Pilot Evaluation Plan

UCL IOE - Faculty of Education and Society
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PROJECT TITLE	**Pilot evaluation of Can-Do Maths**
DEVELOPER (INSTITUTION)	The Education and Training Foundation
EVALUATOR (INSTITUTION)	UCL IOE - Faculty of Education and Society
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PUPIL AGE RANGE AND KEY STAGE	16-19 (Post-16 sector)
NUMBER OF COLLEGES	16
NUMBER OF LEARNERS	800

Evaluation plan version history

VERSION	DATE	REASON FOR REVISION
1.0 [original]	29/05/2025	

Intervention

Background and context

Any 16–19-year-old wishing to pursue a college course who has not achieved at least a grade 4 GCSE in mathematics or English is required, as a condition of their funding, to resit these GCSEs. In summer 2024, 28%[1] of 16-year-olds in school who sat GCSE mathematics did not achieve a minimum grade 4. This figure rises to 40% when GCSE mathematics resit results are included, the majority of which are learners in the 16-19 age range. Furthermore, disadvantaged learners are more likely to fall within this resit group. In the academic year 2023-2024 48% of disadvantaged learners sitting GCSE at age 16, did not achieve the minimum grade compared with just 22% of their more affluent peers[2]. GCSE mathematics resit learners (usually in Further Education (FE) colleges) typically lack engagement and resilience with mathematics and many have negative attitudes towards the subject (Dalby, 2013; Johnson-Wilder et al., 2015). For some, being in a mathematics class is an anxiety-provoking experience (Apostolidu & Johnston-Wilder, 2023). In 2018/2019, the DfE-funded initiative, Centres for Excellence in Maths (CfEM) aimed to deliver sustained improvements in maths outcomes for 16-19-year-olds. Improving engagement and resilience was a focus for six small-scale action research projects as part of this initiative.

Building on the approaches explored as part of the CfEM initiative, the intervention Can-Do Maths was developed as a larger-scale research project by The Education and Training Foundation. The intervention involved professional development for teachers in FE colleges, delivered by a group of intervention leads, and an accompanying suite of activities for four lessons that teachers used with their learners over a seven-week window between the November GCSE resit exams and the Christmas break. The professional development aimed to improve teachers' knowledge of the theories underpinning the lesson activities and support teachers to make use of specific strategies that build learner engagement and resilience in GCSE mathematics resit learners. Pye Tait Consulting (2023) evaluated strands of the CfEM project in 2022, including the projects focusing on engagement and resilience. They used learner pre-tests and post-tests of the same GCSE maths questions and a learner attitudinal questionnaire, as well as questionnaires and focus group discussions with teachers to seek their perspectives on the potential of focusing on engagement and resilience to improve learner outcomes. Pye Tait Consulting (2023) found that learners appeared to become more resilient and teachers reported improved skills in engaging learners. The evaluation also showed a small but statistically significant increase in the mathematics marks achieved by learners after the intervention with highest changes evident amongst the learners in the resilience and engagement group.

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[1] https://analytics.ofqual.gov.uk/apps/GCSE/Outcomes/

[2] https://explore-education-statistics.service.gov.uk/find-statistics/key-stage-4-performance

The Education Endowment Foundation have funded an implementation and process pilot evaluation of Can-Do Maths. The evaluation will investigate whether or not Can-Do Maths:

- provides promising indicative evidence that the intervention can deliver on its expected outcomes as stated in the theory of change (see page 9);
- demonstrates that the intervention can be delivered using an approach that is feasible and acceptable for college staff and learners; and,
- is ready to be delivered at scale to test for wider impact.

A team at UCL IOE - Faculty of Education and Society, (shortened henceforth to IOE) have been awarded this evaluation.

The following definitions of engagement and resilience have been agreed in partnership with the Can-Do Maths delivery team:

Engagement: Refers to the learners' participation in their maths lessons in terms of attending class and involving themselves in mathematics activities during lessons.

Resilience: Refers to learners' perspectives on the four factors in the Growth Zone model (Johnston-Wilder et al. 2016; Apostolidu, M., & Johnston-Wilder, S., 2023):

i) an understanding that maths ability is not fixed but grows with use (*growth mindset*);

ii) personal value of mathematics;

iii) understanding of need for effort and struggle to achieve learning;

iv) accessing available support (*community support*).

Can-Do Maths Template for Intervention and Replication (TIDieR)

Intervention Name

Can-Do Maths

Why (theory/rationale)

Approximately 40% of 16–19-year-olds do not achieve the benchmark, grade 4, in mathematics GCSE. In order to pursue vocational qualifications in further education (FE), they must resit mathematics GCSE until they achieve a minimum grade 4 or are no longer eligible[3]. Teaching and learning experiences at secondary school have not been sufficient to enable these learners to reach the expected standard and even in FE colleges, many learners still do

[3] See https://www.gov.uk/guidance/16-to-19-funding-how-it-works for more information on eligibility

not succeed. As such, these 16–19-year-olds bring with them a sense of repeated 'failure' (Dalby, 2013), resulting in disengagement with the subject (Boli, 2020; Higton et. al., 2017; Crisp et. al., 2023). Promoting resilience in mathematics teaching has been extensively explored in school contexts (e.g. Lee & Johnston-Wilder, 2013; Johnston-Wilder & Lee, 2019; Mackrell & Johnston-Wilder, 2020) with approaches, such as using the Growth Zone Model with learners (Lee & Johnston-Wilder, 2017) leading to an improved relationship with mathematics.

More research is needed to understand whether improving engagement and resilience improves mathematical outcomes for 16–19-year-old learners who are expected to resit GCSE maths as a condition of funding whilst attending a further education (FE) college, including those from disadvantaged backgrounds. The evaluation of the CfEM project (Pye Tait Consulting, 2023) was conducted across four interventions, considering the use of bar models, ratio tables, responsive teaching and developing engagement and resilience. Across all four interventions, there was a small, but statistically significant increase in the marks from pre- to post- test on the same GCSE mathematics questions and learners who participated in the engagement and resilience intervention saw the greatest improvement. Furthermore, the same group of learners showed the largest increase in the proportion of questions attempted in the post- test when compared with the proportion of questions attempted in the pre- test. These outcomes suggest that a focus on improving learner engagement and resilience is a promising approach to addressing these sector-wide challenges.

Research in the FE sector needs to consider the highly complex nexus of factors surrounding mathematics in FE colleges. The Mathematics in Further Education Colleges project (Noyes & Dalby, 2020) highlighted organisational differences between FE colleges often dispersed across multiple sites; variability in the quality of the leadership and management (including cross-college leadership of multiple sites); operational systems and processes such as timetabling; the characteristics of the learner cohorts; and differences within the teacher workforce including those with full or part-time contracts and those who are not specialist teachers. These factors are an important consideration when evaluating the implementation of interventions designed to improve learner outcomes in these diverse institutional contexts.

WHO (RECIPIENTS)

The recipients of Can-Do Maths are:

- Teachers of GCSE mathematics resits in general further education colleges (GFE colleges) in England who participate in a range of training and professional development activities, supported by expert practitioners and deliver a set of lesson activities over two phases each lasting seven weeks in the autumn (phase one) and spring (phase two) terms in one or two of their GCSE mathematics resit class.
- 16–19-year-old learners who are resitting GCSE mathematics in GFE colleges, because they did not achieve at least a grade 4 in their previous GCSE mathematics examination. IOE anticipate that a high percentage of these learners will have been previously eligible for free school meals whilst at secondary school (and this will be self-reported in the learner baseline survey).

WHAT (MATERIALS)

- A set of training materials (presentation slides) and activities for expert practitioners to use when supporting teachers during the professional development sessions.
- A suite of seven lesson activities to fit into teachers' existing lesson plans delivered across two 'phases' of the intervention, comprising:
  - Teacher guidance
  - Lesson PowerPoint slides
  - Printable resources for learner activities

The set of seven lesson activities and accompanying resources to use with learners (implementation materials) will be shared by ETF on an online platform. The activities are designed by ETF to be low-risk and safe, promoting collaboration with learners' peers and to build resilience through teacher support.

Phase one will take place in autumn 2025 (five lesson activities delivered in up to seven[4] lesson inputs over a seven-week period) and phase two (activities tailored to embed the principles in class over a seven-week period) in spring 2026.

Phase one lesson activities:

1. Introduction activity to set the scene
2. Mathematical Resilience
3. Mathematical Mindsets
4. The Growth Zone model
5. Planning for success

Phase two will take place in spring 2026. Before this phase begins, teachers will decide which application (Mathematical Mindsets or Growth Zone Model) they will focus on during phase two. This decision will be determined by which resilience activities worked best for their learners in phase one and inform which set of activities they do during phase two.

Phase two will involve between six and seven lesson inputs - two lesson activities followed by four or five 'bespoke' inputs to embed the concepts covered in phase one in their wider teaching. Both applications focus on strategies for building resilience during maths lessons, revision, or assessment, and both include a reflection tool for learners to record their levels of resilience over the course of phase two.

Phase two lesson activities:

1. Resilience strategies
2. Resilience applications

[4] The developer has allowed seven weeks as some weeks the teachers may not be able to deliver (November resits / tests /staff sickness/ classes merged due to cover / learners on work experience etc)

In phase two, under the guidance of their expert practitioner, teachers will be able to tailor the ways in which the application and associated strategies are embedded in their lessons. For example, these adaptations could relate to the timing of the application – at the start of every lesson, during the introduction of a new topic, or during exam question practice.

WHAT (PROCEDURES)

The Education and Training Foundation (ETF) have developed the lesson activities. They have recruited two individuals who will work for ETF as associates in the role of *expert practitioner* to support the teachers participating in the intervention.

ETF will:

- train two expert practitioners to enable them to deliver the professional development support for teachers;
- design the suite of lesson activities for teachers to use in their classrooms;
- recruit colleges and teachers to participate in Can-Do Maths;
- gather and maintain programme management data e.g. end of programme evaluations and teacher attendance at PD sessions;
- allocate teachers to cluster groups;
- allocate cluster groups to expert practitioners;
- provide an online platform to share the intervention materials with teachers;
- quality-assure the design of the intervention materials and delivery of the intervention training and professional development support;
- set dates for the initial three two-and-a-half-hour training sessions;
- administer remission payments to colleges.

Expert practitioners will:

- undertake four hours of training provided by ETF;
- undertake two days of collaborative planning to prepare for supporting teachers to implement Can-Do Maths;
- deliver three two-and-a-half-hour training sessions to the intervention teachers focusing on:
    - Session 1: Introduction to the intervention/Key themes/What's involved
    - Session 2: Changing pedagogy /Key intervention themes and the theory of change / Content – in depth look at activities part 1
    - Session 3: Content – in depth look at activities part 2 / Planning for delivery;
- liaise with their allocated cluster group and individual teachers to set dates for the professional development support sessions;
- deliver two-hour cluster group meetings online: five in phase one (autumn term) and three in phase two (spring term);
- provide a face-to-face visit to each college in their cluster group in phase one (autumn term);
- provide ad hoc support (e.g., email or short online meetings) as needed by teachers in their allocated cluster group over phases one and two;

- provide one one-hour individual session per teacher online to support planning for phase two in December/ January;
- deliver four one-hour individual support sessions per teacher online in phase two (spring term);
- manage teacher attendance registers for each support session (phases one and two);
- monitor teacher activity logs and reflective logs (phases one and two).

Teachers will:

- undertake all the training and professional development detailed above in the expert practitioner section;
- access the online platform of intervention materials to support the implementation of Can-Do Maths in their classrooms;
- in phase one, deliver five lesson inputs over a seven-week period using the five lesson activities lasting approximately 20 minutes;
- in phase two, deliver two lesson inputs and embed techniques in usual lessons that were successful with their classes during phase one, tailoring their approach;
- make use of the lesson activities beyond phase two when learners are preparing to resit the mathematics GCSE in May/June;
- report when and which lesson activities they use in phase one and phase two and beyond in the activity log provided by ETF;
- maintain reflective logs provided by ETF every time the lesson activities are used in the classroom during phase one and phase two, including how they tailored the activities for their learners;
- engage learners in whole-class and group discussion based on a stimulus, sorting activities, goal setting (knowledge, attitudes, skills and habits - KASH) and reflection on goals.

An overview of the Can-Do Maths intervention timeline is given in Table 1.

Table 1: Timeline for implementation of the core components of Can-Do Maths

Time	Details
June - July 2025	Expert practitioners deliver two two-and-a-half hour online training sessions for teachers.
September 2025	Expert practitioners deliver one two-and-a-half hour online training session to teachers.
September – November 2025	Teachers deliver phase one of Can-Do Maths over a seven-week period.
	Expert practitioners provide five online cluster group sessions of two hours which includes reflection and collaborative planning.
	Expert practitioners provide one face-to-face visit with each teacher.
	Expert practitioners provide ad hoc individual support sessions to teachers.

December 2025 - January 2026	Expert practitioners deliver individual online support with each teacher.
January - March 2026	Teachers deliver phase two of Can-Do Maths over a seven-week period This includes up to seven short lesson inputs.
	Expert practitioners deliver three cluster group sessions of two hours which includes reflection and collaborative planning.
	Expert practitioners deliver four individual support sessions to specific teachers assigned to them.
	Expert practitioners deliver ad hoc support, as needed, to specific teachers assigned to them.

WHO (PROVIDER)

The Education and Training Foundation (ETF) is the workforce development body for the Further Education and Training sector. ETF develops programmes for teachers, trainers and leaders to improve education and training for learners aged 14 and over. The ETF has developed the Can-Do Maths intervention, including lesson activities for use by teachers in GFE colleges, who teach mathematics GCSE resit classes.

ETF have recruited two expert practitioners, working as associates to develop and deliver the professional development support for the teachers participating in the intervention. They were previously involved with the CfEM project and are known experts in supporting teachers in further education to build learner engagement and resilience in GCSE mathematics resit classes.

HOW (FORMAT)

Teachers will attend online training in summer 2025 and participate in the professional development support provided by the expert practitioner. The latter will use a range of approaches including online synchronous professional development sessions, online cluster group sessions, reflection and collaborative planning, face-to-face visits to each teacher in college and online individual support sessions (see table 1). Teachers will deliver the lesson activities face-to-face with the whole class.

WHERE (LOCATION)

- Teachers will be recruited from general further education colleges (GFE colleges) from across England.
- Training for teachers and cluster groups will take place online. Expert practitioners provide one individual support session face to face at each intervention teacher's college.
- Lesson activities will be used in the teachers' usual mathematics classrooms.

When and how much (dosage)

- Expert practitioners receive two two-hour workshops with ETF in November/ December 2024.
- Expert practitioners receive two days in total for collaborative planning of professional development support.
- Teachers receive three half-day training sessions with an expert practitioner at the beginning of the programme.
- Teachers receive eight two-hour cluster group meetings with an expert practitioner: five meetings in autumn 2025 and three in spring 2026.
- Teachers receive one face-to-face visit, October 2025 – November 2025 (phase one).
- Teachers receive ad hoc support from the expert practitioner as requested by the teachers throughout the life of the programme.
- Teachers receive one hour of individual support from expert practitioner in December 2025-January 2026, to plan for phase two.
- Teachers receive four one-hour individual support sessions from expert practitioners January 2026-March 2026.
- Learners receive seven lesson inputs (five in phase one and two in phase two) lasting approximately 20 minutes and embed the techniques in class during a seven-week period in phase two.

Tailoring (adaptation)

Expert practitioners will collaborate to plan professional development support for teachers. It is therefore expected that the support delivered to teachers will have commonalities but also reflect the needs of the teachers present, within the scope of good educational practice. Expert practitioners will provide on-going support adapted to teacher need. For instance, responding to teachers' questions, providing additional suggestions for how an activity can be delivered, how student responses / questions can be answered.

With support from expert practitioners, and time for collaboration, planning and reflection in cluster groups, it is expected that teachers will tailor the lesson activities provided according to the learners' needs and context that they work with. Any modifications teachers make will be done so with support from with the expert practitioners and described in the teacher activity and reflective logs provided as part of the intervention support. In phase two, teachers will select the activities to use with their classes and log these in their activity and reflective logs.

Fidelity will be considered in the following ways, with a view to refining definitions towards a later trial:

1. ***Adherence**: expert practitioners deliver the training and professional development support as intended in line with the professional development core components (see table 1) and principles of Can-Do Maths.*

2. ***Teacher engagement**: teachers attend training and implementation support sessions.*

3. ***Classroom dosage**: delivery of five activities in up to seven teaching inputs lasting approximately 20 minutes over a seven-week period in phase one. Tailoring of activities over a seven-week period, including two lesson inputs in phase two (with flexibility to allow the teachers to tailor sessions for their own context).*

4. ***Content of classroom delivery**: teachers refer to the growth zone factors (e.g. growth mindset, personal value of mathematics, the need for effort and struggle, accessing community support) in their teaching; teachers tailor activities that emphasise these factors.*

THEORY OF CHANGE

The theory of change was designed by ETF with support from EEF and input from IOE. The contextual assumptions and causal mechanisms are described in Appendix A and Appendix B respectively.

The theory of change logic model (see figure 1) outlines the mechanisms by which the intervention is expected to work. The training for expert practitioners prepares them to deliver the professional development support for the GCSE maths resit teachers in the intervention. The different modes of professional development support (i.e., training sessions, cluster group meetings and individual support) enable the teachers to tailor and deliver the Can-Do Maths intervention lesson materials for their specific contexts. The lesson materials include activities for learners over a 14-week period supporting them to develop a range of strategies for dealing with barriers they encounter when learning and doing maths.

In the shorter term, as a result of engaging with the intervention materials, learners develop a more positive attitude to mathematics resulting in improved engagement (e.g., more likely to attend class) and resilience (e.g., more likely to attempt maths questions they find challenging). In the longer term this leads to learners picking up more marks in their GCSE maths examination from questions they would previously have avoided attempting and thus increasing the likelihood of achieving the required grade 4. Furthermore, by engaging with the Can-Do Maths training and teaching/reflecting on the intervention lesson materials, teachers will gain a refreshed approach to teaching GCSE maths resit classes, develop their own knowledge about the theory underpinning the lesson activities and become more confident in promoting engagement and resilience amongst their learners in their everyday teaching.

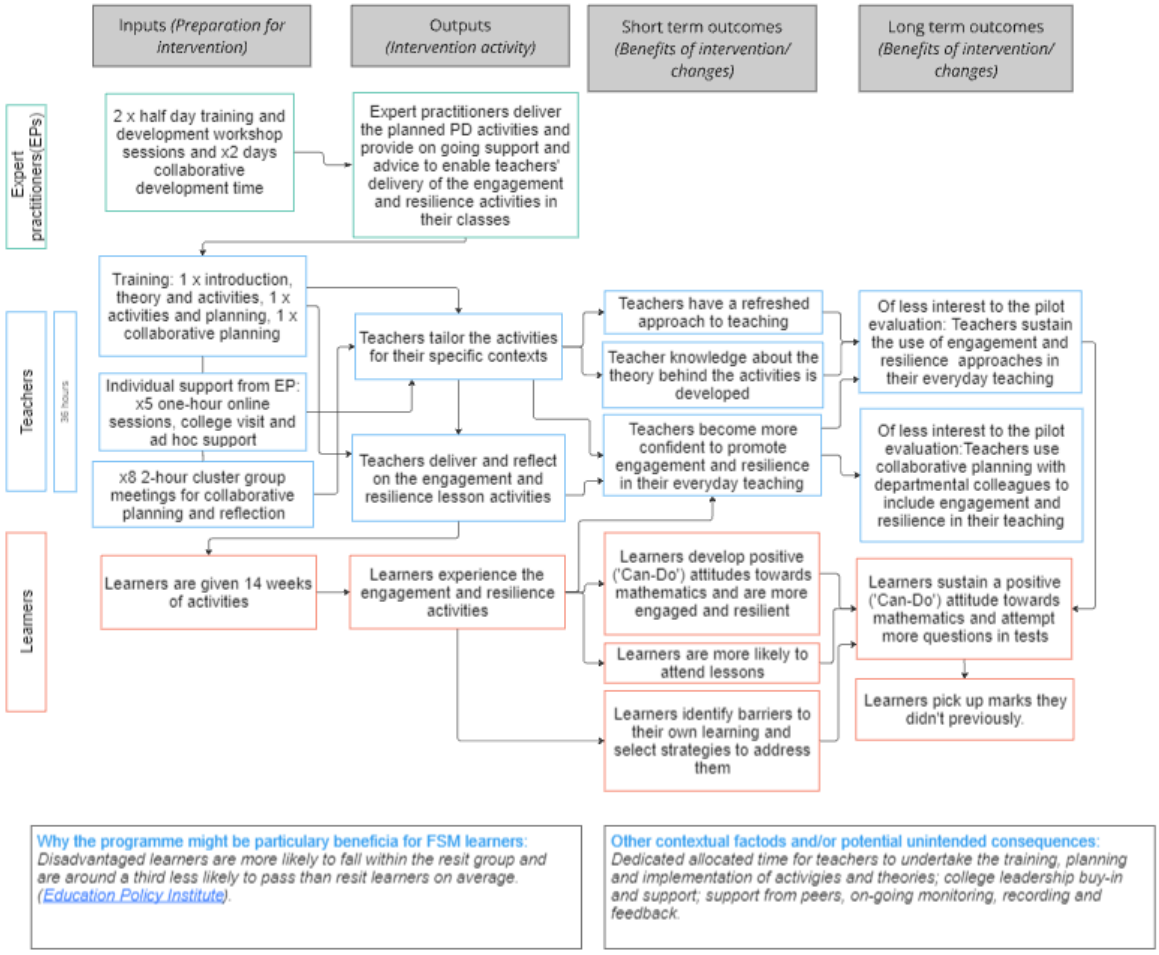

Figure 1: Can-Do Maths Theory of Change

Research questions

This pilot evaluation is designed to address the following research questions organised according to the three pilot criteria - feasibility of implementation, evidence of promise and readiness for trial. The research questions interrogate the theory of change by exploring how the recipients (teachers and learners) experience the different components of the intervention (inputs and outputs). For instance, we are interested in the teachers' experiences of the model and content of the professional development and how the teachers implement the lesson materials in their classrooms and how these components are suited to the college context in which they work. Similarly, we are interested in how the learners experience the lesson materials. Furthermore, the research questions explore any changes arising from participation in the intervention (short-term outcomes), e.g., whether teachers' knowledge and skills to promote learner engagement and resilience changes and as a result whether learners' engagement and resilience change.

Feasibility of Implementation

- RQ1 In what ways does the training and support provided for expert practitioners enable them to support teachers to implement Can-Do Maths with fidelity?
- RQ2 How acceptable is Can-Do Maths?
    - RQ 2.1 How acceptable to teachers across different college contexts is the model of professional development? What adaptations might need to be made for different contexts, including for different numbers of teachers implementing Can-Do Maths in a single college?
    - RQ 2.2 How acceptable to teachers in different college contexts is the content of the Can-Do Maths professional development? What adaptations might need to be made for different contexts?
    - RQ2.3 How acceptable are the Can-Do Maths lesson activities to teachers? What adaptations were made and what contexts informed those adaptations?
    - RQ2.4 How acceptable are the Can-Do Maths lesson activities to learners, including those from disadvantaged backgrounds? What adaptations might need to be made for different learners to access the activities?
- RQ3 In what ways does the role of college leaders differ in different college settings in enabling teachers to implement the intervention?

Evidence of promise

- RQ4 In what way does teachers' confidence and knowledge change in relation to developing engagement and resilience with GCSE mathematics resit learners?
- RQ5 What is the perceived impact of the intervention on learners' engagement and resilience in maths and, in particular, on learners from socially disadvantaged backgrounds?

Readiness for trial/ Scalability

- RQ6 What outcome measures could be used to assess engagement and resilience?
- RQ7 What fidelity indicators are appropriate for trial at scale?
- RQ8 Is the programme scalable in its current form? What level of programme modification is required for scaling to more colleges, for a trial and beyond?
- RQ9 What costs/resources are required by colleges implementing Can-Do Maths and is this feasible and acceptable, at a larger scale for colleges in different contexts.
- RQ10 What possible barriers or challenges, specific to FE, might be encountered when conducting evaluation research in FE institutions?

Success Indicators

The success indicators (Table 2) will be used to support the evaluation. For these success indicators, engagement and resilience are referred to as defined on page three. Learner engagement will be evaluated by considering learner attendance *and* involvement. Learner resilience will be evaluated by considering learner attitudes to the four factors of the growth zone model and their self-perceptions about attempting GCSE mathematics test items.

Table 2: Success indicators

Pilot criteria	Success Indicators	How to assess this?
Feasibility of implementation	F1a. Expert practitioners report that the training they receive from the developer enables them to support teachers to implement Can-Do Maths. (with some amendments). (RQ1) F1b. Expert practitioners deliver professional development with fidelity. (RQ1 and RQ2.1)	• PD session observations and field notes • Expert practitioner interviews • Developer interview
	F2a. Teaching staff in different college contexts find the content and model of professional development allows them to access the professional development. (RQ2.1 and RQ2.2)	• PD attendance registers (programme monitoring data) • Teacher endline survey • Teacher focus group discussions • Expert practitioner interviews – qualitative themes
	F2b. Teaching staff in different college contexts find the content of the professional development supports them to implement Can-Do Maths (with minor amendments). (RQ2.1)	• Teacher endline survey • Teacher focus group discussions • Expert practitioner interviews – qualitative themes
	F3. College leaders from different college contexts report that Can-Do Maths is implementable and affordable. (RQ3)	• College leader survey • College leader interviews
	F4. Teachers based in different college contexts report the intervention materials support them to implement Can-Do Maths (with minor amendments). (RQ2.3)	• Teacher endline survey • Teacher activity and reflective logs (programme monitoring data) • Case study teacher interviews • Expert practitioner interviews
	F5. Teaching staff based in different college contexts are able to deliver the intended intervention **dosage** within the defined period. (RQ2.3)	• Teacher endline survey • Teacher activity logs (programme monitoring data) • Case study teacher interviews • Expert practitioner interviews

		• Case study college leader interviews
	F6. Teaching staff based in different college contexts are able to deliver the intervention with sufficient fidelity (see page 9). (RQ 2.1, RQ2.3)	• Case study teacher interviews • Expert practitioner interviews • Case study lesson activity observations • Teacher activity and reflective logs (programme monitoring data)
	F7. Learners find the lesson activities enjoyable and engaging. (RQ2.4)	• Learner focus groups
Evidence of promise	P1. Findings indicate that Can-Do Maths has a positive influence on teacher knowledge and skills to promote resilience for leaners in GCSE mathematics classes. (RQ4)	• Teacher baseline and endline survey • Case study teacher interviews
	P2. There are indications that Can-Do Maths leads to improved engagement and resilience of learners in GCSE mathematics resit classes. (RQ5)	• Mathematical Resilience Scale (learner baseline and endline survey) • GCSE question attempts instrument (learner baseline and endline survey) • Learner focus groups • Teacher case study interviews • Teacher endline survey
	P3. There are indications that learners from disadvantaged backgrounds benefit as well as learners from those not known to come from disadvantaged backgrounds. (RQ5)	• Mathematics Resilience Scale (learner baseline/endline survey) • Learner focus groups • Teacher endline survey
Readiness for trial	S1. There is a suitable instrument for measuring impact of learners' resilience. (RQ6)	• Mathematics Resilience Scale (learner baseline/endline survey)

	S2. There are definable fidelity indicators appropriate for trial at scale. (RQ7)	• Programme monitoring data • Expert practitioner interviews • Developer interview
	S3. Can-Do Maths can be scaled for an efficacy trial (with minor amendments). (RQ8)	• All 'evidence of promise' success indicators have been met. • All 'feasibility of implementation' success indicators have been met.
	S4. There is viable strategy for delivering Can-Do Maths at scale. (RQ8)	• Expert practitioner interviews • Developer interview
	S5. There are viable strategies to collect sufficient data to monitor compliance and fidelity. (RQ8)	• Programme monitoring data • Expert practitioner interviews
	S6. Costs and resources identified by college leaders are feasible and acceptable at a larger scale. (RQ9)	• College leader surveys • College leader interviews
	S7. Potential barriers to conducting trials in further education colleges have been identified with possible remedies. (RQ10)	• Standing item in developer-evaluator meetings • Evaluator team meeting notes

Methods

Recruitment

IOE recommended to the developers (ETF) to recruit between 24 and 32 teachers who teach GCSE maths resits classes to 16–19-year-olds from between 16 and 20 GFE colleges across England. This number assumes 35 learners per teacher and was agreed with the developer based on their knowledge of the FE sector. Based on this assumption, this profile will produce a minimum sample of 800 learners, powered to detect a Cohen's d effect size (d= 0.2) for our statistical analysis of any differences between pre- and post-test responses in a learner resilience measure. This figure also allows for an estimated attrition of 25% for November resit and 50% at endline during the intervention. If the developers recruit 16 colleges but do not yet have 24 teachers and 800 learners, recruitment will continue until both 24 teachers and 800 learners have been recruited.

Teachers are eligible to participate if they teach GCSE mathematics resit classes for 16–19-year-olds in GFE college settings in England. Teachers must teach at least one GCSE mathematics resit class and should not have previously participated in the Motivation and Engagement large scale research project (CfEM). Teachers cannot be participating in any other mathematics evaluation or trial in the academic year 2025-2026. Colleges leaders may nominate one or two teachers to take part in the intervention and evaluation. Teachers on part-time contracts are eligible to participate but are expected to attend all the professional development activities over the course of the year and use the lesson activities as intended.

IOE recommended that ETF use an opportunistic sample of teachers in order to enable the intervention to be implemented under the most favourable conditions. Learners will be convenience sampled based on their allocation to classes that the participating teachers teach. For the evaluation, teachers may use the lesson activities with one or two of their GCSE maths resit classes. The developer agreed that setting a maximum of two classes would ensure that the burden on teachers to report and reflect on the implementation of the lesson activities [ETF programme monitoring data] was not too high. However, allowing teachers to use the lesson activities with more than one class allows flexibility for recruitment to reach the required number of learners for the pilot evaluation. If a teacher has more than one GCSE resit class, they can decide which one or two of their classes to include for the evaluation. Since classes are not the unit of analysis for the evaluation this sampling approach is suited to convenience sampling. On IOE's behalf, ETF will ask the teachers how many GCSE resit classes they teach, whether they will use the lesson activities with one or two classes and ask them to indicate characteristics about their class(es) (e.g. how they are grouped - by prior GCSE mathematics attainment, mixed prior attainment and/or vocational courses). Learners in the teachers' class(es) will be informed about the pilot evaluation and will be given the right to withdraw from participation in the study before the intervention begins in classrooms. This means that they will still attend their usual maths class but no data will be collected about them for the pilot evaluation. IOE define the learner sample as learners in these classes, who have not withdrawn from the study on the 26th September 2025. In January 2026, teachers will report any learners who, in November 2025, were entered for the GCSE maths resit *and* achieved a grade 4 or higher in order to withdraw them from the pilot evaluation.

Colleges will receive a remission payment of £2,057 per teacher to fund cover time for them to be trained to deliver the intervention. The college will nominate a *key teacher* to support the evaluation activities. This teacher may be participating in the intervention; however, this is not a requirement. Other incentives for participating in the following evaluation activities will also be made:

- Teacher surveys: Teachers who complete **both** base and endline surveys will be entered into a prize draw to win one of two available £50 vouchers.
- Learner survey administration: £25 voucher for key teachers.
- Case study colleges: Key teacher in each case study college (6) receives a £150 voucher to reflect the preparation needed to host the case study visits.

Measures

The theory of change suggests that when learners participate in Can-Do Maths this leads to improved engagement and resilience. Improvement in engagement and resilience means learners may be willing to attempt more questions in their GCSE maths examination and also those questions worth higher marks. IOE will use a single paper-based learner survey at baseline and endline to test two instruments suitable for measuring learner resilience according to the Can-Do principles. IOE will do this by utilising the Mathematical Resilience Scale (MRS) validated by Kooken, J., et al. (2016), drawing on the seven items from the *growth* domain, rated using a Likert 1-10 scale (see Appendix C for the whole instrument including the additional domains of *value* and *struggle*). The scale was chosen because the definition of resilience underpinning its development was closely associated with the theories underpinning the Can-Do Maths intervention, i.e. the Growth Zone Model (Johnston-Wilder et al. 2016; Apostolidu, M., & Johnston-Wilder, S., 2023). The instrument was validated in the US with college students. These students had a higher level of mathematical proficiency than the learners in this evaluation, however we anticipate that this is still an appropriate instrument to determine a change in learners' perceptions of resilience.

The second instrument will be administered immediately after the MRS measure. This will be developed by the IOE evaluation team and will survey learners' views at baseline and endline on the likelihood of them attempting 12 GCSE maths foundation paper items. The items will represent a range of mathematical topics and award different numbers of marks. Learners will be asked to indicate, using a Likert scale 1-10, the likelihood of them attempting the question. The learner baseline and endline surveys will be administered by the intervention teachers in their maths lessons and processed externally by a UCL-approved supplier.

In the learner baseline survey, we will ask learners to indicate whether they have ever been eligible for free school meals in order to explore the impact of the intervention on learners from known disadvantaged backgrounds and the grade awarded for their most recent GCSE maths examination. Learner responses at endline will be compared to their baseline responses to explore any changes.

The theory of change suggests that teachers will improve their knowledge of the theories underpinning Can-Do Maths. The teachers will complete a baseline and endline online survey including 2-3 items that address the specific knowledge that the developer considers the teachers will gain through participating in the programme. [e.g., a set of terms and/or concepts of which teachers rate their familiarity, understanding and confidence in using in the classroom]. The evaluation team will work with the developer to agree these items. Teacher responses at endline will be compared to their baseline responses to explore any changes.

Data Collection

This evaluation will draw on several research methods to answer our key research questions (table 2). These data collection methods are described in more detail below. Some research methods will use participants sampled from the main study population (teachers and learners) or research settings (colleges). Appendix D summarises the different sources of data and the

number of sources of each kind of data that will be collected according to the three pilot criteria. The sampling approaches for these data collection methods are described first.

Sampling

Case study colleges: In the teacher baseline survey, we will gather information about their college contexts to profile colleges by characteristics such as number of GCSE resit classes, number of part-time/ full-time teachers who teach GCSE maths resit, approximate number of GCSE learners in the last three years, whether maths is taught in vocational areas or not, the grouping practices to allocate learners to classes and selection practices of learners for the GCSE maths November resit. IOE will also establish from the college websites how many college sites (campuses) are associated with the college. IOE will use this data to purposively identify six case-study colleges representing, where possible, varied profiles.

Learner focus groups: Learner focus groups of four learners (aged 16-19) per lesson will be opportunistically sampled on the days of the observations.

Professional development sessions: A sample of professional development sessions will be observed. These will be purposively sampled to ensure that all modes of the professional development model are observed at least once e.g., online training, cluster groups (autumn/spring) and x3 individual support (online or face to face).

Teacher focus groups: One teacher focus group per expert practitioner will be opportunistically sampled from the expert practitioners' cluster groups, involving 12 teachers in total[5]. The focus groups will be formed to capture views of teachers with different backgrounds, college contexts and levels of teaching experience and may or may not include teachers from case study colleges.

College leaders: One college leader/ manager in each participating college, who is responsible for GCSE maths resits will be nominated by the college key teacher.

FEASIBILITY

- Members of the IOE evaluation team will observe seven instances of the professional development model across the autumn and spring terms (e.g., x1 online training (autumn), x3 cluster groups (autumn/spring) and x3 individual support (autumn/spring) to inform the discussion with teacher focus groups in spring 2026 and the interviews with expert practitioners in summer 2026. Observation protocols will be developed to focus attention on the delivery and content of the professional development support activities.

[5] The number of cluster groups will be determined by ETF after recruitment.

- In late spring 2026, IOE will form online focus groups of teachers drawn from each of the expert practitioner's cluster groups to explore detailed perceptions of acceptability of the different components of the professional development model (e.g. online training, cluster groups and individual support) and its content. Issues arising from the focus group discussions will inform item design in the teacher endline survey. Interviews will be video recorded in MS Teams and informed consent given.
- IOE will conduct an online survey of all teachers at the end of the intervention in summer 2026 after the GCSE examinations have come to an end, to rate the acceptability of the components of the professional development model and its content and, to rate the acceptability of the intervention materials, including the lesson activities. IOE will also ask teachers in this survey to report which lesson activities they used and how often, to rate the lesson activities in terms of their usefulness and ease of use, and to indicate the extent to which they adapted the activities for their own context.
- IOE will gather teacher attendance data from ETF to determine how many teachers attended each of the different professional development activities over the course of the intervention.
- IOE will gather teacher lesson activity logs and reflective logs from ETF where teachers will have reported which intervention sessions they have used and when and how well these went.
- IOE will gather end of programme monitoring data, such as satisfaction surveys from ETF to triangulate teachers' responses with our own survey data.
- In summer 2026, IOE will gather information about the role of college leaders in supporting teachers to implement Can-Do Maths. IOE will survey online one college leader in each college, to gain a broad understanding of relevant issues and considerations (rather than over-infer statistically from a small sample).
- IOE will interview college leaders. This will include an exploration of any interesting outcomes from our initial analysis of the college leader survey. These interviews will assist us in understanding the college leader survey responses, enable us to explore any adaptations or mechanisms needed to accommodate the intervention implementation at college-leadership level. Interviews will be video recorded in TEAMS and informed consent given.
- IOE will visit the six case study colleges in autumn 2025 and spring 2026 to observe and discuss how teachers tailor the Can-Do Maths lesson activities and embed the principles and teaching techniques into their practice. IOE will observe the interventions being used in one lesson per teacher, per visit in each college, conduct post-lesson teacher interviews and gather the lesson materials used in the observed lesson.
- IOE will interview teachers in case study colleges to find out how acceptable the Can-Do Maths lesson activities are for their context and we will also explore with teachers what adaptations might be needed for different learners to access the activities. Case study teacher interviews will be audio recorded and informed consent given.
- IOE will meet with learners in focus groups of four learners per lesson in case study colleges to find out how acceptable the Can-Do Maths lesson activities are to learners, including those from disadvantaged backgrounds (by self-reporting their eligibility for

free school meals when they were in secondary school). IOE will also explore what adaptations might need to be made for different learners to access the activities. Learner focus groups will be audio recorded and informed consent given.

- At the end of the intervention, IOE will interview the expert practitioners to understand perceptions of the operational feasibility of the professional development model, in particular how teachers made use of the ad-hoc availability of expert practitioners. IOE will ask expert practitioners to describe their prior experience of supporting teachers in colleges, their views on the training they received to support teachers to implement Can-Do Maths and the extent to which it prepared them for their role. Interviews will enable us to explore the issues raised for the expert practitioners to inform future training of others if the intervention was to be scaled up. Expert practitioner interviews will be video recorded in MS Teams and informed consent given.

EVIDENCE OF PROMISE

- IOE will conduct online baseline and endline surveys with teachers to capture their confidence in and knowledge of developing learner engagement and resilience. IOE will use this to explore any changes in teacher confidence and knowledge. IOE will also ask teachers to report in the endline survey whether there has been any perceived impact on learners' engagement and resilience and ask teachers in interviews at case study colleges to give examples of any observed changes in different learners' engagement and resilience.

- IOE will use paper-based baseline and endline surveys with learners, administered in their maths classes by their teacher to gather their perceptions on their resilience. The two instruments included in the learner surveys are described in the 'Measures' section above. For the baseline survey, learners will also be asked to indicate whether they were ever eligible for free school meals when they attended secondary school. Key teachers will be responsible for overseeing the administration and will be provided with clear instructions about how to ensure the learner surveys are completed to avoid bias. The survey will be processed by a UCL approved supplier in partnership with members of the evaluation team who will print, distribute and arrange secure collection of the surveys. Learner responses will be collated and shared with the IOE evaluation team for analysis. To assist with matching learners who have completed the learner baseline with their endline surveys we will ask colleges to return learner first and last names along with their allocated class and teacher in October 2025 when classes are settled. This will enable each learner to be given a unique identifier for the endline survey administration and analysis.
- When IOE visit the six case study colleges in autumn 2025 and spring 2026, we will ask teachers in the teacher interviews to compare how the observed lessons were different from their practices prior to engaging with Can-Do Maths.
- In the learner focus group discussions at case study colleges IOE will discuss with learners their perspectives on how participating in the intervention activities has impacted on their engagement and resilience.
-

- In the teacher focus groups in spring 2026, IOE will explore barriers and facilitators to learner engagement, including those from socially disadvantaged backgrounds and use their experiences to inform the summer 2026 teacher survey.
- In the college leader interviews IOE will explore whether there were any unintended financial or other costs incurred by the colleges informed by surveying college leaders about this.
- We will use a learner base line and endline survey to test an outcome measure for assessing engagement and resilience.
- At the end of the intervention, IOE will interview the expert practitioners to determine the extent to which they were able to deliver the professional development sessions with for teachers with fidelity and whether there would be any implications for delivering the professional development sessions at scale, including the systems in place for collecting programme monitoring.
- At the end of the intervention, IOE will interview the ETF team to understand their strategy for delivering Can-Do Maths at scale, e.g. exploring expert practitioner capacity/recruitment, quality assurance processes and programme monitoring processes.
- The IOE will maintain meeting and research notes to capture any barriers or possible challenges experienced during the research process.

Data analysis

Teacher, learner and college leader surveys will be analysed quantitatively using descriptive statistics where appropriate, with care taken not to over-infer from small sample sizes. IOE will analyse the Mathematical Resilience Scale (MRS) (Kooken, J., et al., 2016) and GCSE-Attempt base and endline learner responses to detect if there is any effect size (Cohen's d=0.2). IOE will also use the GCSE-Attempt responses to explore whether there is a change in reported likelihood of learners attempting items that award higher marks. IOE will also analyse the outcomes of the MRS to assess instrument behaviour with the pilot population of learners. For example, we will assess consistency of responses using Cronbach's alpha and likely level of discrimination of effects. Since these instruments are being used to demonstrate evidence of promise and the MRS is being tested as a suitable outcome measure for resilience, the results of the analysis will not be used to assert any causal claims.

Six within-college case studies will be produced from lesson observations, interviews with teachers and college leaders, teacher activity and reflective logs, and learner focus groups. These data will be analysed through considering the case study data longitudinally (over the two visits) initially, utilising a mixture of structural codes based on the interview protocol and lesson observation protocol, deductive codes based on the theory of change and inductive codes from the data. IOE will undertake qualitative content analysis where appropriate (Mayring, 2023) to interpret the implementation of the lesson activities in phase one and the embedding of the principles in phase two. Interviews will be interpreted and analysed based on the principles of reflexive thematic analysis (Braun & Clarke, 2022). Additional interview data (e.g. teacher focus groups, expert practitioner interviews and the developer team

interview) and further observational data (e.g. of training/ professional development support sessions) will also be analysed using structural codes (based on respective protocols), deductive codes based on the theory of change and inductive codes from the data. The data will be triangulated with themes generated from the within-college case studies, allowing a further iteration of themes. IOE will pay close attention to data integration in response to themes that we identify from our on-going analysis and in the order that data is collected.

Analysis of observations of professional development and initial case study visits (December 2025) will inform protocol development for the phase two case studies, teacher focus groups, college leader interviews and teacher endline surveys.

Programme monitoring data such as satisfaction surveys and teacher activity and reflective logs will be analysed descriptively and triangulated with teacher survey and interview findings.

The IOE evaluation team will answer RQ 6, 7, and 10, by drawing on the aggregate data from the methods outlined above, the IDEA workshop and comparisons to the proposed Theory of Change.

Deductive and structural codes will be discussed and agreed amongst the IOE evaluation team before coding begins. Coding of qualitative data will be conducted by three members of the IOE evaluation team. Each team member will be responsible for coding complete sets of data (e.g. all lesson observations) to ensure consistency in coding. Initial coding of data sources (e.g. two lesson observations; two teacher interviews) will be double coded and discussed to quality assure interpretations of the deductive and structural codes. inductive coding will not be double coded since it is generative from a small number of case studies.

The findings will be considered within the context of the theory of change described in the logic model. For instance, by identifying relationships between input factors that facilitate (suggesting mediators) or cause barriers to (suggesting moderators) achieving any intended outcomes.

Ethics and registration

The evaluation will be conducted in line with the BERA (2024) Guidelines on Research Ethics and has been approved by the IOE Research Ethics Committee with reference REC2113. A number of important ethical issues are likely to be encountered during this research and we have planned for mitigation as follows:

Learners may have negative associations with mathematics. They will be reassured in the information sheet that the intention of the pilot intervention is to help them to do better in their GCSE maths resit. In relation to the evaluation, the resilience measure (within baseline and endline surveys) asks learners to indicate how confident they would feel at having a go at mathematics problems and does not require them to do the mathematics. The baseline and endline surveys will take place in their mathematics class, administered by their mathematics teacher in order to maintain a ‘natural setting’ for this part of the data collection.

IOE will reassure learners in the participant information sheet that lesson observations and interviews will focus on the intervention rather than of them as individuals. Furthermore, when

interviewing learners, researchers will be sensitive to their situation in order to actively engage them in the research activities. When an adult researcher interviews young people, there can be issues associated with power differentials, leading to reduced engagement in the research activities. Learner focus groups will enable learners to benefit from being amongst peers during the conversation with the researcher. The learner focus group discussions will be conducted during the learners' usual mathematics lessons and in a familiar physical space within the college. Learner focus groups will comprise four learners between the ages of 16-19, the researchers will interview the group in accordance with the requirements of colleges' safe-guarding policy, this might be in the presence of other college staff but not where the learners' teachers can hear what their learners say. For instance, we might interview the learners in a corner of the college canteen.

All participants should consent to taking part in the study. College principals/CEOs have been invited to sign their college up to the study through returning a completed Memorandum of Understanding. In addition, learners will be informed of the research through information sheets distributed by colleges either in paper format or digitally, along with withdrawal (opt-out) forms. Learner and teacher consent for baseline and endline surveys will be sought within each survey, making clear that they do not have to participate and that there we will be no negative impact on them of doing so.

Data collection from case study visits (lesson observation, teacher interviews, learner focus groups, teacher focus groups, interviews with college senior leaders and expert practitioners) and interviews involves more active participation. To this end, we propose to collect unambiguous consent from participants for each of these evaluation activities using information sheets and consent form which have been approved by the UCL research ethics committee). IOE recognises the potential power relations within all aspects of this study and will make clear to all participants that the intention is not to judge or evaluate them directly, but to investigate the feasibility and potential of the pilot intervention.

Data protection

The data controller for this project will be University College London (UCL). ETF will be a data processor for the evaluation. The UCL Data Protection Office provides oversight of UCL activities involving the processing of personal data and can be contacted at data-protection@ucl.ac.uk. UCL's Data Protection Officer can also be contacted at data-protection@ucl.ac.uk. Data sharing agreements will be in place with the developers (ETF), the organisation processing learner baseline and endline surveys, the interview transcription service and Marie Joubert (as an independent researcher working on the Can-Do Maths evaluation for the IOE). IOE will ensure data quality and accuracy through triangulation of data sources (e.g. between schools, ETF and UCL).

Participants will be informed of data protection and processing along with information and consent forms discussed above (under ethics). Personal data will be treated with the strictest confidence and will be stored in accordance with data protection legislation, including the General Data Protection Regulation (GDPR). Personal data will be processed as per condition 6(1)e of the GDPR under public interest purposes, because the legal basis for undertaking the research is considered to be a "task carried out in the public interest". IOE will not collect any

Special Category Data within the project. Participants will be made aware that they can withdraw their data at any point prior to analysis for the project report. All personal information (e.g., names, email addresses and learners' self-declared prior eligibility to Free School Meals) will be stored by the evaluation team within UCL's secure Data Safe Haven. The learner baseline paper-based survey containing learners' self-declared prior Free School Meal status will be destroyed by the appointed contractor after the data has been processed and they will send us a Certificate of Data Destruction. All data will be pseudonymised prior to analysis, and participants and colleges will not be identifiable within any reporting of results. Results may include short quotations from interviews, where no-one can be identified. Risk of disclosure within reporting will be checked, for example by suppressing or reducing reporting of college characteristics in the case of small sample sizes of survey respondents.

After findings are disseminated, data will be anonymised and stored securely for 10 years. After the evaluation is complete, data will be retained for research purposes such as presentations at professional or academic conferences or publications in professional or academic journals.

Further information on how UCL uses participant information can be found here: https://www.ucl.ac.uk/legal-services/privacy/ucl-general-research-participant-privacy-notice.

Personnel

The Can-Do Maths **delivery** team includes the following:

Nicola Pearton is an Education Advisor for maths. She will lead on the adaptation of the intervention materials, the design of the training and support plan for teachers and will support with the recruitment of colleges.

Dr Carla Barrett is Head of Evaluation and Impact at ETF. She will advise from ETF's perspective on the design and delivery of the evaluation and reporting.

Nicola Meredith is a Programme Manager at ETF and is responsible for overseeing the implementation of Can-Do Maths and working with Nicola Pearton on the recruitment of colleges.

*Nadine Muhan i*s a Programme Officer at ETF and will work closely with Nicola Meredith to support with the mobilisation and delivery of the Can-Do Maths programme.

Natacha Shakil will be a Can-Do Maths expert practitioner.

Masha Apostolidu will be a Can-Do Maths expert practitioner.

The Can-Do Maths **evaluation** team includes the following:

Dr Laurie Jacques is a Lecturer in Mathematics Education at UCL IOE - Faculty of Education and Society. She will lead the evaluation, prepare the study plan and contribute to the collection and analysis of the qualitative data and lead on the report writing.

Dr Mark Hardman is Associate Professor in the Centre for Teachers and Teaching Research (CTTR) at UCL IOE - Faculty of Education and Society. He will assist Laurie Jacques' leadership of the evaluation, including preparing the study plan and contributing to the design of the IPE instruments and report writing.

Dr Marie Joubert is an independent mathematics education researcher contracted by UCL IOE - Faculty of Education and Society. She will contribute to the design and implementation of the qualitative aspects of the evaluation, contribute to the collection and analysis of the qualitative data and case study writing.

Dr Nicola Bretscher is a Lecturer in Mathematics Education at UCL IOE - Faculty of Education and Society. She will lead on the planning, design, analysis and reporting of the surveys.

Professor Jeremy Hodgen is a Professor of Mathematics Education at the IOE, UCL's Faculty of Education and Society and at the Observatory of Mathematical Education at the University of Nottingham. He will provide a mentoring role, providing advice and guidance to Laurie Jacques, on the leadership and management of the project, the monitoring, planning, design and implementation of the IPE and report writing.

Professor Becky Taylor is Professorial Research Fellow in the Centre for Teachers and Teaching Research (CTTR) and Academic Head of Engagement and Impact at UCL IOE - Faculty of Education and Society. She will provide a quality assurance role of the study plan and the evaluation project.

Research Assistant UCL IOE will appoint an early career research assistant to support various aspects of the pilot evaluation implementation including overseeing administrative duties such as arranging field visits, organising qualitative data as well as supporting the administration of the online surveys.

Risks

Risk	Likelihood	Impact	Action
Failure to recruit colleges	Moderate	High	• Establish timeline for recruitment involving a variety of methods. • Regular ETF and IOE team contact.
Attrition of colleges	Moderate	Moderate/ High	• Over recruitment of two colleges has been included in the recruitment numbers. • Appropriate financial incentives • Regular contact with pilot colleges • Regular ETF and IOE team contact.

Colleges do not provide the learner data	Moderate	High	• MOU clearly states expectations as part of participating (including evaluation incentive for key teacher). • IOE/ETF video record briefing during the first training session outlining the requirements and timings for the evaluation for the key teachers and participating teachers. • Regular ETF and IOE team contact. • IOE ensures that the data transfer instructions are clear and straightforward. • IOE and ETF build a positive working relationship with the key teacher at each college. • IOE RA staff time dedicated for chasing late returns from colleges.
Poor response to evaluation activities including interviews/ surveys/ case studies	Moderate	High	• IOE and ETF to build a working relationship with the key teacher at each college. • MOU clearly states expectations as part of participating (including evaluation incentive for key teacher).IOE/ETF co-produce a video recorded evaluation briefing for key teacher on the requirements and timings for the evaluation. • Regular ETF and IOE team contact. • IOE RA staff time dedicated for chasing communications/late returns from survey respondents. • Voucher prize draw incentive for teacher survey. • Clear and simple collection methods. • Timings and completion window are set to take account of other possible college-related priorities.
Attrition of learners including through non-	Low	High	• Estimated attrition of 25% for November resit and 50% at endline factored into learner sample calculation.

attendance on the survey days			
An expert practitioner becomes unwell or unable to support the teachers	Low	Moderate	• Capacity within the core ETF Can-Do Maths team to reallocate staff to fulfil expert practitioner role.
Loss of IOE staff	Low	Moderate	• IOE has a large staff team and would reallocate staff

Timeline

Dates	Programme Activities (ETF)	Evaluation Activities (All colleges) (IOE)	Evaluation Activities (Case-study colleges)
November 2024	Recruitment begins		
June – July 2025	Two half day online professional development (PD) sessions	Teacher context (baseline) survey (prior to programme activity starts) (Evaluators will observe a sample of PD sessions)	Case-study colleges selected and MOU addendum in place
September - November 2025	One half day online professional development session Delivery of phase one lesson activities over a seven-week period Professional development support: • Five cluster group sessions of two hours	Learner participant information sheets circulated with selected class Learner information sent to evaluation team Learner baseline surveys in college (early October) (Evaluators will observe a sample of PD sessions)	Key teacher liaises with IOE to arrange field visits in autumn 2025 Case-study colleges field visits 1: Can-Do activity observation; learner focus group discussions, teacher interviews

	• One face-to-face visit from expert practitioners • Ad hoc support sessions with expert practitioner as needed		
December 2025 – January 2026	Reflection and planning for phase two of intervention: One individual support session with assigned expert practitioner.	(Evaluators will observe a sample of PD sessions)	Key teacher liaises with IOE to arrange field visits in spring 2026
January - March 2026	Delivery of phase two lesson activities over a seven-week period. This involves two lesson inputs and teachers' own integration of the techniques introduced in phase one into wider teaching Professional development support: • Three cluster group sessions of two hours • Four individual support sessions from assigned expert practitioners • Ad hoc support sessions with expert practitioner as needed College submits a remission claim form (January) and ETF administers remission payments (February)	Colleges notify IOE of Successful November resits by 15th January Learner endline survey in college (late March/ April) Teacher focus groups online (Evaluators will observe a sample of PD sessions)	Case-study college field visits 2: Can-Do activity observation; learner focus group discussions, teacher interviews

	following the approval of the form		
June- July 2026		College leader survey Teacher endline survey	College leader interviews

Date	Other evaluation activity
August-Sept 2026	Data analysis
October 2026	Draft report
March 2027	Final report

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Appendix A – Contextual Assumptions

Assumptions Log 1: Contextual Assumptions			
		Assumption strength - How strong do you think your assumption is? Green – This assumption will hold in the vast majority of circumstances where the programme is delivered Green/Amber – This assumption will hold in most of the circumstances where the programme is delivered Red/Amber – This assumption will often not hold in the circumstances where the programme is delivered Red – There is a good chance of this assumption not holding / do not know whether this assumption will hold or not	Assumption risk - If this assumption does not hold, how much of an impact on programme delivery with fidelity to the original design? Green – The programme could continue to be delivered with very minor impact Green/Amber – The programme could continue to be delivered, but the impact would be substantial Red/Amber – The programme could continue to be delivered, but without fidelity to original design Red – The programme could not be delivered
#	Contextual Assumption	Assumption Strength	Assumption Risk
1	Expert practioners with knowledge of the theories of resilience and engagement used in the intervention can be recruited to deliver the CPD.	Green	Red
2	Expert practioners will be trained to deliver the CPD.	Green	Amber/Green
3	Expert practioners deliver the CPD with fidelity.	Amber/Green	Amber/Red
4	Teachers can access the CPD and will attend all sessions, or most sessions with Expert Practitioner follow-up, requiring college resourcing to be able to release staff for training (i.e. 'can they')	Green	Amber/Red
5	Teachers sign up willingly to the programme and have line manager and senior manager support (i.e. 'will they')	Green	Amber/Red
6	Teacher interventions are planned effectively to be delivered within normal lesson time and are flexible enough to fit the wide range of FE maths lesson formats, lengths and curriculum coverage.	Amber/Green	Amber/Green
7	Teachers are given enough time and support to change their practice through collaborative planning sessions, workshops, reflection and meetings with expert practitioners	Amber/Green	Amber/Green
8	Learners will engage with the activities, whereas some will not engage with more traditional approaches to delivery within maths classrooms either because of issues distracting them from maths, or because of their attitudes to maths.	Amber/Green	Amber/Red
9	By learners increasing maths resilience and engagement they'll spend more time doing maths and be willing to attempt more questions, therefore gain more marks in the final exams.	Green	Green
10	Behaviour change will result from capability, opportunity and motivation (COM-B)	Amber/Green	Amber/Red
11	Relationships between teacher and learners are positive and this facilitates greater learner engagement	Amber/Green	Amber/Green
12	Contextual barriers (e.g. environment; setting, peer pressure) are significant	Amber/Green	Amber/Green

Appendix B - Causal mechanisms

Causal assumption	Where in the ToC does this assumption occur?	Why is this assumption key for your programme?	What is the underlying evidence behind this assumption?	How strong is the underlying evidence for this assumption?
Remission must be provided to ensure teachers have adequate time to engage fully with the project.	All three Teacher Inputs.	Without remission costed for, leader buy-in and recruitment will be difficult, and teachers will be far less likely to attend CPD sessions and do individual and collaborative planning due to their workload.	This assumption is supported by a range of ETF workforce development programmes for the FE sector, for example Centres for Excellence in Maths. Remission increased the organisational buy in to the opportunity and supported individuals to ensure they have the required time to engage.	Green/Amber Although the body of published research evidence appears to be limited, ETF as the lead workforce development body for the FE sector has extensive experience telling us that this is the case.
Training and support will lead to change in teachers' practice	Training and support are received in Teacher Inputs. Change occurs in both Teacher Outputs, all three short term outcomes	If the training and support provided does not lead to the desired changes in practice, then learners will not receive the intervention to increase their maths engagement and resilience. Between training/support and changes in practice are several steps: successfully engaging teachers to	Previous implementation of this approach under the CfEM programme demonstrated impact on teachers' practice. Pye Tait Consulting (2023). https://www.et-foundation.co.uk/wp-content/uploads/2023/04/CfE	Green/Amber The available reviewed evidence is clear that high quality training and support will lead to positive changes in most teachers' practice.

	and two long term outcomes.	participate in training and support sessions, influence on teacher thinking, application to planning, enacting those plans with enough cohorts of learners over a sufficiently sustained time to embed and make 'business as usual'.	M-scale_up-study-Final-Report.pdf Fletcher-Wood and Zucollo (2020) The effects of high quality professional development on teachers and students, Education Policy Institute/Wellcome https://epi.org.uk/publications-and-research/effects-high-quality-professional-development/ Ofsted (2023) Independent review of teachers' professional development in schools, Ofsted https://www.gov.uk/government/publications/teachers-professional-development-in-schools-phase-1-findings/independent-review-of-teachers-professional-development-in-schools-phase-1-findings	There is convincing evidence that not all training and support (CPD) works well - it depends on how well it is designed. Teachers report CPD as facilitating the updating of knowledge, sharing good practice, providing opportunities for collaboration and aiding reflection and future progress. However, often CPD is too prescriptive to facilitate this. Our programme is deliberately designed to give teachers the flexibility and ownership they need.

			Bartleton (2018) Teacher perceptions of the impact of CPD in FE colleges in the West Midlands, Education Futures, vol 8, British Educational Studies Association "The ability of FE institutions to recruit, retain and develop a highly skilled workforce was the biggest barrier to ensuring that learners are receiving high-quality teaching. CPD was seen by many of the interviewees as vital in bridging this gap, as it equips teachers with the skills to provide learners with effective support, regardless of their own prior level of training" Crisp et al (2023) *Post-16 GCSE Resit Review*, CfE&Y / Warwick Uni / EEF Post-16-GCSE-Resit-Practice-Review.pdf	

			(d2tic4wvo1iusb.cloudfront.net)	
Exposure to activities will lead to positive changes in learners' engagement and resilience	Exposure to activities is in Learner Inputs. Also, the Learner Input box will lead to Learner Outputs, i.e., they will engage, spend time and experience positive interactions - which, in turn, leads to Learner positive changes listed in short- and long-term outcomes.	Learners must see the potential benefits of the activities for themselves, take on board and be willing to practice the strategies. Without this exposure, they will not have the opportunity to develop their engagement and resilience.	Changing habits comes from a very concrete vision of the intended change, learners to feel safe (belonging), develop a positive mindset and address negative self- and societal perceptions (e.g., "I can't do maths"). Ref: O'Reilly et al (2017) *Behavioural Insights for Education*, Behaviour Insights Team, Pearson https://www.pearson.com/content/dam/one-dot-com/one-dot-com/global/Files/about-pearson/innovation/open-ideas/Behavioural-Insights-for-Education-WEB.pdf CfEM action research reports, for example, Fremlin et al (2022) The Power of Coaching https://www.et-foundation.co.uk/wp-	Green The examples in the previous column are part of a large body of international evidence from across all educational phases on interventions (exposure) leading to increased engagement and resilience.

			content/uploads/2023/02/The-Power-of-Coaching_City-College-Plymouth-CfEM-action-research-report-2021-22.pdf Chu (2022). Applying positive psychology to foster student engagement and classroom community amid the COVID-19 pandemic and beyond. *Scholarship of Teaching and Learning in Psychology, 8*(2), 154–163. https://doi.org/10.1037/stl0000238	
An increased and sustained learner 'can do' attitude will lead to improvements in attainment	Both Learners Long Term Outcomes	Learner confidence is essential for them to have a go at more exam questions, giving them a chance of picking up more marks. Without increased and sustained learner 'can do' attitude, learners will continue to skip some exam	Gill (undated webpage) *Why building confidence can benefit learners and help them to achieve*, NCFE and FIKA https://www.ncfe.org.uk/all-articles/confidence-benefits-learners	Green/amber There are varied factors influencing attainment, most are beyond our remit. However, there is a strong body of evidence that confidence is a pre-requisite for

		questions so get zero marks.	*Academic self-belief helps raise GCSE learners' grade*s, Centre for Longitudinal Studies, UCL https://cls.ucl.ac.uk/academic-self-belief-helps-to-raise-pupils-gcse-grades-new-study-finds/ (based on Hanson and Henderson, 2019 https://www.tandfonline.com/doi/abs/10.1080/03054985.2019.1594748?journalCode=core20)	progress in learning and exam performance.

Appendix C Mathematical Resilience Scale

Mathematical Resilience Scale (Kooken, J., et al., 2016). The seven items in the growth domain will be used to test a measure for resilience outcomes. Items will be anglicised, i.e. math will be presented as 'maths'.

Measures: Mathematical Resilience Scale

UCL

Likert-type scale from 1 (*low*) to 10 (*high*)

VALUE	V1	Math is essential for my future
	V2	Math will be useful to me in my life's work
	V3	Math courses are very helpful no matter what I decide to study.
	V4	Knowing math contributes greatly to achieving my goals.
	V5	Having a solid knowledge of math helps me understand more complex topics in my field of study.
	V7	Thinking mathematically can help me with things that matter to me.
	V8	It would be difficult to succeed in life without math.
	V9	Math develops good thinking skills that are necessary to succeed in any career.
STRUGGLE	S1	Everyone struggles with math at some point.
	S3	Good mathematicians experience difficulties when solving problems
	S4	People who work in math related fields sometimes find math challenging
	S5	Everyone makes mistakes at times when doing math.
	S6	Struggle is a normal part of working on math.
	S7	People in my peer group struggle sometimes with math
	S8	People who are good at math may fail a hard math test.
	S11	Making mistakes is necessary to get good at math.
GROWTH	G2	Math can be learned by anyone.
	G3	If someone is not a math person, they won't be able to learn much math.
	G4	If someone is not good at math, there is nothing that can be done to change that.
	G5	People are either good at math or they aren't
	G6	Everyone's math ability is determined at birth
	G7	Some people cannot learn math
	G8	Only smart people can do math.

Resilience
any "behavioral, attributional, or emotional response to an academic or social challenge that is positive or beneficial for development" (p. 303)

Yeager, D., & Dweck, C. (2012). Mindsets that promote resilience: When students believe that personal characteristics can be developed. *Educational Psychologist*, *47*, 302–314.

The positive, resilient outcome can be **proximal** as in improved participation in the classroom, greater understanding of the material, enhanced interest and enjoyment, and improved performance on assessments, or **distal** as in persistence in taking higher levels of mathematics... (p. 220)

Kooken, J., Welsh, M. E., McCoach, D. B., Johnston - Wilder, S., & Lee, C. (2016). Development and Validation of the **Mathematical Resilience Scale**. *Measurement and Evaluation in Counseling and Development*, *49*(3), 217–242. https://doi.org/10.1177/0748175615596782

an instrument that can be used to distinguish students who may be more likely to persist in the study of mathematics when they face setbacks from those who are not likely to persist

Appendix D: Data collection summary indicating the number of data sources collected

Pilot criteria and Research Questions	Data collection methods

Feasibility of implementation
 	
RQ1, RQ2.1, RQ2.2, RQ2.3, RQ2.4, RQ3
	• Expert practitioner interviews (n=2)
	• Observations of teacher training and professional development support sessions (n=7)
	• Attendance records for training and professional development support sessions*
	• Programme monitoring data including teacher activity and reflective logs and satisfaction surveys*
	• Teacher online endline survey (n=24)
	• Online teacher focus group discussions (n=3)
	• College leader online survey (n=16)
	• College case studies [x6 colleges, x2 field visits per college]:
	  • Lesson observations (n=12)
	  • Face-to-face teacher interviews (n=12)
	  • Learner focus groups discussions (n=12)
	• Case study college leader online interviews (n=6)

Evidence of Promise **RQ4, RQ5**	• Teacher online baseline survey (n=24) • Teacher online endline survey (n=24) • Learner baseline paper-based survey: Resilience measures: Mathematical Resilience Scale (MRS) and GCSE question attempts (n=800) • Learner endline paper-based survey: Resilience measures: Mathematical Resilience Scale (MRS) and GCSE question attempts (n=800) • Learner face-to-face focus group discussions in six case study colleges (four learners per group on two visits, including learners previously eligible for FSM) (n=12) • Face-to-face case study college teacher interviews (n=12)
Readiness for trial and scalability **RQ6, RQ7, RQ8, RQ9, RQ10**	• Online teacher focus group discussions (x4 teachers per group) (n=3) • Case study college leader online interviews (n=6) • Learner baseline paper-based survey: Resilience measures: Mathematical Resilience Scale (MRS) and GCSE question attempts (n=800) • Learner endline paper-based survey: Resilience measures: Mathematical Resilience Scale (MRS) and GCSE question attempts (n=800) • Programme monitoring data including teacher activity and reflective logs and satisfaction surveys*

	• Expert practitioner interviews (n=2) • Developer interview (n=1) • Evaluator meeting notes*

* Number of data sources not definable at this stage