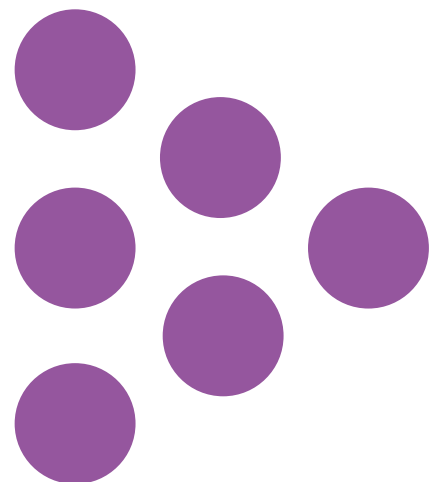

Report

**Qualitative Evaluation of West Yorkshire
Maths Hub**

National Foundation for Educational Research (NFER)



Qualitative Evaluation of West Yorkshire Maths Hub

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Executive summary

About the West Yorkshire Maths Hub’s Primary Teaching for Mastery Work Groups

The West Yorkshire Maths Hub (WYMH) is one of a network of 40 Maths Hubs in England. It is funded by the Department for Education and coordinated by the National Centre for Excellence in the Teaching of Mathematics (NCETM). It has been in operation since 2014 and covers schools in Leeds, Bradford and Calderdale.

Teaching for Mastery (TfM) is a key element of WYMH’s work with primary and secondary schools. The primary TfM Work Groups facilitate professional learning and practice development, emulating Shanghai maths practices (see page 3 for further details). Primary schools participating in the TfM Work Groups progress through four stages of engagement:

- Readiness: a one-year programme for schools not ready to embark on full mastery development
- Development: a one-year programme developing key mastery ideas and practice in the school
- Embedding: a one-year programme focused on embedding mastery developments across the school
- Sustaining: ongoing involvement with other schools in a Work Group, sustaining mastery developments in the school.

Each TfM Work Group is led by a Work Group Lead who is a teacher (or former teacher) expert, with expertise in maths education and in leading teacher professional development. Each Work Group consists of around six schools and 12 participants, including a maths lead and class teacher from each school. In the TfM Work Groups, Work Group Leads model effective practice, which participants take back and implement in their own schools along with other school-based tasks, which are reviewed at the following session. School visits, both of the Work Group Lead to participating schools and of participants to the Work Group Lead’s school and to other participants’ schools are a key feature of the first three stages of engagement.

About the research

This small-scale, qualitative study aimed to gain an in-depth understanding of schools’ perceptions of the effectiveness of WYMH’s TfM Work Groups, as well as the outcomes realised for the maths leads and teachers participating and their schools. It comprised virtual case studies with 10 schools which has participated in TfM Work Groups since 2017, with the case studies taking place between November 2021 and March 2022. In six schools, the maths lead and a teacher/teachers who participated in the Work Group participated in interviews and, in four schools, just the maths lead was interviewed. In total, the research team spoke with 10 maths leads and eight teachers.

Key research findings

Perceptions of effectiveness of the primary TfM Work Groups

The TfM Work Groups are a highly regarded form of CPD, with the maths leads and teachers who were consulted reporting very positive experiences, particularly of the Readiness, Developing and Embedding Work Groups. Aspects of the TfM Work Groups that participants reported worked particularly well included:

- the experience, organisation and responsiveness of their Work Group Lead
- the Work Group Lead's visits to schools to support with developing and implementing TfM action plans
- the practical, collaborative and supportive nature of Work Group sessions, and the size of the groups (around six schools) which facilitated sharing of learning
- the observation of lessons taught by a mastery expert followed by the opportunity for discussion, which supported implementation in their own classrooms and schools.

In comparison to many other forms of maths CPD, participants appreciated the long-term, sustained nature of the Work Groups and their focus on whole-school change.

Maths leads and teachers were a little less positive about their experiences of the Sustaining Work Groups, reporting that these worked less well due to:

- the lack of opportunity for participants to visit the Work Group Lead's school to observe practice, and vice versa
- sessions being less well structured and sequenced compared to previous Work Groups, with less opportunity for collaboration and discussion with other schools.

Interviewees' recommendations for improvements primarily related to the Sustaining Work Groups modelling the structure and content of the previous Work Groups.

Perceptions of outcomes

The majority of interviewees reported improvements in the quality of maths teaching in their schools, resulting from their own self-development and improved maths leadership skills and the dissemination of learning across their schools. They reported the embedding of the mastery approach to teaching maths, either within a key stage or across the whole school, and the development a cohesive and streamlined approach to teaching maths. In addition, they commented on their, and their teaching colleagues': increased maths subject and pedagogical knowledge, and confidence in what a mastery lesson should look like; increased familiarity with the resources to support maths teaching and learning; and increased enjoyment in teaching maths.

Consultees also reported a range of perceived outcomes for pupils resulting from embedding TfM in their schools. These included pupils': deeper understanding and improved application of maths concepts, linked to improved skills in problem solving, reasoning and justifying their answers and using the correct maths vocabulary; increased engagement in, and enjoyment of, maths lessons; improved confidence and self-belief in their maths ability; and improved progress.

1 Introduction and background

1.1 Introduction

This report presents the findings of a small qualitative study which explored perceptions of the effectiveness and outcomes of West Yorkshire Maths Hub’s Teaching for Mastery Work Groups for primary schools. The research was undertaken by the National Foundation for Educational Research (NFER) between November 2021 and March 2022.

1.2 About West Yorkshire Maths Hub (WYMH)

The West Yorkshire Maths Hub (WYMH) is one of a network of 40 Maths Hubs in England. It is funded by the Department for Education and coordinated by the National Centre for Excellence in the Teaching of Mathematics (NCETM). The WYMH covers Leeds, Bradford and Calderdale and it has been in operation since 2014.

The vision of the WYMH is to be connected to every school in its region so that maths teachers are supported in their role. The ultimate aim is to improve the engagement and achievement of students. Two key goals are 60 per cent of primary schools and 50 per cent of secondary schools to have engaged with WYMH’s Teaching for Mastery support by 2023.

WYMH’s work is facilitated by Local Leaders of Maths Education (LLME) who are trained and supported in their role. Within schools, WYMH seeks to support school and professional development leads in their roles of improving the quality of maths teaching and leadership.

Teaching for Mastery (TfM) is a key element of WYMH’s work with primary and secondary schools, alongside specialist knowledge for teaching maths (SKTM) programmes. With partners leading on the Advanced Mathematics Support Programme, WYMH also works with post-16 institutions to develop Core Maths pedagogy.

A programme-wide logic model for the WYMH can be found in Appendix A.

1.3 About WYMH’s Teaching for Mastery (TfM) Work Groups

This study specifically focused on WYMH’s primary TfM Work Groups which facilitate professional learning and practice development and use pedagogical principles from maths teaching in Shanghai¹. The Work Groups include four stages of engagement:

- Readiness: a one-year programme for schools not ready to embark on full mastery development
- Development: a one-year programme developing key mastery ideas and practice in the school

¹ Shanghai practices emphasise whole-class interactive teaching to develop conceptual understanding and procedural fluency, using carefully designed tasks and skilful questioning. To ensure pupils progress together, tasks are designed to allow for extension by deepening understanding of concepts and procedures, and daily intervention is used to support those needing extra tuition. Further details in a DfE evaluation can be found [here](#)

- Embedding: a one-year programme focused on embedding mastery developments across the school
- Sustaining: ongoing involvement with other schools in a Work Group, sustaining mastery developments in the school.

Maths Hub Work Groups enable schools to work together over a sustained period (usually a year). They are led by a Work Group Lead who is a teacher (or former teacher) expert, with expertise in both maths education and in leading teacher professional development. They involve exemplification of effective practice, planning collaborative activities, and school-based tasks which are then reviewed in the next session. There are usually around six schools and 12 participants in each group, including a maths lead and a teacher from each school. The first three stages of engagement also include school visits to support the development of the teachers and leaders or to discuss school priorities to increase the quality of maths teaching.

1.4 Aims of the research

The aims of this small-scale study were to explore the effectiveness of West Yorkshire Maths Hub’s primary TfM Work Groups and perceptions of the early outcomes realised for teachers and schools.

The study targeted three groups of schools which had engaged with the Work Groups since 2017:

- schools which had completed the programme from Mastery Readiness to Mastery Sustaining with no gap in involvement
- schools which had completed the programme from Mastery Development to Mastery Sustaining with no gap in involvement
- Schools which had completed Mastery Development and then had a gap in involvement.

The aim of targeting schools with sustained engagement and a gap in engagement was to compare and contrast outcomes achieved.

1.5 Methodology

The methodology comprised ten virtual school case studies with the intention of interviewing the maths lead and a teacher in each school who had participated in the TfM Work Groups. The aim of the case studies was to gain an in-depth understanding of these schools’ perceptions of the effectiveness and outcomes of the Work Groups they had engaged with. As well as providing intelligence in its own right, it was anticipated that the study would provide a platform for further quantitative work.

Recruitment of schools took place from November 2021 to February 2022 and significant challenges were experienced in engaging schools due to their focus on recovering from the impacts of the pandemic and staffing shortages. A number of schools felt unable to engage due to staffing and time pressures.

Additionally, in some schools that the research team contacted, the maths lead and/or teachers who had engaged with the Work Groups had left the school for posts elsewhere. In the case of

new maths leads within these schools, they felt unable to contribute to the evaluation as they had not been in the post long enough to fully engage with the Work Groups and therefore provide feedback on their experiences.

Despite these challenges, ten schools were engaged in the research and interviews were undertaken with ten maths leads and eight teachers. Case studies for six schools included an interview with a maths lead and a teacher/teachers who had taken part in a TfM Work Group, and four included the school's maths lead only. In two schools, joint interviews were undertaken with two teachers.

Five case-study schools completed the programme from Mastery Readiness to Mastery Sustaining with no gap in involvement. They started engaging with the Work Groups in 2018, completing the Readiness programme in the same year, followed by the Development programme in 2019, the Embedding programme in 2020 and the Sustaining programme in 2021.

Four case-study schools completed the programme from Mastery Development to Mastery Sustaining with no gap in involvement. Three of these schools started engaging with the Work Groups in 2019, completing the Development programme the same year, followed by the Embedding programme in 2020 and the Sustaining programme in 2021. One case-study school began the Mastery Development in 2018, followed by the Embedding programme in 2020 and the Sustaining programme in 2021.

Only one school engaged in the research had a gap in engagement after completing the Mastery Development Work Group. This school started the Mastery Development Work Group in 2017, which they completed in the same year, followed by the Embedding programme in 2018 but then did not complete the Sustaining programme until 2021. The maths lead reported that, after the Embedding Work Group, they had some (but little) contact with the Work Group Lead and other participating schools, but were not aware there was a Sustaining programme to move onto until receiving contact about it in 2021. Three additional schools which had had a gap in engagement expressed initial interest but did so because they believed the research was focusing on the Mastering Number programme which they were participating in. They were not aware of their school's previous participation in the primary TfM Work Groups which had taken place under a different maths lead and, due to the pandemic, engagement had not been revived.

Because of issues experienced in engaging schools with a gap in engagement, comparisons were not made between this one school and the nine schools which had sustained engagement. There were no significant differences between the responses of the nine schools with sustained engagement which had started with the Readiness Work Group as opposed to the Development Work Group.

A full breakdown of the characteristics of the case-study schools can be found in Appendix B.

2 About the research participants and their schools

This section provides details on the characteristics of the schools and participants which took part in the research, as well as contextual information on the priority schools placed on continuing professional development (CPD) and support provided for teacher CPD.

2.1 Characteristics of the schools and participants

The maths leads and teachers involved in this research taught across the Early Years Foundation Stage (EYFS), key stage 1 (KS1) and key stage 2 (KS2), with two maths leads and one teacher also holding assistant headteacher roles. Two teachers reported additional maths responsibility – one shadowed the maths lead in their school with the plan to take over the role in the future, while another teacher was co-maths lead.

Maths leads and teachers had been teaching at primary level for between five and 15+ years, and had been in their current schools for between three and 15+ years. Maths leads tended to have more teaching experience (more than five years) compared to teachers and had held this role for between three and 16 years. Further details on participants' characteristics are provided in Appendix C. Half of the schools were also participating in other maths-related CPD (further details are provided on page 14) and so could be considered high CPD engagers.

2.2 Priority schools placed on continuing professional development (CPD)

All maths leads and teachers reported that their **schools prioritised CPD and tended to describe their schools as 'CPD' and 'research driven'**. Interviewees reported that CPD needs were identified and addressed both at a school- and teacher-level. At the school level, interviewees said that whole-school CPD priorities were identified at the beginning of the year and decisions made over whether these needs would be best met through internal CPD (such as sessions run by subject leads or specialists in school) or externally. One maths lead commented that all external CPD they engaged with was accredited, for example from organisations such as WYMH, and that staff tended to take external CPD more seriously as they knew it was sourced for its high quality and because there was an added accountability.

At the teacher-level, one interviewee described how individual CPD needs were identified through performance management and appraisal meetings, where teachers were encouraged to reflect upon their practice and identify any new topics they would be teaching in the near future, or topics they felt less secure with, so that appropriate support and CPD could be put in place. This support could, for example, entail working with a subject leader on planning, putting in place an action plan, or observing other teachers' practice from where they could 'magpie' ideas and replicate effective practice in their own classroom.

Interviewees commonly reported that their schools had a supportive CPD culture in which teachers were comfortable raising challenges with senior leaders who, in turn, encouraged teachers to participate in CPD and put in place measures to allow this to happen (for example, release time and staff cover). As one teacher commented:

If you've got a case for wanting to go to a course or be involved with something and you pitch that to leadership, as long as it's within reason and benefits the school, they're fairly open about letting you take part in that. (Teacher, case study 9)

A small number of maths leads also commented that their school prioritised CPD for teaching assistants (TAs) as much as they did for teachers. They reported that all TAs attended the CPD sessions that were offered and, in one school, the maths lead reported the impacts of this approach:

We've had a massive culture shift from TAs who used to just sit with the 'bottom' group and now they are up and about, rotating round the room, picking up on misconceptions so they have had a lot of training. (Maths lead, case study 8)

Equally, **subject-specific CPD was a high priority for case-study schools**, to ensure that all teachers were confident to teach all subjects across the curriculum. Several schools reported that every half term a staff meeting was dedicated to each subject and, in one school, teachers were receiving Teaching for Mastery CPD across all subjects. Interviewees commented that areas where attainment and/or teaching required improvement received additional focus – in three schools this was reading, in two schools maths, and in one school phonics.

2.3 Support provided in schools for teacher CPD

Interviewees in **two schools reported that they had a coaching model in place**. Staff who had trained as coaches received time off timetable to carry out lesson observations with their coachees, support them with planning and provide other tailored support as required. All staff, including senior leaders, received this coaching. Other schools commented on **the value of lesson observations for developing teachers' practice**. This tended to work in two ways – firstly with teachers who felt they could improve their practice observing the lesson of a teacher who had been recognised for their strong practice and, secondly, through subject leaders or senior leaders dropping into lessons to observe teachers, which was then followed up with a discussion around the teacher's strengths and areas for development. Interviewees were keen to highlight that, through lesson observations, they were not looking to judge the teacher's practice but to help and support them with ongoing enhancements to their practice.

Interviewees commented on **their schools' focus on teachers working together**, for example to share planning or team teaching. In some cases, teachers planned and delivered the topics they were most confident with, which their partner teacher could then observe and model in the future. Some maths leads reported that this happened across their multi-academy trusts (MATs), which allowed for the creation of networks of teachers in the same year group who were working on the same plans and delivering the same schemes of work, as well as networks of phase teams or year group teams within schools with more than one-form entry.

Other forms of ongoing support that were mentioned included: moderation sessions attended by subject leads across the local authority; in-school book looks; learning walks; mentor and subject leader support given to early-career teachers (ECTs); and general encouragement to share ideas and good practice amongst the teaching team.

3 Schools' engagement in the Teaching for Mastery Work Groups

This section provides details on schools' reasons for engaging in the Teaching for Mastery Work Groups, how teachers were selected for involvement, the activities schools had engaged with, and the support provided within schools to embed learning from the Work Groups.

3.1 Schools' reasons for participation in Teaching for Mastery

Maths leads reported several reasons for their school participating in the TfM Work Groups.

Most maths leads reported that **they hoped that participating in the Work Groups would support them with achieving their maths priorities**, which included raising attainment and enjoyment in maths; embedding more reasoning into maths teaching; providing additional challenge to pupils; and supporting teachers with their maths teaching. Maths leads reported they were changing the way they taught maths in school when they signed up, moving to the mastery approach, and involvement with the Work Groups would support them to embed the new approach. As one maths lead commented:

We were starting our mastery journey and didn't want to go down the route of schemes and books that are rigid, for example with text books. We already had good maths teaching but we wanted something to enhance it so we just needed a bit of input on where to start with mastery and how to embed it. (Maths lead, case study 2)

Another maths lead said:

We wanted to review the maths curriculum and the way it was taught. It was an opportunity to engage and work with others. I was aware of other schools who had engaged with the Maths Hub previously who had spoken very highly about it. It was an approach that I thought would work well and was the direction I wanted to take maths in our school under my lead. (Maths lead, case study 4)

Several maths leads reported that other maths leads had recommended the TfM Work Groups to them. They had shared the positive impact the mastery approach had had in their own schools and how valuable the TfM groups were for providing maths teaching ideas and supporting the delivery of in-house maths training.

Two maths leads had prior experience of the TfM Work Groups from their previous schools and, upon seeing that the approach to maths teaching in their current school could be improved and standards raised, they felt that engaging with the TfM Work Groups and adopting the mastery approach to teaching was the best way to achieve their goals.

A few maths leads reported that they had engaged with other CPD led by WYMH and/or White Rose Maths (WRM), such as the bar modelling course and webinars. They were very satisfied with these courses for their high-quality content, delivery and teaching ideas and this positive experience had fed into their decision to participate in the TfM Work Groups.

3.2 How teachers were selected for involvement

The selection of teachers to participate in the TfM Work Groups varied across schools.

In some schools, the maths lead reported that they were the only member of staff engaging with the TfM Work Groups, either due to the stage the school was at in their mastery journey or the difficulty in releasing staff due to Covid-19 and the associated staffing pressures. These maths leads were regularly disseminating information to staff through in-house CPD sessions (see Section 5).

In some schools, teachers were participating in the Work Groups alongside the maths lead. Reasons for these teachers being selected included:

- they were teaching in a different key stage to the maths lead, so the school had representation from both key stages and someone to feed back learning to each team
- they were teachers who were most confident with maths and would be able to effectively share learning with their year group/key stage team
- they were teachers who were less confident with maths and would benefit from additional support
- they were being prepared to step into the maths lead role.

Four maths leads reported that they had been able to involve all teachers in the groups, either through them attending one-off sessions related to their year group, or through signing teachers up to visit the TfM Work Group Lead’s school to watch maths mastery teaching in action. One maths lead reported that they would have liked to get their teachers out to observe practice in other schools but releasing staff had been challenging, however they hoped to engage more with this opportunity this academic year.

3.3 Teaching for Mastery activities engaged with

Schools had participated in a range of activities over the course of their mastery journey. Initially, this had involved introductory conference-style sessions and CPD to inform schools of the mastery approach to teaching and how it could be embedded into the maths curriculum. Following on from this, schools were assigned to Work Groups with six or seven other schools, with whom they would meet with for sessions either at the Work Group Lead’s school or at schools within the group. Maths leads and teachers reported that sessions focussed on implementing [The Five Big Ideas](#) (Coherence, Representation and Structure, Mathematical Thinking, Fluency and Variation) and other topics including number and place value, representation and the language of problem solving and reasoning across all year groups in KS1 and KS2.

The main activity, reported by all schools, was the participation of both the maths leads and teachers attending the groups, as well as other teachers in school, in **lesson observations** where the mastery approach was established. These happened both in-person and virtually (through pre-recorded lessons).

Interviewees reported that they had **visited the Work Group Lead’s school to observe them teaching using the mastery approach**. These observations were reported to follow a cycle of activity – observations were followed by group discussions and reflection on the Work Group

Lead’s practice, sharing of ideas amongst the group of similar practices, and a discussion on how maths leads and teachers would implement the practice in their own classrooms/school. Maths leads and teachers would then implement the new practices they acquired from the Work Group Lead and others in the group in their own teaching, then at the next session reflect on how this implementation had gone, with suggested solutions being provided to any challenges they had experienced. As mentioned above, in four case-study schools, teachers not directly involved in the Work Group had been given the opportunity to visit open classrooms where they could observe the mastery approach being used in the year group they taught:

I have sent some teachers to [Work Group Lead’s] school to observe her teaching. Through the Work Group, they focus on a different year group each time so every teacher will get to go and have a session with other teachers in the same year group so that’s beneficial this year. That’s good because it means it’ll be spread out across the school more. (Maths lead, case study 8)

Interviewees in eight schools also reported that **the Work Group Lead had visited their school to observe maths teaching in the maths lead’s and participating teacher’s classrooms and provided tailored feedback** on how to implement the strategies discussed in the Work Groups in their setting, and discussed what they were doing well and where they could improve their approach.

Interviewees in four schools reported that **the Work Group Lead had also carried out an audit visit**, and then subsequently supported them to put together an **action plan** based on the school’s maths priorities and provided support with updating maths policies to incorporate the mastery approach. They reported that support with these was provided both during the Work Group sessions and during the Work Group Lead’s visits to their school.

One school also reported that they had attended a CPD session on the Shanghai style of teaching, in which this method was demonstrated along with discussions around how maths leads and teachers might incorporate it into their own practice.

3.4 Support provided to embed learning from Teaching for Mastery Work Groups

Maths leads and teachers in half of the case-study schools reported that they were not given specific time to reflect on their learning after the TfM Work Groups as finding additional time was a challenge. Instead, **teachers reflected on their learning and how they planned to incorporate this into their practice during their planning, preparation and assessment (PPA) time.**

However, **maths leads and teachers in the other half of schools reported that their school was flexible with giving them time after the Work Groups to discuss key learning points**, both with one another and in some cases the wider maths team, and put in place a plan for how the mastery strategy would be implemented across school.

Interviewees in two schools reported that there was time at the start and end of the Work Group sessions for reflection and discussion with other delegates around what they would take from the session and how they would begin implementing in their classrooms/schools. They also

felt that the time between sessions (five to six weeks) was sufficient to properly implement new strategies and see how they worked in their class before feeding back and gaining new ideas from the next session.

Maths leads and teachers reported that they had the freedom to implement the learning from the Work Groups within their practice, and that senior leaders were happy for them to do this because developing the mastery approach was a school priority. Once maths leads and teachers felt confident with the new approach, they shared this with other staff (more details are provided in Section 5). As one teacher commented:

I can come back and implement anything I want to straight away. I will try things with my class first then, if I think it's working, we will roll it out to the rest of the school. Before sharing things with other classes, sometimes I need to think about how a strategy might need to be adapted to better suit different year groups. (Teacher, case study 8)

4 What has worked well and less well in the delivery of the Teaching for Mastery Work Groups?

This section explores interviewees’ perceptions on what has worked well and less well in the delivery of the Teaching for Mastery Work Groups, how they compare to other maths-specific CPD, the impact of Covid-19, and suggestions for enhancements.

4.1 What has worked well?

Maths leads and teachers were very complimentary about the Work Group Leads that led their Readiness, Developing and Embedding Work Groups. They described them as well prepared and reported that the Work Groups were well run and that the time and thought that had gone into session planning, delivery and sequencing was clear to see. Maths leads and teachers also appreciated the responsiveness of Work Group Leads – they reported that the Work Group Lead was always on hand between sessions to check in on how individual schools were progressing with implementing new strategies, and interviewees knew that any requests for support would be quickly actioned. In addition, **maths leads highly valued the Work Group Lead’s visit to their schools** to review their maths policies and practice and support the development and implementation of their TfM action plans and practice.

Maths leads **were very positive about their experiences of the Mastery Readiness Work Groups**, reporting that they enjoyed the practical nature of the sessions, such as becoming familiar with how and when to use resources in the classroom. As two maths leads commented:

In the first year, the Mastery Readiness Work Groups were amazing, we got so much out of that and made so many changes. We found it really good to have days at the hub and then the mastery specialist coming into school looking at our setting, looking at how we were teaching, and together making changes and improvements. Throughout that year, the amount of progress we made was phenomenal. (Maths lead, case study 8)

We liked the Readiness because it really helped prepare us as a school who hadn’t done any mastery teaching at all and hadn’t adapted to the new curriculum very well. It was a really good place to start. It set the foundations and the mindset to get people on board which was great. (Maths lead, case study 6)

Some maths leads who were new to leading the subject reported initially lacking confidence, both with leading a subject and with their own maths abilities, but these **Work Groups provided a safe space to ask questions without feeling criticised** and supported these interviewees both as maths leads and as teachers.

Interviewees in all schools spoke of the **value of lesson observations throughout their mastery journey**, with one maths lead describing these as the ‘*best part*’ of the CPD. Maths leads and teachers reported that seeing the Work Group Lead and other mastery specialists teach a mastery lesson then reviewing and discussing the planning behind it supported them with implementing the approaches in their own classroom. They commented that the ability to see mastery teaching in action was much more effective than being told about the method, or reading about it:

When we watched the Work Group Lead teach, she was very thorough, very meticulous, her lessons were well planned and thought out. She would talk through her thinking process and how she planned it. (Maths lead, case study 7)

These observations allowed maths leads and teachers to see the impact the approach had upon children’s learning, so they could gauge the response they might receive when transferring the approach into their own setting. Maths leads in particular also appreciated the opportunity to observe mastery lessons in year groups other than the one they taught, as this helped them to understand what mastery should look like across school and therefore supported whole-school implementation. As one maths lead who taught in Year 6 commented:

I now have a clearer idea of what I should be seeing when I go into watch maths lessons and I am able to model the practice to teachers. (Maths lead, case study 7)

Interviewees reported that **the opportunity for discussions following observations was very useful**. These discussions often focused on research, putting theory into practice, implementing strategies that had been modelled, and different ways of explaining concepts to pupils, and they were reported to have helped maths leads and teachers to successfully implement mastery in their own settings. As this teacher commented:

The best part of it was seeing someone do it – the observing the lesson and having the chance to discuss afterwards was really useful...You could see it in practice, see how it works and talk about how it would work with our children. (Teacher, case study 9)

Interviewees commented that **it was particularly valuable when another school in the group had already tried a certain strategy**. When this had worked well, delegates shared how they had made it work successfully and, when a school had a negative experience, it meant that other schools knew either not to try it, or could discuss, with support from the Work Group Lead, how to improve their implementation and not make the same mistakes:

For me, as a maths lead, the opportunities to talk were huge, to find out what other schools were doing. We talk about issues, how we are each dealing with it. It’s reassuring to have that network approach. (Maths lead, case study 6)

Maths leads and teachers reported that **the size of works groups (six or seven schools) worked well**. The benefit of the small group was that the Work Group Lead knew the context of every school so was able to provide specific, tailored support. One maths lead added that, because the Work Group Lead had this understanding, they could pair schools up to support one another, for example if two schools were facing a similar issue, or if one school was implementing an approach well that another school could learn from. Other maths leads commented that the schools within their groups all had similar demographics, so the way they implemented strategies and the impacts they saw were applicable across their schools. It was also mentioned that, although the majority of schools within the groups were at the same stage in their mastery journey, where a school was slightly further ahead, it meant other schools could see the trajectory they could expect their own mastery journey to take.

Finally, interviewees commented that the good relationship they had with the Work Group Lead and other schools within the group meant they felt comfortable asking questions and sharing their

ideas and challenges without judgement. One maths lead described the groups as a ‘caring, supportive CPD environment’. In addition a teacher commented:

The thing I enjoyed about it was working with other teachers, it brought an extra depth to it. It wasn’t just training, we were learning from each other, there was lots of ideas and cooperation between the teachers. (Teacher, case study 10)

In addition, **interviewees across all case-study schools praised the sustained collaboration that took place** in the groups. As one maths lead commented:

Having that communication with the same familiar faces through the whole journey, that was good. It’s not just a one-off day course where you never see the people again, you form professional relationships and you can have some really good discussion and you meet up again and you can ask ‘how did that go?’ (Maths lead, case study 5)

Other elements of the TfM Work Groups that were reported to work well included:

- the gap tasks, which provided delegates with a level of accountability as their experience of these would be discussed at the next sessions
- the strong focus on problem solving and reasoning skills in the Work Groups, which interviewees tended to report needed more development in their schools
- the funding that was available to schools to provide staff cover to enable maths leads and teachers to be released to attend the Work Groups.

4.2 How do the Teaching for Mastery Work Groups compare to other maths-specific CPD?

Maths leads in half of the case-study schools reported receiving other maths CPD alongside attending the TfM Work Groups. Maths leads and teachers in the other half of schools reported that the TfM Work Groups were their main source of CPD, with some adding that, although budgets were tight and opportunities for CPD reduced during the pandemic, involvement with the WYMH TfM Work Groups had continued as it was a valued and trusted form of CPD.

The other maths-related CPD that schools were accessing included:

- [I See Maths](#) to support reasoning and problem solving
- Mastering Number
- Oracy Work Groups
- Reception Jigsaw
- support from a maths consultant.

Maths leads and teachers were asked to compare the TfM Work Groups to the other CPD they were receiving. Generally, other CPD was aimed at individual teachers and therefore impacts were at the classroom level, whereas the **TfM was aimed more towards leaders and therefore impacted at whole-school level**. As one maths lead commented:

I See Maths is very good but more about ideas and questions, what you do in the classroom, the activities, very much aimed towards the class teacher rather than whole-school systems.

The mastery is more aimed at a senior level and leads to whole-school changes. (Maths lead, case study 8)

Because of its whole-school focus, it was felt that the outcomes of TfM would still have been seen even with the additional CPD they were receiving.

Maths leads and teachers in the other case-study schools, despite not receiving other maths-related CPD recently, were still able to compare the TfM Work Groups to CPD they had received in the past and were very positive about how it compared:

It is definitely the most useful CPD I've been on for maths. (Teacher, case study 10)

Maths leads and teachers pointed to various positive aspects of the TfM Work Groups. Firstly, they commented on the **long-term and sustained nature of the Work Groups which followed the school on a journey over several years whilst the school's approach to teaching maths was transformed**. This was considered to be unlike much other CPD, which often incorporated a general, one-day course, after which teachers were left to implement the learning alone, without any follow up.

They also mentioned **being able to observe the practice first-hand before implementing in their own classrooms and tailored support with implementation** compared to other CPD which often just involved listening to someone discussing the theory followed by instructive delivery of how to implement. As a maths lead and teacher commented:

The biggest difference is the lesson observations. In the sessions, you'll sit down and talk it through so you have discussions about how you would implement it but seeing it practically in sessions is a lot more helpful. You see them using the resources and what they do with them so that is more helpful than other courses. (Maths lead, case study 2)

The final comparison between TfM Work Groups and other CPD was **the ease with which teachers could implement strategies from the mastery sessions in their maths practice**. As one teacher commented:

Each time we went, I took something away, like a style or the format of it and I used it in my teaching. It was one of my favourite training sessions because I found it really useful for my teaching practice and planning. (Teacher, case study 9)

4.3 What has worked less well?

Interviewees' comments around what had worked less tended to relate to the Sustaining Work Groups, which several maths leads felt they were not gaining as much from compared to the previous TfM Work Groups.

Interviewees reported that, unlike with Readiness, Development and Embedding Work Groups, **the Sustaining Work Groups had rarely involved delegates visiting the Work Group Lead's school to observe them teaching mastery lessons**. They commented that, although the lessons discussed in the Work Groups were planned and resourced, without observations it was more difficult to understand and picture how they would replicate the practice themselves, making changes more difficult to implement. As one maths lead commented:

I do understand that there was more hand holding at the beginning and now it's about what we are going to do to sustain the approach, but it's a sudden change. Throughout Covid, we haven't been able to go out the same [to observe practice] so actually we need to be able to still do this, talk about what strategies have worked/not worked in schools, how different teachers have adapted the schemes. It would be nice to have this a bit clearer. (Maths lead, case study 7)

In one case-study school, the Work Group Lead for their Sustaining Work Group had changed from the previous stages of the mastery journey and, as the new Work Group Lead had not visited the school, they did not have the necessary contextual understanding of the school. As a result, the maths lead reported that they were unable to provide the level of tailored support which the school had been offered in previous years.

Some interviewees felt the delivery of content in the Sustaining Work Group was not as effective as in previous Work Groups. For example, one maths lead reported that, in a two-hour session, around 70 slides could be presented which was a lot of information for delegates to take in and which left little time for discussion. They felt that it would be better for this amount of content to be presented over two or three sessions which would be easier to digest and would also create a better balance between input and discussion. Another maths lead found the sessions on curriculum prioritisation less helpful. Although they acknowledged the importance of this content, they felt delegates could cover this in their own time, which would allow more time in the Work Groups to be dedicated to discussions and focussing on the implementation of mastery strategies in practice.

There was a perception from some that the Sustaining groups were less well organised, structured and sequenced than the previous Work Groups. As one maths lead reported:

The Sustaining groups don't seem as organised as the Readiness, Development and Embedding groups. In previous years, it has been very clear what we are going to discuss, what we will see [in the observation], this is why we do it, we discuss what worked well and what didn't when we tried things in our teaching. I've only been to two Sustaining sessions so far but it isn't as directed or focussed as previous years. (Maths lead, case study 7)

In addition to the previous Work Group structure not being replicated in some Sustaining Work Groups, some interviewees commented that **lessons were not delivered in sequence** (i.e. the model lessons were not presented in the order they would be delivered in the classroom). This meant maths leads and teachers found it difficult to understand how the lessons fitted together and how knowledge and understanding built up over a sequence of lessons as these were not presented to them in order.

Another issue raised related to the timing and length of input regarding a specific year group in the Sustaining Work Group. One maths lead commented that they had invited along their Year 6 teacher to the session they were told would focus on this year group, however only ten minutes at the end of the two-hour session specifically discussed mastery in Year 6 maths. This teacher felt they had wasted an afternoon when they could have been teaching, planning or marking. The maths lead suggested that, in the future, the specific timings of sessions should be

communicated more effectively so that teachers could join for specific elements rather than for the whole session.

Some teachers felt the emphasis on reading around the theory between Sustaining sessions could be reduced. They acknowledged the importance of theory and evidence-informed teaching but felt they gained more from the practical elements of the Work Groups and questioned if it was necessary to focus on theory between sessions when this had already been covered within the Work Group.

The final issue raised with the Sustaining Work Groups was the variation in the number of schools attending each session, which reduced the opportunity for collaboration and discussions with other schools – elements of the Work Groups that interviewees highlighted as valuable. As one maths lead commented:

There is a lot of variation in how many teachers are there. There's sometimes only a few teachers in this group which is good because it means there is time for targeted support for you and your school, but you miss out on the sharing of ideas, gaining other people's experiences. (Maths lead, case study 1)

4.4 The impact of Covid-19

Although not a criticism of the delivery or content of the Work Groups, most interviewees discussed the impact of Covid-19 on the operation of the Work Groups and their participation since March 2020.

The majority of maths leads and teachers raised the logistical challenge of being released to attend the Work Groups over the last two years, which contributed to fewer schools attending Work Groups. Maths leads and teachers reported difficulty securing release time for both virtual sessions and in-person sessions as restrictions began to ease, due to the staffing pressures that Covid-19 has placed upon schools. The pandemic meant that interviewees had not been able to give TfM the same priority as previously, which had affected their progress and resulting outcomes.

The majority of interviewees also reported that the pandemic had led to a loss of valuable elements of the Work Groups. Although moving Work Groups onto Zoom was positive in that it saved time and discussions could be recorded for those unable to attend, it resulted in the loss of delegate visits to the Work Group Lead's school to observe practice and vice versa – elements which interviewees found most valuable (as reported above). Because of this, interviewees did not feel they had gained as much from the Work Groups during the pandemic. As one maths lead commented:

It's such a shame that the last couple of years have been so different because everything has been via Zoom. It hasn't been as effective and I am not sure that we got out of it what was intended...The whole Zoom thing did not work out the same because you did not have the opportunity to go into classes and see things in action...but there's not a lot that could have been helped about that. (Maths lead, case study 5)

Interviewees also felt the level of interaction between schools had reduced and they therefore gained less from discussions. Reasons for the reduction in interactions related to sessions feeling more formal over Zoom and challenges in building relationships with other schools, both of which led to schools feeling less comfortable sharing ideas and experiences in the same way as in-person sessions. One maths lead also felt that the breakout rooms were less effective than the small group work that took place during in-person sessions, as either people were less open to talk in the breakout room or the discussion was dominated by one person, therefore they came away with fewer ideas to transfer into their own practice.

4.5 What enhancements could be made to the Teaching for Mastery Work Groups?

The majority of maths leads and teachers were very satisfied with the Work Groups, particularly the Readiness, Developing and Embedding groups, and their suggestions for improvements primarily related to the Sustaining Work Groups. They were conscious, however, that some of their suggestions might be more difficult or too expensive to execute.

A third of maths leads suggested that **the structure and organisation of the Sustaining Work Groups could be improved** and follow that modelled in previous TfM Work Groups. Specific suggestions included:

- **it would be valuable for Work Group Leads to visit schools to observe practice and provide tailored support to the maths lead and teachers in implementing mastery in their context.** This is a highly praised part of the Readiness, Developing and Embedding Work Groups
- **reduce the content in each session and allow more time for participants to discuss strategies and approaches,** thereby supporting their understanding and confidence in implementing these strategies and approaches in their own schools and in sharing learning with colleagues
- **improve the organisation of the session so the aims of each element are transparent. In addition, set out the timings of each element in advance** to support teachers to join for specific agenda items linked to their key stage or year group
- **try to sequence lesson observations to reflect actual delivery in the classroom.** This will enable delegates to see how the lessons fit together and how knowledge is built over a sequence of lessons
- **it might be helpful for each session to touch on how practice could be implemented in different year groups,** rather than individual sessions focussing solely on one year group. With the current structure, the regular attending teacher might only find one in six sessions fully relevant to them and might find it difficult to engage with content relating to year groups they do not teach
- as the focus of maths leads is the whole-school and teachers are most concerned with class-level approaches and impacts, **it could be useful to have opportunities within the**

session to split off into maths leads and teacher groups which would allow for targeted discussions based around their respective priorities

- **reduce the emphasis on reading around the theory between Sustaining Work Group sessions**, particularly when this has already been covered within the Work Group.

Interviewees were very happy with the other Work Groups and most interviewees did not feel they could be improved. However, a small number suggested some potential additional elements.

One maths lead suggested that the Work Group Lead could lead a mastery CPD session in individual Work Group schools. They commented that, at the moment, the sharing of learning within schools is reliant upon the maths lead and attending teacher. Although this is working well (see Section 5), the Work Group Lead delivering a CPD session within schools could accelerate implementation as maths leads face time constraints, both with sharing learning in their schools and providing support to individual teachers in their classrooms.

Another maths lead suggested **it would be beneficial to have an additional strand of support directed at newly-qualified teachers and teachers who have recently joined schools participating in Tfm Work Groups but who have not taught the mastery approach before.** They commented:

[New teachers] fall into the trap of using schemes [White Rose Maths, Power Maths] like a bible rather than guidance to enhance their teaching. If there was something where new members of staff could visit another school to model the planning process using the scheme then observe the lesson in practice, that would be helpful. (Maths lead, case study 2)

One teacher commented that, although the mastery approach is about keeping all pupils together with the content, this is not always possible so **it would be beneficial to explore what the lessons should comprise for those who require additional support and differentiated work:**

I would like to have seen how to adapt it to children with SEN [special educational needs] and what a mixed classroom would look like. We do have such a variety in our school and when we saw the lessons, there wasn't as many needs in the classroom or as wide abilities as we have, although this depends on the group leader's classroom. (Teacher, case study 9)

A small number of maths leads were concerned that they would be on their own once they had concluded their involvement with the Sustaining Work Groups. They emphasised the need for ongoing support to allow them to keep up-to-date with research and developments and to continue sharing ideas and learning to ensure the approach was successfully sustained in their schools. As one maths lead commented:

After the final Sustaining Work Groups, I feel I will be on my own and I'm dreading this. Each year, the school gets new teachers who will still need to go but, as a maths lead, I will become out of touch with it so I would like for there to be a sustained support group for maths leads to keep going to... (Maths lead, case study 3)

They will be reassured to know that they can maintain their involvement in the Sustaining Work Groups for as long as they wish.

5 How have maths leads and teachers shared their learning?

This section highlights the range of ways in which maths leads and teachers have shared their learning from the TfM Work Groups within their schools.

One of the key ways of sharing learning was through staff meetings or in-house training sessions, reported by the vast majority of interviewees. Whole-school staff meetings provided opportunities for the maths lead and teacher(s) attending the Work Groups to present learning that would benefit all teachers in the school. This included sharing knowledge, approaches, strategies and resources. One maths lead gave the following example of what had been covered in a cross-school staff meeting:

We delivered a staff meeting on the different manipulatives, how to use them, when to use them for certain units and year groups, and staff found this useful because they wouldn't use place value counters usually but they knew when to use these so weren't as hesitant. Naturally, teachers will hesitate to ask a leader because they don't want them to think they are incompetent so teachers found these sessions really good. (Teacher, case study 10)

Other regular staff meetings at which learning was shared included **key stage meetings**, which also resulted in all staff in school being made aware. One maths lead reported that this sharing was facilitated by teachers in the same key stage having PPA time scheduled at the same time. In some instances, maths leads reported arranging meetings for staff members who had a specific need. In addition, some key stage leaders were reported to put reminders about mastery in their staff briefings throughout the term. This maths lead described how learning was cascaded through their school:

I might deliver an overarching theme in the main staff meeting then the key stage leaders will take that and show teachers how it will look in their own team. (Maths lead, case study 6)

Several interviews reported that they fed back learning from the Work Groups through **leading or contributing to research groups and show and tell meetings**.

Another common way of sharing learning was by **maths leads and teachers expert in maths mastery modelling lessons or having open classrooms** at which teachers could observe what an effective maths mastery lesson looked like. The lessons could be targeted at all teachers or less confident teachers and those new to TfM. Following the model lesson, teachers could be observed delivering a mastery lesson or supported to adapt the approach to the needs of their particular class.

Several maths leads reported that they and teachers who had attended the Work Groups were now much **more confident in modelling effective mastery practice within their schools**:

It's enabled me to feel confident enough to see something and mirror it in my own practice then roll that out across the school. (Maths lead, case study 7)

Teachers now feel comfortable with others watching their maths practice and they will say ‘Come and look at this good practice’ so they have this confidence to share and promote what they are doing with others. (Maths lead, case study 1)

Some maths leads and teachers also reported that they were sharing their learning through **coaching or mentoring sessions**. One maths lead mentioned that their school undertook weekly coaching for all staff:

As a school, we have a weekly coaching focus which every member of staff is focusing on, for example to do with counting. There is a demonstration, teachers have time to practice with one another... (Maths lead, case study 1)

In some schools, **experts in mastery would coach and mentor ECTs**.

Several interviewees mentioned **sharing their learning through planning meetings** and identifying where and how mastery could be embedded in maths schemes of work and lessons and identifying appropriate supporting resources.

Maths leads also reported the **regular monitoring of the implementation of maths mastery** through observations, learning walks and check-ins with teachers. This included identifying effective practice and challenges being faced. This intelligence enabled maths leads to direct teachers to others who were exemplifying effective practice and to plan additional support and training, as required. One maths lead reported that they had identified staff who were struggling with adapting topics to the needs of their children so they had modelled how this could be done:

Staff struggled with this [adaptation] at first so I modelled it to them e.g. I am teaching this topic, I know my children can do this so this is one lesson rather than three (Maths lead, case study 3)

There was also mention of an **‘Open Door’ policy** in some schools, with staff from across these schools being encouraged to go to see the maths lead if they needed support or advice, or wanted to observe their lesson delivery.

Other more formal approaches used in sharing learning mentioned by smaller numbers of interviewees included:

- teachers teaching and planning in pairs or teams, which meant that teachers who had attended mastery Work Groups would naturally share their learning with the colleague they were working with and when they moved year groups they would share their learning with a different set of teachers. This enabled messages to filter through the school
- peer-to-peer lesson observations in which teachers watched another teacher teach the lesson and then reflected on how their practice was the same or different and what enhancements they might make
- the creation of a ‘Teacher Research Group’ to replicate the TfM Work Group which was reported to work very well
- TfM Work Group attendees reporting the good practice seen after each Work Group to the assistant headteacher

- TfM Work Group participants speaking about mastery with teachers in year groups above and below theirs.

Some of the less formal and/or structured approaches identified included:

- informal chats with other teachers
- Jamboards on which teachers put questions so the maths lead could see the common challenges and plan to address these
- representations of maths across the school e.g. pictorial, posters of maths vocabulary and resources being set out on tables.

When discussing the implementation of mastery across their school, one maths lead made an important point around ensuring that staff did not feel judged which could negatively impact on teachers' confidence:

When sharing practice, we try to do this in an informal, relaxed way so that teachers aren't feeling that they are being judged. We want to develop them rather than flatten their confidence which can be easily done. (Maths lead, case study 10)

6 What perceived outcomes and impacts have been realised?

This section presents interviewees’ perceptions of the outcomes of their involvement in the Teaching for Mastery Work Groups on themselves, other teachers in school, their school more broadly and on pupils.

6.1 What are the perceived outcomes for teachers participating in the Teaching for Mastery Work Groups?

The maths leads and teachers who had directly taken part in the TfM Work Groups were asked what outcomes they had realised from their participation. In some cases, maths leads spoke for both themselves and other teachers who had been directly involved, whilst teachers spoke just for themselves. Interviewees reported a range of direct outcomes that had been realised which are explored below.

A commonly reported outcome, reported by the majority of interviewees, was an **improvement in the quality of their teaching**. Some reported a ‘change of mind-set’, that the Work Groups had ‘transformed’ their teaching and that benefits had increased relative to the time spent attending the Work Groups. As two maths leads commented:

I had taught Year 2 for five years and the group I taught whilst on the mastery course had the best maths teaching ready for Year 3. (Maths lead, case study 9)

There has definitely been more impact for teachers who have been more involved, they are better at doing the mastery style of teaching rather than pages and pages of the same calculation. (Maths lead, case study 8)

Improvements in the quality of teaching were often a result of:

- improved confidence in, and enthusiasm for, using the mastery approach
- increased subject- and maths-specific pedagogical knowledge, including new ideas and approaches to maths teaching and improved planning
- increased familiarity with the range of resources available to support maths teaching, including being more selective and confident in using them.

As two interviewees commented:

I think that we [myself and the teacher attending the Work Groups] have grown in confidence with teaching the mastery approach. I think that we are quite fluid and flexible now in our questioning. We are quite competent now at spotting where something might be wrong or where we can use questioning to improve things and how we can put mastery into our questioning as well. (Maths lead, case study 5)

I’m definitely more confident teaching maths and my subject knowledge has improved. I can better explain things to them [pupils] when they don’t quite get it... (Teacher, case study 4)

Interviewees commonly talked about **how implementing mastery had changed the way they taught maths**. For example, they were not afraid to slow down and only move onto a new concept or topic when pupils understood the current one. They also reported improved confidence in the use of maths vocabulary, questioning, stem sentences, manipulatives and concrete resources and being better able to explain their use to other teachers:

We all knew how to use manipulatives and concrete resources but it [TfM Work Groups] ensured we were using it in the correct way, using it every lesson, that children were aware of why we were using them...Because we were becoming more confident, we could coach the other teachers in our year group/either side of the year group in how to use it too so there was consistency across the year and key stage. It meant that, at the end of the year, we sent those children up feeling confident that we had done everything we could to support and develop their maths skills. (Maths lead, case study 9)

Linked to teachers' improved confidence, subject and pedagogical knowledge was their **increased enjoyment in teaching maths**:

I really like teaching maths now. I always felt I taught English better because I knew how to break it down and make it more accessible for all children which is what I can do now [in maths]... (Teacher, case study 9)

Teachers also reported becoming **more familiar with the key stage that they did not currently teach**, which made them more able to effectively prepare pupils for their next year group or gave them a better understanding of pupils' stage of development in a lower key stage:

For me, it's really helped me improve because I've always worked in key stage 1 and Foundation so it's been good for me to learn the subject knowledge side of key stage 2. (Maths lead, case study 2)

A very positive outcome reported by a small number of interviewees was **reduced workload**:

In terms of teacher workload, there is lots of stuff online through NCETM which can help with lessons so workload has reduced which is good. (Teacher, case study 4)

Several maths leaders also reported that they now felt **more effective in their role as maths leads** within their schools. This include more confidence and self-belief as a teacher and leader, in identifying issues and justifying changes, and in supporting others to transform their teaching:

I didn't properly understand maths at school...but working on the mastery project has helped me understand the process and strategies better so it has made me a better teacher and meant I can support other staff with confidence. (Maths lead, case study 8)

It's improved me as a maths lead. I am now very specific about what the issues are in maths, why it is happening and what we need to do about it. (Maths lead, case study 6)

A small number of maths leads reported the impacts of the Work Groups on the **maths teaching and leadership skills of teachers** who had attended:

One of our strongest maths teachers is the one who has been on the most courses and we use him as an example of how to build a lesson, how to plan, what books may look like so that is real improvement. (Maths lead, case study 2)

One of these maths leads reported that the leadership skills another teacher in their school had gained was benefitting them in their leadership of other subjects:

...the other person on the course got from it not just maths teaching but also leadership skills as well. He's not maths lead but he leads other subjects and I think it gave him some skills in leadership and, because he did join in leading the maths CPD and talking about what we had done, I think that then filtered into how to lead his other subjects and how to present CPD on those. (Maths lead, case study 5)

In some cases, **mastery was also filtering into other subjects**. For example, two teachers in one school reported how they were teaching to the top ability range and scaffolding learning differently for pupils who needed more support in other lessons.

In other cases, **attendance at the Work Groups was leading to increased responsibility** for teachers, with plans for them to become the next maths lead or to co-lead maths. In this way, the Work Groups were supporting schools with their succession planning. There was one example of actual maths-related career progression, with a teacher moving to another school to become the maths lead and embedding mastery as part of their role.

Some consultees expected to see more impacts on their practice as their involvement in the maths groups continued and they built on their current knowledge.

6.2 What are the perceived outcomes for other teachers in schools?

Maths leads and teachers reported a range of outcomes for other teachers in their schools as a result of sharing their learning. Many of these outcomes were similar to those they had identified for themselves. Section 6.3 explores these outcomes further.

Teachers in schools who had not directly participated in the TfM Work Groups were reported to have **increased confidence and expertise in the use of mastery and what a good lesson looked like**. A number were now effectively embedding mastery approaches, whilst others finding the approach more challenging could receive coaching or other support:

Teachers love this and they are now confident mastery teachers...They know what the big five are, they use the White Rose Maths resources confidently. Every teacher knows what a lesson should consist of and where a child should be at the end of the year...the school is ten times better than it was three or four years ago because of the mastery programme from West Yorkshire Maths Hub. (Maths lead, case study 3)

Many teachers were reported to have increased maths subject and pedagogical knowledge and to better understand what resources could support their teaching. They were reported to be thinking about different ways of helping children understand maths concepts and more effectively tailoring their lessons to the needs of their pupils:

It has had a positive effect on subject knowledge. Some staff were quite new so they struggled with certain topics, didn't know where to start, what resources to use. White Rose Maths provides all of the resources and questioning. (Teacher, case study 7)

...It has made the teachers think about how to tailor the lesson to their children, they are taking ownership of their lessons... (Maths lead, case study 7)

Teachers were also reported to have **more awareness of what they needed to cover to ensure that their pupils were ready for the next year group.**

6.3 What are the perceived outcomes for schools more broadly?

A key outcome reported by most maths leads was the **embedding of mastery teaching** across a key stage or the entire school, which they felt would be sustained over the longer-term. Teachers were reported to be receptive to the approach and some interviewees reported that the way that maths was taught across the key stage or school had been, or was in the process of being, transformed:

...Staff have been very receptive and very open to the changes that have been made...When you go into lessons now there is a real sense of mastery coming through...There are still gaps but you can see how their teaching has changed. The use of concrete resources has come on dramatically. I do think we can sustain it because teachers are used to doing it that way, there is so much support online in terms of resources. (Maths lead, case study 7)

One maths lead went so far as to mention that Ofsted had noticed that TfM was embedded across the school:

We had Ofsted in...and they commented on how did we get the children to enjoy maths even when they were making mistakes? How is it that they are so positive and that they all believe that they are good at maths? They asked about how we managed to get the staff so competent in asking mastery questions and developing that throughout the lesson. They said that we had strong mastery throughout school. I think a lot of what they saw had been informed by the Work Group and, at that stage in particular, the mastery Readiness and the first year of the Teaching for Mastery. (Maths lead, case study 5)

The vast majority of maths leads reported that their school now had a **cohesive and streamlined approach to teaching maths**, which incorporated the use of consistent schemes of work and resources. Everything was mapped out and sequenced so teachers just needed to adapt lessons and resources to their particular pupil group. As these maths leads commented:

There is coherence across the school – we have a set way of teaching and staff are comfortable with that...when Ofsted came in they could see there was the same structure to maths lessons throughout the school. (Maths lead, case study 6)

It gives all teachers the same system and consistency...mastery forms the foundation and everything else is an add-on. (Maths lead, case study 10)

Some maths leads had created a mastery lesson structure, which detailed how teachers should deliver a maths mastery lesson and the elements the maths lead would expect to see during an observation. This has supported teachers to transition to the mastery approach and, because this structure was in place across the school, this meant that when teachers and pupils moved year group, although the maths content changed, they knew what to expect from maths lessons as the delivery style and structure remained constant:

We started off having a formal lesson design of things I wanted to see in a mastery lesson because it completely changed the way we taught...everyone knows what is needed from a mastery lesson. (Maths lead, case study 8)

Maths leads reported that this whole-school **consistency made it easier for them to monitor effectiveness and to identify outcomes**.

As part of the mastery approach, maths leads reported an **increased focus in their schools on: problem solving within real-life contexts; the use of mathematical vocabulary and oracy; sequencing; stem sentences; reasoning and pupils justifying their answers** (for example ‘I know this is the answer because...’). As two maths leads commented:

There is a lot more focus now on the problem solving, on reasoning and on the understanding of things rather than just the fluency. (Maths lead, case study 7)

Before going on the training, I would say we had quite a skills-based maths curriculum so we did lots of calculations. From the [Work Groups], using the five big ideas, we’ve been able to change the way we teach maths so we still keep the calculations but we have much more reasoning involved and problem solving. It’s not 100% embedded but we’ve made big improvements. (Maths lead, case study 2)

Some interviewees mentioned observing the **slowing down of the pace of maths lessons, with teachers moving forward in small steps, recapping learning and ensuring pupils’ knowledge was secure before being built upon in the next topic**. This approach made it easier for staff to identify gaps and misconceptions. This compared to a previous system where one topic was covered per week then revisited the following term. As one maths lead commented:

They [teachers] can take their time and work at the right pace of the children rather than feeling pressured to move onto the next topic. (Maths lead, case study 4)

Maths leads and teachers reported **increased use of physical and visual aids**. For example, one maths lead reported that manipulatives and resources were on tables and available to pupils in all maths lessons, not just when related to the topic. Others reported more effective use of concrete, pictorial and abstract resources and power maths books. The use of these resources supported pupils’ reasoning skills and their ability to justify how they solved a problem. For example, one maths lead commented that, although higher-ability children might be able to solve problems in their head, the use of counters meant they had to prove how they reached an answer.

Lessons across the school were reported to be more interactive – for example involving discussions in pairs/small groups and practical work - **fun and engaging** whilst maintaining the need to ensure ‘evidence is in [pupils’] books’. Maths leads commented that teachers were

enjoying teaching maths through the mastery approach more, with one maths lead commenting that the culture of maths in their school had changed with teachers having the mind-set of ‘we can all do maths’ (Maths lead, case study 6).

6.4 What are the perceived outcomes for pupils?

Maths leads and teachers reported a range of outcomes on pupils as a result of embedding TfM in their schools. However, some commented that Covid-19 had reduced impact over the past two years as a result of periods of home learning. It is also worth noting that these were their perceived outcomes and they were not asked to provide documentary evidence.

A key perceived outcome, reported by the majority of maths leads, was **pupils’ deepened understanding, and improved application, of maths concepts**:

Their understanding is better in terms of their application of different maths concepts, for example applying addition and subtraction to money problems. (Teacher, case study 4)

...it made them think more, work the answers, slow it down so there is time to understand what they are doing (Maths lead, case study 7)

...I’ve done some pupil interviews and will be doing some more and they are more able to express their understanding verbally rather than just giving yes or no answers where you’d have to elicit the information out of them. They have a greater vocabulary about what they are doing and their fluency is improving. (Teacher, case study 8)

One maths lead commented how this understanding was being achieved through pupils being taught maths mastery from nursery upwards:

When I’ve observed nursery and reception, you can see that there is a real emphasis now on giving children that solid understanding from an early age. The nursery teacher is doing subitising and counting, teachers are modelling the language to the children. It’s all in the provision. This is one of the strongest things to come from it – because the provision is so good there. These children will have such a deep understanding as they come up the school. (Maths lead, case study 7)

A range of aspects were contributing to this deepened understanding. Pupils were reported to have **improved problem-solving and reasoning skills and were better able to justify their answers**:

I can see from books that children’s reasoning skills have improved. Their work is a lot more detailed and includes calculations, whereas before it was quite surface level. (Maths lead, case study 2)

We’re trying to focus more on reasoning at the moment. The children enjoy it and it leads to deeper learning, as they have to think for themselves. (Maths lead, case study 8)

...They are more competent at answering the questions and giving justification rather than just saying ‘I know it is right’. (Teacher, case study 10)

Linked to this, pupils were reported to be **better able to choose the right approaches to solve problems and to use the correct maths vocabulary**:

...the vocabulary that they are using within lessons, when you talk to them they can explain it to you – not all of them perfectly but they are better than at the beginning [of TfM]. (Maths lead, case study 7)

The majority of interviewees reported pupils' **improved engagement with, and enjoyment of, maths**, despite some pupils taking some time to adjust:

Children who previously weren't as engaged with maths want to learn and be involved with the lesson. (Maths lead, case study 1)

They enjoy doing the 'What do you notice, what is different, what has changed?' tasks because children notice patterns really well and get excited by seeing numbers in a different way...Engagement has increased particularly for those who didn't find maths as easy. (Teacher, case study 9)

Another key outcome was pupils' **increased confidence in their maths ability**. Those who had previously had little self-belief had developed a more positive attitude towards maths and were more adaptable and open to learning new skills. This was linked to their increased enjoyment of maths lessons:

Their attitude to maths has changed. There are lots of discussions and lots of practical work... so, by the time they are working in their books, they know what they are doing, they are confident and they are proud of their work. (Maths lead case study 6)

The group I teach have low self-esteem, not much confidence in maths, they panic or rush when they think they know it so mastery has made me slow down the rushers but helped the ones who struggle by showing them the small steps and breaking it down for them...it's breaking down barriers for those who have heard it from their parents that they didn't like maths at school...Children are becoming more confident with maths. (Teacher, case study 7)

The mind-set of the children has changed...We did pupil voice [before] and out of this came responses like 'I'm rubbish at maths'... 'I get easier work because I can't do maths'... now their attitude towards maths is much more positive for example 'I can do maths', 'My friends help me with maths' and 'I can get the counters to help me'. (Maths lead, case study 8)

Maths leads in most case-study schools perceived **an improvement in maths progress and/or attainment as a result of embedding TfM**, with reports of it leading to more pupils working above age-related expectations:

After the first year of attending the groups, we got the best results ever in maths – top one per cent in [name of town] compared to bottom 20 per cent. (Maths lead, case study 9)

At the end of the Readiness year, the data showed a clear positive impact and even more so in the second year. Key stage 1 results were the best the school had ever had and we are starting to see results in key stage 2. (Maths lead, case study 6)

Before the mastery approach, the school's maths results were well below national average but they are now in the top five per cent for maths results so the impact on standards and on children's progress is fantastic. (Maths lead, case study 1)

It was often commented that attainment was better the longer pupils had been learning thorough mastery.

One maths lead reported that **children who had struggled with maths previously were particularly benefitting from being stretched and challenged**, by teachers 'teaching to the top' whilst also scaffolding learning. Another mentioned weekly key skills tests, which identified gaps and were followed up by instant interventions to tackle these gaps. Improved attainment was also commonly linked to pupils':

- improved reasoning skills ('...we have got children who...understand that reasoning is a part of maths and that not everything is just a straightforward calculation' (Maths lead, case study 5))
- improved retention and recall
- higher engagement
- 'can do' attitude and support from their peers who were 'on the journey together'.

In a number of cases, **the pandemic had impacted on gains in attainment** that had previously been made:

You can see their progress...There are gaps in their knowledge from Covid but it's not as big an impact... [as it might have been]. (Maths lead, case study 9)

In other cases, the pandemic had prevented any impact being seen. In addition, some maths leads were more cautious about making any association between attainment and Tfm:

Data-wise...it is hard to tell. If I think about our current Year 4, 5 and 3...I would say that they are more competent at adapting and learning new skills and I don't know if that has got anything to do with mastery but they don't seem to have been affected Covid and the time out, so I don't know if that means the mastery has helped them think more logically or retain facts. Whereas, Year 6 at the moment, I'd say weren't as strong whereas they have been involved in the mastery for just as long, if not longer. So, I'm not really sure what the correlations are...There are too many outside factors. (Maths lead, case study 5)

7 Conclusions and recommendations

7.1 Conclusions

WYMH's Teaching for Mastery Work Groups are highly regarded by schools. The elements reported to be particularly effective are: the expertise and responsiveness of the Work Group Leads; visits to schools to support the development and implementation of TfM action plans; the practical, collaborative and supportive nature of the Work Groups; and the observations of mastery practice in action, including the opportunity for discussion following observations.

Maths leads and teachers also appreciate the opportunity to ask questions in a 'safe space' without judgement, and the small size of the Work Groups which facilitate sharing of learning and networking between schools.

Consultees reported that what sets the Teaching for Mastery Work Groups apart from much other CPD is the long-term, sustained nature of the provision which follows schools on a journey over several years to support implementation, as well as its focus on whole-school change.

Interviewees were a little less positive about their experience of the Sustaining Work Groups which they felt would be more effective if they directly mirrored previous Work Groups. Their suggestions for improvements are included in the recommendations section below.

Maths leads and teachers reported a range of perceived outcomes on themselves, other teachers in school and their school as a whole as a result of their engagement in the Teaching for Mastery Work Groups.

The outcomes they had gained from direct participation included:

- improved quality of teaching, underpinned by increased confidence and maths subject and pedagogical knowledge
- changes in the way they taught maths to implement the mastery approach, for example slowing down to ensure pupils understood concepts and improved confidence in the use of maths vocabulary, questioning and resources
- increased enjoyment of teaching maths
- increased effectiveness as a maths lead or, in the case of teachers, the development of expertise to move into this role.

In terms of outcomes for other teachers, interviewees reported a range of similar outcomes to those they had gained themselves. This included teachers' increased confidence and expertise in the use of mastery, improved subject and pedagogical knowledge and increased understanding, and usage, of effective resources to support teaching.

At a whole-school level, they reported the embedding of mastery teaching and a more cohesive, streamlined and structured approach to maths, which made monitoring effectiveness and outcomes more straightforward.

Schools also reported a range of perceived outcomes for pupils resulting from embedding TFM in their schools. These included: pupils’ deeper understanding and improved application of maths concepts, linked to improved skills in problem solving, reasoning and justifying their answers and using the correct maths vocabulary; increased engagement in, and enjoyment of, maths lessons; improved confidence and self-belief in their maths ability. Maths leads in most schools also reported pupils’ improved progress and/or attainment in maths, although it is worth noting that these were their perceptions and they were not asked to provide supporting evidence. In addition, positive moves in this direction had often been impacted by Covid-19 and some maths leads felt too cautious to directly link positive changes to the TFM Work Groups.

7.2 Recommendations

In terms of areas for development, schools focused primarily on the Sustaining Work Groups. Their perception was that they were less well organised and more light-touch than the other Work Groups. The main suggestions were to:

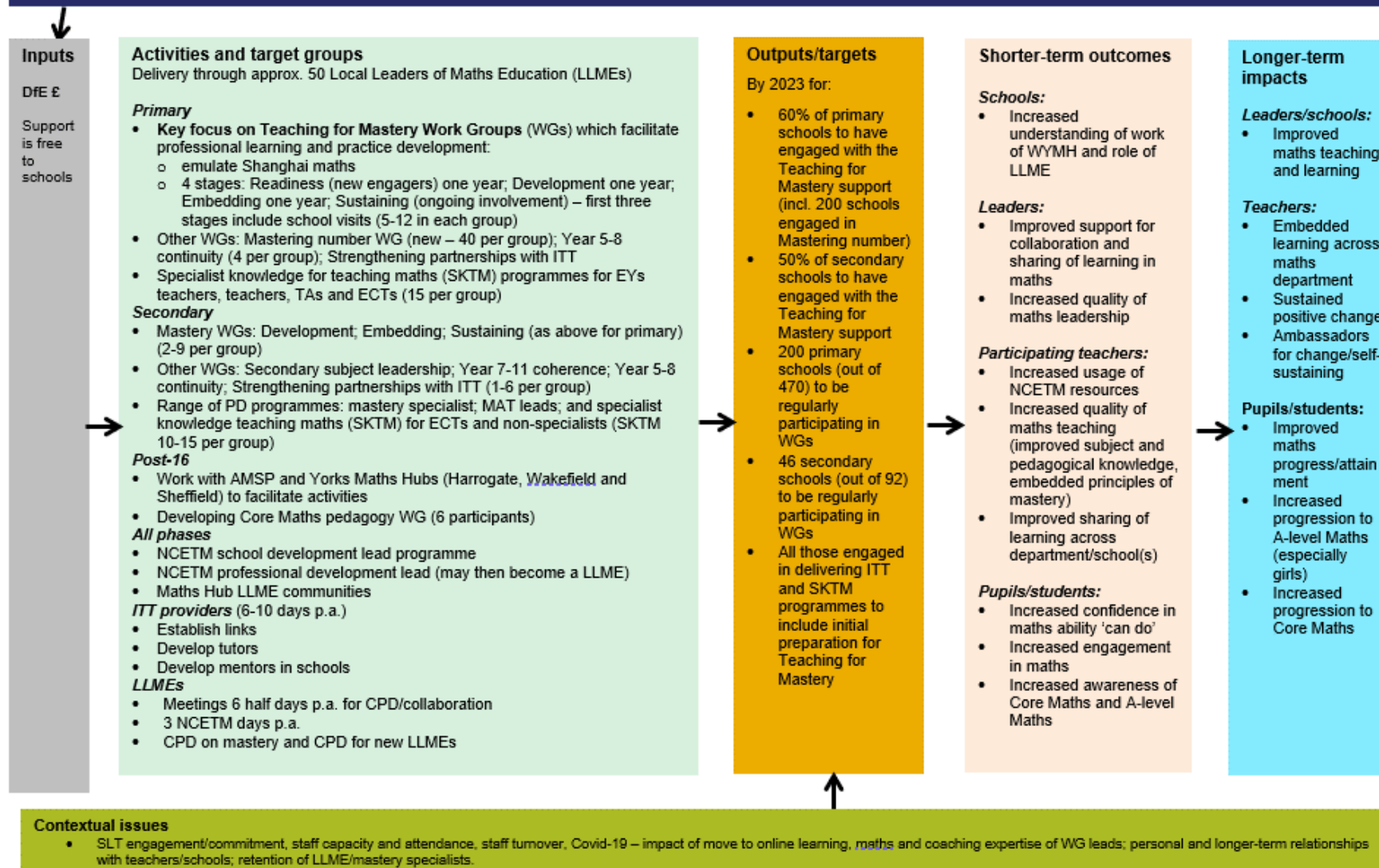
- include a Work Group Lead visit to participating schools to support their ongoing implementation of mastery
- reduce the content covered in each session to allow more time for discussion; and reduce the emphasis on reading around the theory between sessions
- improve the organisation of the session so the aims of each element are transparent and set out the timings of each element in advance to support teachers to join for specific agenda items
- try to sequence lesson observations to reflect actual delivery in the classroom
- if feasible, in each session, touch on how practice could be implemented in different year groups, rather than individual sessions focussing solely on one year group
- organise breakout groups for maths leads and teachers so they can discuss their respective priorities.

Two additional elements which could be considered for the other Work Groups include: the Work Group Lead leading a mastery CPD session in individual Work Group schools to accelerate implementation; and providing an additional strand of support directed at newly-qualified teachers and teachers who have recently joined schools but who have not taught the mastery approach before.

It would also be helpful to make it clearer to schools that they can maintain their involvement in the Sustaining Work Groups for as long as they wish. In addition, given the recommendations above to augment the Sustaining Work Groups, it might also be useful for WYMH to offer a more light-touch type of engagement for those who have been involved for a while, for example a support group which allows participants to keep up-to-date with research and developments and to continue sharing ideas and learning.

Appendix A: West Yorkshire Maths Hub logic model

Aim: through providing support to teachers and leaders, enable the continuous improvement of maths education for all pupils/students in Bradford, Calderdale and Leeds and raise pupil/student attainment.



Appendix B: Characteristics of case-study schools

Participants	Number
Schools	10
Maths leads	10
Teachers	8 (within 6 schools. In 2 schools, 2 teachers participated in a joint interview)
Participation in TfM Work Groups	
Mastery Readiness to Mastery Sustaining	5
Mastery Development to Mastery Sustaining	4
Gap in Mastery Development to Mastery Sustaining	1
Location	
Bradford	7
Leeds	1
Calderdale	2
Ofsted rating	
Requires Improvement	2
Good	7
Outstanding	1
Proportion of pupils eligible for free school meals (FSM) during the past six years	
< 20%	3
20 – 29%	1
30 – 39%	2
40 – 49%	3
> 50%	1
Proportion of pupils with English as an additional language (EAL)	
< 10%	4
10 – 19%	1
20 – 29%	1
60 – 69%	1
70 – 79%	1
> 90%	2
Proportion of pupils with an SEN Education, Health and Care Plan	
< 1%	4
1 – 1.9%	3
2 – 2.9%	2
9 – 9.9%	1

Appendix C: Characteristics of maths leads and teachers

Case study	Maths lead – years teaching	Maths lead – years in school	Maths lead – years as math lead	Teacher – years teaching		Teacher – years in school	
1	19 years	8 years	8 years	Teacher 1	7 years	Teacher 1	8 years
				Teacher 2	No data	Teacher 2	No data
2	7 years	3 years	3 years	Did not speak with a teacher			
3	12 years	4 years	4 years	Did not speak with a teacher			
4	12 years	10 years	4 years	5 years		5 years	
5	15+ years	8 years	16 years	Did not speak with a teacher			
6	15+ years	6 years	5 years	Did not speak with a teacher			
7	6 years	4 years	4 years	15+ years		3 years	
8	15+ years	15+ years	6 years	8 years		8 years	
9	10 years	12 years	6 years	Teacher 1	6 years	Teacher 1	6 years
				Teacher 2	8 years	Teacher 2	4 years
10	No data		9 years	5 years		2 years	

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