students taking A level Further Mathematics. In 2014–15 this proportion had grown to over 66%.

Aims of the FMSP

The remit of the FMSP has widened since its inception. Whilst increasing access to Further Mathematics

tuition remains at the core of the FMSP, the aims are now to:

- Increase participation in AS/A level Mathematics and Further Mathematics, particularly that of girls;
- Increase capacity within schools and colleges to provide high quality mathematics teaching;
- Increase demand from students to study AS/A level Mathematics and Further Mathematics post-16;
- Support improvements in level 3 mathematics education.

The FMSP works to achieve these through supporting students, promoting the study of mathematics, supporting teachers, providing professional development, providing teaching and enrichment resources and liaising with Higher Education and working with other organizations involved in level 3 mathematics education.

The FMSP continues to develop its support programmes to meet the changing needs of students and schools.

Promoting Interest and Creating Demand

The FMSP promotes interest and enjoyment in doing mathematics to thousands of secondary schools students each year. At one-day enrichment events the FMSP provides information about the continued study of mathematics after GCSE alongside engaging activities and talks illustrating the power, usefulness and beauty of mathematics. In 2015–16 over 12 000 students will have attended one of these events. In addition the FMSP organizes two major team competitions, the Senior Team Maths Challenge (www.furthermaths.org.uk/stmchallenge), which is run in partnership with the UKMT, and the Year 10 Maths Feasts (www.furthermaths.org.uk/maths-feast). Together these competitions provide an enriching activity for almost 10 000 14–19-year-olds. The competitions generate lots of really interesting problem-solving materials that schools can use to enhance the learning of students.

Enrichment activities are only part of the solution and the FMSP also provides CPD for KS4 teachers to improve the student experience at GCSE in order to encourage more to consider taking mathematics at A level.

A level Mathematics and Further Mathematics continue to increase in popularity. In both 2014 and 2015 Mathematics was the most popular A level subject. However, whilst it is the number 1 subject taken by boys, it is not as popular with girls, being the 4th most popular. There is still much to be done to persuade young people, especially girls, of the importance of continuing with their studies in mathematics and convince them that the subject is interesting, accessible and useful. The FMSP is liaising with Higher Education departments to inform them of the increased numbers of students taking A level

Mathematics and Further Mathematics. The aim is to get departments to be more explicit about the mathematical requirements of their degree courses and to further encourage uptake at A level by indicating to prospective students the mathematical preparation that is needed to make a smooth transition. Data from UCAS shows that an increasing number of undergraduates on STEM degrees have studied A level Further Mathematics (see Baldwin and Lee, 2014).

Over the last two years the UCL Institute of Education has carried out research for the FMSP into factors affecting girls' choices of A levels. Prior attainment at GCSE is the most important factor. Case studies of schools and colleges with above-average female participation have also highlighted the importance of building confidence and raising girls' self-concept through support from teachers and introducing girls to more challenging mathematics in Key Stage 4. Full details of the report and additional information in this area can be seen on the FMSP website: www.furthermaths.org.uk/encouraging-girls-maths.

Flexible Approaches to Support for Students

The FMSP is able to provide students with tuition in schools/colleges that are unable to offer Further Mathematics. Originally much of this was face-to-face tuition with FMSP tutors visiting schools/colleges. However, as many more centres are able to provide support for Further Mathematics in-house, the FMSP tuition is delivered increasingly via online classrooms. Individual students from different centres across England are combined into small online groups, which provide a more engaging experience than studying alone.

With the advancement of technology the FMSP has developed the way it supports students. In 2011 the FMSP began offering live interactive lectures for a range of A level modules to support schools in the teaching of content. These lecture courses with the associated support materials provide a means by which schools can continue to offer students a good quality Further Mathematics course but on reduced contact time. Since their launch the range and popularity of the 'lectures' has grown. The online tuition and lectures are inexpensive and through these any student wishing to take Further Mathematics now has the opportunity to do so wherever they go to school or college in England.

Developing Teaching Capacity

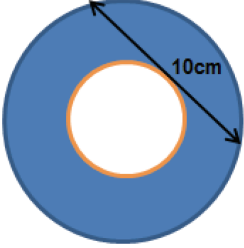
For over 10 years the FMSP has provided high quality professional development for teachers. Each year the FMSP provides the equivalent of over 5000 days of CPD. Predominantly this is enhancing subject knowledge of A level topics and developing pedagogy so that A level is taught in an engaging way, developing understanding.

The FMSP has pioneered innovative and flexible approaches to delivering CPD including online courses and blended learning. The year-long Teaching Advanced Mathematics (TAM) course features a mixture of study-days, school visits and observations, online tutorials and discussions and the opportunity to acquire masters accreditation. The aim of this course is to increase confidence in A level Mathematics content for teachers who have not taught A level before.

The FMSP has also created resources to help teachers develop and practise mathematical problem-solving skills: www.furthermaths.org.uk/prob_solv_materials.

Problem 16

Can you work out the shaded area in the diagram?



The diagram shows a blue annulus (a ring shape) with an outer radius of 10 cm. The inner radius is not specified, but the shaded area is the region between the two concentric circles.

Many of the FMSP CPD courses focus on problem-solving skills development at Key Stage 4 and A level, including the higher-level problem-solving skills necessary to tackle problems in STEP, AEA and the MAT examinations. All of these resources and CPD courses aim to support teachers with the new requirements in GCSE Mathematics and the new A levels.

Access to Higher Education

In the last two years the FMSP has begun providing information and guidance for students and teachers on the mathematical requirements of a range of undergraduate degrees. The FMSP website (www.furthermaths.org.uk/universities) has resources illustrating the mathematics that students are likely to encounter in the first year of different degree courses, as well as information about the likely entry requirements. The aim is to ensure that students are adequately prepared for the transition to degree study.

The FMSP has also established regular support in a number of areas for students from state-funded institutions who are preparing for STEP, AEA and the MAT examinations. These additional qualifications are required for entry to study mathematics at some prestigious universities and this can be an obstacle for students whose schools/colleges are not able to support them. In the longer term the FMSP's programme of CPD focusing on higher-level problem-solving should mean that many more teachers will have the confidence to support their students with preparation for STEP, AEA and the MAT.

The New A levels and FMSP Support

Over the next 18 months teachers will be getting ready for teaching the new A level specifications for mathematics. Whilst actual specifications or sample assessment materials are unlikely to be seen until later in the summer term, the FMSP has begun providing information about the changes through its website and through teacher network meetings. These meetings provide an invaluable forum for teachers to discuss the implications of moving to a linear A level, the 100% specified content in A level Mathematics, including statistics and mechanics, and the decoupling of AS level from A level. It is less clear exactly what Further Mathematics will be like, which has 50% specified content, as there is likely to be some choice of topics. As more details about the changes emerge this year the FMSP will be producing resources to support teachers and adapting its CPD provision and support for students, see: www.furthermaths.org.uk/2017.

In Conclusion

The FMSP is a government-funded programme that seeks to support students, teachers and schools with mathematics. Local events and details of the relevant Area Coordinators can be found from the website's regions page (www.furthermaths.org.uk/regions), and the central management team can be seen on the contacts page: www.furthermaths.org.uk/contact.

References

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