

Improving Access for State-School Students

Kevin Lord and Charlie Stripp MBE FIMA, MEI

In a Guardian article [1] in November 2014, Paul Mason described how students from private schools have an advantage over state-educated students when applying for courses at leading universities. We support his conclusion that there should be a system that offers clear and transparent information about the requirements for courses, so that all students, whatever their background or type of school or college, understand what is required to access prestigious undergraduate degree courses.

However, Paul Mason’s article did not mention the good news, particularly in relation to Mathematics, that shows how increasing numbers of state educated students are now able to access the information and support they need to prepare them to study Mathematics and mathematics-related subjects at leading universities.

This short paper gives a more comprehensive background and additional information on projects and activities that are addressing this important issue.

The Further Mathematics Support Programme

For almost 10 years, the Further Mathematics Support Programme (FMSP – www.furthermaths.org.uk), a government-funded project initiated and managed by Mathematics in Education and Industry (MEI – www.mei.org.uk), an educational charity, has worked with state schools and colleges to improve provision for AS/A-level Further Mathematics and promote the study of mathematics to 14–19 year old students.

Growth in entries for A-level Further Mathematics

Paul Mason’s article does not mention that there has been a truly remarkable rise in the number of students taking A-level Further Mathematics over the last ten years.

Entries for Further Mathematics have more than doubled since 2005, with students from state-funded institutions accounting for the large majority of this growth. More students each year now take Further Mathematics than take many other mainstream A-level subjects such as ICT, Computing, PE, Law or any of the Modern Foreign Languages. Further Mathematics has climbed from being the 27th most popular A-level in 2005 to the 17th last year (see www.jcq.org.uk).

	2005	2010	2014	increase (2005–2014)
All entries	5373	10813	14785	175.4%
State-funded	3334	7559	11183	235.6%
Independent	2039	3254	3602	76.9%
Proportion (state)	62.1%	69.9%	75.6%	

Table 1: A-level Further Mathematics entries

Whilst it remains true that a disproportionately high number of A-level Further Mathematics entries come from privately educated students, the situation has improved dramatically and continues to do so.

Table 1 shows entries to A-level Further Mathematics in 2005, 2010 and 2014, including separate figures for state and independent schools. Data from 2014 is provided by the Department for Education (DfE) [2] and is the most recent available. The 2010 data are the first equivalent statistics provided by the DfE. The Further Mathematics Network (the FMSP’s predecessor) was set up by MEI in 2005 and equivalent data for 2005 were provided by the then Department for Children, Schools and Families as a bespoke extract from the National Pupil Database.



It is very clear from Table 1 that the total number of entries to A-level Further Mathematics has increased over the last decade, by over 175%. However, this increase has predominantly come from the state-funded sector, which showed a 236% increase, compared to 77% in the independent sector. The proportion of the A-level Further Mathematics cohort that is from the state-funded sector has increased from 62% in 2005, through to 70% in 2010 and then on to nearly 76% in 2014.

This rise in Further Mathematics entries is all the more impressive considering it is against the background of severe tightening of funding for sixth form courses. In many institutions there might be just one student wishing to take Further Mathematics in order to access his or her chosen degree course. The FMSP works with schools/colleges to find affordable solutions to providing high-quality tuition and support for small classes. The FMSP can help schools and colleges that cannot afford to timetable lessons for small numbers of students, offering online support so that these students can join with students from other schools and colleges in a virtual classroom, taught by an expert online tutor.

Promoting Mathematics and Further Mathematics

Students and teachers in state-funded schools and colleges are really getting the message that Further Mathematics is an extremely useful qualification for degree-level study in subjects like Mathematics, Physics, Computer Science and Engineering. As well as engaging with schools and colleges to support teachers and students with the teaching and learning of Further Mathematics, the FMSP also works with schools and colleges to provide mathematics enrichment and careers talks to promote the study of mathematics beyond GCSE level. Through its website, the FMSP also provides extensive information to teachers and students about the value and importance of studying Further Mathematics and the entry requirements of the increasingly wide range of degree courses that require, or strongly encourage, prospective undergraduates to take Further Mathematics. In the academic year 2013–14, over 7,000 Key Stage 4 students attended FMSP enrichment events and approximately 5,000 teachers participated in FMSP enrichment or professional development activities.

Through the work of the FMSP, and that of outreach programmes from universities and subject associations, teachers and students in the state sector now have better access to information to help them make informed choices of A-level subjects, particularly in relation to subjects requiring mathematics. Many recent reports recommend that universities should send clearer signals about the mathematical preparation required for entry to STEM and non-STEM degree courses. For example, the Higher Education Academy's 2014 'Mathematical Transitions' report [3] states:

'There should be clear signalling to the pre-university sector about the nature and extent of mathematical and statistical knowledge and skills needed in undergraduate degree programmes. As part of this signalling, university tutors should consider recommending the benefits of continuing with mathematical/statistical study beyond the age of 16.'

Mathematical Transitions, HEA, 2014, p.7

The FMSP is acting on these recommendations by liaising with Higher Education departments to discuss ways to help make students properly aware of the mathematics qualifications that HE requires. Guidance and information for teachers and students is continually being added to the FMSP website. However, more could and should be done by universities to ensure that accurate information is available and widely known.

Further Mathematics is not just useful for those getting A and A* grades

Another misconception promoted by Paul Mason's article is that only achieving grade A or A* in Further Mathematics is worthwhile. This is not the case. Studying the additional content covered in Further Mathematics introduces students to new techniques and concepts that help prepare them for further study across a range of STEM disciplines. Learned societies for science and engineering encourage students to take Further Mathematics to help them during the transition to degree courses (see www.furthermaths.org.uk/choose_fm). Familiarity with the additional mathematical concepts is helpful to students, whatever grade they achieve. Furthermore, taking Further Mathematics can have a significant positive impact on A-level Mathematics performance. The A level Information Service (ALIS) has shown that studying Further Mathematics can improve a student's achievement in A-level Mathematics by between a half and one A-level grade [4].

In 2014, despite evidence that shows Further Mathematics is one of the most demanding A-levels [5], 57.3% of A-level Further Mathematics students achieved a grade A or A*, a far greater proportion than other subjects (the average across all subjects is that 26.5% of students achieve A or A* grades) [2]. This is because many schools and colleges only allow students with exceptional mathematical ability to take Further Mathematics. The FMSP encourages state-funded schools and

colleges to promote Further Mathematics AS and A-level to students with a wider range of mathematical ability, so helping many more students to improve their preparation for STEM degree courses at university.

AS Further Mathematics is a very useful course in its own right, and should be promoted to all students wishing to pursue a STEM degree. It introduces students to important mathematical concepts such as complex numbers and matrices, and is being taken by increasingly large numbers of students. The A Level Content Advisory Board Committee for Mathematics (ALCAB), chaired by Professor Richard Craster of Imperial College, in a letter to the DfE [6] stated:

'Particular thought and planning needs to go into maintaining AS and A level further mathematics, the AS being particularly valuable to many students aiming for quantitative degree programmes. Decreases in uptake for AS further mathematics could have unintended consequences in terms of widening participation as the very best universities are exactly the ones requiring further mathematics as an entry requirement for many courses.'

ALCAB, 8 July 2014





Supporting entry to the most prestigious Mathematics degree courses

Additional, highly demanding, mathematics examinations such as the Sixth Term Examination Papers (STEP), the Advanced Extension Award (AEA) and the Mathematics Admissions Test (MAT) are also required for entry to some of the most prestigious university Mathematics degree courses. It used to be the case that state-educated students could not access support to help prepare for these exams. The FMSP works with several top universities to ensure support and tuition is available for prospective undergraduates from state schools and colleges to prepare for these exams, enabling them to access the help they need to compete for places on an equal footing with privately educated students. The scope of this support has expanded and the FMSP is now working with more universities, schools and colleges than ever before to provide regular sessions to help students develop high-level mathematical problem solving skills and prepare for the STEP, AEA and MAT examinations. As well as face-to-face sessions, the FMSP runs online support classes, ensuring easy access. The FMSP is also working to improve the knowledge, expertise and confidence of teachers from state schools and colleges, so that they can better support students taking the STEP, AEA and MAT examinations.

A brighter future?

Whilst there is still much more work to be done to ensure that state educated students have the same opportunities to get places on prestigious courses at leading universities, the situation is certainly improving. Numbers choosing to study AS and A-level Further Mathematics are increasing, more state-funded institutions are offering Further Mathematics as part of their A-level provision,

often with FMSP support, and there is much more information available to students and teachers about the importance of AS and A-level Further Mathematics in applying for degree courses. If state schools and colleges can weather the current funding squeeze, the success of the FMSP's work shows that the future can be bright for increasing access to leading universities for our state educated students.

REFERENCES

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