

# Core Maths: the difficult questions.

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‘Core Maths is the most significant development in 16-19 mathematics education in a generation.’

This quote from Professor Paul Glaister indicates something of the scale of the ambition of introducing Core Maths among post-16 providers. A change of culture is required such that the expectation is that students routinely continue their mathematics education throughout their 16-19 studies. The questions that are often raised as centres consider offering Core Maths relate to the rationale for teaching Core Maths, the status and permanence of the qualifications and the logistical challenges of offering the subject within the funding constraints and existing timetable demands. These are the questions that I would like to address in this introductory article.

## Why should post-16 providers teach Core Maths?

It is interesting to turn this question on its head and ask ‘Why would you disadvantage your students by not offering them Core Maths?’. Core Maths is being promoted as mathematics for ‘education, employment and everyday life’. As such for many students the course offers a very different experience from their GCSE mathematics. Encountering mathematics in meaningful contexts with opportunity for collaboration in a rich range of problem solving activities contribute to both the appeal and the advantage for students doing Core Maths

The role of mathematics as a service subject has long been recognised: courses such as maths for scientists, biologists, or psychologists provide evidence of this. New A levels have increased mathematical demands, particularly in subjects like Physics and Economics but also in Biology, Psychology and Geography. These demands increase as students progress to Higher Education. The recent HEA Mathematics Transitions report investigated the mathematical and statistical requirements of university degrees in Business and Management, Chemistry, Computing, Economics, Geography, Sociology and Psychology. Alarming over 80,000 students following these courses struggled to meet the mathematical demands of these courses. These students had achieved Grade C or above on the GCSE Mathematics exam at 16 but had then dropped their mathematics. Core Maths enables students to retain, deepen and extend their mathematics to better cope with the demands of their education both alongside and beyond their 16-19 studies.

For the world of work the mathematical demands continue to increase across a wide range of areas of employment spanning business, commerce, engineering, construction, health, legal, travel and tourism, and the leisure industry. The mathematics that is needed here has been the subject of a number of recent reports. Employees will not necessarily be required to solve complex equations but will need to be able to use good estimation skills, have a sound understanding of proportion and use algebraic concepts in working with spreadsheets. Core Maths courses provide opportunities to give young people the skills they need for the workplace and to encounter a wide range of applications of mathematics in a rich range of contexts. These applications may be of a general nature or potentially specifically tailored to the vocational interests of students where for example a group of students are being taught together who are following a common course such as Engineering or Health Care.

Mathematics is increasingly integral to everyday life. Core Maths takes account of this with resources provided for financial maths that covers student loans, taxation, mortgages etc. Additional work in probability and statistics raise students' understanding of how data is represented and risk in a range of areas spanning from drug tests through to gambling.

A further factor is that in the past for many students who have enjoyed their experience of studying mathematics at GCSE and who have successfully achieved their grade C or B, there has not been a widely accepted qualification that enables them to progress beyond the level they have reached. Not many institutions would allow these students to continue with A or As level Mathematics but Core Maths now provides a valid progression route that is widely recognised by UCAS, employers and Higher Education as equivalent to an AS award. Core Maths now completes the progression route to 19 for students in England.

So rather than ask the questions of 'Why do we need Core Maths?' or 'Why should post-16 providers teach Core Maths?' I would like to see an enthusiastic embracing of the Core Maths qualifications among all of the post-16 providers.

### How do I know that Core Maths is here to stay?

Given the track record of low take up of other Level 3 mathematics qualifications such as the Free Standing Mathematics Qualifications (FSMQ) and Use of Mathematics alongside the Key Skills and Functional Skills qualifications how can we be sure that Core Maths will be an enduring qualification? Or in other words what is the status and what is the likely permanence of the Core Maths qualifications?

Several factors suggest that Core Maths will be a significant qualification for the foreseeable future. These include:

1. The strong research base including international comparisons such as the Nuffield 'Is the UK an outlier' report and the higher education academy (HEA) Mathematical Transitions report provide a compelling case for students to continue studying mathematics to 18. The Nuffield report highlighted the fact that the proportions in the UK studying mathematics post-16 are very low compared to other developed countries. The comparisons do not of themselves present an argument for students to continue studying mathematics. Doing something purely because somebody else is doing could simply be a case of conforming or succumbing to the pressure of the crowd. What is more important is to investigate the reasons why young people continue with their mathematics education through to 18. The arguments are essentially utilitarian, economic and esoteric. The importance of mathematics to support other areas of study is recognised in the 'service' nature of the subject. This does not stop at 16. It is also argued that a more mathematically capable and confident workforce is better equipped to thrive in the knowledge economies of the 21<sup>st</sup> century. Additionally other cultures hold the subject of mathematics in higher esteem than is often the case in the UK.
2. The wide cross-party support for Core Maths provides further evidence to suggest that this initiative is here for the long term. It was in a lecture to the Royal Society in 2011 that Michael Gove, then Secretary of State for education, declared the intention that within 10 years the 'vast majority' of students would continue studying mathematics to 18. The Labour Party manifesto included a commitment to making mathematics compulsory to 18.
3. A third factor is the significant investment on the part of the government to introduce Core Maths. At a time when there are very few government funded initiatives in education almost

fifteen million pounds has been committed to supporting the implementation of Core Maths. Over five million pounds has been invested in the Early Adopter Teaching Project initiative to fund developmental activities in schools and colleges who are preparing students to sit Core Maths qualifications in 2016. Upwards of £7m is invested in the Core Maths Support Programme (CMSP), the bulk of which is going to the post-16 providers where Core Maths Leads are working to support developments in their own and other centres in their locality. Further funding of the order of £1m has been made available to help centres prepare for teaching Core Maths from September 2015

4. The sector-led model of support for Core Maths means that at the end of the CMSP (Oct 2016) there will be strong leadership for Core Maths on a regional basis from the CMLs and the developing Maths Hubs structures.
5. Core Maths rather than being seen as another 'come today, gone tomorrow' qualification is building on the accumulated experience of earlier post-16 mathematics course. This has fed into the Technical Guidance for Core Maths and also influences key approaches central to the teaching of Core Maths such as the importance of problem solving and for students to encounter the mathematics in meaningful contexts.
6. The nature of Core Maths is intentionally different from a student's typical current experience at GCSE. Along with the revised GCSEs Core Maths aims to make the course accessible through students encountering problems that are set in a realistic context. Thus making mathematics more meaningful and addressing the criticism that mathematics is not often about anything! Core Maths will provide a progression route from GCSE that is more challenging, both in terms of the mathematics and statistics that are studied and in the problems and scenarios including financial maths that are covered.
7. Recognition by UCAS that Core Maths merits UCAS tariff points equivalent to AS has given status to these qualifications and a currency that is understood both by higher education and employers. (An important part of the CMSP is to secure understanding, recognition and endorsement of the qualifications by both HE and employers.)
8. The inclusion of Core Maths as an acceptable qualification to count in the new Level 3 mathematics achievement measure that will appear in the school and college performance tables from 2017.

## What are the biggest challenges in introducing Core Maths?

Responses from teachers and senior leaders attending conferences over the Easter period suggest that there is a lack of awareness within the profession about the new Core Maths qualifications. Not all are aware that Core Maths qualifications have the same UCAS tariff as an AS level or that Core Maths is recognised as an eligible Level 3 mathematics qualification for the new Level 3 mathematics achievement measure in the 2017 school and college performance tables.

In addition to the challenge of ensuring that post-16 providers are accurately informed about Core Maths there are two further main challenges to address. The first challenge is that of teacher capacity. As things stand we simply do not have enough teachers to teach mathematics to the full cohort. The second concern relates to the logistical challenges of timetabling and funding.

The Core Maths Support Programme has a strong commitment to professional development. This is partly to increase the skills set of existing teachers but also to help increase the supply of teachers for Core Maths. It is estimated that there are potentially a quarter of a million students in each year group who achieve GCSE grade C or above but who currently do not continue to study

mathematics. Currently we do not have a sufficient number of mathematics teachers to teach Core Maths to this number of students. Many centres are struggling to recruit mathematics teachers to cope with the increased demands from students resitting GCSE mathematics or continuing with a suitable Level 2 course in mathematics. The need to attract and retain high quality teachers of mathematics is recognised in the various schemes and incentives designed to encourage entry to the profession such as the bursaries and funding available on the DfE Get Into Teaching initiative.

The Core Maths Support Programme recognises that mathematically confident teachers whose specialism is not in mathematics may have a part to play in the teaching of Core Maths. Specialist teachers in Geography, Economics, Biology, etc. could enrich the teaching of Core Maths by the applications they will be able to draw on from their own subject areas. Additionally the professional development to support their contribution to the teaching of Core Maths may enhance their teaching of the applications of mathematics in their own areas of specialism.

Clearly, at a time of austerity, there are funding challenges within 16-19 education in both schools and colleges. Changes in funding moving away from funding by qualification to funding for students according to the hours of their study programme have not always been understood to include a range of enrichment activities which in some cases would include Core Maths. Ideally Core Maths should be offered alongside the comparable range of AS level course. Various models of delivery are being considered in the Early Adopters of Core Maths. These range from full integration into the timetable through to an after school enrichment activity. Possibilities of a one year course are also being pursued, particularly relevant for FE colleges that operate on a 12 month cycle.

### **A Culture Change is needed**

We now have interesting and relevant courses that provide appropriate mathematical progression for GCSE grade B/C students post-16. (These students have traditionally found AS and A level Mathematics courses challenging and rarely achieve anything better than a pass grade.)

The ambition for Core Maths is that we move beyond post-16 providers simply offering Core Maths to one where the expectation is that studying mathematics is the norm for all 16-19 students. The fact that this is the practice in foreign parts and nearer to home in centres offering the International Baccalaureate inspires confidence that Core Maths can succeed and become an important part of the education of large numbers of students for years to come. Indeed 'the most significant development in 16-19 mathematics education in a generation'.

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