

Excellence and equity in maths education: Maths Excellence Fund objectives, activities and evaluation approach

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Purposeful Ventures

The Maths Excellence Fund has been established to increase the number of students who are on track to succeed in A-level maths and beyond, by improving student attainment and progression in maths. Informed by the 2023 Maths Excellence Pathways report, it has a particular focus on socio-economically disadvantaged students with high key stage two attainment, for whom studying maths can unlock significant opportunities. The Fund is supporting programmes that will be led by schools, universities and charities. Each programme will be independently evaluated to better understand which activities might improve student attainment and progress in maths, and to replicate best practice models. This paper focuses on the Fund's objectives, activities, and evaluation plans.

Keywords: A-level; enrichment; equity; evaluation; secondary

Introduction

The paper provides an overview of the Maths Excellence Fund. It sets out the objectives of the Fund and the approach to evaluation, focusing on the evaluation co-design stage, and the main activities planned for delivery by the first four funded programmes.

The Maths Excellence Fund

The Maths Excellence Fund ('the Fund') was established to improve student attainment and progression in maths, increasing the number of students who are on track to succeed in A-level maths and beyond. It has a particular focus on students for whom studying maths can unlock significant opportunities. The Fund has two main objectives:

1. To support schools to improve attainment and progression in maths for socio-economically disadvantaged students with high prior attainment from ages 11-16 and 16-18.
2. To trial and evaluate programmes to better understand which activities can support students' attainment and progress in maths, and to establish models to replicate these beyond the Fund.

The Fund is supporting programmes led by schools, universities and charities. Each programme is being independently evaluated to better understand which activities might improve student attainment and progress in maths, and to replicate best practice.

The Fund was set up following the publication of Maths Excellence Pathways, a research report by the University of Nottingham and XTX Markets (Noyes et al, 2023). The report highlights some of the key challenges in supporting students to join and stay on the maths excellence pathway, especially students from disadvantaged backgrounds. Drawing on key findings from this report, the Fund identified five student outcomes for the Fund's activities to focus on addressing and measuring:

- i) Enjoying and engaging in maths from ages 11 to 16
- ii) Attaining grade 7-9 in GCSE maths

- iii) Choosing to study A-level maths and, where appropriate, A-level further maths
- iv) Attaining grade A-A* in A-level maths and, where appropriate, A-level further maths
- v) Progressing to a maths degree.

Maths Excellence Fund programmes

From over 50 initial expressions of interest, four delivery partners were selected and awarded grants totalling £7m to provide wide-ranging support to a group of schools in a different region of England. The four delivery partners are Co-op Academies Trust, Mathematics in Education and Industry (MEI), East Maths Community (Inspiration Trust and the University of East Anglia) and United Learning. Programme delivery in schools and colleges begins in September 2024 and is expected to run for five academic years. The four programmes selected are ‘cohort and champion’ models. They each include an in-school champion (a maths teacher or maths graduate), responsible for leadership of the programme in participating schools.

The National Foundation for Educational Research (NFER) are conducting an independent implementation and process evaluation during the first two years of delivery (Sept 2024–August 2026). This evaluation comprises of individual evaluations for each programme and an overarching evaluation of the Fund to identify common lessons, summative findings and recommendations for the Fund and delivery partners. This interim evaluation, which is the focus of this paper and referred to throughout as ‘the evaluation’ seeks to understand how the programmes have been implemented and the views of stakeholders to provide formative feedback for each programme. This evaluation has four main stages: 1) evaluation co-design, 2) baseline data collection, 3) ongoing data collection monitoring and evaluation activities during the first and second years of delivery with formative findings at the end of each year; and 4) final summative reporting at the end of year 2. In this paper we focus on the evaluation co-design stage.

Evaluation co-design

During the evaluation co-design stage, the NFER evaluation team worked with delivery partners and the Fund to understand the four programmes, their development stage and the best approaches to evaluating each individually, and at a Fund level. This included producing a Theory of Change and success indicators for each programme, and evaluation plans which were externally peer reviewed.

Following a series of meetings, the evaluation team identified key themes, similarities and differences between the programmes. This included planned activities for students, staff, and in some cases parents/carers, intended outcomes and anticipated change mechanisms. These are documented in the programme theories of change, using a standard template to support identification of Fund-level findings.

The four programmes have been designed drawing on professional expertise and the experience of delivery partners who have previously been involved in delivery of similar activities at a smaller scale. Given the developmental stage of the programmes, the evaluation will explore three evaluation themes: feasibility of implementation, evidence of promise and scalability. To draw together Fund level findings across programmes, a common set of research questions and success indicators were developed. For each programme an additional two to three research questions focus on unique elements of programme design or delivery.

During the co-design phase, programme activities were categorised into six pathway components: data tracking and monitoring; training and development;

curriculum; tailored student support; enrichment; and community of practice. Each programme is designed with activities in every pathway, as shown in table 1. There are different combinations of activities in each pathway, and programmes vary in emphasis or allocation of resource to components. The next section sets out key features of these components and sub-components, illustrated by examples from the four programmes, drawing on relevant research literature and priorities for the evaluation.

Table 1: Overview of the four funded programmes

Input/pathway component	MEI Maths Progression Programme	East Maths Community	United Learning	Co-op
Region	Birmingham	East Anglia	England	North of England
Number of schools/colleges	10	12	14	12
Leadership: In-school maths champion	<i>Maths Progression Lead (MPL)</i>	<i>Maths Advocate</i>	<i>Leaders in Maths Excellence (LMEs)</i>	<i>Graduate Maths Excellence Specialists (GMESs)</i>
Data tracking and monitoring	Maths Progression Lead monitors students and tracks progress	Maths Advocate identifies, tracks and monitors students	LME tracks pupil progress in each school (facilitated by Trust dashboard)	Head of Maths/GMESs identifies, tracks and monitors students
Training and development	Training for MPL; teacher CPD	Training for staff at Into University Hubs	Training for LMEs; teacher CPD	Induction and support for GMESs; teacher CPD; training for early career and non-specialist teachers
Curriculum	Level 2 Further or Extended Maths Certificate; curriculum review	Level 2 Further Maths Certificate (remote lessons); revision sessions	Level 2 Extended Maths Certificate; enriched KS3 maths curriculum	Level 2 Further Maths Certificate and GCSE Statistics
Tailored student support	Curriculum support; peer mentoring; problem solving	GCSE and A-level tutoring	KS2-KS3 transition projects; targeted small-group tuition	Academic and pastoral tutoring; Sparx Maths homework
Enrichment	Bespoke school enrichment offer (e.g. maths challenges, Axiom maths circles)	Maths clubs, Axiom maths circles, inter-school competitions; Higher Education visits	Axiom maths circles, celebration events, speaker events	Maths homework club; enrichment events and clubs
Community of practice	Networking for Heads of Maths and MPLs	Parent workshop; collaborative sessions for Maths Advocates	Networking for LMEs	Resource sharing and collaboration across schools and colleges

Component pathway: Data tracking and monitoring

The identification, tracking and monitoring of students is an important part of all four programmes. In the data tracking and monitoring pathway the evaluation will explore the effectiveness of programme and evaluation monitoring systems set up to track student selection and participation in programme activities as well as the effectiveness of the champion and other lead maths roles. All students with 110+ in maths Key Stage 2 SATS who are eligible for the Pupil Premium must be enrolled in programmes. Whether programmes are reaching and engaging these students will be a key focus. The evaluation will consider the level and nature of delivery partner support with participation data, how this relates to in-school workloads and how data is used to inform student experience.

Component pathway: Teacher training and development

The impact of professional development (PD) varies widely. Effective PD can have similar attainment effects to those generated by large structural reforms and a clearer picture is now emerging of the mechanisms that differentiate more effective PD (Sims et al., 2021). The quantity and focus of the PD offer varies considerably across the four delivery partners. For example, the role of teacher training is minimal in the East Maths Community programme, while the Co-op programme includes training for the Graduate Maths Excellence Specialists, for Early Career Teachers and non-specialists, and an extensive programme of further teacher development.

In this pathway, the evaluation will focus on how the programmes develop teachers' subject and pedagogical knowledge, confidence and maths teaching practice, including PD activities focused on specific teaching tools (e.g. technology) and enriched curriculum. For the East Maths Community, the evaluation will consider how programmes support the development of participating tutors and staff working in community learning hubs.

Component pathway: Curriculum

Schools participating in the United Learning programme will offer students in top sets an enriched curriculum that goes beyond the National Curriculum. The MEI programme will also include an enriched curriculum offer at key stage 3 (KS3). This will be taught outside the school timetable in groups of 6-8 students. All four delivery partners include a Level 2 Further Maths qualification at key stage 4 (KS4).

There is an emergent evidence base on the impact of curriculum development, supported by curriculum-linked professional development. A US study on impact in elementary school maths found that professional development intended to help in the adoption of new curricula had a small but significant impact, with an effect size of +0.12 (Pellegrini et al., 2021). In England, implementation of a maths curriculum was found to have a moderate effect size (Jerrim and Vignoles, 2016).

Component pathway: Tailored student support

Each of the programmes include tailored student support, such as tutoring or peer mentoring. Although the impact of tutoring is positive on average, there is a large amount of unexplained variation between the results, with impact on literacy generally more positive than on mathematics and less evidence of the impact of tutoring on older students (EEF, 2021). Greater impact is found from one-on-one or small-group tutoring

with no more than four students per tutor, and at least three tutoring sessions per week (Nickow, Oreopoulos and Quan, 2020).

Component pathway: Enrichment

All four delivery partners include components that involve aspects of mathematics beyond the National Curriculum, which aim to engage and motivate students. These include UKMT maths challenges, Axiom Maths Circles, inter-school competitions and university and careers enrichment.

Enrichment is taken here to include experiences that replace, supplement, or extend instruction to tackle both attitudes towards maths and students' mathematical skills (Santos and Barmby, 2010). The evidence base for the impact of enrichment remains limited and offers a mixed picture, though there is some evidence of the potential for positive impact (Mahagna, Berman and Leikin, 2023).

In the curriculum, tailored student support and enrichment pathways the evaluation will explore overlapping themes, including the extent to which the activities support students' maths enjoyment, engagement, progress, choices and retention in the Maths Excellence Pathway. This will include considering different modes of delivery, the key enablers and barriers to implementation and unplanned adaptations.

Component pathway: Community of Practice

All four of the selected programmes emphasise the importance of collaboration. The intention is that in-school champions will both build and benefit from communities of practice. The term 'community of practice' is used here to indicate a theoretical concept where individuals learn and gain membership and identity through participation in an informal community with tight social relationships and a strong group identification (Lave & Wenger, 1991). The regional nature of three of the programmes is intended to foster inter-school communities of practice. Although United Learning is implementing nationwide, they have selected participating schools in geographical clusters.

Research suggests that professional collaborative activities might have a positive effect on student achievement (Sims et al., 2021). Teacher collaboration has been identified as one of seven factors that constitute effective professional development (Darling-Hammond et al., 2017). However, there is a lack of maths-specific evidence of the impact of teacher collaboration.

In this pathway, the evaluation will explore implementation relating to the perceived success of collaboration between schools and teachers. For example, looking at whether the focus in specific local or regional clusters promotes more partnership working than otherwise possible. It will also explore the role of collaboration in supporting changes in maths department practice and culture.

Summary and next steps

This paper sets out how Maths Excellence Fund programmes are designed to work with schools and colleges from September 2024. Using a 'cohort and champion' model, delivery partners are aiming to improve student attainment and progression in maths, with a particular focus on supporting students from socio-economically disadvantaged backgrounds with high prior attainment to succeed in A-level maths and beyond. In parallel to delivery activity, the evaluation will provide formative findings to inform programme development through the first two years of delivery. In the longer-term, NFER's independent report is expected to be published by the end of 2026.

Acknowledgements

The Maths Excellence Fund is a charitable programme of Purposeful Ventures, a registered charity in England and Wales (1204622). It is funded by XTX Markets and The Hg Foundation.

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