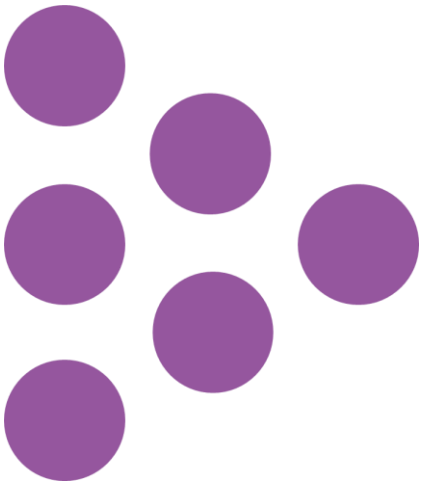
National Foundation for Educational Research

Report

Evaluation of White Rose Maths (WRM) Post-16 Maths Continuing Professional Development (CPD)

Final evaluation report

National Foundation for Educational Research (NFER)



Evaluation of White Rose Maths (WRM) Post-16 Maths Continuing Professional Development (CPD)

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Executive Summary

Introduction

The White Rose Maths (WRM) Post-16 Maths Continuing Professional Development (CPD) programme was funded by the Department for Education (DfE) and aimed to support teachers of GCSE maths resits and/or Functional Skills Qualification (FSQ) maths who were teaching students aged 16-19. The CPD was an important element of drives to improve GCSE maths provision post-16 given students are required to continue studying maths post-16 if they have not achieved a Grade 4 at school and historically very small proportions of post-16 learners achieve the minimum Grade 4 in GCSE maths resits (e.g. 17.1 per cent in 2025).

The CPD was rooted in the mastery approach to teaching maths and was delivered by a team of WRM programme leads. It aimed to support ten teachers in each of 40 further education (FE) colleges nationwide and was delivered in three cohorts between February 2023 and March 2025 (400 teachers in total). The aim was for teachers in each college in each cohort to undertake the CPD programme for 14 months which included three stages: Foundation Stage; Developing Stage; Embedding Stage. CPD participants were also able to access funding for resources to support the implementation of the teaching approaches advocated in the programme.

WRM commissioned the National Foundation for Educational Research (NFER) to undertake an independent evaluation of their post-16 maths CPD programme. The evaluation is based on: interviews with the WRM programme manager; a focus group with WRM programme leads; baseline and endpoint surveys completed by 544 and 301 participants, respectively (including teachers/lecturers and maths subject leads); monitoring information and internal evaluation data collected by WRM; and case-study interviews in six colleges.

Key findings

Programme reach

The programme considerably exceeded targets to work with 40 FE colleges and 400 teachers and in practice worked with 49 colleges (mostly General FE Colleges) and 555 teachers. This, coupled with feedback from college senior leaders and maths leads, indicates a considerable demand for the programme.

Extent of engagement

All 49 colleges that signed up to the programme remained engaged and participated in at least some programme activities as part of each stage, which indicates a high level of retention in this sustained CPD programme. Levels of participant engagement across the programme activities were also generally high with two-thirds of teachers responding to the survey reporting engagement with Foundation Stage modules, over three-quarters engaging with Developing Stage modules, and almost all subject leads (a sub-group of the overall participant sample) reporting engagement to some extent with the Embedding Stage. Where respondents had not fully engaged in the programme, this was typically due to other commitments and priorities.

Reasons for engagement

Participants were particularly attracted to the programme because of the focus on developing practices to better support GCSE resit learners. The reputation of WRM, opportunity for whole-department CPD, and the funding accompanying the training were also key motivators.

Views of the programme

Participants reported high levels of satisfaction with the programme, with the content and delivery widely viewed as high quality. Notable features of the programme included the knowledge and expertise of the programme leads and the opportunity for face-to-face, tailored and whole-department collaborative support and development. Occasionally, participants were less satisfied with the programme and this tended to relate to the mode of delivery (such as the webinars being regarded as less effective than face-to-face sessions), content (which was sometimes perceived to be insufficiently relevant for application in post-16 teaching) and timing (sessions being too long or delivered at times in the year that did not facilitate application in practice, such as late in the summer term when lesson planning for the following year had already been completed).

Adaptations to the programme

The programme was delivered in close alignment to the original design. However, some elements of the programme were refined and adapted by WRM staff during implementation to improve programme effectiveness. This included additional sessions being offered for new staff joining colleges, adjustments to the timing of webinars to make them more accessible, increasing opportunities for interaction in webinars, and clarifying the coaching support available in the Embedding Stage.

Impacts of the programme

Although most participants reported being experienced teachers of maths, there is evidence that taking part in the programme helped to enhance participants' maths subject and pedagogical knowledge, confidence teaching GCSE maths topics, and that it substantially increased confidence, understanding and the use of mastery strategies in GCSE/FSQ maths teaching. Furthermore, most participants reported that they had implemented learning from the programme in their maths practice and that the programme had improved their maths teaching. Around half or more participants rated the quality of their maths teaching higher at the end of the programme than at the start and were more likely to report effectively using manipulatives, supporting students to use problem solving strategies, supporting students to overcome maths anxiety and scaffolding students' learning. This is compelling evidence for the impact of the programme on maths teaching given that most participants were experienced teachers of maths. Most participants agreed that they would continue to use learning from the programme in their maths practice, indicating the changes to maths teaching practice are likely to be sustained over the longer term.

However, impacts may have been less likely where participants felt their existing practices were more effective and matched to their students' needs.

Almost all maths leads reported that the programme had improved their maths leadership and half of maths leads indicated feeling more confident at the end of the programme compared to the start with regards to their role and supporting staff to deliver good maths lessons.

Participants often reported positive impacts of the CPD on students' maths confidence and engagement, and modest impacts on students' maths progress. However, participants were much more reticent about identifying impacts on students' maths attainment, not least because improvements in GCSE maths resit results are very difficult to realise and are likely to be influenced by multiple factors.

It is likely that other sources of professional development (in addition to the WRM CPD), both internal CPD and CPD undertaken externally, may also have contributed to the changes in practice reported in this evaluation.

Facilitators and barriers

The wider factors that facilitated the effectiveness of the CPD were predominantly time and encouragement from senior colleagues to engage in the programme. Factors which impeded the effectiveness of the CPD were staff turnover, insufficient time for implementation and poor student behaviour.

Key learning to enhance the CPD in future

Key learning to inform the future delivery and enhancement of this type of CPD includes:

- opportunities for face-to-face, tailored, sustained and flexible CPD are particularly valued
- pedagogies and approaches presented should be readily adapted to teaching the types of learners in focus
- direct engagement of multiple staff in CPD helps to raise the profile, consistency and embedding of developments.

Conclusions

The WRM post-16 maths CPD has successfully met a particular need for support focusing specifically on teachers of GCSE maths post-16. The programme has been consistently well received and highly regarded by participants and this evaluation has recorded promising evidence of positive impacts on the teaching and leadership of GCSE/FSQ maths post-16. The evaluation evidence endorses the delivery model and sustained nature of the programme and highlights the face-to-face, whole-department and tailored elements as being particularly effective. However, there is scope to further develop the programme by adapting the mastery strategies and approaches to better meet the needs of post-16 GCSE students whose engagement in maths is typically low and who have limited time to learn and apply new strategies before their GCSE retake.

1. Introduction

1.1. About the programme

The White Rose Maths (WRM) Post-16 Maths Continuing Professional Development (CPD) programme was funded by the Department for Education (DfE) and aimed to support teachers of GCSE maths resits and/or Functional Skills Qualification (FSQ) maths who were teaching students aged 16-19.

It is a government requirement that students who do not achieve a Grade 4 in GCSE maths at school should continue studying maths as part of their post-16 programme and, for many, this includes resitting the GCSE. However, the proportion of learners who resit GCSE maths at aged 17 and over and who achieve a Grade 4 is historically very small. In 2025, just 17.1 per cent of learners aged 17 or older taking GCSE maths achieved at least a Grade 4[1]. This is a slight fall from 2024 (17.4 per cent), a slight increase from 2023 (16.4 per cent), but has decreased since pre-pandemic levels (21.2 per cent in 2019)[2].

The WRM CPD was therefore an important element of drives to improve GCSE maths provision post-16. It was rooted in the mastery approach to teaching maths and was delivered by a team of WRM programme leads. It aimed to support ten teachers in each of 40 Further Education (FE) colleges nationwide and was delivered in three overlapping cohorts (400 teachers in total):

- Cohort 1: February 2023 to March 2024 (10 colleges)
- Cohort 2: September 2023 to October 2024 (15 colleges)
- Cohort 3: February 2024 to March 2025 (15 colleges).

The aim was for teachers in each college in each cohort to undertake the CPD programme for 14 months. This included three stages each comprising a number of modules (as described in Table 1). In addition, participants were provided with a journal to record key learning from the training and were encouraged to identify 'gap tasks' to complete in between modules to help incorporate the learning into their practice. Participating colleges could also access funding of £250 per participant (up to £2,500 per college) to spend on resources to support the implementation of the teaching approaches advocated in the programme.

[1] https://feweek.co.uk/gcse-resits-2025-english-and-maths-pass-rates-stable-amid-entries-surge/?mc_cid=e6bd421a26&mc_eid=2541db20f8

[2] https://feweek.co.uk/gcse-resits-2023-maths-and-english-pass-rates-down-again/; GCSE-Full-Course-English-and-Maths-Results-England-Post-16.pdf

Table 1 Programme contents

Stage	Contents
Foundation Stage	Four compulsory modules, delivered via an initial in-person session and three online webinars 1. Exploring the mastery approach 2. Teaching for understanding 3. Metacognition and problem solving 4. Maths anxiety
Developing Stage	Participants selected six modules based on identified needs, delivered via online webinars 1. Double-sided counters 2. Algebra tiles 3. Using bar models to support algebraic understanding 4. Using bar models to support understanding of ratio and proportion 5. Using bar models to support understanding of fractions and percentages 6. Developing algebra 7. Developing number 8. Developing understanding of 2D and 3D shapes 9. Developing understanding of statistics 10. Supporting exam preparation 11. Promoting ownership of learning 12. Developing calculator confidence
Embedding Stage	Tailored coaching, delivered via a combination of remote and in-person support. Each college could access up to 10 hours of support. At the end of the Embedding Stage, WRM programme leads provided personalised feedback to each college, summarising the specific development focus and providing recommendations for sustaining changes to practice. This feedback was provided in the form of a presentation that subject leads could share with their maths department and senior leadership colleagues to report and help embed the progress.

2. Evaluation methodology

2.1. Evaluation design and methods

WRM commissioned the NFER to undertake an independent evaluation of their post-16 maths CPD programme. The evaluation started in January 2023 and continued throughout the delivery of the programme and concluded with this final report of the evaluation findings.

The evaluation aimed to address the following research questions (RQ).

Engagement

RQ1: Why did colleges engage with the post-16 CPD programme?

RQ2: Did the programme achieve the reach it aimed for?

RQ3: How much of the programme did teachers and subject leads engage with?

Delivery

RQ4: What were teachers'/subject leads' views on the CPD modules and coaching received? Was it: relevant to need/of high quality/well-structured/of an appropriate length/effectively delivered? What aspects worked well and less well and why?

RQ5: How did the WRM CPD programme compare to any previous maths-specific CPD which teachers had undertaken?

RQ6: Was delivery adapted in response to internal participant feedback?

Outcomes and impacts

RQ7: Were subject leads able to make changes to practice in their colleges as a result of the support received? What were the facilitators for, and barriers to, this practice change?

RQ8: Were teachers able to make changes to their practice as a result of CPD learning? What were the facilitators for, and barriers to, this practice change?

RQ9: What were the perceptions of the outcomes of the CPD on subject leads (e.g. on their knowledge, skills and confidence in leading change within their department)?

RQ10: What were the perceptions of the outcomes of the CPD on teachers (e.g. improvements in confidence, subject knowledge, pedagogical knowledge, quality of teaching)?

RQ11: What were the perceptions of the outcomes of the CPD on maths departments (e.g. improvements in schemes of work, resources)?

RQ12: What were the perceptions of the outcomes of the CPD on students (e.g. improvements in confidence, grasp and application of maths, and progress)?

RQ13: Did subject leads and teachers receive any other maths-specific CPD whilst participating in the WRM CPD programme? If so, to what extent did this other CPD contribute to the various outcomes reported?

RQ14: What factors (in delivery, in college contexts) facilitated and/or strengthened outcomes? What factors impeded outcomes?

RQ15: How did perceptions of the outcomes vary by amount of engagement?

RQ16: What were the perceptions of the longer-term, quantifiable impacts of colleges' engagement e.g. improvements in teacher retention and student attainment?

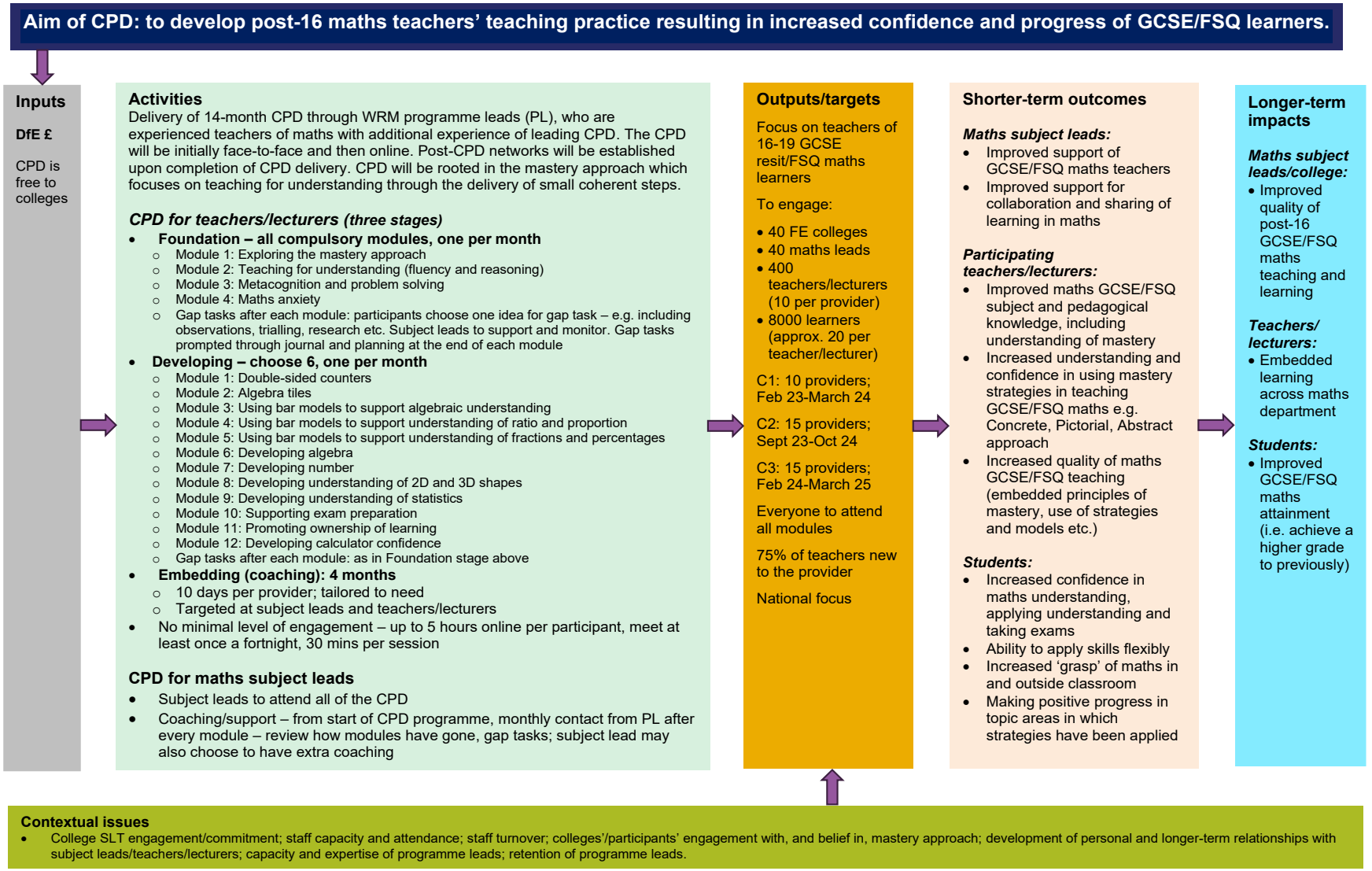
Learning

RQ17: What can be learnt to enhance the delivery of this type of CPD going forwards?

Figure 1 presents the logic model that was developed to underpin the evaluation. It presents a visual summary of the connections between the programme's resources and activities (inputs, activities and outputs) and what it aims to achieve in the short term (outcomes) and the ultimate, longer-term difference it aims to make (impacts[3]). This evaluation report explores the extent to which this intended model for the programme's impact transpired in practice.

[3] It was beyond the scope of this evaluation to explore the longer-term impacts of the programme logic model.

Figure 1 WRM Post-16 Maths CPD logic model



The following data was collected as part of the evaluation of the programme:

- baseline, midpoint and endpoint interviews with the WRM programme manager
- focus group with five WRM programme leads
- baseline survey with 544 programme participants
- endpoint survey with 301 programme participants (259 participants who responded at endpoint had also responded at baseline and their individual responses at each timepoint were matched to see how their responses had changed over time)[4]
- monitoring information and internal evaluation data collected by WRM (college and participant reach and engagement, participant satisfaction)
- six case studies undertaken with two Cohort 1 colleges, two Cohort 2 colleges, and two Cohort 3 colleges involving interviews with six senior leaders (or someone in another role senior to the maths lead), six heads of maths/maths subject leads, 12 maths teachers/lecturers, and focus groups with 39 students aged 16-19 who were resitting maths GCSE (some students had sat the GCSE maths exam more than once previously).

2.2. Survey sample characteristics

All participants were asked to complete a baseline evaluation survey at the start of the programme and, in the majority of cases, participants were asked to complete this during the compulsory first face-to-face training session of the Foundation Stage. At the end of the programme, WRM updated NFER with details of participants, including any who had left the colleges or programme since the start and new participants who had joined the colleges or programme since baseline. These participants were emailed a link inviting them to complete the endpoint survey. Table 2 shows the number of participants in each cohort of the programme who completed evaluation surveys.

Table 2 Number of survey responses per cohort at baseline and endpoint

	Total participants on the programme (N)	Baseline survey response rates			Endpoint survey response rates		
		N	% of total responses	% of cohort population	N	% of total responses	% of cohort population
Cohort 1	124	107	20	86	74	25	60
Cohort 2	188	175	32	93	102	34	54
Cohort 3	243	262[5]	48	108	125	42	51
Total	555	544	100	-	301	100	-

[4] The number of participants answering each individual survey question may be lower than this if participants did not provide a response or were not shown the question due to routing. The number of participants responding to each question is provided in footnotes to the tables and figures throughout the report.
[5] For Cohort 3, the number of baseline surveys received was slightly higher than the total number of participants recorded as attending the first face-to-face session in WRM data shared with NFER. This may be due to additional participants attending sessions and completing the baseline survey, or possibly participants completing the baseline survey at extra 'mop-up' sessions and this information not being available to NFER.

WRM CPD participant registers – number of participants recorded as attending the first Foundation Stage face-to-face module. NFER participant baseline and endpoint surveys, 2023-2025. Percentages may not sum to 100 due to rounding.

Table 3 displays the characteristics of the 49 colleges participating in the programme and shows that most were General FE colleges with 'good' Ofsted ratings serving mixed-gender post-16 students. Survey responses were received from participants in 48 of the colleges.

Table 3 College characteristics – summary

Characteristic	Frequency (N)
Further education type	43 participating colleges were General Further Education Colleges; six were 'other' types of FE (e.g. Academy 16-19 converter, Land-based college, Independent training provider)
Gender of entry	All 49 colleges served mixed (male and female) populations
Phase of education	All 49 colleges served the age group 16 years plus
Ofsted rating	Six colleges were rated 'outstanding'; 38 colleges were rated 'good'; and five were rated 'requires improvement' by Ofsted.

Department for Education's Get Information About Schools, 2025.

Table 4 shows survey participants' characteristics at baseline and the characteristics of those participants who only answered at endpoint to provide an indication of the characteristics of all participants on the programme who completed at least one evaluation survey[6]. The table shows that, while there was some variation in characteristics, the sample of participants responding to the evaluation survey primarily included qualified and experienced teachers who specialised in teaching maths GCSE or FSQ. Survey participants included teachers/lecturers and maths subject leads and, in most cases, their views are reported collectively in this report as 'participants' other than in a small number of instances where subject leads only were asked specific questions. In the case of the latter, caution is needed in interpreting results given the small number of respondents (N=79). Most of the analysis in this report is concerned with how participants' perceptions may have changed over time in relation to maths teaching and learning. As this analysis involved comparing the perceptions of the same participants at each timepoint, any differences observed are not due to variations in the characteristics of the sample over time. Frequencies of responses to these questions can be viewed in Appendix A.

[6] The baseline characteristics are used wherever available even when participants also responded at endpoint as the largest sample was achieved at baseline and most characteristics would not be expected to change substantially over time. Data on participants' characteristics is only taken from the endpoint survey where this was the only evaluation survey the participant completed.

Table 4 Survey sample characteristics – summary

Characteristic	Frequency (%)
Main job role	78 per cent of respondents were teachers/lecturers; 14 per cent maths subject leads; nine per cent 'other' (e.g. maths coach)
Main subject taught	90 per cent of respondents taught maths as their main subject
Maths courses taught	Most respondents taught GCSE maths (87 per cent), followed by Functional Skills Qualification (FSQ) maths (61 per cent), with smaller proportions teaching A-level maths (nine per cent), core maths (5 per cent) and other maths courses (e.g. maths course for speakers of languages other than English, Access course in maths, Stepping Stones maths) (7 per cent)
Highest maths-specific qualification	54 per cent of respondents had a maths degree (or equivalent) or higher qualification; 25 per cent had A-level (or equivalent) maths; 20 per cent had GCSE (or equivalent) maths
Teaching qualification	89 per cent of respondents had a teaching qualification
Length of time teaching at college	16 per cent of respondents were in their first year of teaching at the college; 35 per cent had been at their college 1-4 years; 24 per cent 5-9 years; 24 per cent 10 years or more
Length of time teaching maths	Seven per cent of respondents were in their first year of teaching maths; 19 per cent had been teaching maths 1-4 years; 28 per cent 5-9 years; 45 per cent 10 years or more
Length of time teaching maths GCSE resit or FSQ maths	11 per cent of respondents were in their first year of teaching maths GCSE resit/FSQ maths; 30 per cent had been teaching maths GCSE resit/FSQ maths 1-4 years; 31 per cent 5-9 years; 27 per cent 10 years or more

NFER participant baseline and endpoint only survey responses, 2023-2025. N=575-577

3. Evaluation findings: Engagement in programme activities

3.1. Programme reach

Table 5 shows the number of colleges and participants engaged in the programme in relation to the target numbers. The results show that **the programme met and exceeded targets for Cohorts 1, 2 and 3** in terms of the number of participants and colleges recruited. Forty-nine colleges (mostly General FE Colleges) and 555 participants registered on the programme.

Table 5 Number of colleges and participants

Cohort	Target no. of colleges	Achieved no. of colleges	Target no. of participants	Achieved no. of participants
Cohort 1	10	11	100	124
Cohort 2	15	18	150	188
Cohort 3	15	20	150	243
Total	**40**	**49**	**400**	**555**

WRM CPD participant registers shared with NFER, 2023-2025. Participants registered on programme at the start.

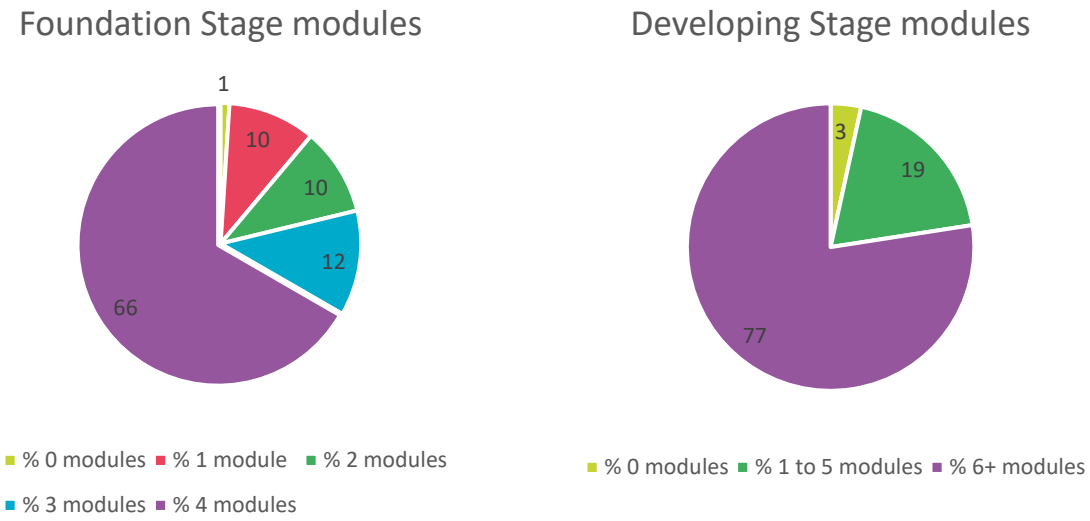
3.2. Extent of engagement in programme activities

As part of the programme, participants in each college had the opportunity to attend four Foundation Stage modules (the first being face-to-face), a choice of Developing Stage modules offered at different times, and bespoke coaching support as part of the Embedding Stage. Each college only took part in one cohort of the programme, although occasionally new staff who joined their college mid-year, and who had missed the initial face-to-face session with their college, were able to join sessions delivered within other cohorts. WRM delivered 76 face-to-face sessions (including initial Foundation Stage sessions, re-run or 'mop-up' Foundation Stage sessions and visits to schools to provide face-to-face training as part of the Embedding Stage) and 118 online webinars (covering Foundation and Developing Stage modules). The programme was delivered to colleges covering a wide geographic spread (eight out of the nine regions of England). As such, **the programme activities were delivered as planned** in relation to the logic model. WRM also made recordings of webinars available following live online delivery and sent reminders on dates of sessions to encourage participants to attend.

The teacher survey indicated **high levels of engagement with each of the three stages of the programme**, with the majority of participants engaging as intended with the Foundation, Developing and Embedding Stages.

Regarding the Foundation Stage, as can be seen in Figure 2, **most respondents engaged with all four Foundation Stage modules** (66 per cent), with smaller proportions engaging in three, two or only one of the Foundation Stage modules (12, 10, 10 per cent respectively). Figure 2 also shows that **most respondents engaged with six or more Developing Stage modules** (77 per cent). Just less than a fifth (19 per cent) engaged with between one and five modules.

Figure 2 Engagement with Foundation and Developing Stage modules



NFER participant endpoint survey, 2023-2025. N=293-7

Almost all subject leads indicated that they had been supported to some extent with coaching offered to their college as part of the Embedding Stage of the programme (98 per cent).

Half of respondents had engaged with the programme gap tasks in between sessions (53 per cent). However, 24 per cent of respondents did not know whether or not they had engaged in gap tasks, suggesting this aspect of the programme could have been clearer. Although participation in this element of the programme seems slightly lower than others, gap tasks were an optional element of the programme rather than a requirement, and may have been defined by participants in different ways (for instance, participants may not have regarded informal 'trialling' of strategies in practice as a gap task).

Overall, **more than half of respondents had engaged at the optimal level required for the programme** i.e. they had participated in all four Foundation Stage modules and six or more Developing Stage modules (54 per cent). The other half of respondents had either engaged optimally with either the Foundation or Developing Stage, but not both (12 per cent and 24 per cent, respectively) and a small proportion had below optimal engagement with both stages (11 per cent). Further details of frequency of engagement can be found in Appendix B.

The main reason respondents gave for below optimal engagement was **other commitments and priorities which prevented them from attending the sessions**.

Evidence from interviews with the programme team and based on the internal monitoring data they collected about participation in all colleges, provides further insight into the extent and nature of engagement with the programme. In interviews, **WRM reported that all 49 colleges that signed up to the programme remained engaged and participated in at least some programme activities** as part of each of the three stages, which indicates a high level of retention in this sustained CPD programme. Participant attendance at the initial Foundation Stage face-to-face session and subsequent webinars was reported to be high as colleges were required to commit to

attendance as part of signing up to the programme. Whole departments tended to be involved in the face-to face-sessions. The programme also required participants to attend a minimum of six Developing Stage webinars and monitoring data indicates high levels of engagement overall (although tracking individual engagement with specific webinars was difficult due to participants joining the programme at different timepoints and having the option to watch recordings of webinars). Some webinars achieved higher attendance than others, particularly those on exam preparation and calculator use, reflecting participants' specific interests. However, all webinars saw reasonable uptake. A couple of colleges had not engaged with the Embedding Stage due to staffing changes, and some colleges had not received all the available support within the original programme timeline. To address this, the programme was extended by four months to the end of the 2024/25 academic year, allowing colleges further opportunities to receive support to embed practices. The Embedding Stage was tailored to each college's needs, typically involving as many staff members within maths departments as possible. Staff turnover in colleges appeared to be the biggest challenge to sustained engagement in the programme.

Interviewed **maths leads reported that they had fully engaged with all stages and activities of the programme**. Generally, **interviewed teachers had also engaged with most of the programme activities**, although this was slightly more variable for online webinars and Embedding Stage activities. Reasons for not engaging with some programme activities included staff turnover and competing priorities that limited availability. Staff illness also prevented attendance at some Foundation Stage modules but teachers appreciated the opportunity to watch recordings of the webinar sessions at another time. Interviewed participants explained how they had chosen which Developing Stage modules to attend based on the needs of the students they taught, personal interests, departmental priorities, and their availability for the scheduled live sessions. Most interviewed participants had also completed the journal booklet provided to record reflections during the training sessions and webinars. **All interviewed participants had also undertaken 'gap-tasks'** by implementing ideas from the training in their own classrooms (discussed in detail in section 5 in relation to changes in practice), although the extent of formal documentation of this activity varied. **In most case studies, the Embedding Stage activities had involved the whole department**, though in one case study it was most appropriate to involve specific staff as the focus was on teaching approaches for low-attaining students. Staff availability and role-type were the main factors influencing which individuals participated in the Embedding Stage activities. Interviewed subject leads described liaising with WRM programme leads to plan and tailor the Embedding Stage activities to address a specific identified need. Case-study interviewees had engaged with various activities as part of the Embedding Stage, including meeting with the WRM programme lead to discuss progress, receiving further face-to-face training and guidance on implementing specific strategies within the college context, reviewing schemes of work (SoW) and being observed teaching lessons.

Case-study interviewees made very **little mention of involvement in post-CPD networks** with other colleges, although they felt they could reach out to the WRM programme lead following the CPD if required. WRM programme leads reported helping some colleges make informal links to network with colleagues in other colleges where there was shared interest.

3.3. Reasons for engagement

The survey indicated that **the most common reason for teachers participating in the programme was that they wanted to better support their students** (69 per cent) **and develop their maths teaching skills** (67 per cent). Interestingly, half of participants (51 per cent) were asked to take part in the CPD, rather than choosing to participate, which may have had implications for the extent of commitment to the programme. Maths leads' most common reasons for participating in the WRM post-16 CPD programme were to improve the quality of maths teaching (82 per cent) and improve students' progress across the department (79 per cent). Frequencies of responses can be viewed in Appendix C.

Interviewed senior leaders, maths leads and teachers explained that their **main motivations for engaging with the programme was to improve teaching practices in GCSE maths resit provision**. In this regard, the specific focus of the training on teaching GCSE maths in post-16 settings was very welcomed. Case-study interviewees reported that they hoped the CPD would develop teachers' practices and some were particularly interested in learning about mastery approaches and alternative pedagogies to improve student engagement and prepare students better for the GCSE assessment. Ultimately, case-study interviewees hoped the CPD would help to increase students' confidence and engagement in maths, leading to more students achieving maths GCSE at Grade 4 or above. Hence, the emphasis of the programme on supporting students to overcome maths anxiety was of particular interest. These aims are expressed in the words of a senior leader from a case-study school:

> *We would like our achievement to go up, our students to have a better experience, to be more motivated, to be more engaged with maths, to look at maths differently. So, we try to use this programme to get new strategies, to upgrade our teachers, to see the impact on the students' behaviour and attitudes towards maths, maths anxiety, motivation, and we wanted our teachers to be equipped with new research, ideas, methodologies.*
>
> College Senior Leader

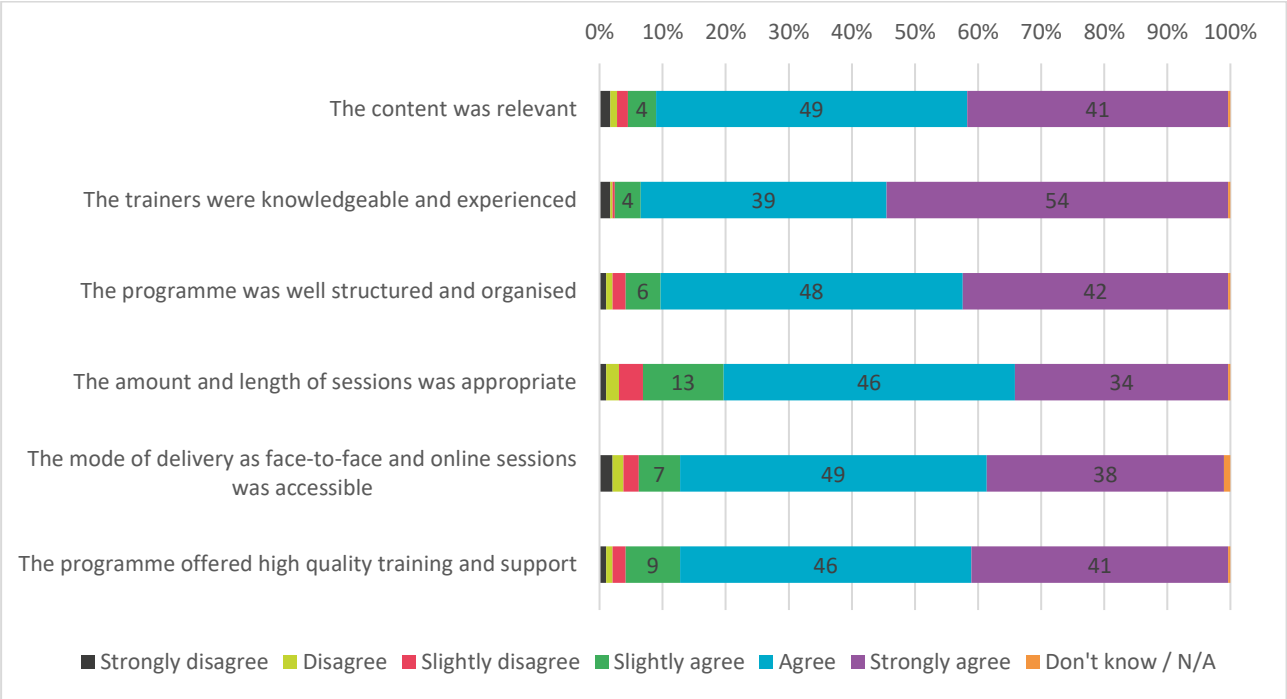
The **CPD was also seen as particularly appealing given that all teachers in the maths department could take part** and that there was funding available for resources. Interviewees also explained that WRM had a reputation for delivering high-quality resources and CPD programmes.

4. Evaluation findings: Views of the CPD

4.1. Participants' views of the CPD

Participants were asked in the endpoint survey to rate the extent to which they agreed or disagreed with a series of statements to indicate their satisfaction with the programme. Figure 3 shows that **the vast majority of respondents were positive about all aspects of the programme, indicating high levels of satisfaction**.

Figure 3 Participants' satisfaction with the programme



NFER participant endpoint survey, 2023-2025. N=290

This positive experience demonstrated in the survey was **strongly echoed by interviewed participants, who regarded the programme's content and delivery as high quality.** Case-study interviewees highlighted several aspects of the programme that worked particularly well. This included **face-to-face training** in the colleges, which provided the opportunity for whole maths departments to reflect on, and develop, their maths practice and strategies collaboratively. As one teacher explained:

> *My overall impression of the White Rose training is very good. Some of it is absolutely excellent, particularly the face-to-face. That is a really, really good way of delivering CPD and ensuring that not only do we understand it but we had practical opportunities. The whole day was just tremendous, one of the best CPD days that I've had.*
>
> College maths teacher/lecturer

The **organisation and structure of the programme** with comprehensive content, different modes of delivery, appropriate timing and scheduling of activities, and effective communication from a WRM programme lead assigned to each college were highly praised features of the programme and made it accessible. The **flexibility** for participants to attend most of the webinars in their own time and remotely was also appreciated. Participants noted the effective balance of core modules and modules that individuals could choose depending on their needs. The **bespoke nature of the programme**, with tailored support to address college and departmental priorities within their specific contexts, was also praised.

All three stakeholder groups (college senior leaders, maths leads and maths teachers/lecturers) reported that they **found the WRM programme leads to be highly engaging and knowledgeable about teaching maths**, as well as being enthusiastic, personable and supportive. Participants appreciated the leads' maths expertise and specialism, as noted by a teacher:

> *Maths taught by maths teachers, by maths specialists really comes across and that's one of the beautiful things that they did, with White Rose it was very, very maths.*

College maths teacher/lecturer

WRM programme leads' visual and practical style of delivery was also praised, along with their measured approach to content delivery which avoided the training being overwhelming. College staff noted the consultative nature of the training in that programme leads gave attention and space to what participants wanted to learn, for example, in the Embedding Stage:

> *The team all enjoyed it because he* [WRM programme lead] *was there to* [say] *'Do you think this will work?' As the expert, it was nice to have him/her there. People were asking him/her questions about what they could do for this topic just to make it less chalk and talk and more interactive.*

College Maths Lead

A common theme of feedback among case-study interviewees was the **high quality of the programme's maths teaching strategies and resources** that were easy to implement and incorporate within practice and which included relevant examples. As one college maths teacher/lecturer explained:

> *They give you examples and time to explore it. I like that they give us ideas on how to actually teach it, not just say 'This is what we do, these are our resources, use them.' It's more dynamic than that.*

College maths teacher/lecturer

Similarly, there was appreciation of the practical suggestions for supporting students, as conveyed by one maths lead:

> *The algebra terminology activity was really useful. I actually use it with my students now to get them to understand what the definitions and terminology*

means. I can always see the impact of what we are being taught in the White Rose programme, and how it can be implemented, how to help the students.

College Maths Lead

Occasionally, case-study interviewees identified issues with the programme content. A few case-study interviewees explained that some webinar content felt repetitive of the techniques presented in previous sessions. Other aspects of the programme that participants were less satisfied with related to content where there was a perception that the resources and approaches presented in the programme required adaptation for post-16 students (for example, to make them age-appropriate, quicker to use, and to apply the strategies to different topics).

Occasionally, interviewees also suggested aspects of the programme timing and organisation were less effective. A few interviewees suggested that the **webinars were too long and could have been faster paced**. Participants had **mixed experiences with the level of interaction** in webinars**.** Some felt there was too little, while others found discussions with teachers from other colleges too extensive – the latter feedback was linked to when there were large numbers of participants in webinars, which resulted in limited opportunities for active engagement and discussion relevant to each individual or college context. Issues were also occasionally raised about the **timing of the programme input being too late in the academic year to inform planning** for the following year. There were also comments about there being too little time spent during sessions reflecting on how to implement ideas in practice in different scenarios.

A further area for development was the **limited personalised feedback for individual staff in the Embedding Stage** activities.

However, it is worth noting that these were isolated comments made during evaluation interviews and very small proportions of survey respondents reporting dissatisfaction with the CPD. Overall, **WRM consistently received very positive internal feedback from participants** on the quality of delivery of the programme, gathered via brief questionnaires at the end of each face-to-face training and online session. Table 6 shows that almost all participants strongly agreed or agreed[7] (96-100 per cent) that activities at each stage of the programme were delivered in a professional and engaging manner.

[7] The questions asked participants to rate their extent of agreement on a five-point scale: strongly disagree; disagree; neither agree nor disagree; agree; strongly agree.

Table 6 Quality of delivery – internal programme evaluation data

	Foundation Stage face-to-face training (% strongly agree/agree)	Foundation Stage webinars[8] (% strongly agree/agree)	Developing Stage webinars[9] (% strongly agree/agree)	Embedding Stage face-to-face training[10] (% strongly agree/agree)
This session was delivered in an engaging and professional manner	100	97	97	100
Total N of responses	535	727	1158	254

WRM post-CPD session evaluation forms collected 2023-25.

4.2. Comparison to other maths-specific CPD

Case-study interviewees reported a number of ways in which the **WRM CPD compared favourably to other maths-specific CPD** that they had undertaken. This included:

- the focus of the CPD on teaching GCSE maths resit in post-16 contexts accounting for the specific needs of learners, including the need to deepen learners' understanding, build confidence and engagement, and reduce anxiety with maths
- the organisation of the programme with clear timings and scope for flexibility to individual colleges
- the sustained nature of the programme with access to trainers for follow-up support
- the accompanying funding for maths resources.

As one maths lead explained:

> *I feel, and the team would probably feel the same as well, … to have a specialist, specialised in post-16 FE maths delivery is very beneficial for us because there is a lot of maths CPD going on... but I think this is very specifically focused on the difficulties and challenges that FE maths teachers are facing.*
>
> College maths lead

Additionally, the opportunity for all maths teachers in the department to attend the CPD together set the WRM CPD apart from other external maths CPD, which would often involve nominating one representative from the department to attend. As one maths lead explained, the programme provided a unique opportunity for collaboration and development of *all* staff in the department:

> *Just by all teachers getting together in the face-to-face sessions and then to speak to the trainer and then reflect and share their practice, I think that is very useful time for team building.*

[8] Mean responses across cohorts.
[9] Mean responses across cohorts.
[10] Mean responses across cohorts. Provided by WRM for Cohort 2 and 3 only.

College maths lead

In comparison, other CPD opportunities were often reported to take the form of one-off events attended by individual teachers and were not supported by the provision of materials and resources. This made the WRM CPD programme stand out from the other maths-specific CPD available. However, certain aspects of other CPD were favoured, such as more in-person delivery than the WRM CPD offered. Other CPD was also reported as being complementary to the WRM CPD, for example, also covering strategies for behaviour management and addressing maths anxiety.

4.3. Adaptation of delivery in response to feedback

The programme was delivered in close alignment to the original design and each cohort of participants was offered the same programme stages and amount of activities, meaning that there was negligible variation in delivery across the three cohorts. However, some elements of the programme were slightly refined and adapted throughout delivery to improve programme effectiveness. The WRM programme manager and CPD leads reported making several minor adaptations to how the programme was delivered in response to feedback from subject leads and teachers and their own reflections on delivery. These adaptations are described below.

Firstly, maths teachers who joined the programme later than the rest of their department (for instance, due to staff turnover) were given the **opportunity to join another cohort or attend 'mop-up' sessions** to ensure they still received the mandatory Foundation Stage modules. These additional sessions had not been planned initially.

Secondly, the **timing and scheduling of webinars was altered** based on teacher feedback in order to increase accessibility for participants. Webinars were made shorter (reduced from one and a half hours to one hour) and were scheduled to start slightly later in the school day (4.30pm as opposed to 4pm) to ensure teachers had sufficient time to end their teaching day and log into the sessions. In addition, for Cohort 3, each webinar was provided on multiple different dates to increase the number of teachers who could access them live and benefit from interaction with colleagues (as opposed to watching a recording of the session). In other cases, webinars were run at bespoke times to accommodate teachers' availability and college teaching timetables.

Thirdly, in response to participant feedback, **more opportunities for interactivity were incorporated into webinars**. This included:

- having a co-host to monitor the webinar chat to ensure questions and experiences were shared and the sessions were conversational
- including quizzes, activities, jam boards and chat boxes
- trainers using visualisers to model strategies and activities followed by group discussion
- the use of break-out groups where participants were encouraged to turn on their microphones and cameras and interact with colleagues.

Finally, learning from Cohort 1 regarding the best way to engage colleges in the Embedding Stage was applied to subsequent implementation. **The Embedding Stage offer was clarified and offered to colleges earlier in the programme schedule** to enable colleges to plan visits and implementation support needs. In the second and third cohorts of the programme, the Embedding

Stage comprised a bespoke package of support provided through a more robust and consistent process. This involved a process of:

- discovery – exploring with the subject lead and maths department team their needs for development to ensure high relevance and wide buy-in
- planning – identifying and clarifying a specific and manageable area of focus with a clear aim and rationale, set out in an embedding plan
- embedding – specific activities, such as additional training, lesson observations, development of lesson plans and schemes of work, designed to implement and embed the specific approaches in practice.

The embedding process is based on the Education Endowment Foundation's (EEF) good practice guidance on effective implementation[11]. The Embedding Stage concludes with a brief report, compiled in collaboration between the WRM programme lead and the subject lead at each college. This report aims to summarise and review progress in relation to the developmental focus and recommend next steps for longer-term implementation and embedding.

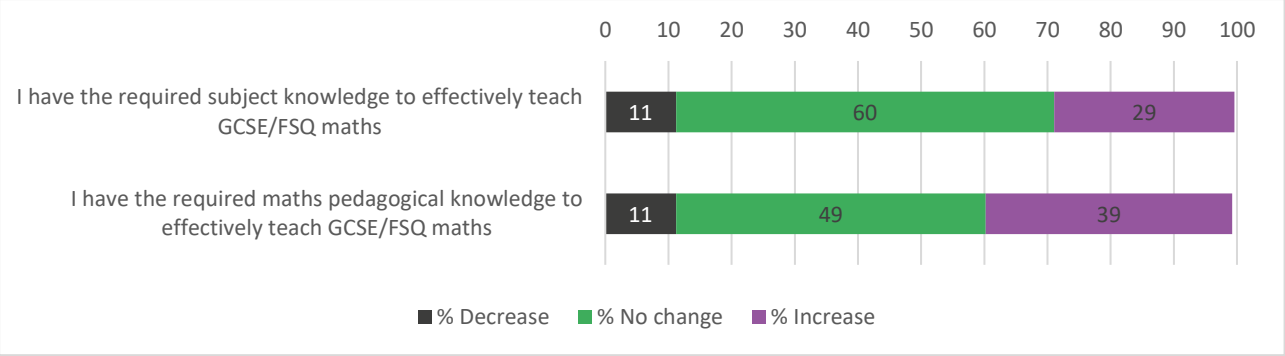
[11] https://educationendowmentfoundation.org.uk/education-evidence/guidance-reports/implementation

5. Evaluation findings: Outcomes and impacts

5.1. Impact on teachers' confidence, subject and pedagogical knowledge

Participants were asked at both the start and end of the programme to rate the extent to which they agreed or disagreed with statements about their maths subject and pedagogical knowledge. While most participants agreed that they had the required maths subject and pedagogical knowledge at the start of the programme to effectively teach GCSE/FSQ maths, Figure 4 shows how participants' responses changed over time when asked the questions again at the end of the programme. Responses are grouped into three statements in which: 1) positive increases were seen (i.e. they became more positive on the agree/disagree scale); 2) responses did not change, or 3); in which decreases were seen (i.e. they became less positive on the agree/disagree scale). Around **one-third of participants were more positive about their maths subject knowledge** (29 per cent) **and maths pedagogical knowledge** (39 per cent) **at the end of the programme**, compared to the start. This suggests the programme may have had a positive impact on participants' maths pedagogical knowledge in particular. However, for a larger proportion of participants, their responses did not change over time, most likely as perceptions were already high at the start of the programme leaving only limited scope to see improvement. Frequencies of responses to these questions at baseline and endpoint can be viewed in Appendix D.

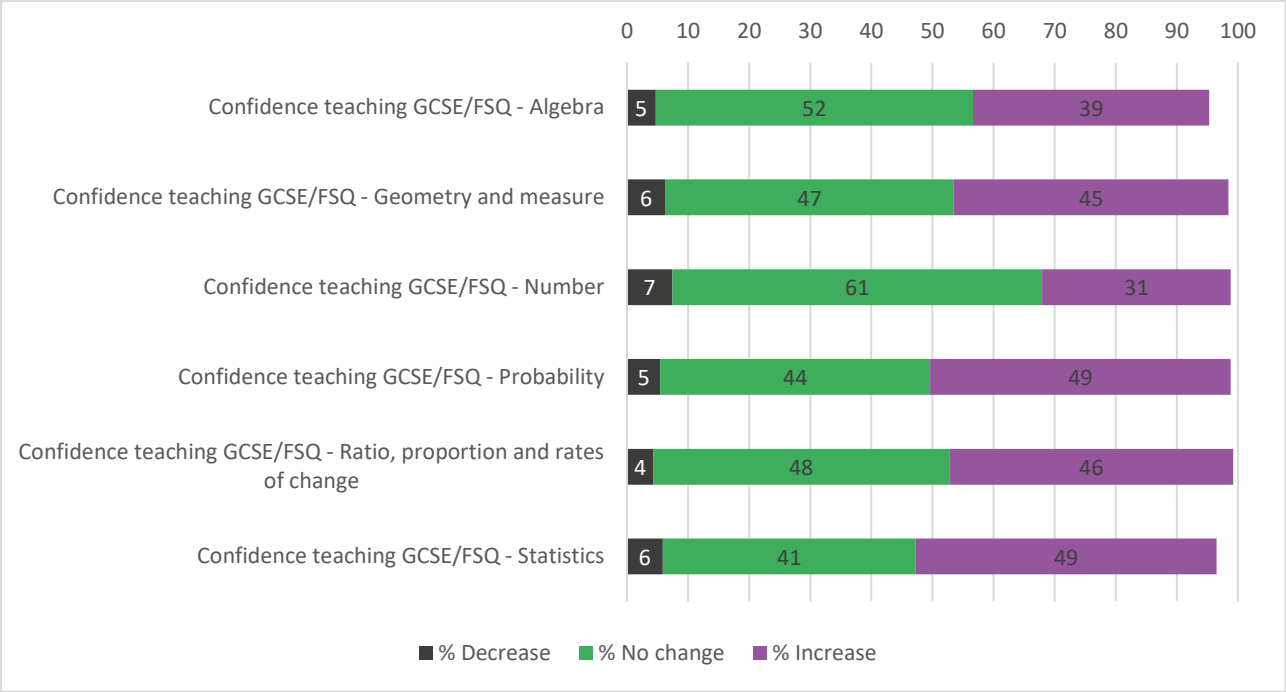
Figure 4 Perceptions of change in maths subject and pedagogical knowledge



NFER participant baseline and endpoint surveys, 2023-2025. N=259

Participants were asked at both baseline and endpoint to rate their confidence teaching GCSE/FSQ topics: algebra; geometry and measure; number; probability; ratio, proportion and rates of change; and statistics. Figure 5 shows that **between one-third and half of participants were more confident teaching maths topics after the programme**, compared to the start. This is a substantial shift in attitudes given that most teachers rated themselves as already confident or very confident at baseline. Frequencies of responses to these questions at baseline and endpoint can be viewed in Appendix E.

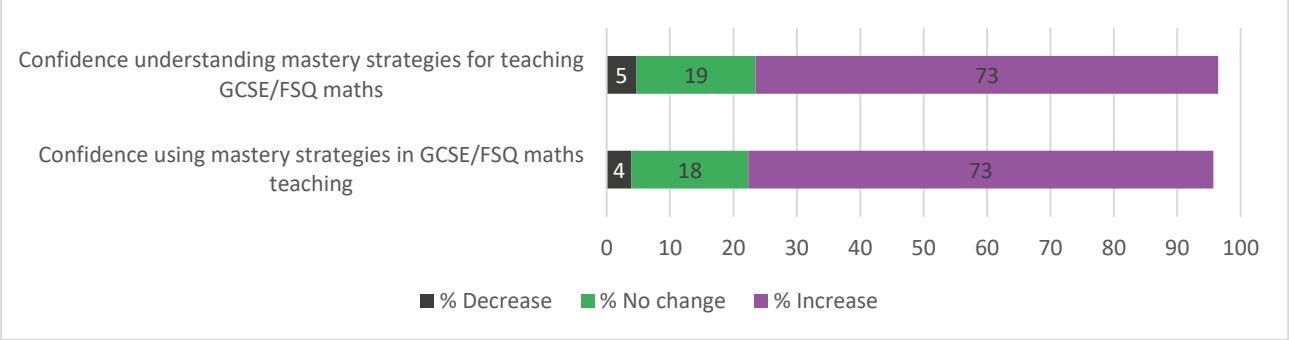
Figure 5 Perceptions of change in confidence teaching GCSE/FSQ maths topics



NFER participant baseline and endpoint surveys, 2023-2025. N=256

The baseline and endpoint survey also asked participants to rate their level of confidence in understanding and using mastery strategies for teaching GCSE/FSQ maths. Figure 6 shows a large shift in responses, with **73 per cent of participants rating their confidence in understanding mastery strategies more highly after the programme than before**. Even more impressively, **73 per cent of participants rated their confidence *using* mastery strategies in GCSE/FSQ maths teaching more highly after the programme** than before. These findings reflect the strong emphasis of the programme on mastery strategies and that participants typically had lower levels of confidence in understanding and using mastery strategies prior to the programme. Frequencies of responses to these questions at baseline and endpoint can be viewed in Appendix F.

Figure 6 Perceptions of change in confidence in understanding and in using mastery strategies



NFER participant baseline and endpoint surveys, 2023-2025. N=255

These positive impacts indicated in the survey responses were also echoed across the qualitative interviews. **Teachers reported increased confidence in using a wider range of strategies and resources in their maths teaching.** One outcome of the CPD was that all interviewee groups interviewed during the case studies perceived that they themselves or teachers in the maths department were more confident, with better subject knowledge and more diverse pedagogical skills. More specifically, teachers reported being better equipped to use a wider range of strategies in their teaching, for example:

> *I feel more confident. I think that it gives* [teachers] *more confidence because we have more knowledge, more resources and more experience. Previously, I didn't use the models very much, for example, the bar models, the counters in algebra. […] This gave me more motivation to try them and see the results. […] I saw the results are very good so I am using them more.*
>
> College maths teacher/lecturer

This improved confidence and knowledge has shaped and revised the way some teachers teach maths topics. For example, one teacher reported substantial changes in how they taught the topic of percentages: prior to the CPD they would talk through the steps in the calculation, whereas following the training they accompanied this with bar models to provide students with a visual representation to aid their understanding.

Maths leads and senior leaders also provided examples of teachers in their department appearing more enthusiastic and confident about teaching maths GCSE resits, including whilst being observed by colleagues.

As well as supporting students to improve their maths achievement, **some teachers felt that their increased confidence equipped them to enhance their students' attitudes towards maths**. Teachers reported using a variety of strategies to improve students' abilities as most of their students had not managed to get Grade 4 GCSE maths at secondary school, leading to a fear of failure on resitting. The strategies used included:

- adopting a more gradual, scaffolded approach to introducing concepts rather than rushing through new topics
- praising students' efforts
- using prompting questions to elicit prior knowledge
- encouraging students to use problem-solving strategies that they found most useful.

This helped to build student confidence and a growth mindset. As one teacher reported:

> *It has built my confidence in terms of how to deliver certain topics, what to focus on. I feel like I used to take a student from zero to 100 quite quickly.* [It has] *really helped me to stop and think about my teaching and to scaffold in different ways to help the students. I've definitely become more confident, so I'm likely to stay in teaching and perhaps help others, maybe newly qualified teachers.*
>
> College maths teacher/lecturer

Participant feedback gathered by internal evaluation activities echoed the positive impacts of the programme on maths teachers' confidence, subject and pedagogical knowledge reported in the

external evaluation survey and interviews. Table 7 shows the responses to brief questionnaires administered by WRM to gather feedback on the CPD. The **vast majority of participants reported positive impacts from all stages of the CPD on their knowledge and understanding** (82-99 per cent strongly agreed or agreed), **and practical ideas to use in teaching** (95-99 per cent strongly agreed or agreed). Responses were high across all three cohorts of the programme, suggesting that impacts on participants were consistently achieved for each cohort that took part. Table 8 shows that participants also reported 'strongly' or 'some' positive impacts[12] of gap tasks (learning reflection activities completed in participants' programme journals in between CPD sessions) on both student (92-95 per cent) and teacher (90-94 per cent) confidence.

Table 7 Impacts on teachers/lecturers' maths knowledge, understanding and practical ideas - internal programme evaluation data

	Foundation Stage face-to-face training (% strongly agree/agree)	**Foundation Stage webinars[13]** (% strongly agree/agree)	**Developing Stage webinars[14]** (% strongly agree/agree)	**Embedding Stage face-to-face training[15]** (% strongly agree/agree)
This session has enhanced my knowledge and understanding	98	86	90	99
This session provided me with practical ideas I can use in everyday work	99	95	95	99
Total N of responses	535	727	1158	254

WRM post-CPD session evaluation forms collected 2023-25.

[12] The questions asked participants to rate their responses on a four-point scale: strongly positive, some positive, negative impact, and no impact.
[13] Mean responses across cohorts.
[14] Mean responses across cohorts.
[15] Mean responses across cohorts. Provided by WRM for Cohort 2 and 3 only.

Table 8 Impacts of gap tasks on student and teacher confidence - internal programme evaluation data

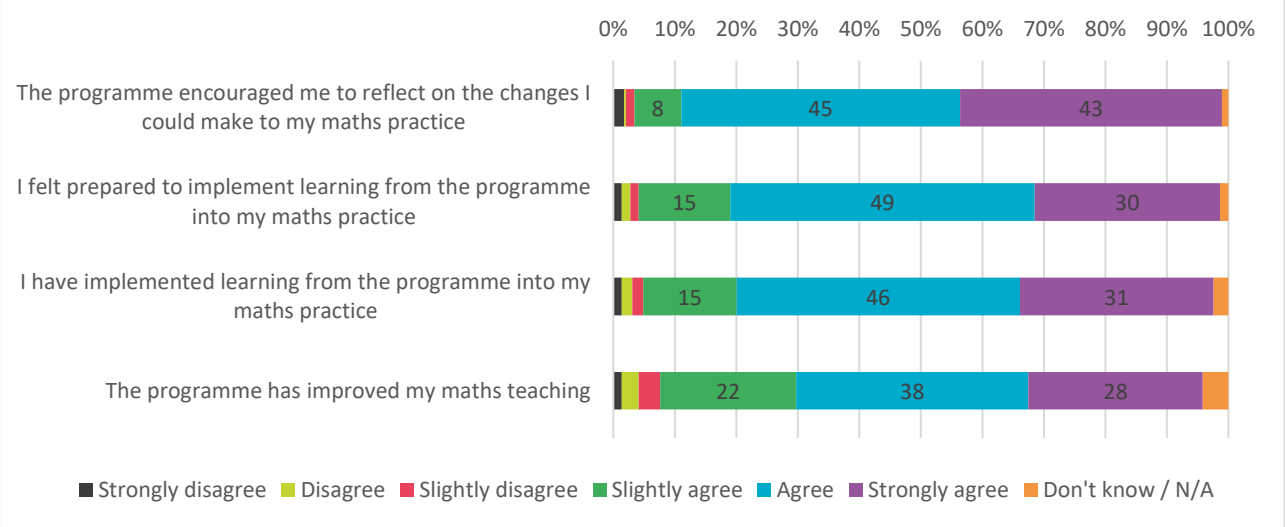
	Foundation Stage webinars[16] (% rating strongly or some positive impact)	Developing Stage webinars[17] (% rating strongly or some positive impact)
How would you rate the impact of your gap task on your students' confidence/understanding?	94	94
How would you rate the impact of your gap task on developing you own skills/confidence?	92	92
Total N of responses	727	1158

WRM post-CPD session evaluation forms collected 2023-25.

5.2. Impact on maths teaching practice

Participants were asked in the endpoint survey to rate the extent to which they agreed or disagreed with a series of statements to indicate the impact of the programme on their maths teaching practice. Figure 7 shows that **almost all respondents agreed to some extent that the programme had encouraged them to reflect on their practice** and prepared them to implement new learning. Furthermore, **the vast majority of participants agreed to some extent that they had implemented learning from the programme in their maths practice** and that the programme had improved their maths teaching.

Figure 7 Perceptions of impact on maths teaching practice

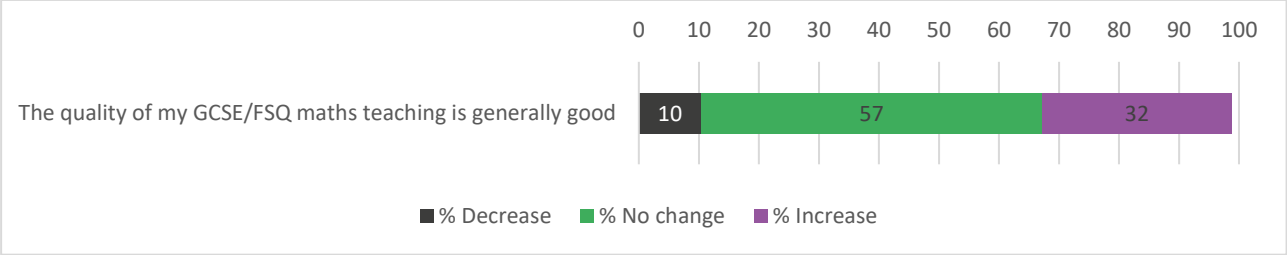


NFER participant endpoint survey, 2023-2025. N=289

[16] Mean responses across cohorts.
[17] Mean responses across cohorts.

The analysis also compared participants' responses in the baseline and endpoint surveys to the statement, 'The quality of my GCSE/FSQ maths teaching is generally good'. Figure 8 shows that one third of teachers (32 per cent) answered more positively at the end of the programme compared to the start, indicating a **higher quality of GCSE/FSQ maths teaching following the programme**. Over half of teachers (57 per cent) rated the quality of their practice similarly at baseline and endpoint, and one in ten teachers (10 per cent) gave a less positive rating at endpoint compared to baseline, reflecting that the participants had high starting points and tended to be very experienced, leaving limited scope to improve already good quality maths teaching. Frequencies of responses to these questions at baseline and endpoint can be viewed in Appendix G.

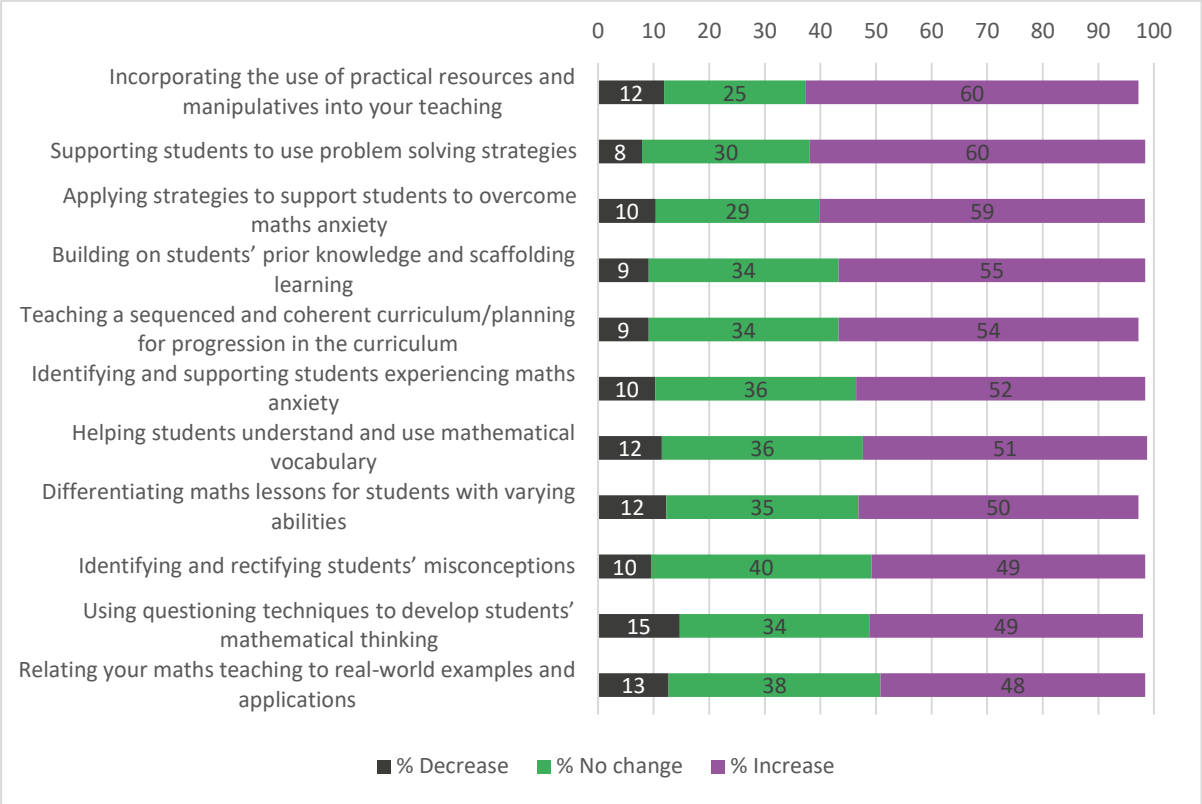
Figure 8 Perceptions of change in quality of maths teaching



NFER participant baseline and endpoint surveys, 2023-2025. N=259

A further question in the baseline and endpoint survey compared participants' responses to a series of questions about how effective they felt in various aspects of maths teaching. Figure 9 shows that around **half of respondents indicated being more effective after the programme than before in a range of aspects of maths teaching**, particularly using practical resources and manipulatives in teaching, supporting students to use problem solving strategies, supporting students with maths anxiety, scaffolding students' learning and teaching a sequenced and coherent curriculum. This is compelling evidence for the impact of the programme on maths teaching given that most participants were experienced teachers of maths. Frequencies of responses to these questions at baseline and endpoint can be viewed in Appendix H.

Figure 9 Perceptions of change in effectiveness teaching maths



NFER participant baseline and endpoint surveys, 2023-2025. N=251-252

Programme leads and case-study interviewees reported that **the CPD had upskilled maths teachers/lecturers, particularly in maths mastery teaching.** All stakeholder groups reported that the CPD had provided teachers with the knowledge and confidence to make changes to their teaching practice, and in particular to use mastery strategies. Changes included greater use of concrete tools, visual modelling strategies using a visualiser, changes to lesson planning to consistently incorporate mastery strategies, and generally incorporating more varied teaching approaches into lessons to engage learners. Specific changes to practice included incorporating use of bar modelling, ratio tables, algebra tiles, directed number counters, goal-free problems, problem-solving strategies, diagnostic questioning and more use of calculators to reduce the cognitive demand on students undertaking complex tasks. These changes were reported by interviewees to help meet learners' different needs as lessons were more engaging and practical, with concrete resources helping students to understand abstract concepts.

A selection of comments from interviewees exemplify these impacts:

> *What we're trying to do is to stop the chalk and talk and tutor-led sessions and White Rose have been a big part of this. We still have work to do, there's still a little bit of that. But, certainly, there's a lot more innovative stuff going on.*
>
> College Senior Leader

The team are trialling things that maybe they wouldn't have done before... people are adapting their lessons more now and maybe they have got that bit of confidence for adapting it because they've got these tools that they've learned from doing the CPD.

College Maths Subject Lead

Something that we didn't often do was make use of calculators. But, since the CPD, it's been more of a tool now, so it's on the desk at all times and a learner can use it as a safety net. So, it's not for a special lesson, it's there all the time. So, they're exposed to it which then does build their confidence. That's come from the CPD. That's now something that all teachers do.

College Maths Subject Lead

Their [maths teachers/lecturers] *practice is changing, and they are seeing benefits in the classroom. There's more passion there, there's more excitement there.*

College Senior Leader

Senior leaders and maths leads reported **improvement in maths teaching quality** following the CPD. For instance, during learning walks they had observed teachers delivering more engaging maths lessons and using a wider range of resources and techniques to help students learn maths, such as 'goal-free' problems, algebra tiles and bar models.

However, **in a few cases, teachers had tried the approaches and found them not to be effective with their students**. The main barriers to changes in practice appeared to be student behaviour issues and, as the weekly time allocated for maths teaching varied from two to four hours across colleges, a lack of maths teaching time with students. Furthermore, the introduction of complex techniques that students would not be able to replicate in exam conditions without the accompanying resources was a concern. One maths lead noted that mastery is challenging in FE as there is **very limited time to build depth of understanding** for students who are unfamiliar with the approaches and who essentially need quick strategies to enable them to pass the exam.

One teacher found algebra tiles too complicated for students and felt that students would require a greater level of support and time to understand this approach than was available in the curriculum timetable (for instance, one or two lessons per week). Some teachers suggested that the post-16 GCSE resit curriculum really only allows time for revision of the topics and there is very limited time for students to learn new strategies that take time to understand and apply. For instance, as this teacher expresses:

That didn't go well for me, the algebra tiles. Bringing in the algebra tiles at the last minute before the exams, it throws them [the students] *off, they can't achieve anything.*

College maths teacher/lecturer

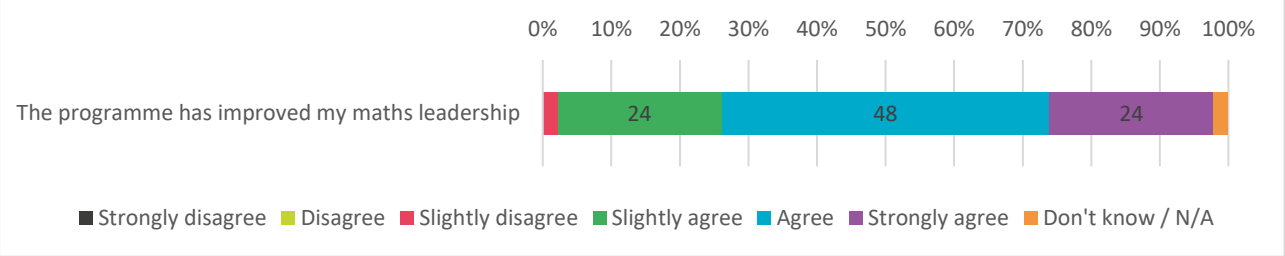
In general, **some approaches were considered more appropriate for lower-attaining learners**, providing them with alternative strategies to help them understand maths. However, some teachers

suggested the approaches tended to be less suitable for students who had previously achieved a Grade 3 and were resitting maths to try to achieve the required Grade 4. For these students, it was potentially confusing to learn new and different approaches to those they had used previously. Some of the practices with concrete resources were also regarded as being **more suitable for younger learners** where the approaches could be introduced and embedded to aid understanding earlier in education. A maths lead echoed this point, noting that some students were resistant to trying bar modelling as they felt this was something that much younger pupils would use.

5.3. Impact on maths leadership and subject leads' knowledge, skills and confidence

In the endpoint survey, **almost all subject leads indicated that the programme had improved their maths leadership** (96 per cent in total), with 24 per cent agreeing strongly, 48 per cent agreeing, and 24 per cent agreeing slightly (see Figure 10). However, as the number of subject leads responding (N=46) is smaller than 100, percentages should be interpreted with caution.

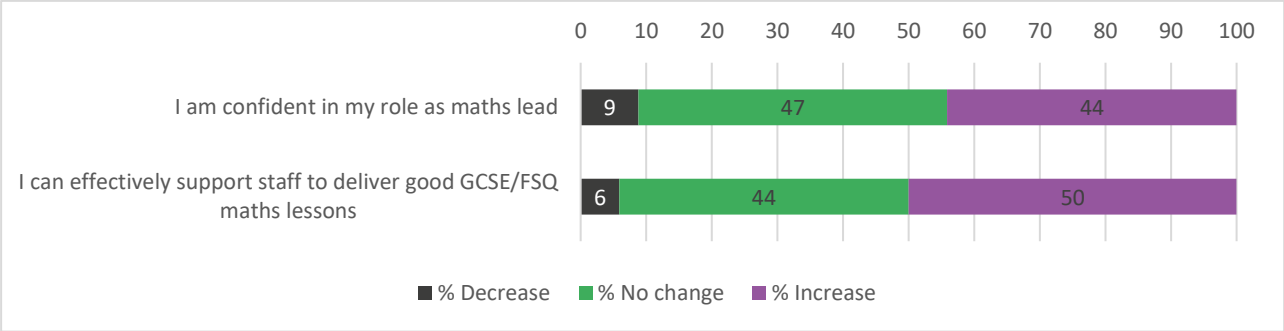
Figure 10 Perceptions of impact on maths leadership



NFER participant endpoint survey, 2023-2025. Subject leads only. N=46

Furthermore, subject leads were asked questions in the baseline and endpoint surveys about their maths leadership to explore any changes over time. Figure 11 shows that around **half of maths subject leads agreed that they felt more confident and effective after the programme than before** in their role as maths lead and supporting staff to deliver good lessons. These findings indicate that the programme effectively supported the development of maths subject leadership within participating colleges, by building effective working relationships with subject leads and encouraging whole-staff participation. However, as the number of subject leads responding (N=34) is smaller than 100, percentages should be interpreted with caution. Frequencies of responses to these questions at baseline and endpoint can be viewed in Appendix I.

Figure 11 Perceptions of changes to maths leadership



NFER participant baseline and endpoint surveys, 2023-2025. Subject leads only. N=34

WRM programme leads and case-study interviewees reported **increased consistency of maths teaching approaches within maths departments** as the CPD involved whole maths departments. This included a department-wide emphasis on all staff using the pedagogies and resources introduced in the training. Some interviewees also suggested there was **more collaboration in the department** as a result of the collaborative nature of the programme and staff being exposed to the same inputs. Maths subject leads reported feeling **more confident to lead changes to practice** across their teams, as illustrated by this quote by a maths subject lead:

> *It's given me the confidence to encourage our staff to use mastery…* [and to] *standardise the way we do it.*
>
> College Maths Subject Lead

Senior leaders and maths leads in some colleges also identified **impacts regarding changes to schemes of work**, for example restructuring the sequencing of topics taught to make it more conducive to building and reinforcing students' maths understanding. This included teaching related topics consecutively. They also reported that the CPD had given teachers the space and support to take risks and try new teaching methods and that this had enhanced enthusiasm and encouraged reflection on their practices. The WRM programme lead describes this impact in one college:

> *One college has undertaken a curriculum restructure - that has had a huge impact on teachers' lesson planning, coherence across things. They really adopted our scheme of learning and incorporated the use of bar models and ratios.*
>
> WRM programme lead

Case-study interviewees reported that their **departments had benefited from the funding** they had received as part of the programme. This had allowed them to buy resources such as visualisers, calculators for all students, mini whiteboards, manipulatives[18] such as double-sided

[18] Manipulatives in maths teaching are hands-on tools, such as objects, charts and activities that students can physically use to help represent and visualise mathematical concepts. They are often called 'concrete' tools to help students learn 'abstract' concepts.

counters, and stationery – all of which were reportedly helping to improve the maths teaching and learning experience for staff and students.

Other outcomes from the CPD on maths leadership were around **enhancing colleges' CPD provision and classroom observations**. A senior leader reported that the WRM CPD had helped to shape their college's CPD offer and that, without the support of WRM, this would have been more challenging to design. The senior leader also noted that changes in their maths leader's approach to CPD were enabled by the ongoing relationship with the programme leads and the external, non-judgemental nature of the WRM CPD:

> [The WRM CPD] *has really helped the direction and leadership of the maths department over the past year. There is a level of sadness genuinely felt that it is coming to an end, because it has been really helpful to have a touchpoint every term or so with someone that they have built a relationship with. The advantage of it being someone external is that there has been openness and receptiveness because it is not someone who is coming to judge, it's purely an objective input from someone who is not in any managerial relationship with them. It certainly has sharpened* [the maths leadership] *focus and given some sort of framework in which to devise* [the maths] *CPD programme. I think it has just given more momentum and impetus to the leadership.*
>
> College Senior Leader

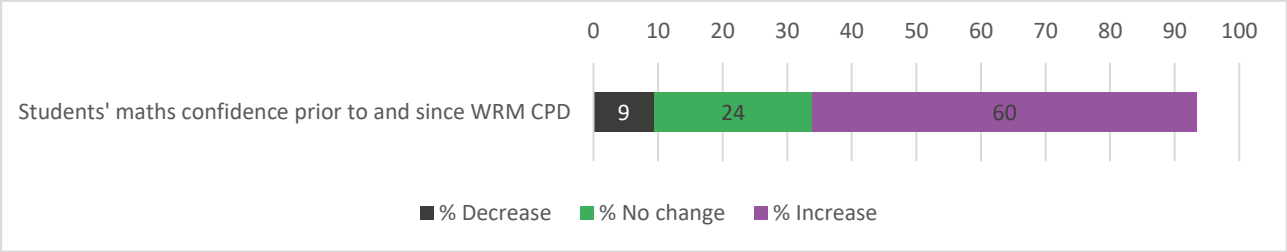
Another outcome noted by interviewees was that **lesson observations were now more structured around particular elements of mastery pedagogy**, whereas previously the focus was more general. One maths lead reported conducting more frequent learning walks and peer observations during the programme to support colleagues to implement the new approaches. A senior leader in another college also noted that the WRM CPD had helped to inform the pedagogical foci of their learning walks and observations.

5.4. Impact on students

Figure 12 shows that **almost two thirds of participants (60 per cent) rated students' confidence in maths more highly at endpoint compared to baseline**[19]. Frequencies of responses to these questions at baseline and endpoint can be viewed in Appendix J.

[19] A small proportion of participants responded: 'I haven't been teaching GCSE/FSQ maths recently/am not teaching GCSE/FSQ maths this year' and these responses were not included in the change over time analysis.

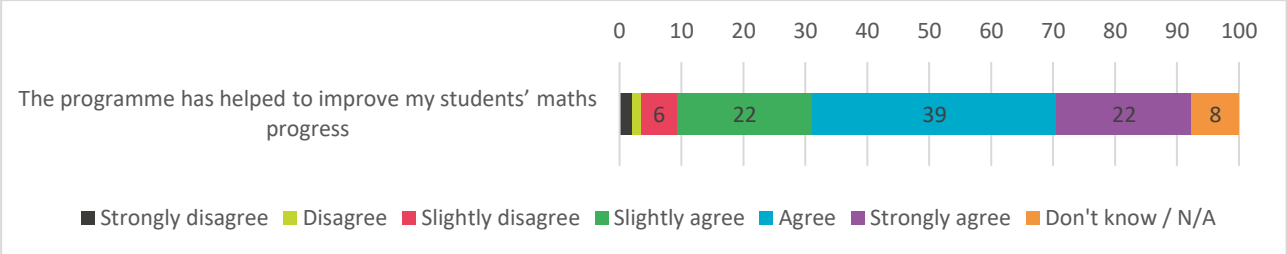
Figure 12 Perceptions of change in students' confidence in maths



NFER participant baseline and endpoint surveys, 2023-2025. N=245

Responding to the endpoint survey, **most participants (83 per cent) agreed to some extent that the programme had helped to improve students' maths progress**[20] (see Figure 13).

Figure 13 Perceptions of impact on students' maths progress



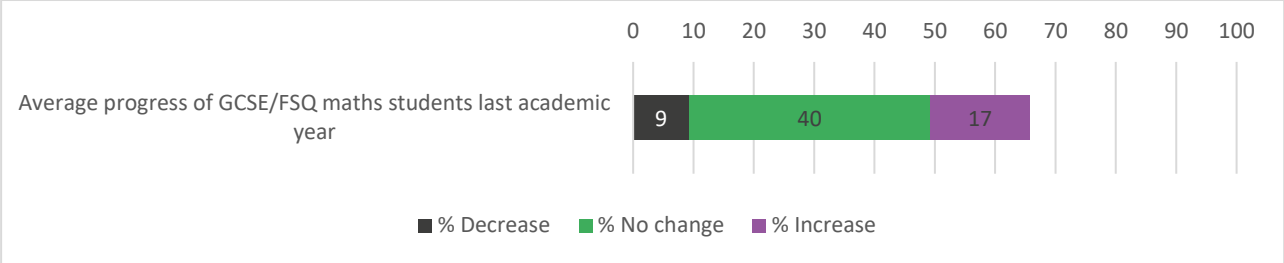
NFER participant endpoint survey, 2023-2025. N=289

A series of analyses compared participants' perceptions of student progress and the extent to which this changed over the course of the programme in terms of whether GCSE/FSQ maths students were making below, expected or better than expected progress. As participants may have completed the evaluation surveys at different timepoints within the academic year, depending on when they started and ended the programme, the gap in academic years that respondents were asked to consider varies.

Firstly, the baseline and endpoint survey asked participants to consider GCSE/FSQ students' maths progress in the last full academic year prior to completing each survey[21]. Figure 14 presents the responses combined across cohorts and analyses changes in responses between baseline and endpoint. It shows that **almost two in ten participants (17 per cent) were more positive about their students' progress in maths** in the last academic year at endpoint compared to baseline. Four in ten participants reported no change and less than one in ten participants indicated a less positive response between the two surveys. Other respondents either did not know or did not teach the courses during the periods asked about. Frequencies of responses to these questions at baseline and endpoint can be viewed in Appendix J.

[20] The remaining minority of respondents either did not know or disagreed to some extent.
[21] The Cohort 1 surveys asked participants to consider academic years 2021-22 at baseline vs 2022-23 at endpoint (a one year gap); the Cohort 2 surveys asked participants to consider academic years 2021-22 at baseline vs 2023-24 at endpoint (a two year gap); the Cohort 3 surveys asked participants to consider academic years 2022-23 at baseline vs 2023-24 at endpoint (a one year gap).

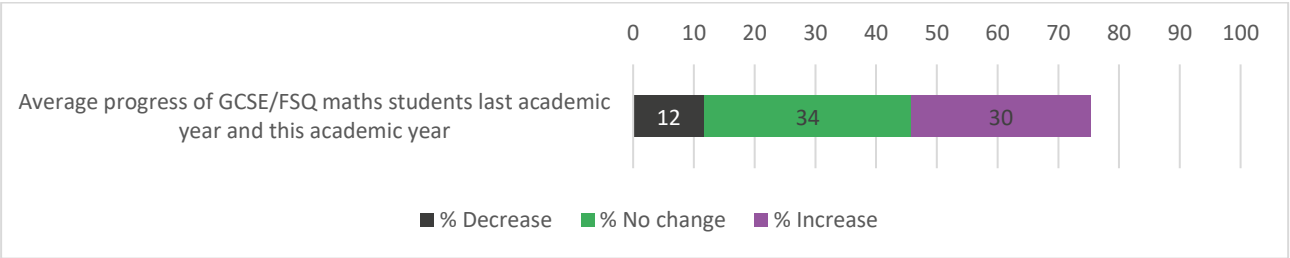
Figure 14 Perceptions of changes to student maths progress in last full academic year



NFER participant baseline and endpoint surveys, 2023-2025. N=248

Next, the analysis compared participants' responses at baseline about student progress in the last full academic year to their responses at endpoint about student progress in the current academic year[22]. Most participants (76 per cent) indicated in the endpoint survey that GCSE/FSQ maths students had made expected or better than expected progress in the current academic year. There are also further signs of modest improvements in teachers' perceptions of student progress over time. Figure 15 shows that **three in ten participants (30 per cent) were more positive about student progress** in the current academic year compared to the academic year asked about at baseline. However, slightly more than three in ten participants (34 per cent) reported no change, and slightly more than one in ten (12 per cent) reported a decrease in progress. Frequencies of responses to these questions at baseline and endpoint can be viewed in Appendix J.

Figure 15 Perceptions of changes to student maths progress in last academic year compared to current academic year



NFER participant baseline and endpoint surveys, 2023-2025. N=247

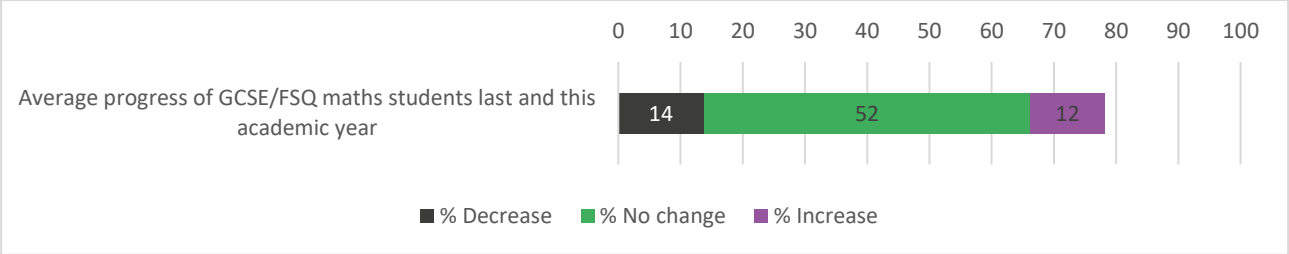
Finally, in the endpoint survey only, participants were asked to indicate their students' progress in the previous and current academic years[23]. Figure 16 shows that participants tended to report **minimal change in students' maths progress** in the current academic year compared to the previous academic year; just over one in ten indicated this, with the most common response being

[22] The Cohort 1 surveys asked participants to consider academic years 2021-22 at baseline vs 2023-24 at endpoint (a two year gap); the Cohort 2 surveys asked participants to consider academic years 2021-22 at baseline vs 2024-25 at endpoint (a three year gap); the Cohort 3 surveys asked participants to consider academic years 2022-23 at baseline vs 2024-25 at endpoint (a two year gap).

[23] The Cohort 1 survey asked participants to consider last academic year 2022-23 vs the current academic year 2023-24 in the endpoint survey (a one year gap); the Cohort 2 survey asked participants to consider last academic year 2023-24 vs the current academic year 2024-25 in the endpoint survey (a one year gap); the Cohort 3 survey asked participants to consider last academic years 2023-24 vs the current academic year 2024-25 in the endpoint survey (a one year gap).

no change[24]. One possible explanation for this minimal difference is that the survey questions asked about a relatively short period of time comparing the current and previous academic years, and covered periods of time when input from the CPD may have spanned both academic years asked about and participants may have been responding to the survey before the end of the current academic year. Frequencies of responses to these questions at endpoint can be viewed in Appendix J.

Figure 16 Perceptions of student maths progress last academic year compared to current academic year



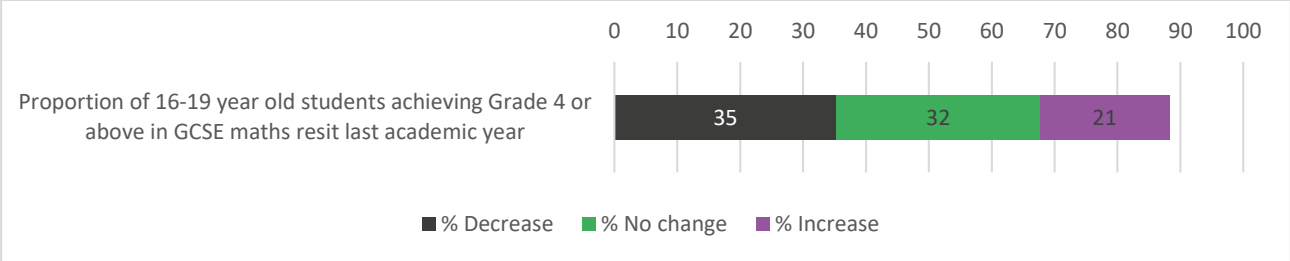
NFER participant endpoint survey, 2023-2025. N=284

Overall, **participants' perceptions of change in their students' maths progress over time were fairly positive**, which is promising as impacts of teacher CPD on learners can take time to emerge and taking into account the challenges GCSE resit learners face in progressing in maths.

However, **participants reported mixed perceptions of any change over time in their students' maths achievement of Grade 4 or above in GCSE maths**, with similar proportions identifying increases and decreases in student maths attainment over time. Two in ten subject leads (21 per cent) reported at endpoint compared to baseline that a higher proportion of students had achieved Grade 4 or above in GCSE maths resits in the most recent full academic year[25]. However, one-third (32 per cent) of respondents gave a similar response at baseline and endpoint and one-third (35 per cent) of respondents indicated that a smaller proportion of students had achieved Grade 4 or above at endpoint compared to baseline[26] (see Figure 17). The results to this question are quite mixed which may reflect the different student cohorts taught by participants between the baseline and endpoint surveys. Other influences on student attainment are likely to include issues with student behaviour, attendance, and competing demands of their main course. However, as the number of subject leads responding (N=34) is smaller than 100, percentages should be interpreted with caution. Frequencies of responses to these questions at baseline and endpoint can be viewed in Appendix J.

[24] Small proportions of participants responded 'I don't know' or 'I don't teach GCSE/FSQ maths this year' and these responses were not included in this analysis.
[25] The Cohort 1 surveys asked participants to consider academic years 2021–22 at baseline vs 2022– 23 at endpoint (a one year gap); the Cohort 2 surveys asked participants to consider academic years 2021–22 at baseline vs 2023–24 at endpoint (a two year gap); the Cohort 3 surveys asked participants to consider academic years 2022–23 at baseline vs 2023–24 at endpoint (a one year gap).
[26] Additional categories of response e.g. 'don't know' 'we don't teach GCSE/FSQ maths to 16-19 year olds' were not included in the analysis of change in responses over time.

Figure 17 Perceptions of changes to proportion of students achieving Grade 4 or above in GCSE maths resit in last full academic year



NFER participant baseline and endpoint surveys, 2023-2025. Subject leads only. N=34

Subject leads were also asked an equivalent question about FSQ maths. However, most did not teach this qualification or did not know about student progress in this qualification. Frequencies of responses to these questions at baseline and endpoint can be viewed in Appendix J.

While these impacts of the CPD on students are relatively modest in the sense that they were only identified by a minority of participants, they are nevertheless important potential contributions to improving GCSE maths resit results which are notoriously low and very challenging to increase.

Case-study interviewees also identified positive impacts of the CPD on students. Interviewees highlighted **students' enhanced understanding, confidence and problem-solving skills**, particularly in relation to topics such as ratios, fractions and percentages, especially for lower-attaining learners. Interviewees suggested that the visual methods advocated in the CPD, such as bar modelling, had led to these notable improvements for students. Interviewees also reported that students' confidence with maths was enhanced with greater use of calculators as a result of the CPD, which reduced students' cognitive load. Teachers noted that students were more confident in maths lessons particularly in response to the application of goal-free activities introduced by the programme as students were able to explore the problem rather than focus on identifying a specific 'correct' answer. Another teacher reported that, before the CPD, their students would not attempt long-answer maths questions, but using approaches presented in the CPD to help students break the problem down and capitalise on concrete resources, enabled some students to feel more confident to attempt such questions.

A selection of comments from interviewees convey these impacts:

> *It's helped me to develop their* [students] *self-coaching skills.* [I've learnt] *to encourage them with self-coaching… to defeat that inner critic, by asking prompting questions… rather than jumping in or trying to show them myself, I give them time, now, to think. It builds their confidence that they can do it.*
>
> College maths teacher/lecturer

> *I've had feedback from students who tell me they liked it. The directed counters went down a treat. It's been very helpful for my low ability students.*
>
> College maths teacher/lecturer

Students find the bar models much easier to use when it comes to finding fractions of amounts, doing percentages.

College maths teacher/lecturer

It's given them [the students] *the confidence to try a problem-solving question that they would just tend to skip. If you give them a wordy question and you give them some snap cubes, they represent the ratio, you give them something tangible that they can move and they start to attempt the question without knowing that they've done any maths because they have got that back up.*

College maths subject lead

What I loved was using the modelling method to teach ratio and fractions. They [students] *see ratio as 'Oh god, how am I going to do this?' but when we introduce the modelling method to draw it on the board, 'This is the parts', 'What is the portion or quantity for one part?', they get it. That's from the CPD.*

College maths teacher/lecturer

Some students also commented on aspects of their teachers' approach to teaching them maths that they valued and compared this favourably to how they had been taught GCSE maths previously in secondary school, as these students explain:

It is different from the school approach and environment because there is more pressure on students in schools and stricter teachers; here, it is so different – they teach so deeply in one problem. After each lesson for each topic, we do quizzes on the same topic so we can understand the topic. It's fun.

Student

I like how teachers encourage us to understand the reasoning behind the formulas, rather than just memorising them.

Student

Case-study interviewees also reported **enhanced student engagement in lessons.** College staff often noted an improvement in learners' engagement in maths lessons following the CPD. This included students remaining engaged for longer in lessons and participating more in discussions and whole-class question and answer sessions. Using a range of approaches to keep lessons varied and appeal to different learner needs was regarded as key to enhancing and sustaining student engagement in GCSE maths resit lessons.

Case-study interviewees had limited capacity to comment on the impact of the CPD on student achievement as often they did not have the results available for the cohort of students taught during the programme. Generally, interviewees reported that outcomes for students varied and only small proportions of students passed resits. However, in some cases, interviewees reported that their most recent cohort of students achieved **higher grades in maths GCSE resits compared to the previous cohort** and suggested the CPD had contributed to this. These senior leaders explain these impacts:

Even from November, we've moved a little bit higher from eight to 12 per cent [Grades 4+ in November resits]. I can see the last year's results in November - they could not attempt the wordy problems, five-six mark [questions]*, now I can see some improvement. I see bar modelling, and they can tackle the big five-mark problems now.*

College Senior Leader

We've a long way to go as a college, but our November resit results suggest that it is working. We've tripled our achievement rate from June to November. It's never the same cohort, never the same learners with the same grades going in for those exams, but that was quite a mighty improvement and some of that is down to that improved engagement and staff trying different things.

College Senior Leader

However, as noted by one maths lead in Section 5.2, while the CPD had a positive impact on teaching practice, mastery approaches take time to embed. Consequently, impacts on student progress and attainment may have been more likely to be seen in the summer resits, rather than in November, as teachers would have had more time to implement any new strategies.

Further discussion with students revealed some of the **explanations for only modest impact on student attainment**. Although some students felt more confident studying maths in college than they had at secondary school, they did not enjoy re-taking the course. Students also identified that they had experienced **insufficient time to learn maths**, spending too much time on certain topics, and they felt some teaching approaches were more suited to younger learners. They expressed variable levels of confidence in their progress and preparedness to retake maths GCSE.

Students also described issues with **other students' disruptive behaviour** in maths lessons that they witnessed the class teachers struggle to manage, with some students frequently misbehaving and disrupting learning. Teachers echoed this, explaining that some students refused to engage, so the methods presented in the CPD did not work. A teacher explained that: '*… it works for the students who listen and who are making connections. About 10 or 15 per cent of the students do not want to engage'.* This appears to be a substantial barrier to the potential impact of the programme on supporting students' maths confidence and attainment if students are unable to fully engage and concentrate in maths classes.

Challenges around **students' attendance, punctuality and level of commitment** were also highlighted by teachers, for example:

They start every lesson with a 'do it now' task and sometimes there is a goal-free or diagnostic question at the start. If students come in late, they miss that, which doesn't help. If they are not engaging much, not doing their homework – that doesn't help.

College maths teacher/lecturer

Other reasons for limited student outcomes were students' low levels of proficiency speaking and understanding English, repeated prior failure in maths and a perceived lack of relevance of GCSE maths for the students' chosen subject/career.

5.5. Variation of impact depending on amount of engagement and participant characteristics

The analysis of participants' survey responses explored whether the impact of the programme varied in relation to the following variables:

- the amount of engagement participants had with the programme
    - optimal engagement – with all four Foundation Stage modules and at least six Developing Stage modules[27]
    - optimal engagement Foundation Stage only
    - optimal engagement Developing Stage only
    - below optimal engagement – engagement with fewer than four Foundation Stage modules and fewer than six Developing Stage modules
- length of time in teaching
    - first four years of teaching (1-4 years)
    - mid-career (5-19 years)
    - late-career (20 years or more)
- highest maths-specific qualification
    - GCSE or equivalent
    - A-level or equivalent
    - Degree level or equivalent and above.

The analysis compared the extent of change over time in participants' survey responses by each of these variables to explore if there were any significant relationships[28].

In general, this analysis revealed **very few statistically significant differences in the extent of change in participants' responses over time in relation to these variables**, suggesting there are no consistent clear trends in how these factors may influence changes in participants' maths teaching practices. Indeed, the lack of significant associations is notable given these variables could influence teachers' perceptions of their practice.

Overall, the findings from this analysis indicate that, where participants have reported changes in practice over the course of the programme, this is largely regardless of their characteristics. This suggests that **the programme has the potential to support teachers with varied levels of teaching experience and subject expertise in maths** and has adapted well to participants' different backgrounds in these regards. While there were clearly differences in the extent of

[27] Participant engagement in gap tasks was not included in the measure of 'optimal engagement' as it was an optional element of the programme and participants may have defined this activity in different ways. Similarly, engagement in the Embedding Stage was not included in the measure of 'optimal engagement' as it was intended that participant engagement in this stage would be dependent on the specific focus and needs in the department and, for this reason, only subject leads were asked about this in the survey.

[28] Chi-squared tests were used to determine if there was a significant association between the frequencies of participants' responses compared to expected frequencies (which would be evenly distributed in each of the categories if there was no association). If the test identifies a significant difference between the observed and expected frequencies it does not determine where this difference lies between the different categories of each variable, so the findings should be interpreted with caution. Significance was measured at the 5% level – less than 5 per cent chance any significance observed is due to chance, indicated by a p-value <0.05.

impacts of the programme reported by participants, these differences do not seem to be consistently linked to participants' different characteristics.

It should also be noted that most participants were positive about their confidence and practices teaching GCSE/FSQ maths prior to the programme, leaving only limited scope to detect changes over time. Furthermore, the numbers of survey responses when broken down by different characteristics is small in some cases.

The analysis of the extent of impacts in relation to participants' level of engagement in the programme also revealed few consistent trends, indicating that participants may benefit from the programme even when they do not fully engage in all activities offered. However, the analysis provides tentative evidence that **optimal engagement is associated with perceptions of positive impacts on students** more so than below optimal engagement. There is also tentative evidence that higher proportions of participants who engaged optimally only in the Foundation Stage reported improvements than those who engaged optimally only in the Developing Stage – providing **tentative evidence for the particular value of the Foundation Stage** which included an initial face-to-face session.

However, some isolated instances of significant associations were identified and are discussed in turn in the following sections. They provide some tentative but inconsistent evidence that the extent of change in practice as a result of the CPD is sometimes more likely where participants have lower levels of maths specialist knowledge (most associations were found for this variable), have higher levels of engagement in the programme, and are earlier in their careers.

5.5.1. Variation by level of engagement in the programme

Participants' level of engagement in the programme was significantly associated with the extent to which participants' reported change over time in confidence teaching the maths topics geometry and measure, and number. Table 9 shows that higher proportions of participants who engaged optimally with only the Foundation Stage of the programme or below optimally reported increased confidence teaching geometry and measure than those who participated optimally overall and with the Developing Stage only. Table 10 shows a similar pattern of responses for the number topic. These findings should be interpreted with caution as only small numbers of participants engaged below the optimal level, but do not indicate that increased engagement with the programme was consistently associated with increased confidence in teaching these topics. Significant associations were also not found for the other four maths topics asked about in the survey, suggesting there may not be any meaningful relationship overall.

Table 9 Perceptions of change in confidence teaching geometry and measure by level of programme engagement

	Decrease (%)	No change (%)	Increase (%)
Optimal engagement	5	45	47
Optimal foundation only	3	35	61
Optimal development only	7	69	24
Below optimal engagement	14	27	59

NFER participant baseline and endpoint only survey responses, 2023-2025. N=256 (includes valid but non-comparable responses not displayed (e.g. “I don’t know)). p=0.0049. Percentages may not sum to 100 due to rounding.

Table 10 Perceptions of change in confidence teaching number by level of programme engagement

	Decrease (%)	No change (%)	Increase (%)
Optimal engagement	7	62	30
Optimal foundation only	3	45	52
Optimal development only	7	72	20
Below optimal engagement	18	45	36

NFER participant baseline and endpoint only survey responses, 2023-2025. N=256 (includes valid but non-comparable responses not displayed (e.g. “I don’t know)). p=0.0239. Percentages may not sum to 100 due to rounding.

Participants’ level of engagement in the programme was also significantly associated with the extent to which participants’ reported change over time in their effectiveness in building on students’ prior knowledge and scaffolding learning. Table 11 shows the frequencies of responses broken down by this variable but provides no clear trend as to the direction of the relationship as a higher proportion of participants engaging optimally in the Foundation Stage only report increased effectiveness than participants engaging below optimally, optimally or optimally only with the Developing Stage. Furthermore, for most of the areas of practice asked about in the survey there was no significant association with level of engagement in the programme, indicating levels of programme engagement did not consistently influence the extent of changes in teachers’ practice.

Table 11 Perceptions of change in effectiveness building on students' prior knowledge and scaffolding learning by level of programme engagement

	Decrease (%)	No change (%)	Increase (%)
Optimal engagement	8	37	53
Optimal foundation only	0	23	77
Optimal development only	13	39	48
Below optimal engagement	24	19	57

NFER participant baseline and endpoint only survey responses, 2023-2025. N=252 (includes valid but non-comparable responses not displayed (e.g. "I don't know)). p=0.0219. Percentages may not sum to 100 due to rounding.

Participants' level of engagement in the programme was also significantly associated with the extent to which they reported change over time in students' confidence and progress in maths. The frequencies of responses by this variable can be viewed in Table 12 and show variation across the categories. For instance, higher proportions of participants who engaged optimally overall or with just the Foundation Stage reported increase in their students' confidence and progress in maths over time than those who engaged optimally with just the Developing Stage or below optimally overall. This may provide tentative evidence to indicate the sustained nature of the programme input is important in reaching ultimate impacts on students.

Table 12 Perceptions of change in students' confidence and progress in maths by level of programme engagement

	Decrease (%)	No change (%)	Increase (%)
Optimal engagement	6	21	65
Optimal foundation only	10	13	77
Optimal development only	18	37	41
Below optimal engagement	15	35	40

NFER participant baseline and endpoint only survey responses, 2023-2025. N=245 (includes valid but non-comparable responses not displayed (e.g. "I don't know)). p=0.0029. Percentages may not sum to 100 due to rounding.

5.5.2. Variation by length of time in teaching

A significant association was found between participants' length of time teaching and the extent they reported changes in their maths pedagogical knowledge. The frequencies of responses by this variable can be viewed in Table 13 and show variation across the categories. For instance, a higher proportion of participants who were in their first four years of teaching or mid-career reported positive change in their maths pedagogical knowledge between baseline and endpoint (48 per cent and 39 per cent respectively) than participants in their late career (20 per cent). This may reflect that teachers later in their career may have rated their maths pedagogical knowledge highly at both baseline and endpoint due to their long-standing experience or possibly could indicate a greater interest in developing pedagogy among teachers in their early and mid-careers.

Table 13 Perceptions of change in maths pedagogical knowledge by length of time teaching

	Decrease (%)	No change (%)	Increase (%)
First 4 years	16	33	48
Mid-career	10	51	39
Late career	9	71	20

NFER participant baseline and endpoint only survey responses, 2023-2025. N=257 (includes valid but non-comparable responses not displayed (e.g. "I don't know)). p=0.0109. Percentages may not sum to 100 due to rounding.

Participants' length of time in teaching was also found to be significantly associated with the extent to which they reported changes over time in confidence teaching the maths topics number and statistics. Tables 14 and 15 show that a higher proportion of participants who were in their first four years of teaching reported increased confidence and a higher proportion of participants in their late career reported no change in confidence. However, it is worth noting that no other significant associations were found between length of time in teaching and the extent of change over time in participants' confidence teaching the other four maths topics asked about in the survey: indicating length of time teaching is not a consistent influence on teachers' CPD outcomes.

Table 14 Perceptions of change in confidence teaching number by length of time teaching

	Decrease (%)	No change (%)	Increase (%)
First 4 years	7	46	43
Mid-career	9	64	27
Late career	0	74	23

NFER participant baseline and endpoint only survey responses, 2023-2025. N=256 (includes valid but non-comparable responses not displayed (e.g. "I don't know)). p=0.0149. Percentages may not sum to 100 due to rounding.

Table 15 Perceptions of change in confidence teaching statistics by length of time teaching

	Decrease (%)	No change (%)	Increase (%)
First 4 years	13	23	57
Mid-career	4	47	47
Late career	0	54	46

NFER participant baseline and endpoint only survey responses, 2023-2025. N=256 (includes valid but non-comparable responses not displayed (e.g. "I don't know)). p=0.0014. Percentages may not sum to 100 due to rounding.

A significant association was also found between participants' length of time teaching and the extent they reported change over time in their effectiveness identifying and rectifying students'

misconceptions. Table 16 shows a higher proportion of participants in their late career reported increased effectiveness and a smaller proportion reported no change compared to the other groups. These results are contrary to those described above and again should be interpreted with caution given small numbers of participants in some groups (for instance, late career) and that this was the only significant finding by length of time teaching across 11 areas of practice asked about in the survey.

Table 16 Perceptions of change in effectiveness identifying and rectifying students' misconceptions by length of time teaching

	Decrease (%)	No change (%)	Increase (%)
First 4 years	6	54	34
Mid-career	12	36	52
Late career	6	26	68

NFER participant baseline and endpoint only survey responses, 2023-2025. N=251 (includes valid but non-comparable responses not displayed (e.g. "I don't know)). p=0.0084. Percentages may not sum to 100 due to rounding.

5.5.3. Variation by highest maths-specific qualification

Participants' level of qualification in maths was significantly associated with the extent to which participants indicated change in the quality of their maths teaching practice. The frequencies of responses by this variable can be viewed in Table 17 and show variation across the categories. For instance, a higher proportion of participants with a degree-level qualification reported no change in the quality of their maths teaching (61 per cent) than participants with A-level or GCSE maths as their highest maths-specific qualification (55 and 45 per cent, respectively).

This may seem logical as a higher level of subject-specific knowledge is likely to be an important factor associated with teaching quality. However, a higher proportion of participants with GCSE maths as their highest maths-specific qualification reported a decrease in the quality of their maths teaching over time (26 per cent) than participants with A-level or degree-level maths qualifications (5 per cent and 8 per cent, respectively). One possible explanation for this somewhat counterintuitive finding is that the programme may have exposed some aspects of quality maths teaching that participants with lower levels of maths specific subject knowledge may have required further support with or made them realise that they had more to learn.

Table 17 Perceptions of change in quality of maths teaching by highest maths qualification

	Decrease (%)	No change (%)	Increase (%)
GCSE	26	45	29
A level	5	55	36
Degree or above	8	61	30

NFER participant baseline and endpoint only survey responses, 2023-2025. N=255 (includes valid but non-comparable responses not displayed (e.g. “I don’t know)). p=0.0084. Percentages may not sum to 100 due to rounding.

Participants’ confidence to teach the topics geometry and measure, number, probability, and ratio, proportion and rates of change was also significantly associated with level of maths qualification. The results displayed in the following tables (Table 18-21) are rather mixed and do not indicate a consistent direction of relationship between participants’ confidence and maths qualification, but in general show that a higher proportion of teachers with a degree-level maths qualification report no change over time than those with a lower maths qualification.

Table 18 Perceptions of change in confidence teaching geometry and measure by highest maths qualification

	Decrease (%)	No change (%)	Increase (%)
GCSE	16	32	51
A level	5	35	55
Degree or above	4	56	39

NFER participant baseline and endpoint only survey responses, 2023-2025. N=253 (includes valid but non-comparable responses not displayed (e.g. “I don’t know)). p=0.0014. Percentages may not sum to 100 due to rounding.

Table 19 Perceptions of change in confidence teaching number by highest maths qualification

	Decrease (%)	No change (%)	Increase (%)
GCSE	19	43	38
A level	8	54	35
Degree or above	4	69	27

NFER participant baseline and endpoint only survey responses, 2023-2025. N=253 (includes valid but non-comparable responses not displayed (e.g. “I don’t know)). p=0.0044. Percentages may not sum to 100 due to rounding.

Table 20 Perceptions of change in confidence teaching probability by highest maths qualification

	Decrease (%)	No change (%)	Increase (%)
GCSE	16	38	43
A level	4	38	55
Degree or above	4	49	47

NFER participant baseline and endpoint only survey responses, 2023-2025. N=253 (includes valid but non-comparable responses not displayed (e.g. “I don’t know)). p=0.0169. Percentages may not sum to 100 due to rounding.

Table 21 Perceptions of change in confidence teaching ratio, proportion and rates of change by highest maths qualification

	Decrease (%)	No change (%)	Increase (%)
GCSE	14	46	41
A level	4	42	51
Degree or above	1	54	45

NFER participant baseline and endpoint only survey responses, 2023-2025. N=253 (includes valid but non-comparable responses not displayed (e.g. “I don’t know)). p=0.0154. Percentages may not sum to 100 due to rounding.

A significant association was also found between participants’ level of maths qualification and the extent of change they reported over time in their confidence understanding mastery strategies. Table 22 shows the results are rather mixed and a little contrary to expectations and other findings, with a higher proportion of teachers with A-level maths reporting increased confidence, followed by participants with degree level maths, then participants with GCSE level maths. However, this may reflect the strong emphasis on mastery in the CPD and that increased confidence with mastery over the course of the programme was one of the most prevalent changes overall as participants tended to have lower levels of confidence and knowledge of this approach initially in comparison to other aspects of practice. Participants with lower levels of maths subject knowledge may have found the concept of maths mastery particularly challenging.

Table 22 Perceptions of change in confidence understanding mastery strategies by highest maths qualification

	Decrease (%)	No change (%)	Increase (%)
GCSE	8	27	62
A level	0	11	84
Degree or above	6	20	71

NFER participant baseline and endpoint only survey responses, 2023-2025. N=251 (includes valid but non-comparable responses not displayed (e.g. “I don’t know)). p=0.0219. Percentages may not sum to 100 due to rounding.

A significant association was also found between participants' level of maths qualification and the extent of change they reported over time in their effectiveness building on students' prior knowledge and scaffolding learning. Table 23 shows the responses by this variable with a smaller proportion of teachers with a maths degree or higher equivalent qualification reporting increases over time and larger proportion reporting no change compared to the other groups. Again, small numbers in some groups and the lack of consistency in associations across numerous other areas of practice indicate this result should be interpreted with caution.

Table 23 Perceptions of change in effectiveness building on students' prior knowledge and scaffolding learning by highest maths qualification

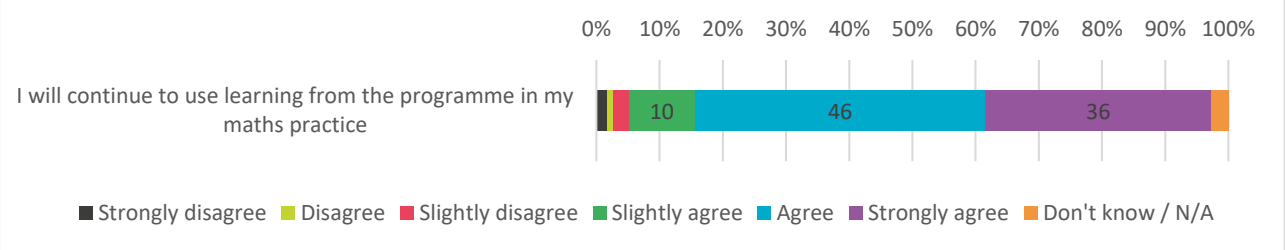
	Decrease (%)	No change (%)	Increase (%)
GCSE	14	27	57
A level	8	23	65
Degree or above	7	43	50

NFER participant baseline and endpoint only survey responses, 2023-2025. N=249 (includes valid but non-comparable responses not displayed (e.g. "I don't know)). p=0.0439. Percentages may not sum to 100 due to rounding.

5.6. Anticipated longer-term impacts

Almost all participants (92 per cent) **agreed to some extent that they would continue to use learning from the programme in their maths practice** (see Figure 18). This indicates that changes to maths teaching practice are likely to be sustained longer term.

Figure 18 Perceptions of longer term impact on practice



NFER participant endpoint survey, 2023-2025. N=289

Qualitative evidence from college case studies also indicated that impacts on maths teaching practice are likely to be long term. **Staff in all six case-study colleges planned to continue to use and embed the teaching strategies** learned on the WRM training.

Interviewees found the reports provided by WRM at the end of the programme useful in summarising their progress, suggesting next steps and recommending how they could continue to develop their provision. They planned to continue to embed the approaches and support this through staff meetings, coaching colleagues one-to-one, conducting learning walks, and developing schemes of work and associated resources. Senior leaders reported planning for teachers to revisit the recorded webinar CPD sessions and for new teachers to shadow experienced colleagues to observe methods.

Maths leads felt that **ongoing support from WRM**, for example in the form of phone calls or emails to discuss ideas, or lesson observations and tailored feedback to support staff who were struggling with implementation, would be beneficial to support the long-term embedding of learning from the programme. They also hoped to network with colleagues in other colleges in similar contexts to share their experiences. Some of the networks have been set up by WRM, with meetings organised by the lead trainer, to focus on shared interests, for example, problem-solving skills.

Several senior leaders and maths leads planned to embed the teaching strategies from the CPD more broadly in the teaching of maths-related content within vocational subjects or other maths courses. For instance, using ratios to measure hair dye proportions in hairdressing.

5.7. Contribution of other CPD to impacts

The endpoint survey asked participants whether they had participated in any other sustained externally delivered maths CPD other than WRM CPD over the previous two academic years. The responses, displayed in Table 24, indicate a divided picture with 48 per cent of respondents engaging in other maths CPD and 52 per cent of respondents not. This suggests that, **for some participants at least, CPD other than the WRM programme may have contributed to the changes reported in maths knowledge, practice and leadership**.

Table 24 Participation in other maths-related CPD

Participation in other sustained externally delivered maths CPD over last two academic years…	Frequency (N)	Frequency (%)
Yes	137	48
No	146	52

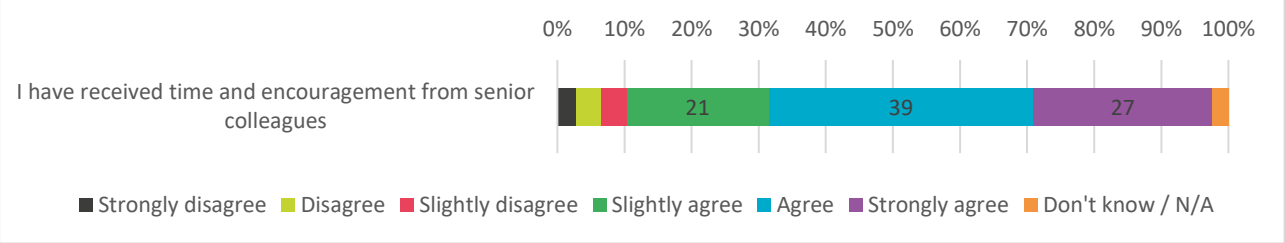
NFER participant endpoint survey, 2023-2025. N=283. Percentages may not sum to 100 due to rounding.

Although the endpoint survey did not ask any follow-up questions to explore the nature of other CPD that participants had undertaken, this is indicated in case-study interviews. Case-study interviewees reported engaging with CPD from other sources, including Maths Hubs, the National Centre for Excellence in the Teaching of Mathematics (NCETM), Centres for Excellence in Maths (CfEM) and the Advanced Maths Support Programme (AMSP). Colleges also often had their own internal CPD programmes (often non-maths specific) and departmental developments relating to the maths curriculum and pedagogy. In the qualitative interviews, senior leaders and maths leads were asked to what extent other maths-related CPD had contributed to the outcomes they had reported but respondents could not specify its impact. However, in general, they commented that the **WRM CPD had complemented other maths-related CPD** well in terms of content and quality. It therefore seems likely that, while the WRM CPD was for many colleges the main source of external development during the timeframe of the programme, it is possible that other sources of support, both internal and external, may also have contributed to the positive impacts and changes in practice reported in this study.

6. Evaluation findings: Facilitators and barriers to implementation

The majority of participants (87 per cent) **agreed to some extent that they had received time and encouragement from senior colleagues to engage in the programme** (see Figure 19). This support is likely to have been a key factor in the success of the programme, including its achievement of positive impacts. The programme model itself may have also helped to foster this support by involving all staff in the department and thus creating a higher profile for the CPD.

Figure 19 Perceptions of support to participate in the programme



NFER participant endpoint survey, 2023-2025. N=289

Interviewees identified several key factors in the delivery of the CPD in their colleges that facilitated the successful outcomes of the CPD. These may help colleges to support optimal engagement with the CPD in the future. Maths leads and teachers found **time off-timetable** helpful in enabling them to engage with the first face-to-face session. This aided staff buy-in and commitment and a collaborative approach to development of maths teaching approaches. Other facilitating factors included:

- dedicated time for teachers to engage with the programme
- time for teachers to implement approaches and adapt strategies through 'trial and error' in different topics so they became embedded
- time to prioritise updating lesson plans and revising SoW to incorporate new approaches
- time and a forum for teachers to share reflections on strategies and ideas for implementation, such as slots to share learning with colleagues during departmental time
- in some colleges, staff were also given time off timetable to engage with the Embedding Stage activities, for instance, whole department CPD and development sessions.

Maths leads and teachers also reported that they were supported to implement changes in practice through **senior leadership recognising and prioritising the need for developments** and enhancements in the department. The openness of maths departments to trialling innovative approaches was also highlighted. Where **maths leads** (or other key staff in maths departments/college) **acted as advocates of the practices** within their departments, and catalysts of change, leading on new practices and enthusing and supporting teachers to implement changes, greater impacts were realised. Participants' existing familiarity and affinity with mastery approaches was also important to the success of implementation.

Key barriers reported by interviewees included staff turnover, insufficient time for implementation and poor student behaviour. High levels of staff turnover meant that staff in maths departments had different levels of exposure to the programme and therefore varying levels

of impetus and ability to implement change. In some cases, there were lower levels of interest and capacity to prioritise the programme from some key contacts and teachers. Strategies, approaches and SoW presented in the CPD generally required adaptation to effectively support the specific needs and learning context of post-16 GSCE maths re-sit learners and, where insufficient time was allowed for these changes to practice, the impacts were impeded. A further barrier was that there was insufficient time in the GCSE resit schedule to support the deeper learning of mastery strategies advocated in the programme. Poor student behaviour in GCSE maths resit classes disrupting learning and engagement was also mentioned as a barrier to implementing changes to practice. Other barriers related to insufficient lead-in time to make changes to SoW and lesson plans in advance of these needing to be delivered. In some colleges, interviewees reported insufficient time to meet with colleagues off timetable to work collaboratively and plan for more embedded use of the strategies introduced in the CPD.

7. Evaluation findings: Key learning to enhance the CPD in future

Looking across the feedback gathered, this evaluation highlights a number of key learning messages to inform the future delivery and enhancement of the CPD.

Programme delivery mode, capacity and flexibility:

- opportunities for face-to-face sessions were particularly valued – overall, the programme appeared to strike an effective balance between face-to-face and online/remote support
- sufficient capacity within the programme delivery team was crucial to ensure that the CPD could be delivered in line with colleges' needs and thereby maximise accessibility for participants – for example, the flexibility of the WRM team to deliver training on specific days reserved for CPD in colleges was appreciated by participants
- establishing a main contact within the programme provider and each recipient organisation helped to aid communication, coordination and build a trusting relationship
- bespoke, tailored and flexible professional development - such as the ability for participants to choose modules and focus development on areas relevant to needs, as well as attend sessions at convenient times
- engaging the widest possible buy-in from staff through direct involvement in the CPD.

Programme structure, content and resources:

- the structure of the programme which included opportunities for different forms of support, regular and sustained input and continuous reflection and implementation proved effective
- the programme content was largely praised as being relevant to participants' needs, although in future content may be refined further to incorporate new evidence on effective practices, more explicit instruction on mastery teaching techniques modelled in the training sessions, and more support with incorporating strategies into lesson plans
- the programme content included easy to implement practical approaches and resources, however, feedback indicates that the resources would benefit from further adaptation for the post-16 teaching and learning context, including taking greater account of teaching time constraints and older student age groups. WRM support with these adaptations may be needed as part of delivery.

College context and support:

- the allocation of time, strong subject leadership, prioritising pedagogical developments, and colleague collaboration all contribute to more consistent and embedded development from CPD. Senior leaders and subject leaders participating in the CPD may need to consider how new practices can be explored and incorporated in light of timing constraints and low levels of student engagement in post-16 GCSE maths.

8. Conclusions

The WRM post-16 maths CPD has successfully met a particular need for support focusing specifically on teachers of GCSE maths at post-16. Teaching these students presents a unique challenge in that approaches throughout secondary education have failed to sufficiently support students to achieve GCSE maths resulting in disengagement, and as students age and enter post-16 settings, they require an adapted approach.

The programme has been consistently well received and highly regarded by participants and this evaluation has recorded promising evidence of positive impacts on the teaching and leadership of GCSE/FSQ maths post-16. Impacts are particularly noted in terms of participants' understanding and use of mastery strategies in teaching. There are also signs that developments in participants' practices are leading to teachers' perceptions of improved confidence among students – an essential initial step in students' journeys to achieving the required standard in GCSE maths. There are also signs of modest improvements in teachers' perceptions of students' maths progress, however, this has not yet transpired into perceived impact on students' maths attainment. If appropriate, a follow-up impact evaluation of the CPD programme could measure the impacts of the programme on student outcomes and provide a more robust indication of its impacts.

The evaluation evidence endorses the delivery model and sustained nature of the programme and highlights the face-to-face, whole-department and tailored elements as particularly effective. There is scope to develop the programme by further refining the focus on teaching GCSE maths to post-16 students to ensure the strategies are feasible where student engagement is likely to be particularly low, where there is very limited time for students to learn and apply new strategies, and where student behaviour is a considerable risk to learning.

Appendix A – Survey sample characteristics

Table 25 Participant characteristics – Main job role

Main job role	Frequency (N)	Frequency (%)
Teacher/lecturer (e.g. classroom teacher/lecturer, supply teacher/lecturer, cover teacher/lecturer)	447	78
Maths lead (e.g. head of maths department/subject)	79	14
Other (please specify)	50	9

NFER participant baseline and endpoint only survey responses, 2023-2025. N=576. Percentages may not sum to 100 due to rounding.

Table 26 Participant characteristics – Main subject taught

Main subject taught	Frequency (N)	Frequency (%)
Maths is the main subject I teach	518	90
Maths is not the main subject I teach	58	10

NFER participant baseline and endpoint only survey responses, 2023-2025. N=576. Percentages may not sum to 100 due to rounding.

Table 27 Participant characteristics – Maths course taught

Maths course taught	Frequency (N)	Frequency (%)
GCSE Maths	502	87
Functional Skills Maths	350	61
A Level Maths	35	6
A Level Further Maths	16	3
Core Maths	31	5
Other	40	7

NFER participant baseline and endpoint only survey responses, 2023-2025. N=577. Multiple response question.

Table 28 Participant characteristics – Highest maths-specific qualification

Highest maths-specific qualification	Frequency (N)	Frequency (%)
PhD	12	2
Masters	75	13
Degree	222	39
A Level	145	25
GCSE/O Level	115	20
Other (please specify)	7	1

NFER participant baseline and endpoint only survey responses, 2023-2025. N=576. Percentages may not sum to 100 due to rounding. Note: responses in 'other' were re-categorised where possible if the level of the qualification could be discerned as being equivalent to each of the categories. The following categorisation was applied: GCSE/O Level = Level 1-2 qualifications; A Level = Level 3 qualifications; Degree = Level 4-6 qualifications; Masters = Level 7 qualifications; PhD = Level 8 qualifications. Responses remained as 'other' where it was not possible to identify the level of the qualification from the description provided in open text.

Table 29 Participant characteristics – Teaching qualification

Teaching qualification	Frequency (N)	Frequency (%)
Yes	511	89
No	64	11

NFER participant baseline and endpoint only survey responses, 2023-2025. N=575. Percentages may not sum to 100 due to rounding.

Table 30 Participant characteristics – Length of time teaching at college

Length of time teaching at college	Frequency (N)	Frequency (%)
This is my first year teaching at the college	94	16
1 - 4 years	204	35
5 - 9 years	137	24
10 - 19 years	106	18
20 - 29 years	24	4
30 years or more	10	2

NFER participant baseline and endpoint only survey responses, 2023-2025. N=575. Percentages may not sum to 100 due to rounding.

Table 31 Participant characteristics – Length of time teaching maths

Length of time teaching maths	Frequency (N)	Frequency (%)
This is my first year teaching maths	42	7

Length of time teaching maths	Frequency (N)	Frequency (%)
1 - 4 years	109	19
5 - 9 years	159	28
10 - 19 years	172	30
20 - 29 years	62	11
30 years or more	25	4
I haven't taught maths previously, but I will in the future	6	1

NFER participant baseline and endpoint only survey responses, 2023-2025. N=575. Percentages may not sum to 100 due to rounding.

Table 32 Participant characteristics – Length of time teaching maths GCSE resit or maths FSQ

Length of time teaching maths GCSE resit or maths FSQ	Frequency (N)	Frequency (%)
This is my first year	65	11
1 - 4 years	171	30
5 - 9 years	176	31
10 - 19 years	120	21
20 - 29 years	28	5
30 years or more	6	1
I haven't taught GCSE resit/FSQ maths previously, but I will in the future	11	2

NFER participant baseline and endpoint only survey responses, 2023-2025. N=577. Percentages may not sum to 100 due to rounding.

Appendix B – Extent of engagement

Table 33 Engagement with Foundation Stage modules

No. of Foundation Stage modules engaged with	Frequency (N)	Frequency (%)
0	3	1
1	31	10
2	31	10
3	37	12
4	195	66

NFER participant endpoint survey, 2023-2025. N=297. Percentages may not sum to 100 due to rounding.

Table 34 Engagement with Developing Stage modules

No. of Developing Stage modules engaged with	Frequency (N)	Frequency (%)
0	10	3
1	3	1
2	5	2
3	15	5
4	11	4
5	22	8
6	140	48
7	30	10
8	16	5
9	10	3
10	8	3
11	3	1
12	20	7

NFER participant endpoint survey, 2023-2025. N= 293. Percentages may not sum to 100 due to rounding.

Table 35 Level of engagement

Level of engagement	Frequency (N)	Frequency (%)
Optimal engagement (4 Foundation Stage modules and 6+ Developing Stage modules)	158	54
Optimal Foundation only (4 Foundation Stage modules and <6 Developing Stage modules)	34	12
Optimal Development only (<4 Foundation Stage modules and 6+ Developing Stage modules)	69	24
Below optimal engagement (<4 Foundation Stage modules and <6 Developing Stage modules)	32	11

NFER participant endpoint survey, 2023-2025. N=293. Percentages may not sum to 100 due to rounding.

Table 36 Reasons for below optimal engagement

Reasons for below optimal engagement	Frequency (N)	Frequency (%)
Other commitments/priorities prevented me from attending the sessions	79	59
Was not in post at the time of the sessions	17	13
Did not know about the session timing/details	13	10
Did not perceive it as relevant/useful to attend the sessions	11	8
Other	29	22

NFER participant endpoint survey, 2023-2025. N=133. Multiple response question. 'Other' responses included: a misunderstanding of the question where respondents thought they had selected the required minimum number of modules but they had not; participants could not remember the title of the modules they had attended; illness/absence; intended to listen to the session recording in future; and other colleagues attended and provided feedback. Several other responses overlapped with the categories presented in the questionnaire.

Table 37 Engagement with Embedding Stage

Extent agree/disagree…	Strongly disagree		Disagree		Slightly disagree		Slightly agree		Agree		Strongly agree	
	N	%	N	%	N	%	N	%	N	%	N	%
…that you have been supported with coaching offered to your college as part of the 'Embedding Stage'	1	2	0	0	0	0	2	4	19	41	24	52

NFER participant endpoint survey, 2023-2025. N=46 (subject leads only). Percentages may not sum to 100 due to rounding.

Table 38 Engagement with gap tasks

Engagement with gap tasks	Frequency (N)	Frequency (%)
Yes	155	53
No	65	22
I don't know	71	24

NFER participant endpoint survey, 2023-2025. N=291. Percentages may not sum to 100 due to rounding.

Appendix C – Reasons for participation

Table 39 Reasons for participating in WRM CPD

Reasons for participating in WRM CPD	Frequency (N)	Frequency (%)
I want to be able to better support my students	364	69
I want to further develop my maths teaching skills/improve my current approach to teaching maths	355	67
I want my students to achieve higher GCSE/FSQ maths grades	324	61
I want to improve my maths pedagogical knowledge	298	57
I was asked to participate in the CPD	267	51
I want to improve my maths subject knowledge	240	46
I want to increase my confidence in teaching maths	221	42
I am new to teaching GCSE/FSQ maths	73	14
I want to improve the quality of GCSE/FSQ maths teaching across the maths department (Subject Lead only)	63	82
I want to improve the maths progress and achievement of students across the maths department (Subject Lead only)	61	79
I want to better support the maths teachers in my department (Subject Lead only)	59	77
I want to increase my confidence as a maths lead (Subject Lead only)	40	52

NFER participant baseline survey, 2023-2024. N=527 all respondents; N=77 subject leads. Multiple response question.

Appendix D – Change over time: teachers' subject and pedagogical knowledge

Table 40 Teachers' subject and pedagogical knowledge – baseline responses

Extent agree/disagree…	Strongly disagree		Disagree		Slightly disagree		Slightly agree		Agree		Strongly agree		N/A	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
I have the required subject knowledge to effectively teach GCSE/FSQ maths	20	4	10	2	10	2	29	5	200	37	271	50	3	1
I have the required maths pedagogical knowledge to effectively teach GCSE/FSQ maths	9	2	13	2	12	2	78	14	279	51	150	28	2	<1

NFER participant baseline survey, 2023-2024. N=543. Percentages may not sum to 100 due to rounding.

Table 41 Teachers' subject and pedagogical knowledge – endpoint responses

Extent agree/disagree…	Strongly disagree		Disagree		Slightly disagree		Slightly agree		Agree		Strongly agree		N/A	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
I have the required subject knowledge to effectively teach GCSE/FSQ maths	4	1	2	1	5	2	4	1	83	29	189	65	3	1
I have the required maths pedagogical knowledge to effectively teach GCSE/FSQ maths	5	2	1	<1	4	1	15	5	116	40	145	50	4	1

NFER participant endpoint survey, 2023-2025. N=290. Percentages may not sum to 100 due to rounding.

Appendix E – Change over time: teachers' confidence teaching maths topics

Table 42 Teachers' confidence teaching maths topics – baseline responses

Confidence teaching GCSE/FSQ…	Not at all confident		Not very confident		Slightly confident		Quite confident		Confident		Very confident		I don't teach /haven't taught this topic	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Algebra	4	1	18	3	30	6	68	13	170	32	227	42	21	4
Geometry and measure	4	1	15	3	44	8	87	16	194	36	184	34	10	2
Number	0	0	2	<1	17	3	51	9	189	35	275	51	4	1
Probability	4	1	18	3	36	7	89	17	225	42	157	29	9	2
Ratio, proportion and rates of change	3	1	15	3	25	5	83	15	213	40	191	36	8	1
Statistics	6	1	20	4	39	7	92	17	212	39	157	29	12	2

NFER participant baseline survey, 2023-2024. N=538. Percentages may not sum to 100 due to rounding.

Table 43 Teachers' confidence teaching maths topics – endpoint responses

Confidence teaching GCSE/FSQ…	Not at all confident		Not very confident		Slightly confident		Quite confident		Confident		Very confident		I don't teach /haven't taught this topic	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Algebra	2	1	4	1	10	3	10	3	61	21	196	68	7	2
Geometry and measure	0	0	1	<1	11	4	14	5	83	29	179	62	2	1
Number	0	0	1	<1	4	1	8	3	59	20	215	74	3	1
Probability	0	0	3	1	7	2	17	6	82	28	179	62	2	1
Ratio, proportion and rates of change	0	0	1	<1	6	2	9	3	78	27	194	67	2	1
Statistics	2	1	4	1	4	1	21	7	82	28	170	59	7	2

NFER participant endpoint survey, 2023-2025. N=290. Percentages may not sum to 100 due to rounding.

Appendix F – Change over time: teachers' confidence understanding and using mastery strategies

Table 44 Teachers' confidence understanding and using mastery strategies – baseline responses

	Not at all confident		Not very confident		Slightly confident		Quite confident		Confident		Very confident		I am not aware of / don't use mastery strategies	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Confidence understanding mastery strategies for teaching GCSE/FSQ maths	18	3	92	17	146	27	149	28	95	18	15	3	25	5
Confidence using mastery strategies in GCSE/FSQ maths teaching	20	4	100	19	175	32	127	24	78	14	12	2	28	5

NFER participant baseline survey, 2023-2024. N=540. Percentages may not sum to 100 due to rounding.

Table 45 Teachers' confidence understanding and using mastery strategies – endpoint responses

	Not at all confident		Not very confident		Slightly confident		Quite confident		Confident		Very confident		I am not aware of / don't use mastery strategies	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Confidence understanding mastery strategies for teaching GCSE/FSQ maths	1	<1	2	1	30	10	71	25	119	41	65	23	0	0
Confidence using mastery strategies in GCSE/FSQ maths teaching	1	<1	5	2	34	12	87	30	115	40	45	16	1	<1

NFER participant endpoint survey, 2023-2025. N=288. Percentages may not sum to 100 due to rounding.

Appendix G – Change over time: teachers' maths teaching quality

Table 46 Teachers' maths teaching quality – baseline responses

Extent agree/disagree…	Strongly disagree		Disagree		Slightly disagree		Slightly agree		Agree		Strongly agree		N/A	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
The quality of my GCSE/FSQ maths teaching is generally good	11	2	4	1	7	1	62	11	288	53	164	30	7	1

NFER participant baseline survey, 2023-2024. N=543. Percentages may not sum to 100 due to rounding.

Table 47 Teachers' maths teaching quality – endpoint responses

Extent agree/disagree…	Strongly disagree		Disagree		Slightly disagree		Slightly agree		Agree		Strongly agree		N/A	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
The quality of my GCSE/FSQ maths teaching is generally good	4	1	1	<1	3	1	9	3	135	47	135	47	3	1

NFER participant endpoint survey, 2023-2025. N=290. Percentages may not sum to 100 due to rounding.

Appendix H – Change over time: teachers' effectiveness teaching maths

Table 48 Teachers' effectiveness teaching maths – baseline responses

How effective doing the following in teaching maths…	Not at all effective		Not very effective		Slightly effective		Quite effective		Effective		Very effective		N/A	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Building on students' prior knowledge and scaffolding learning	1	<1	4	1	79	15	178	33	190	36	75	14	8	1
Teaching a sequenced and coherent curriculum/planning for progression in the curriculum	1	<1	12	2	74	14	163	30	187	35	85	16	13	2
Incorporating the use of practical resources and manipulatives into your teaching	12	2	89	17	143	27	135	25	101	19	43	8	12	2
Relating your maths teaching to real-world examples and applications	2	<1	28	5	82	15	167	31	165	31	85	16	6	1
Identifying and rectifying students' misconceptions	1	<1	11	2	62	12	182	34	188	35	83	16	8	1
Helping students understand and use mathematical vocabulary	2	<1	9	2	69	13	173	32	189	35	88	16	5	1
Differentiating maths lessons for students with varying abilities	1	<1	26	5	67	13	186	35	169	32	78	15	8	1
Identifying and supporting students experiencing maths anxiety	1	<1	22	4	101	19	169	32	168	31	68	13	6	1
Applying strategies to support students to overcome maths anxiety	2	<1	39	7	131	25	191	36	115	22	50	9	6	1
Using questioning techniques to develop students' mathematical thinking	0	0	14	3	76	14	165	31	180	34	91	17	9	2
Supporting students to use problem solving strategies	2	<1	16	3	118	22	176	33	170	32	46	9	7	1

NFER participant baseline survey, 2023-2024. N=534-535. Percentages may not sum to 100 due to rounding.

Table 49 Teachers' effectiveness teaching maths – endpoint responses

How effective doing the following in teaching maths…	Not at all effective		Not very effective		Slightly effective		Quite effective		Effective		Very effective		N/A	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Building on students' prior knowledge and scaffolding learning	1	<1	0	0	9	3	49	17	143	50	81	28	3	1
Teaching a sequenced and coherent curriculum/planning for progression in the curriculum	0	0	3	1	7	2	39	14	145	51	87	30	5	2
Incorporating the use of practical resources and manipulatives into your teaching	1	<1	13	5	36	13	76	27	105	37	51	18	4	1
Relating your maths teaching to real-world examples and applications	0	0	4	1	21	7	68	24	109	38	80	28	4	1
Identifying and rectifying students' misconceptions	1	<1	1	<1	11	4	55	19	130	45	85	30	3	1
Helping students understand and use mathematical vocabulary	2	1	0	0	13	5	46	16	137	48	85	30	3	1
Differentiating maths lessons for students with varying abilities	1	<1	2	1	12	4	64	22	122	43	79	28	6	2
Identifying and supporting students experiencing maths anxiety	1	<1	2	1	20	7	59	21	126	44	75	26	3	1
Applying strategies to support students to overcome maths anxiety	1	<1	3	1	27	9	71	25	123	43	58	20	3	1
Using questioning techniques to develop students' mathematical thinking	0	0	3	1	11	4	58	20	123	43	88	31	3	1
Supporting students to use problem solving strategies	0	0	3	1	8	3	64	22	132	46	76	27	3	1

NFER participant endpoint survey, 2023-2025. N=286. Percentages may not sum to 100 due to rounding.

Appendix I – Change over time: subject leadership

Table 50 Subject leadership – baseline responses

Extent agree/disagree…	Strongly disagree		Disagree		Slightly disagree		Slightly agree		Agree		Strongly agree	
	N	%	N	%	N	%	N	%	N	%	N	%
I am confident in my role as maths lead	0	0	2	3	2	3	17	22	40	53	15	20
I can effectively support staff to deliver good GCSE/FSQ maths lessons	0	0	2	3	3	4	20	26	40	53	11	14

NFER participant baseline survey, 2023-2024. N=76. Percentages may not sum to 100 due to rounding.

Table 51 Subject leadership – endpoint responses

Extent agree/disagree…	Strongly disagree		Disagree		Slightly disagree		Slightly agree		Agree		Strongly agree	
	N	%	N	%	N	%	N	%	N	%	N	%
I am confident in my role as maths lead	0	0	1	2	0	0	1	2	26	58	17	38
I can effectively support staff to deliver good GCSE/FSQ maths lessons	0	0	0	0	0	0	3	7	25	56	17	38

NFER participant endpoint survey, 2023-2025. N=45. Percentages may not sum to 100 due to rounding.

Appendix J – Change over time: student confidence, progress and attainment

Table 52 Students' maths confidence – baseline responses

	Not at all confident		Not very confident		Slightly confident		Quite confident		Confident		Very confident		I haven't been teaching GCSE/FSQ maths recently/am not teaching GCSE/FSQ maths this year	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Students' maths confidence prior to WRM CPD	36	7	229	44	130	25	77	15	21	4	5	1	27	5

NFER participant baseline survey, 2023-2024. N=525. Percentages may not sum to 100 due to rounding.

Table 53 Students' maths confidence – endpoint responses

	Not at all confident		Not very confident		Slightly confident		Quite confident		Confident		Very confident		I haven't been teaching GCSE/FSQ maths recently/am not teaching GCSE/FSQ maths this year	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Students' maths confidence since WRM CPD	2	1	42	15	91	32	111	39	25	9	4	1	9	3

NFER participant endpoint survey, 2023-2025. N=284. Percentages may not sum to 100 due to rounding.

Table 54 Student progress in last full academic year – baseline responses

	Below expected progress		Expected progress		Better than expected progress		I don't know		I didn't teach GCSE/FSQ maths last year	
	N	%	N	%	N	%	N	%	N	%
Average progress of GCSE/FSQ maths students last academic year	74	14	227	43	94	18	65	12	69	13

NFER participant baseline survey, 2023-2024. N=529. Percentages may not sum to 100 due to rounding.

Table 55 Student progress in last full academic year – endpoint responses

	Below expected progress		Expected progress		Better than expected progress		I don't know		I didn't teach GCSE/FSQ maths last year	
	N	%	N	%	N	%	N	%	N	%
Average progress of GCSE/FSQ maths students last academic year	20	7	161	56	62	22	30	10	13	5

NFER participant endpoint survey, 2023-2025. N=286. Percentages may not sum to 100 due to rounding.

Table 56 Student progress in current academic year – endpoint responses

	Below expected progress		Expected progress		Better than expected progress		I don't know		I didn't teach GCSE/FSQ maths last year	
	N	%	N	%	N	%	N	%	N	%
Average progress of GCSE/FSQ maths students this academic year	19	7	158	56	59	21	36	13	12	4

NFER participant endpoint survey, 2023-2025. N=284. Percentages may not sum to 100 due to rounding.

Table 57 Proportion of 16–19-year-old students achieving Grade 4 or above in GCSE maths resit last academic year – baseline responses

	Less than 10%		11 - 15%		16 - 20%		21 - 25%		26 - 30%		31 - 35%		36 - 40%		41 - 50%		51 - 60%		Over 60%		I don't know		We don't teach GCSE maths to 16-19 year olds	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Proportion of 16-19 year old students achieving Grade 4 or above in GCSE maths resit last academic year	9	12	11	14	16	21	15	19	8	10	3	4	3	4	3	4	2	3	0	0	7	9	0	0

NFER participant baseline survey, 2023-2024. Subject leads only. N=77. Percentages may not sum to 100 due to rounding.

Table 58 Proportion of 16-19 year old students achieving Grade 4 or above in GCSE maths resit last academic year – endpoint responses

	Less than 10%		11 - 15%		16 - 20%		21 - 25%		26 - 30%		31 - 35%		36 - 40%		41 - 50%		51 - 60%		Over 60%		I don't know		We don't teach GCSE maths to 16-19 year olds	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Proportion of 16-19 year old students achieving Grade 4 or above in GCSE maths resit last academic year	9	20	6	13	10	22	10	22	2	4	5	11	0	0	1	2	0	0	0	0	2	4	0	0

NFER participant endpoint survey, 2023-2025. Subject leads only. N=45. Percentages may not sum to 100 due to rounding.

Table 59 Proportion of 16-19 year old students achieving Level 2 FSQ maths last academic year – baseline responses

	Less than 10%		11 - 15%		16 - 20%		21 - 25%		26 - 30%		31 - 35%		36 - 40%		41 - 50%		51 - 60%		Over 60%		I don't know		We don't teach FSQ maths to 16-19 year olds	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Proportion of 16-19 year old students achieving Level 2 FSQ maths last academic year	4	5	1	1	1	1	2	3	2	3	1	1	3	4	1	1	4	5	3	4	34	44	21	27

NFER participant baseline survey, 2023-2024. Subject leads only. N=77. Percentages may not sum to 100 due to rounding.

Table 60 Proportion of 16-19 year old students achieving Level 2 FSQ maths last academic year – endpoint responses

	Less than 10%		11 - 15%		16 - 20%		21 - 25%		26 - 30%		31 - 35%		36 - 40%		41 - 50%		51 - 60%		Over 60%		I don't know		We don't teach FSQ maths to 16-19 year olds	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Proportion of 16-19 year old students achieving Level 2 FSQ maths last academic year	1	2	0	0	0	0	0	0	1	2	1	2	1	2	1	2	0	0	2	4	7	16	31	69

NFER participant endpoint survey, 2023-2025. Subject leads only. N=45. Percentages may not sum to 100 due to rounding.

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