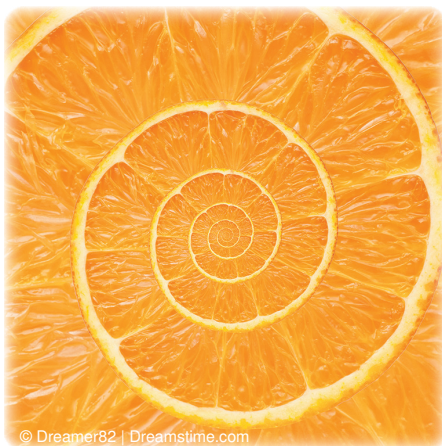


Think Education: The Evolution of Level 3 Maths

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Welcome to our new series, focusing on the many and varied aspects of mathematics education. We know that mathematics is a subject that evokes emotions and creates debates. It is highly valued for both its intrinsic value and its application within other fields. Political perspectives, social and economic stimuli, the requirements of employers and industry, and many other factors influence the shape of maths education, both in the UK and internationally. Through this series of articles, we hope to inform, engage and inspire readers to consider the key issues influencing maths education – in its broadest sense – today and in the future. As always, we welcome your feedback (contact Rebecca.Waters@ima.org.uk).



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Introduction

In previous articles (e.g. [1]), we have shared information and guidance about changes to level 3 maths qualifications, stressing the vital role that all stakeholders – including employers, universities, parents, school and colleges – have in boosting rates of progression to level 3 maths courses.

In this article we will discuss the latest participation data for level 3 maths qualifications and refer to potential changes in national policy, while considering the implications of these for stakeholders.

There will continue to be a changing landscape in level 3 maths education in coming years; now is an opportune moment to consider ‘where we are at’ and factors that interplay to influence future policy in this area.

Participation

We will focus on AS and A-level qualifications in mathematics and further mathematics and the level 3 core maths qualification. However, it is important to note that other level 3 qualifications have an embedded mathematical element, including T levels.

Participation in level 3 maths has seen notable growth over several years. England has a history of being an outlier in terms of participation in post-16 mathematics education compared to many other countries. Research conducted in 2010 [2] across 24 countries found that England had a 13% participation rate in maths post-16, whereas in 18 countries the participation rates were more than 50% and in eight countries it was 100%. Since this report was published, the participation rate in England has doubled to around 26% (of those who obtain a grade 4 or above in GCSE maths), but it remains relatively low internationally.

The 2017 Industrial Strategy [3] pledged over £400 million for maths, digital and technical education to improve STEM skills. This funding aimed to ensure that the maths pipeline does not narrow as students progress from GCSE to post-16 education and to STEM degrees, and to address the identified regional variation in uptake of maths at level 3. The educational, financial and

political worlds have, of course, changed significantly since then, influenced in no small part by wider global factors, but national policy continues to develop, as we will see in the next section.

Level 3 core maths

Core maths qualifications consolidate and build on students’ mathematical understanding from GCSE and develop their mathematical understanding and problem-solving skills in authentic contexts. They prepare students for the mathematical demands they will face at university and

within employment across a broad range of academic, professional and technical fields. Designed for any post-16 student who has achieved a grade 4 or above in GCSE maths, they are graded A to E and are worth the same number of UCAS tariff points as an AS level. Core maths qualifications were introduced following a series of reports, such as [4], highlighting the relatively low participation rate in maths post-16 in England.

Core maths was first examined in 2016 with an entry of just under 3000 students. By 2024 this had risen to 12 810 with approximately equal proportions of girls and boys in recent years [5]; however, the proportion of state-funded schools and colleges offering it certainly has scope to increase, and government funding mechanisms – outlined below – are one incentive for schools and colleges to do so. The ‘pull’ factor from universities and employers is also crucially important. In fact, 12 UK universities currently make alternative offers to students with core maths [6].

If national policy moves closer towards all students taking maths post-16, we might see more universities signalling which level 3 maths qualifications students would find useful as preparation for their degree courses.

AS/A-level maths and further maths (England)

Entries for A-level mathematics have grown steadily since 2000 and, after a slight dip when reformed A-levels were introduced in 2017, there has been a sharp rise in recent years. In 2024 they stood at 100 052 [7], which is an 11% increase from 2023, making maths the most popular A-level choice by some way.

Likewise, entries for A-level further maths have seen enormous growth. From just over 5000 entries in 2003, they reached an impressive 17 140 entries in 2024, representing a 20% increase from 2023. AS level further maths entries also increased by 8%, despite the declining entry in AS levels overall since the reform in 2017 when AS and A-levels were decoupled.

In 2024, 37% of those taking mathematics A-level were girls; the figure for further maths was 27%. Although girls make up a lower proportion of the A-level maths cohort than boys, note that A-level maths was the fourth most popular A-level for girls in 2024 with entries of 37 014. This is important, and a number we should aim to increase, especially amongst students from disadvantaged areas.

National policy

There has been a period of political and societal uncertainty over recent years, which has impacted many areas of our lives, including mathematics education. However, there have been some positive activities and plans in this area in recent years.

The Advanced Mathematics Support Programme (AMSP) is a government-funded initiative that provides national support for teachers and students in state-funded schools and colleges, with the aim of increasing participation in level 3 maths. Established in 2018, the AMSP works closely with maths hubs to share good practice. By building on the work of various prior and related government-funded initiatives, it has proven to be highly successful [8]. The combination of student and teacher engagement along with information, advice and guidance for wider stakeholders, including universities, are major strengths of this programme.

In December 2023, the previous government proposed the Advanced British Standard (ABS) qualification framework for 16- to 18-year-olds, which would include every student studying some form of maths to the age of 18. Latest government policy moves away from the ABS but continues a commitment to fund maths teaching and teacher recruitment and retention [9].

The government's Maths to 18 Expert Advisory Group was established to consider the maths knowledge and skills needed for jobs in the modern economy and how these should be included in a system where all young people, including those with special educational needs and disabilities (SEND), study meaningful maths up to age 18, regardless of their chosen pathway.

Mathematics in Education and Industry (MEI) echoes the sentiment that having a high proportion of students who cease studying maths at 16 is unusual, and supports the broadening of the UK curriculum that would result from a move to the study of an appropriate course of maths to the age of 18 for all [10].

The importance of the 'flow' of students through the mathematics pipeline was highlighted in recent research [11] focusing on gender, ethnicity and socio-economic status. The report notes, as we have above, that girls' participation in A-level maths and further maths continues to be lower than that of boys and that these 'longstanding patterns are stubbornly resistant to efforts to change them' [11, p. 46]. It suggests that new approaches are needed early in secondary education, and possibly before that.

The AMSP has several strategies [12] that can be adopted by schools and colleges to try to support wider participation, such as careers panels with female role models and providing information about the post-16 maths used in a wide range of careers.

Funding

Increasing participation in level 3 maths was a key part of the previous government's industrial strategy [3] to equip more young people with important maths skills. Funding initiatives have been introduced to incentivise engagement with various prioritised programmes of study, including level 3 maths.

In 2017, the Department for Education (DfE) announced changes to the Large Programme Uplift and introduced the Advanced Maths Premium. In 2019, the government introduced the High Value Courses Premium, providing extra funding to encourage and support the delivery of selected level 3 courses that lead to higher wage returns. In February 2024, the government announced the Core Maths Premium, meaning there will be additional funding of £900 for each level 3 core maths student.

Case study evidence, unsurprisingly, outlines the wider benefits, beyond funding, of offering additional level 3 maths qualifications. For example, the National Centre for Excellence in the Teaching of Mathematics (NCETM) [13] found that the support that core maths offers for students on A-level science and psychology courses who are not studying A-level maths was tangible and created cross-curricular support between subject departments.

Conclusion

So, where are we at with level 3 maths education? It is clear that there has been a welcome improvement in participation, with an upward trend over many years, but we must not become complacent. We must continue to drive the increased participation in level 3 maths in the same direction; with so many careers needing analytical skills, all stakeholders in maths education need to maintain the forward momentum to enable us to get closer to the universal participation in post-16 maths that is so common in many other countries. The importance of maths in keeping open the options available to young people cannot be overestimated.

There is also the non-trivial task of changing societal views and eliminating those casual remarks that could so easily dissuade students from pursuing maths post-16, or even enjoying it pre-16.

It would be remiss to finish without noting the challenge of ensuring that there is a highly skilled maths workforce, which is necessary for ensuring that all students can access appropriate level 3 maths programmes. MEI has recently published a discussion paper outlining proposals relating to the recruitment, professional development and career pathways for teachers [14].

Undoubtably there will be ongoing policy developments for level 3 maths that may build on those cited above. As a maths community, we should continue to work effectively together to guarantee that the pathways for all young people ensure that they can, and want to, access level 3 maths.

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