What Works *for* Children's Social Care

Affordable Maths Tuition

EVALUATION REPORT

May 2022

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Acknowledgments

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ACRONYMS AND ABBREVIATIONS

AMT	Affordable Maths Tuition
CIC	Children in Care
CIN	Child in Need (Plan)
CME	Children Missing Education
CP	Child Protection (Plan)
EHCP	Education, Health and Care Plan
LAC	Looked After Children
KS#	Key Stage #
mAMAS	Modified Abbreviated Maths Anxiety Scale
NTP	National Tutoring Programme
RCT	Randomised Controlled Trial
SATs	Standardised Assessment Tests
SEMH	Social, Emotional, and Mental Health
SEND	Special Educational Needs and Disability
SLT	Senior Leadership Team
STEM	Science, Technology, Engineering and Maths
TA	Teaching Assistant
TSL	Third Space Learning
VSH	Virtual School Head

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EXECUTIVE SUMMARY

Introduction

Children who have had a social worker have significantly lower attainment than their peers. Evidence suggests that one-to-one tuition offers a good option to boost their educational attainment. However, tuition is typically prohibitively expensive.

Affordable Maths Tuition (AMT) by Third Space Learning (TSL) is an online tutoring programme that aims to reduce the maths attainment gap by recruiting and training maths tutors in India and Sri Lanka to make online one-to-one tuition more affordable to children in English schools. The programme is designed so teachers can use tuition to support classroom teaching.

AMT provides weekly online sessions in which tutors work one-to-one with pupils on maths topics. The virtual sessions are led by maths tutors in India and Sri Lanka trained by TSL to provide tuition based on the UK curriculum. Tutors provide feedback which informs regular reports that are available to pupils' teachers, helping to guide them in class work.

This evaluation aimed to assess the effectiveness of AMT in improving maths attainment for children who have had a social worker in the past six years. The evaluation's original design comprised both an impact evaluation and an implementation and process evaluation (IPE). However, the Covid-19 pandemic disrupted in-school activities and the primary outcome measure, KS2 SATs scores, was no longer available for the 2020/21 cohort, making the impact evaluation unviable. The IPE was retained as a means of understanding experiences of the AMT programme.

Research questions

The IPE brought together multiple strands of work to answer key research questions, set out in Table 1 below.

Table 1: Research questions by evaluation domain

Fidelity: • How has AMT been implemented in schools? • Are schools/ teachers administering the programme as prescribed (i.e. is there intervention fidelity)? • Is AMT being delivered consistently by tutors?
Differentiation: • What does 'business as usual' teaching look like in participating schools? • Are schools providing other forms of (maths) tuition to pupils/ specific groups of pupils?
Adaptation: • Have schools needed or chosen to adapt the intervention in any way? • What does this adaptation look like? • What level of adaptation is acceptable?
Acceptability: • What is the experience of schools/ teachers and pupils involved with the intervention? • What are the facilitators and challenges of implementing AMT? • Do teachers and pupils feel AMT is the right response to problems with attainment/ lack of confidence in maths?

Mechanism: • Do stakeholders (teachers/ pupils/ tutors) feel that the intervention has had an impact on pupil outcomes as set out in the logic model?
Costs: • What resources have teachers/ school leaders needed to contribute to the running of the intervention?

Methods

The evaluation comprised several strands of work, employing both qualitative and quantitative methods in order to better understand and assess how AMT had been implemented and received. These work strands were:

- A review of tutor training materials and recorded online training sessions with tutors
- Observation of ten recorded AMT sessions
- Telephone interviews with maths leads/ teachers (20 at baseline and 11 at endline)
- Online paired/ grouped interviews with 14 pupils in the intervention group
- Online interviews with ten AMT tutors
- Five online/ telephone interviews with Virtual School Heads
- Two telephone interviews with stakeholders from TSL
- Collection of cost data from participating schools.

Qualitative data was compiled and analysed thematically using NatCen's Framework method. Findings are mapped against the research questions and presented by evaluation domain.

The evaluation ran from August 2020 until March 2022, with AMT session delivered to pupils to pupils between October 2020 and July 2021. Significant disruption to delivery occurred between January and April 2021 due to the Covid-19 pandemic, which led schools to close to all pupils with the exception of provision for vulnerable children and children of critical workers.

Key findings

Fidelity

- Tutors delivered sessions with a high level of consistency overall. Where delivery varied from the implementation model, this was typically due to technical problems or a lack of pupil engagement
- Overall, teachers' awareness and understanding of aspects of the tutoring programme was low, which had a negative impact on teacher and pupil engagement.

Differentiation

- Schools' 'business as usual' approach to maths teaching typically involved the use of a range of concepts, tools and resources. Examples given included the White Rose Approach, Google Classroom for remote delivery of lessons, and BBC Bitesize learning videos to support remote learning
- Schools also offered a range of tuition interventions to support maths learning, particularly for those falling behind. These included group and individual work, and specific programmes such as the NTP
- Some schools had first-hand experience of TSL tuition programmes before their involvement in the AMT evaluation.

Adaptation

- Any intentional changes teachers made to programme delivery were adjustments to pandemic staff shortages which meant that supervision was sometimes not as comprehensive as intended
- School closures during the evaluation period meant some pupils participated in AMT sessions from home.

Acceptability

- Key motivations for schools to sign up to the intervention were around improving pupils' maths skills, particularly those who were under-achieving. However, before the intervention was implemented school staff showed a mix of expectations about what pupils might achieve
- Overall, parents and carers took a positive view of the programme and were keen for their children to be involved
- Schools were generally pleased with the support they received for the set-up and running of the programme
- However, there were some challenges to ongoing delivery in schools, including school closures, resourcing supervision of sessions, providing pupils with suitable space for AMT (both physical and in the timetable), pupil absence (often connected to Covid-19) leading to missed sessions, and technical difficulties
- Pupil engagement varied and was affected by the match between pupil ability and content, use of rewards, the physical environment (e.g. whether there was background noise) and whether there were technical difficulties
- The extent to which teachers integrated data from the TSL dashboard reports into wider classroom teaching varied significantly with their awareness of the programme
- Where teachers did use dashboard data, it was integrated into wider teaching in several ways, including monitoring pupils' progress, sharing data and resources with other teaching staff, and lesson planning
- There were mixed views from school staff on whether the content of tuition was well-matched to pupils' ability. Where the match was poor, pupil engagement suffered. It was noted that although this was a particular issue for SEND pupils and those working much below age expectations, these groups of pupils were not eligible for the AMT programme, and may have been put forward for the programme due to a lack of understanding of eligibility criteria
- Although pupils were able to build positive relationships with their tutors, difficulties with communication (e.g. accents) and having several tutors over the course of the programme were identified as challenges to engagement
- Tutors found their training valuable and felt supported by TSL. Whilst they generally felt positive about their role, some encountered difficulties managing pupils' challenging behaviour/ a lack of engagement.

Mechanism

- Predominantly school staff and pupils perceived positive impacts of AMT, this included improvements in verbal reasoning, understanding of maths topics, ability to use new maths strategies, engagement, enjoyment and confidence in maths
- Positive outcomes were thought to have been achieved through the one-to-one, personalised tuition provided by the programme in an engaging format

- Where the programme was considered to have been less successful, this was generally attributed to content not being aligned with the learning needs and abilities of individual pupils or the school curriculum
- Suggestions for developing the AMT programme included improving communication and information provision to school staff, greater involvement of teachers in the selection of tuition content, and a higher level of tutor consistency.

Costs

- Some schools incurred additional staffing costs to cover supervision of AMT sessions
- The overall cost to schools (including tuition and staffing costs) was estimated at £597.33 per pupil.

Discussion

The AMT programme offered a welcome approach to supporting disadvantaged pupils with maths learning. The format and nature of the intervention (specifically a tailored online one-to-one tuition service) presented a positive approach to tackling educational disadvantage. The programme was well received overall, with school staff and pupils often highlighting improvements in maths engagement, enjoyment and confidence.

There were, however, several barriers to delivery, limiting the potential of the programme to impact pupils' outcomes. These barriers were predominantly practical, with technical difficulties, lack of available space, staff resource constraints and pupil absence being raised by stakeholders. This was compounded by issues with awareness and engagement among some school staff, which limited their use of tools available as part of AMT.

It is also important to note that Covid-19 was a key barrier to key elements of success of the programme, including fidelity, acceptability and mechanisms by which outcomes were achieved. This was primarily because school closures put many students with a lack of access to technology and parental support for learning at home at greater disadvantage to progressing with their learning via the AMT programme.

Conclusion and recommendations

Findings from the evaluation suggest that the AMT programme offers promise for children with a social worker, with some limitations and caveats. The evaluation highlighted several issues with delivery which could helpfully be addressed. This might include:

- Improving the quality of equipment provided as part of the intervention (such as headsets)
- Greater reliance (and perhaps further consideration of rewards, such as effort points), in order to improve pupil engagement
- Ensuring that pupils have the same tutor week on week
- Reconsideration of the 24-hour cancellation/ rescheduling policy to give school staff greater flexibility to reschedule AMT sessions
- Clearer communication with teachers around eligibility criteria to ensure that pupils abilities are better matched to the programme, and, in turn, that they can benefit from it

- Activities to promote engagement of school staff and encourage teachers to make better use of tools available to them as part of AMT. This will help teachers build closer connections between AMT and maths teaching in the classroom.

Importantly it is recommended that the AMT programme is evaluated with an impact evaluation and IPE once the educational context is more stable, and Covid-19 less of a mitigating factor in delivery.

INTRODUCTION

Project background

Children who have had a social worker have significantly lower attainment than their peers. Just over half (51%) of Looked After Children (LAC) and Children in Need (CIN) (48%) achieve the expected standard in maths at Key Stage 2 (KS2), compared with four-fifths (79%) of non-looked after children (DfE, 2020)[2]. Children who have had a social worker also make less progress than their peers, resulting in a wider attainment gap at KS4.

Previous research indicates that one-to-one tuition can significantly improve academic attainment. The Education Endowment Foundation (EEF) reports that one-to-one tuition can deliver, on average, five additional months' progress (EEF, 2020). However, as one-to-one tuition is typically expensive, it is not a realistic prospect for many disadvantaged pupils whose families have lower incomes.

The cost and supply of tutors also makes tuition very hard for schools to use effectively. Research and best practice suggest that tuition should be directed by teachers to reinforce class teaching strategies to ensure the greatest academic benefit for each tutored pupil. Achieving this effectively across multiple students can add to the already high workload of teachers.

Affordable Maths Tuition (AMT) by Third Space Learning (TSL) is an online tutoring programme that aims to reduce the maths attainment gap for disadvantaged pupils. It uses maths tutors in India and Sri Lanka to address the domestic supply issue and make online one-to-one tuition more affordable and accessible to children in English schools. Importantly, the programme is specifically designed to make it easy for teachers to use online tuition within the school timetable to support their class teaching strategies.

AMT consists of a baseline assessment of a pupil's abilities, and weekly one-to-one sessions in which tutors work with pupils on maths topics selected in collaboration with the pupil's class teacher. It is delivered via an online platform, with supervision from a teacher or teaching assistant. TSL provides each pupil with a headset and a microphone to enable them to talk with their tutor in a virtual classroom. The virtual sessions are led by maths tutors based in India and Sri Lanka who have been trained by TSL to provide tuition based on the UK curriculum. Following each session, the online tutor provides feedback to the pupil's teacher, allowing them to incorporate the feedback in their own work with the pupil and to guide them in selecting the following week's tailored session content. The full description of the programme is given in Appendix 1, and a logic model of how it theoretically achieves its aims is provided in Appendix 2.

Previous evaluation

An efficacy trial conducted for the EEF in 2014/15 found no evidence of an impact from AMT, concluding that pupils made no additional progress relative to their peers after 27 weeks tuition (Torgerson et al., 2016). However, qualitative analysis highlighted that many schools pointed to 'good or excellent progress' amongst pupils in the trial.

Re-analysis of impact data by What Works for Children's Social Care (WWCSC) found that, on average, pupils who have had a social worker and who received AMT made three additional

[2] Figures for children in need exclude looked after children.

months progress relative to those who did not receive AMT (Sanders et al., 2020). The original study was not sufficiently powered to detect an effect on this sub-group, making the analysis exploratory.

The AMT evaluation

This evaluation aimed to assess the effectiveness of AMT for children who have had a social worker in the past six years. The evaluation was originally conceived as a Randomised Controlled Trial (RCT) in which individual eligible pupils were randomised to receive AMT or continue with standard school maths teaching alone, for one academic year.

To be eligible for the intervention, pupils needed to be in Year 6 and in the past six years be:

- a Child in Need
- subject to a Special Guardianship Order
- subject to a Child Protection Plan
- have been Looked After

Schools were asked to identify eligible pupils when signing up for the intervention and evaluation. In November 2020 the evaluation included 231 schools from 53 local authorities (LA) across England. (Recruitment is described in more detail below.)

In its original form the evaluation aimed to explore whether scaling-up AMT was effective in improving maths attainment for children who have a social worker. This original design comprised both an impact evaluation and an implementation and process evaluation (IPE). The impact evaluation was due to use KS2 attainment data drawn from the National Pupil Database (NPD) as the primary outcome, and a measure of maths anxiety (mAMAS) collected as part of a pupil survey as the secondary outcome.

However, the Covid-19 pandemic seriously disrupted in-school activities and prompted the government to reconsider usual academic assessment activities, meaning that the primary outcome measure, KS2 SATs scores would no longer be available for the 2020/21 cohort. This made the impact evaluation unviable and WWCSC, in consultation with NatCen and TSL, decided to discontinue it.

The IPE was retained as a means of understanding experiences of the AMT programme, its strengths and weaknesses, factors affecting its implementation and perceptions of its value for pupils' maths learning.

However, school closures and adaptations in response to the pandemic also affected the delivery of the IPE. Some interviews with teachers were cancelled due to workload, and two pupil focus groups in the last week of the summer term could not be rescheduled after a bubble burst. Workload and logistical challenges also meant that several schools withdrew from evaluation activities altogether, which reduced the number available to discuss AMT provision.

METHODS

Research questions

The IPE brought together multiple strands of work to answer key research questions. These questions are set out in the first column of the table below (grouped by evaluation domain). The second column details the evaluation activities used to address each set of questions.

Table 2: Research questions and associated evaluation activities

Research questions	Evaluation activities
Fidelity: • How has AMT been implemented in schools? • Are schools/ teachers administering the programme as prescribed (i.e. is there intervention fidelity)? • Is AMT being delivered consistently by tutors?	• Telephone interviews with maths leads/ teachers at baseline (Autumn term) and follow-up (Summer term) • Review of tutor training materials and recorded sessions • Observation of recorded tuition sessions • Online interviews with tutors (Summer term)
Differentiation: • What does 'business as usual' teaching look like in participating schools? • Are schools providing other forms of (maths) tuition to pupils/ specific groups of pupils?	• Baseline and follow-up telephone interviews with maths leads/ teachers • Interviews with pupils (Summer term)
Adaptation: • Have schools needed or chosen to adapt the intervention in any way? • What does this adaptation look like? • What level of adaptation is acceptable?	• Baseline and follow-up telephone interviews with maths leads/ teachers • Review of tutor training materials and recorded sessions Observation of recorded tuition sessions
Acceptability: • What is the experience of schools/ teachers and pupils involved with the intervention? • What are the facilitators and challenges of implementing AMT? • Do teachers and pupils feel AMT is the right response to problems with attainment/ lack of confidence in maths?	• Baseline and follow-up telephone interviews with maths leads/ teachers • Survey with pupils • Interviews with pupils (Summer term)
Mechanism: • Do stakeholders (teachers/ pupils/ tutors) feel that the intervention has had an impact on pupil outcomes as set out in the logic model?	• Baseline and follow-up telephone interviews with maths leads/ teachers • Interviews with pupils (Summer term) • Online interviews with tutors (Summer term)

Costs: • What resources have teachers/ school leaders needed to contribute to the running of the intervention?	• Follow-up telephone interviews with maths leads/ teachers • Collection of cost data from teachers at endline (cost pro-forma)

Protocol registration and ethical review

The evaluation protocol was registered on the WWCSC website in December 2020.

Ethical approval for this study was granted by NatCen's Research Ethics Committee (REC) in September 2020. The NatCen REC reviewed the study design to confirm compliance with internal ethical standards.

Research design and data collection

The design for the IPE brought together several strands of work, employing both qualitative and quantitative methods in order to better understand and assess how AMT had been implemented and received. These work strands are discussed in turn below.

Observations of tutor training and tuition sessions

The IPE began with a review of tutor training materials and recorded online training sessions with tutors. Training materials were shared by TSL with NatCen.

The team also used observation methods to explore how the tuition was delivered in practice: ten recorded tuition sessions were reviewed from across the intervention period. The videos were analysed using an observation pro-forma to collect qualitative data on pupil participation, engagement and understanding. The sessions used for observation were selected by the evaluation team and included three from early in the intervention period (November-December 2020), four from the middle (January-February 2021), and three from the end (March-April 2021). The sessions included tutors from across the three training centres in India and Sri Lanka.

Qualitative interviews with school staff (maths leads/ teachers)

Telephone interviews were conducted with maths leads/ teachers (20 at baseline and 11 at endline) based within participating primary schools, located in different Local Authorities and with different school characteristics. The sample was selected to ensure it included teaching staff in schools with different characteristics, such as Ofsted rating, number of eligible pupils and level of disadvantage (see Table 3).

Table 3: Distribution of school-level characteristics across school staff interviews

School-level characteristics	Number of interviews with school staff		
	Minimum number to be recruited in each category at baseline	Actual recruitment at baseline	Actual recruitment at endline
Ofsted rating			
Outstanding	2	4	2
Good	2	12	6

Requires improvement/ inadequate	2	4	3
Number of eligible pupils			
1 to 3	5	9	4
4 plus	5	11	7
Area disadvantage			
High Free School Meals	5	11	8
Low Free School Meals	5	9	3
Total	**-**	**20**	**11**

Note: Only school staff who has taken part in the baseline interviews were invited to participate in the endline interviews.

Interviews with school staff were conducted at two timepoints: 1) during the 2020 Autumn term (baseline), and 2) towards the end of the 2021 Summer term (endline). The baseline interviews were used as an opportunity to explore expectations and early experiences of the intervention. The endline interviews encouraged staff to reflect on prior expectations and perceived outcomes for pupils, as well as collecting feedback on any issues with implementation and information on resource requirements for the school.

Interviews also included a discussion of 'business-as-usual', including any other tuition being delivered to pupils. Questions were included in the topic guide to ensure sufficient information was captured about what usual maths teaching looked like at each school, and any additional support provided for pupils in the control group, the intervention group or both.

Qualitative interviews with pupils

The IPE used paired and grouped interviews with pupils in the intervention group to explore their perceptions of the maths tuition they received and its effectiveness. Grouping pupils for the interviews was intended to help them to feel more relaxed in an interview setting, and to stimulate discussion about the intervention. Care was taken to ensure topics such as maths attainment and lack of confidence in maths were handled sensitively. The interviews were intended to be conducted face-to-face but had to be moved online in line with Covid-19 restrictions in schools.

The evaluation team spoke to a total of 14 pupils in June and July 2021. The interviews included pupils working with maths leads/teachers taking part in the IPE (that is, school staff interviewees). Pupils were encouraged to discuss their experience of AMT, assess perceived impacts on their confidence and attainment in maths, and describe any other tuition they received.

Qualitative interviews with tutors

Data collection with school staff and pupils was supplemented by online interviews with tutors. The tutor sample was selected to include those with different levels of experience delivering AMT, tutors from across the three centres, and those working with different numbers of tutees. The ten AMT tutor interviews were conducted in June and July 2021, towards the end of the intervention period, allowing tutors to reflect on how the intervention had been operationalised (including any training and support received) and its effectiveness on pupils' comprehension, confidence and attainment in maths.

Qualitative interviews with Virtual School Heads

Five online/ telephone interviews were conducted with Virtual School Heads (VSHs), all connected to participating pupils, and identified through data supplied by schools as part of the recruitment process. The interviews explored VSH experiences of recruitment and sign-up, perceptions of the potential value of online tuition for pupils with a social worker, and issues with delivery.

Qualitative interviews with TSL

Interviews were conducted with two key members of the TSL delivery team. These interviews were intended to gather reflections on sign-up, implementation and delivery. They were also used as an opportunity to explore difficulties with recruitment and early implementation in schools, as well as issues encountered during school closures and contingency measures to ensure continued delivery.

Estimates of costs from schools

At the end of the Summer term in 2021 the research team asked schools to complete a spreadsheet to estimate the financial costs (related to hardware and staffing) and the time costs (from setup and supervision) required to support AMT for pupils in their schools.

Achieved data collection

Table 4 shows all data collection activity from across the evaluation. Differences between the desired and achieved number of interviews with school staff and with pupils reflect difficulties with recruitment in the 2021 Summer term (discussed above).

Table 4: Achieved data collection

Data collection activity	Timepoint	Achieved (desired) sample
Observation of recorded tuition sessions	Various dates in 2020/21 school year	10 (10)
In-depth interviews with maths leads or teachers (school staff)	Baseline Dec 2020 Endline May–July 2021	20 (20) 11 (20)
Time and financial costs incurred by schools	July 2021	15 (requested of 122 schools)
In-depth interviews with pupils	June/July 2020	14 (25)
In-depth interviews with Virtual School Heads	July 2021	5 (5)
In-depth interviews with AMT tutors	July/August 2020	10 (10)
In-depth interviews with TSL staff	June and October 2021	2 (2)

Recruitment

TSL approached all VSHs in England to ask whether they would take responsibility for promoting the intervention and evaluation to schools in their area. Some VSHs gave school contacts to TSL, in some cases covering all schools in their areas and in other cases only some schools. TSL communicated with schools directly and sent the memorandum of understanding (MOU) to those that were interested. The MOU was drafted by NatCen with input from TSL and is included as Appendix 3. All 378 schools that signed MOUs were invited to upload information about pupils through an online recruitment form. NatCen sent the schools an invitation and three reminder emails plus one email extending the deadline due to concerns over low numbers of pupils recruited.

Thirty-six schools withdrew their MOUs at various stages of the process. Of the remaining 342 schools, 231 uploaded pupil data (for a total of 803 pupils). Of these, 189 schools had at least one pupil randomised to the intervention arm of the trial. Teachers in these schools were eligible to be interviewed for the IPE. Aiming to recruit 20 teachers for baseline interview in Autumn term 2020, 130 schools were approached and teachers were recruited across schools meeting quotas for a range of characteristics (see Table 3). Teachers interviewed at endline in Summer term 2021 were recruited from those interviewed at baseline.

Due to the difficulties of recruiting pupils for focus groups without teacher support, teachers interviewed at baseline were asked to help recruit pupils for interview in the Summer term.

TSL provided NatCen with a sample frame of 105 tutors. From the sample, 10 tutors were recruited by NatCen to take part in interviews, meaning TSL would not know which tutors were interviewed.

Analysis

Interviews were recorded (with respondents' permission) and transcribed. Observations of tutoring sessions were recorded using detailed fieldnotes entered into a tailored observation pro-forma. Framework in NVivo was used to facilitate thematic analysis of qualitative data. In the Framework approach data from each interview is summarised within an analysis matrix (where columns represent the key sub-themes or topics and the rows represent participants), so the data are ordered systematically and grounded in participants' accounts. Analysis looked for patterns, consistencies and inconsistencies in data collected from different respondents and across schools in order to help answer the research questions.

FINDINGS

Fidelity

How has AMT been implemented in schools?

Respondents reported that, commonly, the senior leadership team made the decision to take part in the AMT programme. This might entail several members of the Senior Leadership Team (SLT), including the Head, the school coordinator for maths, or the SENCO; though in some schools just one of these senior staff members had made the decision.

There were typically fewer than five pupils receiving AMT in each school. However, several schools taking part in the evaluation were paying for other pupils to receive tutoring services from TSL, and one school had chosen to pay for AMT for one pupil allocated to the control group (an important consideration for any future impact evaluation).

In terms of the practicalities of the tutoring sessions, they were held during or after regular school hours. Where pupils had to miss regular classes for the sessions, schools would schedule them over subjects like PE, humanities or general "topic lesson" time, and were keen to avoid any pupil missing maths or English. Schools also took pupils' wishes into consideration, arranging sessions to avoid them missing their favourite subjects like art or computing.

Arranging space and supervision for the pupils was a challenge for some schools. Some school staff allowed pupils to be supervised for only the first ten minutes of a session, with staff available to "look in" on them every now and then. Another had problems finding a space in the school where the internet connection was good enough for AMT, and as a result a pupil had to receive tutoring in a corridor.

> *He was in the library, which is next to the reception building... the internet was so poor there, because where we live, we're right out in the countryside, here, so we have to find places that sometimes make the tutoring a success. He's basically in the corridor in my class, next to my classroom, which is not the ideal place to study but that's the only place we have.* ***School staff***

However, other schools reported no significant problems with the practicalities of the sessions. or found ways to overcome potential challenges. For example, some pupils received tutoring at the back of the classroom, where they could be easily supervised, or a Teaching Assistant (TA) supervised several pupils receiving tutoring in another room.

Understandably, schools struggled to continue with the sessions during Covid-19 closures. Challenges included pupils not having the necessary technology or environment to take part in the sessions at home, or engagement dropping off significantly when teachers could not physically monitor them. However, despite these challenges, a small number of schools reported sessions continuing more or less unaffected during the closure period. This was especially the case where pupils were able to continue in-person education due to being the children of key workers or those considered vulnerable.

Are schools/ teachers administering the programme as described?

Schools generally followed guidance from TSL on setting up and administering the sessions. Pupils were provided with computers with stable internet connections, in a quiet (though not always private) part of the school where they could be supervised while receiving their tuition. However, as described above, this was a challenge for some schools, including those not able to find a room where the pupil could work in private or have a member of staff available to supervise them. This could lead to less-than-optimal situations such as a pupil undertaking the tuition sessions in a corridor.

Generally, and as prescribed, sessions took place once a week in a regular time slot. Most often, this was during the school day, though it was possible for the tutoring to be held after school. Some teachers found it a struggle to schedule in the sessions every week – due to time or space constraints – hence there were cases of sessions being held only fortnightly.

As discussed above, teachers demonstrated varying levels of awareness about AMT and the tools available to them as part of the programme. Developers at TSL attributed this to the way in which the AMT evaluation was implemented. For other tutoring provision outside of the AMT evaluation, schools would typically approach TSL and, after a period of consultation and "buy in", would decide to purchase tutoring sessions. In contrast, for the AMT evaluation, schools received tuition after a streamlined period of consultation with TSL and no purchase cost. It is possible this resulted in lower engagement from school staff and pupils, which had several knock-on effects.

For example, a key pillar of the TSL approach involves schools integrating TSL tuition into their teaching. While schools could choose whether or not to select what topics pupils would cover in the sessions, they were expected, as part of the intervention, to use post-session information from the data dashboard to inform their regular class teaching. However, as interview data suggests, few schools were doing so. This might be due to pressures on teacher time, but just as often they seem to have been unaware that this was an option available to them.

> *Our preferred programme, which about 95 per cent of schools opt for as well, is called the diagnostic. The child will sit a test at the start of their time with TSL, and that will generate a kind of bespoke learning journey for that child. It will pick up the gaps in certain topics and for certain levels. It might be fractions, they might be at a Year 3 level for example, and then they'll work them up to Year 4, Year 5, Year 6, up into the current age that they're at. It might be more of a breadth of stuff for their year group, so they might be put on enhancing Year 6 materials across a scope of topics, if that makes sense. It's all bespoke to the child. They won't sit the same lessons as their peers.* ***Third Space Learning***

Attendance was also a significant problem. Even before schools were closed due to Covid-19, pupils frequently did not turn up to their arranged sessions. Attendance dropped further when pupils were at home during lockdown. The following subsection presents an overview of pupil attendance during the evaluation.

Pupil attendance and programme dosage

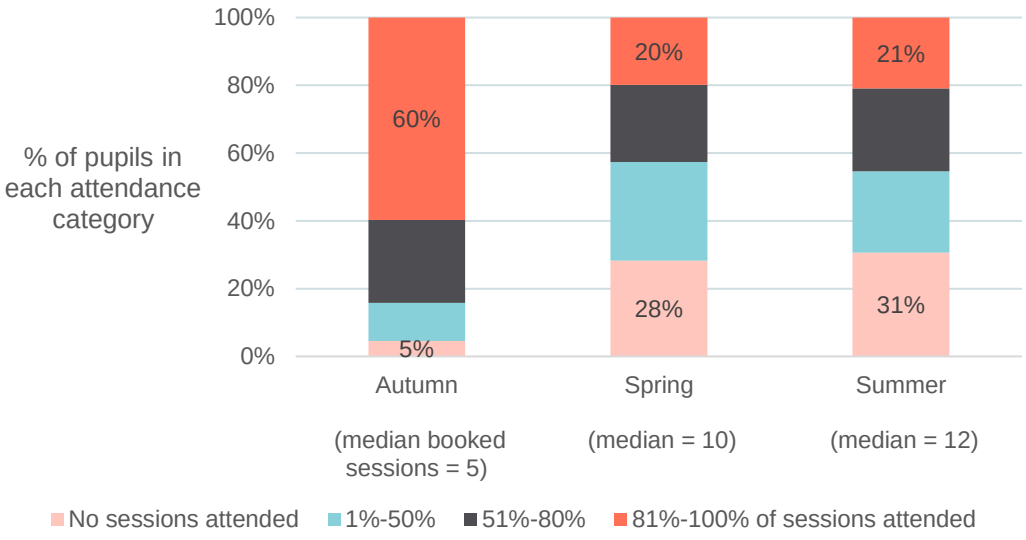
Provision of all teaching in the 2020/21 academic year, including AMT provision, was disrupted by the pandemic and associated social restrictions. Several factors affected the extent of AMT attendance among pupils in the trial: pupil absence from school due to partial or total school

closures or to sickness or self-isolation, staff absence due to sickness or self-isolation, and in-school logistics including restrictions related to bubbles all affected pupils' abilities to attend. In addition, some children learning from home had difficulties attending AMT sessions remotely due to limited access to equipment, and/or a space to focus on tuition sessions. Levels of attendance were assessed to better understand intervention dosage, that is the level of exposure pupils had to AMT.

In the 2020 Autumn term, 205 of the 392 children receiving tuition attended all their scheduled sessions (52%), and two-thirds (66%) attended at least 80% of sessions. However, the total number of available sessions in the Autumn term was low due to the schedule of recruitment into the planned trial, meaning that almost all children (367/392) had six or fewer booked sessions.

In the Spring and Summer terms, which were heavily affected by school closures, around 30% of pupils had zero attendance, while only 20–21% attended more than 80% of booked sessions (**Error! Reference source not found.**). In addition, some of those who attended all or most of their sessions had had an atypically small number of sessions booked.

Figure 1: Attendance by term for the 392 pupils enrolled in the AMT sessions in 2020/21



The challenges to delivery are discussed in detail through the Findings section; however, it is worth noting that due to staffing pressures several schools withdrew from the intervention altogether, while in many others, pupils had fewer than a full quota of sessions booked, and/or attended only a fraction of their planned sessions. In schools that did not withdraw altogether, there was no relationship between the number of pupils in the school receiving the intervention and the average level of attendance per pupil.

Although the impact evaluation did not go ahead, meaning that intervention dosage (number of tuition sessions) was no longer needed to quantitatively assess effectiveness, analysis of attendance provides important context for understanding findings from the IPE.

Is AMT being delivered consistently by tutors?

By examining data from observations of ten recorded tuition sessions and ten interviews with TSL tutors, we can understand to what degree tutors were able to deliver their sessions consistently.

Structure and content

Broadly, delivery by tutors was highly consistent. Tutors would begin each session by establishing rapport, usually by showing pupils a funny animal picture or similar. Or, if better known to the pupils, asking informal questions like what they had done at the weekend.

There were minor variations in the way tutors introduced the maths content. Often, tutors would start with a brief "hook" activity to test the pupil's knowledge. This might involve the tutor asking the pupil to recap what they had learned the previous week or showing them the title of the session and asking them to predict what the session would be about. However, at other times tutors launched abruptly into the maths content from the introduction, without any kind of "hook" activity. Next, tutors would move on to an "arithmetic warm up", then a mix of "practice" and "application" exercises. Application exercises involved taking a learned concept, such as rounding large numbers, and applying it to a real-world scenario. When pupils needed help, tutors diverted to a virtual whiteboard to break down concepts for them.

> *Whatever we are teaching them, we have to connect it with their real world. So, I gave one real world example that if you went for shopping and if you see sometimes a discount at some item, let's say 50 per cent discount, 20 per cent discount.* ***Tutor***

During the main body of the session, tutors would focus on at least one "learning objective", that is, a maths concept. Each learning objective was designed to take up one 50-minute session, with scope for it to continue for one more week if pupils could not complete it in this time. If a pupil completed a learning objective before the 50 minutes was up, tutors would move on to a new one.

Growth mindset

Tutors did their best to follow the TSL "growth mindset". They were patient with pupils, using the virtual whiteboard to help them understand any concept they struggled with. They would praise and reward efforts or achievement by the pupils with "effort points" (tallied on the pupil's screen as part of the TSL application), funny pictures or happy emojis. Tutors described this "growth mindset" style of teaching as a positive experience for both them and pupils. They saw it build pupils' confidence, and said it opened their own eyes to new ways of teaching.

Challenges

Where tutors were observed to be delivering sessions inconsistently, this was generally due to issues beyond their control. The two chief problems they faced were technical issues and a lack of pupil engagement.

Technical problems commonly involved either their headset or their pupil's not working or cutting out suddenly and the application failing to display properly on a pupil's screen. Tutors followed TSL guidance to address these issues – displaying troubleshooting slides for the pupils and asking to speak to an adult in the room as a last resort. Unfortunately, technical

issues interfered often enough that large chunks of sessions could be missed. Furthermore, tutors mentioned these problems as one of the main challenges of the job.

Tutors also described some cases where pupils were so disengaged that they struggled to make progress, and the "growth mindset" approach was not effective for these pupils.

> *There were some learners of mine, I did not complete even one single session with them because, after two weeks, you have to change to the next session, so two weeks with the same session not completed because the learner is not even listening to me.* ***Tutor***

In these situations, tutors had the option of raising the problem with the pupil's school but did not always see this as offering an effective solution.

Differentiation

What does 'business as usual' teaching look like in participating schools?

At the beginning of the intervention period (in Autumn 2020) maths teaching for Year 6 pupils showed some variation across participating schools. The duration of lessons generally ranged from forty to ninety minutes and were held daily, or for at least five sessions a week. The structure of maths lessons also varied between schools, for example, one school held daily lessons which included a 20-minute arithmetic session, others began lessons with rapid recall sessions or times tables. For some pupils, maths lessons were combined with targeted interventions, discussed in Additional Interventions, below.

Schools generally delivered maths classes either within class groups or in sets. Schools with sets typically organised classes according to maths ability. Children in lower ability sets sometimes received more personalised support in response to their needs.

> *We do try to have the lower ability set with a smaller number of children, so that they get more personalised provision, as that is where most of our SEND needs are… The top set does tend to be the bigger set.* ***School staff***

For schools not using sets, pupils were taught maths within their Year 6 classes. These schools generally offered targeted interventions for those in need of additional support as well as providing more in-depth maths teaching for pupils performing at a level above their peers.

Maths in lockdown

In the endline interviews, school staff focused on changes that had occurred to teaching due to Covid-19 lockdowns. For most, maths teaching during school closures involved a combination of live and pre-recorded lessons. At some schools, pupils were required to attend at least one live, teacher-led, maths session a day. One school provided pupils with a 'no-screen wellbeing' Friday once a fortnight.

Maths lessons were generally delivered through Google Classroom, Microsoft Teams, or Zoom. Schools also used online platforms to email pupils, provide links to maths activities and recorded learning videos. Pupils could use the same platforms to submit evidence of learning.

> *We focussed on setting the children literacy topics, and maths activities through the platform, Purple Mash… we needed something that the children were really familiar with and was easy to use.* ***School staff***

One school reported using a 'home delivery service' during the first lockdown. Here staff split into bubbles to deliver and collect schoolwork on a weekly basis. The school believed parents would be unwilling to come to collect pupils' work and felt they could not rely on technology.

Early in the Covid-19 pandemic, during the first lockdown in Spring 2020, some schools set weekly tasks via school websites, attaching links to BBC Bitesize or White Rose videos as suggested learning tools. However, during the 2020 Autumn term, schools increasingly used blended learning – a combination of live lessons and pre-set activities.

Schools identified several benefits of pre-recorded sessions, such as enabling pupils to access and learn at the time of day and pace that most suited them, using pause and rewind functions.

Whilst schools offered online learning, they remained open for the children of key workers and for vulnerable pupils. One school explained how they offered in-school teaching to a majority of their pupils.

> *[W]e are 60 per cent Pupil Premium so a lot of real deprivation and real issues amongst our learners, so we offered in-school teaching for as many children as we possibly could. To anyone who came under social care, early help, special needs, vulnerable. So, we had about 55-ish per cent of our children who attended through both closures because that was the safest place for them to be.* ***School staff***

Approaches to maths

To understand the use of AMT in relation to what is being taught at school, it is important to understand how schools approached maths lessons. Participating schools reported several approaches to maths, which commonly involved a range of concepts and teaching schemes.

Concepts

School staff reported several concepts in their school's approach to maths which included:

- Problem solving
- Reasoning
- Creativeness
- Fluency
- Real-life application
- Vocalisation (talking and explaining)

Such approaches were commonly reported by participating schools. Additionally, teachers mentioned a focus on "*resilience*" in maths and a "*rigorous*" approach. Resilience in maths was understood as encouraging pupils to persist until they achieved understanding in maths, whilst the rigorous approach meant a systematic path of learning for all year groups within the school, in which pupils studied each maths function in turn (addition, subtraction, fractions, percentages, etc.).

Schemes

The schemes which schools reported using included:

- White Rose
- Maths Mastery
- Times Table Rock Stars
- Hope Hamilton
- Learning by Questions

- Herts for Learning Essentials

Commonly used by schools, the White Rose Approach (WRA) encourages real life application of maths concepts to enable pupils to apply learning to the real world and deepen understanding. Teachers reported finding the approach helpful, closely followed its guidance and resources, and used it to build pupil's problem-solving skills, reasoning and maths fluency.

Are schools providing other forms of (maths) tuition to pupils/ specific groups of pupils?

Schools offered a range of tuition to support maths learning among Year 6 pupils. Interventions included group and individual support, usually delivered by school staff, or provided through the NTP. Some schools also had prior experience of TSL programmes.

Additional Interventions

Many schools provided additional interventions for pupils who were struggling with maths, including to ensure they did not fall further behind as a result of Covid-19. For some, staggered school start and end times allowed teachers to provide pupils with an extra 30-minute tuition session at the end or the start of the day. For others, TAs provided weekly tuition sessions, as well as targeted support for children with SEND or vulnerable pupils coming into school during the lockdown.

Additional support reported by school staff can be grouped into four key types:

1. One-to-one support

This type of support was delivered by the class teacher, TA, or a maths tutor. Support was usually provided in class or after school for pupils who were falling behind or underachieving. Examples of this type of intervention included 6 weeks of one-to-one support on specific topics, mentoring in preparation for the SATs, or Diagnostic Assessment of Numbers (DAN). DAN involved identifying gaps for those working two years below target levels and addressing these gaps through specific one-to-one interventions. During the pandemic catch-up funding was also used to deliver personalised sessions to pupils with SEND or in receipt of the Pupil Premium, those with minimal support at home and children working below target level.

2. Group support

Group support involved targeted maths tuition within small groups, provided by class teachers, TAs and in one case, the deputy head of the school. The criteria for involvement was based on pupils struggling to understand particular topics and needs identified by class teachers during progress meetings or baseline assessments. One school used LAC funding for extra weekly group tuition.

Support included teaching alternative methods for problem solving and providing revision sessions in the run up to SATs. In one school, Teach First academic mentoring was also being planned for Year 6 pupils in order to plug learning gaps. 'Success at Arithmetic' was delivered by TAs, focusing on maths functions. One school noted that pupils were moved into or out of group tuition according to their performance, which was regularly monitored.

> *We baselined early to identify [pupils] and then we retested at October half-term to make sure our groups were still correct, because some children actually caught up in that six-week period, so didn't need the extra input, whereas some other children fell*

behind. We've continually rejigged those groups, to make sure they're getting the input that they need. ***School staff***

3. Same-day interventions

Same day interventions were generally provided by teachers and Tas. Interventions usually involved pre-teaching which included a session of tutoring to struggling pupils prior to the whole class maths lesson to introduce the maths topic and support their learning in class. Some students were also provided post-teaching sessions to embed topics further, acting as an 'immediate intervention' to pick up errors or misconceptions. One teacher referred to this type of intervention as 'Correction Clinics' for pupils falling behind.

> *The whole class works in class, we don't take groups out, and the children who they offer support in the lessons, teachers and TAs if you have any. Then we have catch-up, what we call correction clinics, either the same afternoon or the next morning, just to bridge those gaps before they move on.* ***School staff***

4. Booster clubs

Booster clubs were provided as an opportunity for Year 6 pupils to have an extra hour of maths after school. For some schools this focussed on content missed during the Covid-19 lockdown, in others it was provided as a general SATs booster session. Sessions were usually run by teachers and/ or TAs. In some schools they targeted pupils in need of specific support, but in others were open to all who wanted to attend. Booster clubs were presented by some schools as a fun after-school club involving problem solving and logic puzzles, some competing with local schools in maths quizzes. Schools sometimes subscribed to online platforms such as Rapid Maths, Times Tables Rock Stars, MyMaths, Maths Shed and Power Maths resources to deliver the booster interventions.

Prior experience of TSL tuition

Some schools had first-hand experience of TSL tuition before their involvement in the AMT evaluation. One school had used pupil premium funding to purchase TSL tuition and having been pleased with pupil progress had extended the programme to a wider group of pupils. One school reported using TSL tuition for a group of Year 6 pupils in parallel to the evaluation which was paid for by the school and separate from the AMT intervention. Some teachers had not used TSL tuition themselves but were aware of programme from other teachers and/or experiences in other schools.

Prior experience of TSL tuition meant that some school staff entered the evaluation with preconceptions about the programme and its usefulness for pupils. For some, these expectations were positive:

> *[We used AMT] at my last school and we did actually see some improvements in their understanding and their confidence in their maths over time.* ***School staff***

Others flagged concerns about resource requirements for teachers and TAs, and technical difficulties.

Although awareness of TSL was fairly high overall, some schools had not heard about the programme until they were approached by their Virtual School Head about taking part in the evaluation.

Involvement in other online tutoring programmes

Interviews with school staff indicated limited involvement in the National Tutoring Programme (NTP). Where schools were involved in the NTP, views on the programme and extent of use varied. At some schools NTP was used alongside AMT or for its catch-up timetables. One school reported using NTP to support pupils from disadvantaged backgrounds with an identified need. Another school used NTP to provide three one-hour weekly sessions

Outside of the NTP, one school reported having used Bramble, a live group tutoring programme, since March 2021. This was funded for those who were most affected by lost learning as a result of Covid-19 and the school ensured these pupils were not also involved in the AMT programme. The school interviewee highlighted several similarities between AMT and Bramble, including the opportunity to tailor tuition and monitor pupil progress. Differences included Bramble's tuition library and session transcripts, as well as offering teachers the opportunity to meet the tutor in advance of the first session.

Adaptation

Have schools needed or chosen to adapt the intervention in any way?

Standard delivery of the AMT programme involves the baseline diagnostic assessment, topic suggestions by classroom teachers, weekly tuition sessions for participating pupils, and production of dashboard reports that class teachers can use to complement their classroom work. Adaptation of an intended programme entails "changes that are made to the intervention during the process of implementation" (Humphrey et al 2016, p13). Changes may be superficial ("relatively minor") or deep, entailing differences that overlap with infidelity of implementation.

Findings at baseline and endline suggest that all intentional changes teachers made to programme delivery were adjustments to pandemic staff shortages and school closures, rather than any deliberate changes to the intervention.

What does this adaptation look like?

As discussed, during the periods of lockdown, some pupils continued attending school, either because they were vulnerable or children of key workers. For pupils who were still in school and whose schools continued with AMT, there was little change to normal delivery, although staff shortages meant that supervision was sometimes not as comprehensive as intended.

> *I set him up before and sat with him for the first ten minutes and then I've asked him to run through the programme, and when he's finished, to come and find me. It worked on the first couple of sessions but as I said, these technological issues have surfaced and there isn't anyone really at the moment we can have that can sit with this person.* ***School staff***

The main adaptation was the widespread delivery of TSL tutoring in the home rather than in school, in the Spring and Summer terms. Whether this adaptation was possible for individual pupils varied between pupils and across schools. Schools were often able to provide laptops, especially for pupils receiving pupil premium, but could not necessarily meet other technology needs, such as providing internet access where none was available at home. In one school

the government initially promised 29 laptops, but this was reduced to six, which were delayed in arriving.

> *One of them hasn't got a device at home, so that's just a weakness, I suppose, over – it's not really Third Space Learning's fault, but that creates a barrier for the learning for those children.* ***School staff***

The alternative to delivery at home was to miss sessions. Home delivery had implications for both setup and supervision. Even where there were not technological barriers, home delivery depended largely on parents' willingness to facilitate, which varied. Schools made efforts to encourage parents to support the sessions. For example, one school emailed a pupil's parents every night to remind them of the tuition and kept the child behind after the 3pm remote lesson. However, a lack of engagement by the parents resulted in the child attending only one or two lessons during lockdown.

> *It was really hard to facilitate, but that was more due to the child and his circumstances I think.* ***School staff***

What level of adaptation is acceptable?

The adaptations made due to pandemic were forced by circumstances rather than being adopted in order to 'improve' the intervention or simplify implementations. School staff discussed the adapted delivery in terms of necessity, rather than acceptability.

Interviews also indicated considerable variation in understanding and engagement with the programme from school staff, with some teachers showing limited use of tools such as the data dashboard. This type of partial or limited use of the programme could also be classed as adaptation. Stakeholders at TSL suggested that a lack of "buy-in" from some school staff was likely connected to the difficult context it was being delivered in (i.e. managing the intervention amidst the disruption created by Covid-19), and perhaps also to the nature of the evaluation, specifically that schools had not made a financial investment in the programme. TSL stakeholders felt that under a more typical delivery model (where schools made a per pupil payment) school staff were more engaged, showing greater input into sessions and available resources. Engagement would also be boosted by higher levels of communication with TSL during the set-up and onboarding phase, which was necessarily streamlined as part of the evaluation.

Acceptability

What is the experience of schools, teachers and pupils involved with the intervention?

Initial perceptions of AMT

School staff's initial views of AMT were gathered during baseline interviews. This included their motivation to sign up to the programme, initial concerns, and their perceptions of parent and carer support for the programme.

School sign-up

School staff were initially attracted to the programme for several reasons. Some had found TSL tuition to be effective in the past. Others had had recommendations by other schools. School staff were also interested in trialling a new intervention, with the intention of delivering to a wider cohort if it was found to be beneficial. In the context of Covid-19 school closures,

school staff thought AMT would help plug the gaps in pupils' learning, especially for pupils from disadvantaged backgrounds who were disproportionately impacted. Furthermore, some schools perceived AMT to align with school priorities and needs**,** either because the school had a high proportion of LAC pupils or because maths was an area deemed to require improvement. There was a view among school staff that LAC often had the least support available to them of all pupil groups. The format of AMT delivery, that is, that it was delivered by a trained tutor on a one-to-one basis, also appealed to school staff. There was a view that online delivery was the most engaging format for pupils and, moreover, could be delivered in pupils' homes if required. Finally, there was a financial incentive as schools were offered the programme as part of the evaluation at no external cost.

Initial concerns

During baseline interviews, some school staff identified initial concerns they had when signing up to the programme. These included:

- **Technology** – there were concerns that that the school's internet connection would not be stable enough to support AMT. Some staff had encountered issues with technology when using TSL tuition previously. Staff also highlighted that not all pupils had equipment at home, which could pose challenges if schools were to close due to Covid-19.
- **Logistics and set-up** – that timetabling, staffing and finding a suitable location for tuition could be challenging. Interviewees highlighted that Covid-19 made logistical planning more difficult as policies determined where pupils and staff were allowed to go and who they could interact with.

> *Often with these things it's more about logistics and how it works and finding a space and all those sorts of things, rather than the actual quality of what's being delivered.* ***School staff***

- **Suitability for individual children** – there were concerns that the content would not be pitched at an appropriate level for the pupils.
- **Quality of teaching** – around the level of training that tutor received and concern that that the tuition would be of lower quality than classroom teaching. The lack of clarity around tutor standards suggests that staff had not sought out specific information about the tutors on the TSL website. Staff were particularly worried that tutors might teach pupils/ different methods of learning which they thought could confuse pupils (see the section on Mechanisms for further discussion of this).

Parent and carer views

School staff perceived parents and carers to be generally positive about the programme and keen for their children to be involved, especially considering lost learning as a result of school closures. School staff received positive feedback from parents and carers when pupils took part in AMT at home. However, some expressed concerns around scheduling as they did not want the pupils to miss core subjects such as English and maths to take part in AMT.

School staff reported that some parents and carers chose to opt-out of the programme because they did not believe their child needed additional support, or because of the looked after status eligibility criteria which made them cautious and apprehensive about the child's involvement.

> *The most difficult thing I had was explaining to parents what it was, why they'd been selected and to get parental consent, because anything around*

looked-after or identifying a social worker instantly gets … their heckles [sic] up. ***School staff***

Views on set-up process and logistics

In considering AMT set-up and logistics, school staff were generally pleased with the support they received from TSL. Staff found TSL easy to reach by phone or email if there were any issues with the set-up process, and supported staff when they needed to cancel or reschedule a session. Staff found communication clear and appreciated instructions for setting up devices, such as how to ensure firewalls did not block the platform and downloading the correct web browsers.

However, there were other areas of set-up and logistics that were found to be more challenging. As discussed in Fidelity, above, some schools found staffing the sessions particularly challenging because they had limited staff resources. In some cases, this meant teachers were supervising AMT sessions whilst teaching a class. In another example, a TA was sourced to supervise AMT sessions, but this meant they were no longer able to support their usual group of pupils.

Another difficulty reported by school staff was adhering to the 24-hour session cancellation period. School staff explained that if they cancelled a session more than 24 hours before it was due to run, they could reschedule the session for another day. Within 24 hours before the start of a session, it could not be rescheduled.[3] School staff explained that they were often not given as much as 24-hour notice if a pupil could not attend a session. This was made more challenging in the context of Covid-19. For example, it was difficult to give 24-hour notice if pupils were sent home due to being in contact with a Covid-19 case or themselves tested positive. This meant that pupils lost out on AMT sessions.

An issue highlighted by school staff, tutors and pupils was that pupils did not like missing their favourite lessons every week in order to receive AMT. Tutors and pupils reported that this sometimes acted as a barrier to pupil's engagement in the sessions.

> *If I'm completely honest, I don't really like doing Third Space Learning [AMT]. It misses out fun lessons, because we always have more fun lessons in the afternoon.* ***Pupil***

Interviews and tuition observations also indicated problems with the technology needed for tuition sessions. School staff, pupils and tutors reported that the AMT headsets could be unreliable, which created difficulties with audio and microphones. Where there were issues with headsets, pupils resorted to using the chatbox function, which worked well for some pupils, but created further frustrations for those how struggled with literacy.

Internet connectivity was also a persistent issue for both tutors and pupils sometimes resulting in long time lags which pupils found frustrating. Tutors could put up slides to help pupils solve technical issues but found it difficult to re-engage pupils once the issues had been resolved.

> *[W]hen there is some technical issues, students get distracted and then it is very tough to manage them and then come back to their session.* ***Tutor***

[3] The 24-hour cancellation policy was implemented to ensure that TSL tutor were fairly compensated for short-notice cancellations. TSL waived this policy during the course of the evaluation in response to Covid-19.

Views on AMT platform

In considering the AMT platform, school staff and pupils particularly liked the effort points and certificates features. School staff felt that these increased pupils' motivation as they liked to receive the maximum number of points each session. However, pupils wished they could do more with the effort points and some perceived other rewards they were given, such as avatars, inappropriate for their age (i.e. better suited to younger pupils).

Pupils also liked the tutor feedback feature, which enabled them to leave feedback and suggestions for their tutor at the end of each session. However, pupils reported that tutors did not always take the feedback on board.

> *Sometimes it is good to [leave feedback] … it tells [the tutor] what it improves… sometimes they don't take notes [though].* ***Pupil***

School staff found the dashboard particularly useful. They liked that the session slides were available on the dashboard and they could see what pupils had covered in their session. However, interviews suggested that not all teachers were aware of this feature. School staff also liked that pupil reports could be viewed on the dashboard at any time. Reports were found to be easy to read and informative, indicating which objectives pupils worked on in each session and how they got on.

> *It's great to see how they're doing. It's very clear what objectives they've worked on that day and how they've got on with them.* ***School staff***

Views on the structure and content of sessions

Structure

School staff considered AMT sessions to be well structured. They particularly liked how each session began with the objective, followed by a pre-prepared presentation. At the end of the session, pupils had the opportunity to independently apply their learning. This followed a similar structure to schools' classroom teaching.

> *It's going through all the applying skills, which obviously is, that's a similar pattern to what we would do in school.* ***School staff***

School staff observed that the one-to-one format allowed pupils to go at their own pace and meant that they felt more comfortable asking questions and saying when they did not understand something.

Selection of topics

School staff emphasised the value of the diagnostic assessment as it flagged gaps in pupils' understanding and meant that sessions could be tailored toward areas they struggled with.

Where staff manually selected topics to be covered in sessions, pupils found it particularly useful when their class teacher selected topics that they struggled with in class, as this enabled pupils to plug gaps in their learning and move on to other topics. However, not all staff were aware that they could manually choose topics, and some expressed the view that they wanted greater involvement in designing the content that was covered in the sessions so that it was more aligned with classroom teaching. Others explained that topics that they had chosen had not in fact been covered in the sessions.

Content

Pupils liked that they learnt new and more efficient methods of solving maths problems. Sessions were made fun and engaging by varying activities and the use of real-life scenarios to explain concepts. However, some pupils found it difficult when tutors taught them in a different way to their maths teacher. For example, one AMT tutor used the term 'indices', which was unfamiliar to some pupils, and pupils were asked to work out equations using a different method to the one they had learnt in the classroom, causing confusion.

> *[I]f we do it our way then they'll say it's wrong and then do it their way.* ***Pupil***

Views on tutors

Pupils liked aspects of tutor behaviour, including being humorous and making jokes about maths, or showing an interest in what the pupil liked by displaying pictures of animals or cars. Pupils also liked tutors who were patient and took the time to explain concepts in depth. These tutors let pupils think before they offered help.

However, pupils reported that not all tutors were patient; some would become frustrated when they got answers consistently wrong and others were keen to move quickly through the session content.

> *[Y]ou just wanted to learn the subject, and if you're like struggling a bit, they just want you to learn it as quick … as possible.* ***Pupil***

Another challenge encountered by pupils was difficulties understanding tutors' accents. Pupils reported that they had not had much previous exposure to tutors' accent. When pupils could not understand their tutor, some guessed what the tutor said, other asked their tutors to repeat themselves throughout the session. Some school staff thought this made it challenging for pupils to access the session content and added an extra obstacle for pupils who already struggled with maths.

It was common for pupils to have multiple tutors over the course of the AMT programme. TSL considered that this was likely due to tutors changing their availability due to moving to home working as a result of the Covid-19 pandemic. Prior to the pandemic, pupils would have had the same tutor throughout as tutors tended to keep the same schedule. Pupils did not like that sessions were delivered by multiple tutors. Schools thought consistency was important to help pupils to build rapport with their tutor.

> *Obviously, they develop a bit of a bond with, they're expecting the same person when they do the call ... I think it's just they've got used to hearing that person's voice and it's a bit of comfort, isn't it, to hear the same, when they're that age, a comfort to hear the same, to know it's going to be the same person.* ***School staff***

Responsiveness

Pupil engagement

School staff reported that the more engaged pupils felt positive and enthusiastic about sessions, and remained engaged for a full hour, especially those who enjoyed maths. Pupils had particularly enjoyed being taught by someone other than their class teacher and preferred the online modality to working from a whiteboard or book.

Where pupils were less engaged, school staff reported that it was because they felt nervous speaking to a stranger, found the one-to-one aspect too intense, lacked confidence in maths or found the content too difficult. In an extreme case, a pupil stopped attending school because they did not want to attend the AMT session.

Additional factors that inhibited pupil engagement in sessions included:

- **Background noise** – Pupils explained that they did not always have a quiet space to work, often there was background noise from other pupils or the environment (e.g. the school printer in the staff room). There was also background noise at the tutors' end (as a result of home working), such as children shouting and dogs barking, which pupils found distracting.
- **Technical issues** – As discussed above, technical issues such as equipment malfunctioning and poor WiFi disrupted the flow of sessions and led to problems with pupil engagement. In terms of improving engagement, staff reported that pupils enjoyed and were motivated by the rewards they were given, such as effort points and certificates.

Integration of AMT into regular maths teaching

When it came to integration of AMT into regular maths teaching, schools fell into three broad categories:

1. Those who had little or no plans to integrate AMT

Teachers at these schools generally had very limited understanding of the AMT programme, and what influence they could have on it. Some thought they would have to sit with the pupils while they were tutored if they were to understand the sessions and were not aware of the data dashboard.

> *There isn't any link between what they're doing and what's happening in the class. I don't know what information we get given and when about what the children are doing, what they've struggled with and what they've managed to achieve. I don't know how much information we get given, because when they're doing it obviously, they're each working individually on their own laptop plugged into it, so we can't hear what they're doing.* ***School staff***

Despite the TSL platform being designed to incorporate teacher guidance into the tutoring, these schools had limited awareness of the options open to them. As a result, they had limited impetus to integrate AMT into regular maths teaching.

Teachers were also sceptical that they could easily follow up on the sessions with pupils receiving tutoring, while still effectively teaching all children in their classes. In some instances, school staff felt the AMT content did not align with the topics taught in class, or AMT was used as a standalone activity, for example only for revision purposes.

Other reasons for not integrating AMT into wider teaching included a lack of staff time or capacity to review reports after each session, or not perceiving there to be a need to access dashboard reports because staff collected their own assessment data.

2. Those with tentative plans for integrating AMT

These schools were more aware of what the AMT programme involved, and in the baseline interviews expressed an in interest in integrating it into regular class sessions.

Once I've had a chance to talk to their class teacher, I think what we'll probably do is pick some gaps… that we know that they struggle with, and we feel is most important and most aligned to what we're doing generally in class at that time. ***School staff***

However, even among schools that were aware of things like the weekly data dashboard reports were those who were sceptical that they could practically follow up on the sessions in regular teaching, when they had a whole class to plan for.

3. Those who had detailed plans for integrating AMT

Teachers in this group had a much stronger understanding of the AMT programme, which in some instances came from working with TSL before (see Prior experience of TSL). They planned to, or were already, using the data dashboard to follow up individual exercises from the tutoring sessions in class, for example, by asking a pupil to work out why they got specific questions wrong.

A subset of schools had even more specific plans to integrate the tutoring sessions into regular classroom teaching. This group was aware they could select topics to be covered in AMT sessions and hoped to follow this up in regular class teaching.

It gives the class teacher an opportunity to look and see where they have achieved on the lesson, and then she can adjust her classroom teaching and the activities when they do that. ***School staff***

Although school staff who integrated AMT into wider learning using dashboard data were in the minority, where this was done, it involved several different uses of data:

1. **Monitoring** – Some staff looked at dashboard reports each week to see where pupils were making progress and if they were meeting objectives. School staff found monitoring particularly helpful with higher ability pupils, who received less targeted support in the classroom. Staff also used reports in order to select areas of focus for future AMT sessions.
2. **Sharing data** – School staff shared data from dashboard reports with Year 6 staff. In some schools, reports were shared with parents/carers to make them aware of what their child was struggling with and facilitate a joined-up approach to supporting the pupil with their learning.
3. **TSL resources used** – School staff shared TSL resources with teachers. For example, at the start of every maths lesson, one school conducted a 'Fluent in Five' exercise, which is a Third Space resource. Teachers also used TSL slides in their own classroom teaching to provide consistency for pupils involved in AMT.
4. **Lesson planning** – School staff used dashboard report data to feed into classroom teaching. This allowed teachers to further develop pupils' strengths but to also look for common areas of difficulty to recap with the whole class.

   [I]f those two pupils - or even just one of those pupils - is struggling with it, it's worth recapping it for the class. That's how we've integrated it into their learning. ***School staff***

5. **Targeted interventions** – School staff used dashboard reports to inform targeted interventions for pupils. For example, problematic topics/areas were recapped in daily 'maths fluency' sessions, during post-teaching sessions with a TA or as homework.

One school planned to integrate the AMT sessions with the Teach First academic mentor who provided extra support to pupils with their work in AMT sessions.

Tutor training and support

Overall, tutors had positive experiences of tutor training. Tutors appreciated learning how to assess pupils on their maths abilities, adapt teaching for different pupils and deal with challenging situations. Tutors also appreciated learning about the UK curriculum and subtle cultural differences in learning and teaching styles – for example, praising students is not common practice in Sri Lanka. Tutors thought that evaluators were supportive and provided useful and actionable feedback.

Tutors were taught techniques to engage pupils. For example, 'role-reversal' techniques where tutors would ask the pupil to lead the session, or by relating the maths problem to a real-life scenario. Tutors also used available resources on the platform, such as explaining through a virtual whiteboard or by using "effort points" and funny pictures as rewards to motivate pupils. By the end of the training, tutors had gained confidence working with children and using technology through demonstrations with the evaluator.

When providing ongoing support, tutors found that TSL were responsive, especially when solving technical issues, and supervisors were easy to get in touch with if advice was needed during a session. TSL management kept tutors updated about any changes, such as session content and teaching techniques. However, tutors found regular changes and updates difficult to manage.

What are the facilitators and challenges of delivering AMT?

Overall, tutors reported that most pupils were engaged in learning during the AMT sessions. Pupils were often reserved when meeting the tutor for the first time and were more likely to use the chatbox function than speaking. However, this changed over time as the tutor built rapport with the pupil. Pupils who struggled most with maths were harder to engage and those who lacked confidence required more patience as they worried about getting answers incorrect.

Tutors also noted that pupil behaviour was sometimes a challenge. Some pupils did not noticeably make an effort, were disruptive or made negative remarks about the tutor. When this occurred, tutors would flag the issue in the feedback form for the school through a 'red flag' system. However, tutors reported that schools did not always appear to act on this feedback.

Tutors found it useful when school staff provided detailed information on each pupil. This helped them to know if pupils had a special educational need. Tutors also appreciated it when schools assisted with technical difficulties or pupil behaviour issues.

Tutors familiarised themselves with terminology most commonly used in the UK in advance of the sessions in order to improve the usefulness of sessions. However, some found it difficult to remember to use the correct terminology. For example, in Sri Lanka tutors would say 'minus' or 'deduct' where in the UK they use the term 'take away'. Tutors studied these differences in order to become more confident using UK terminology.

Pupils were asked to leave feedback at the end of each session which tutors found useful in helping them understand how to improve their practice.

> *The feedback which I'm getting nowadays from the learners is much more than the feedback I used to get earlier, so that means I have improved a lot, so it was two-way learning. I also learn something from the students.* ***Tutor***

Do teachers and pupils feel AMT is the right response to problems with attainment and lack of confidence in maths?

The following section explores school staff's perception of eligible pupils' maths abilities and their reflections on whether the content of sessions was pitched at an appropriate level. Further discussions of perceived pupil outcomes are explored in the Mechanism section.

Maths abilities of the eligible cohort

School teachers described the cohort of pupils who received AMT tuition as mixed in their maths abilities. Some eligible pupils were achieving below age-related expectations in maths. In some cases, this was because the pupils had missed out on learning due to school moves or limited access to education in the past, while other pupils had SEND which made understanding maths concepts more difficult. Particular challenges faced by eligible pupils included verbal reasoning, test situations and a struggle to maintain focus. However, school staff reported that some eligible pupils were good at maths but lacked self-confidence which was a barrier to attainment (see Mechanisms).

> *[A] lot of the pupils [who] were eligible, lacked confidence because of things that have happened in their life. That transfers to maths as well.* ***School staff***

Opinions differed about the appropriateness of the content of tuition sessions in relation to pupils' maths abilities. While some school staff thought that the content was pitched at the right level, others reported that it was too easy or too difficult, which led pupils to become frustrated. Where the content was not pitched at the right level, staff suggested that this was because the initial diagnostic questions had been too easy or difficult to accurately capture the pupils' abilities, or because tutors did not challenge pupils during the session. Problems were especially important for pupils with SEND or who were working significantly below age expectations. Sessions that were too challenging made pupils anxious.

> *Instead of breaking down the skills more, she's been stuck on the same skill for a few weeks now. So, in terms of the special educational needs, I think it does need to be tailored a little bit more.* ***School staff***

We note that AMT was not intended to be delivered to pupils working substantially below their age expectations, or those with severe or complex SEND. This was specified in eligibility criteria shared with school staff upon pupil enrolment, but nonetheless the AMT group did appear to include some pupils with such needs.

Improved social-emotional and communication skills

School staff reported that pupils demonstrated improved social-emotional and communication skills as a result of participating in AMT. They thought this improvement occurred as pupils worked one-to-one with their tutor and thereby communicated with at least one new person. School staff felt this was particularly important for pupils in the target group (those who have or have had a social worker) because their willingness and ability to communicate with adults may have been negatively affected by their personal experiences. The requirement to

communicate in tuition sessions and talking to tutors about their daily lives and interests was thought to have facilitated pupils' social-emotional development. Additionally, school staff thought having an international tutor improved pupils' ability to communicate with people from a different cultural background. This was considered to be especially true of pupils living and going to school in predominantly White British areas.

Gaps in learning in other subjects

School staff expressed concern that participating in AMT during the school day led pupils to miss out on learning from their usual maths class or in other subjects. Teachers believed this issue was exacerbated because the AMT sessions happened at the same time every week, meaning that the pupil regularly missed the same class, resulting in large learning gaps.

Suggestions and recommendations

Interviewees had the following suggestions and recommendations for AMT delivery going forward:

- **Communication** – Staff would have also liked more communication with tutors around pupil progress and behaviour. Virtual schools also wanted more regular updates from schools around which pupils were involved and how they were progressing. This would have been useful to update social workers and could have been written into the annual reports on the children they support.
- **Additional information** – School staff wanted more information on what to expect from the diagnostic assessment and how to select session topics for each pupil would have been helpful as these aspects were most unclear. Advance notification of session content would help to align class teaching. Staff would have welcomed more advice on how best to use dashboard reports and how AMT could be used in a wider learning context.
- **Set-up of AMT** – Teachers would have liked greater control over the topics covered in the sessions, speedier replacement of faulty headsets and greater flexibility around the cancellation period which was made more impractical given Covid-19-related absences. Teachers would also have liked to meet with tutors at the start of the programme to give some background information on the pupil and discuss the approach to tuition.
- **Tutor consistency** – Pupils, tutors and Virtual School Heads thought that pupils should have the same tutor throughout their AMT sessions. Consistency was seen to be particularly important for pupil groups that were targeted by the intervention, such as LAC.
- **Session content** – Tutors suggested that there should be one learning objective per session, as they found it difficult to take questions and follow-up or embed deeper knowledge when covering multiple objectives. Tutors also reflected that sessions were not frequent enough, as pupils found it difficult to recall what they had done in the previous session. They suggested that sessions should be held twice a week.

Schools which had previously used TSL felt that expansion as part of the NTP had compromised the quality of the provision (for example, they had encountered more technical issues and issues with equipment). Staff emphasised that quality of provision needed to be maintained as it is scaled up.

Impacts of Covid-19

In January 2021, schools were partially closed in response to Government guidance, with only certain pupils (children of key workers and vulnerable children) able to attend school during this period. When schools were open, pupils were frequently required to self-isolate because they had Covid-19 or because someone in their bubble had tested positive. As a result, many pupils had to receive AMT at home; this was not how AMT was designed to be delivered. As discussed in the Differentiation and Adaptation sections, school staff reported a number of challenges delivering the intervention at home, including limited access to devices, online connectivity and parents' IT skills. This led some pupils to miss sessions.

> *I'm really disappointed that one of them can't get on. That's not Third Space's fault, but it's just a reflection of what the pupils have got access to. One hasn't got a laptop, so he's missing it.* ***School staff***

Pupils noted that they found it easier to participate in sessions at school than at home. This was because there were fewer distractions and better access to technology in schools.

> *[A]t home sometimes you don't have that quiet space to do it and you get the stress from all the noise around you.* ***Pupil***

There were other general challenges to learning as a result of Covid-19, including issues with attendance, reduced focus and limited parental engagement. However, AMT gave some relief to schools who knew that pupils were doing at least an hour of maths a week, which contributed towards their catch-up and reduced learning gaps resulting from school closures.

Mechanism

Do stakeholders feel that the intervention has had an impact on pupil outcomes as set out in the logic model?

Improved verbal reasoning

There was a view among school staff that pupils' verbal reasoning had improved as a result of the AMT programme. Pupils showed this by improved understanding of written maths problems, increased ability to articulate their understanding of maths, and proposed solutions to questions, all of which was evident in their class work. Teachers thought verbal reasoning had been improved as a result of pupils regularly talking through maths problems aloud with their AMT tutors. Tutors reported that pupils had become increasingly adept at explaining their mathematical thinking in a logical and clear way over the course of AMT sessions.

On the other hand, there were also views that pupils' verbal reasoning skills had stagnated or decreased as a result of the Covid-19 pandemic and disruptions to their learning. Teachers who held this view thought that the possible impact of the tuition programme on verbal reasoning had either been weakened or was now impossible to determine.

There were also school staff who reported that AMT had had no discernible impact on pupils' verbal reasoning skills because the tuition was pitched at the wrong level and had not sufficiently challenged higher-attaining pupils.

Better understanding of maths topics

There were mixed views among teachers about whether the tuition programme had promoted better understanding of maths topics among pupils. Tutors, on the other hand, tended to consider that the programme had a positive impact on pupils' understanding of maths topics.

Teachers felt that the tuition offered pupils personal attention and was a space in which there was 'nowhere to hide', so that individual weaknesses were tackled more effectively than in group settings. This personalised approach had expanded pupils' mathematical knowledge, plugging gaps particularly for middle- or lower-attaining pupils. Where pupils were higher-attaining, teachers thought the tuition acted like a revision session, helping to solidify classroom teaching, rather than filling gaps in understanding.

Teachers who reported that AMT had improved pupils' understanding of maths topics noted that pupils were making fewer errors in maths, progressing faster through topics and doing higher quality work overall. Tutors noted that pupils had shown improved understanding of maths topics by remembering content from previous tuition sessions, which showed they had retained understanding of concepts and methods over time. Likewise, pupils reported that their mathematical understanding had developed, evidenced through grasping classroom content more readily, working through questions in class more quickly, and higher test scores.

> *[The pupil] definitely had a great improvement in the quality of maths work in the classroom, reasoning skills and generally in the one-to-one attention.* ***School staff***

Another group of school staff reported that although their pupils had made progress as a result of the AMT programme, they were still considerably below age-related expectations and consequently, the tuition had not met their expectations. These teachers had hoped that AMT would have closed pupils' gaps in understanding more significantly.

There were also teachers who reported *no* increase in mathematical understanding amongst pupils receiving the tuition. One reason given was that the pupils selected for AMT were not able to benefit from it, either because they had a severe SEN or they were too far below age-related expectations in maths. Staff recognised that the inaccessibility of the sessions meant it was unlikely that the programme would have produced a demonstrable impact, but may have been able to benefit pupils who had been specifically selected by teachers to take part on the basis of their ability and prior attainment.

School staff also thought that pupils' ability to develop their understanding in maths had been affected by the Covid-19 pandemic. Interviewees explained how pupils eligible for the intervention (that is, pupils who have or have had a social worker) were more likely to experience a low-quality home learning environment and to receive less support at home than the wider pupil population. School staff thought this meant that intervention pupils were more negatively impacted by disruptions to learning caused by the Covid-19 pandemic. School staff described how AMT served to mitigate some of the negative impacts of missed schooling on maths attainment, especially for pupils who regularly attended online.

In schools where tuition sessions did not cover the same topics at the same time as the school curriculum, teachers found it difficult to judge whether pupils had made any progress in their understanding of maths topics.

New strategies in maths

School staff reported that pupils learnt new strategies to tackle maths questions through AMT. However, they felt that strategies which were not covered in classroom teaching, or which offered a different method to tackling maths questions than taught in the school curriculum,

confused pupils. Teachers described how new strategies and methods were unhelpful in promoting better understanding of maths and problem solving because they did not align with wider school teaching, and intervention pupils' maths ability tended to be too low for them to be able to fully understand and use multiple methods.

> *It flummoxed him that he was being taught a completely different method that is not in our school policy or school curriculum. It bothered him, it got him down at the time that he didn't get it because it was too much for him to take in and was confusing.* ***School staff***

This was reflected in accounts from some pupils, who reported that learning different methods to those taught in class was confusing and hindered understanding. Difficulties were exacerbated if the tutor was unwilling to use methods already familiar to pupils.

> *If we do it our way, then the tutor will say it's wrong and then do it their way.* ***Pupil***

In contrast to the wider group of learners, higher-achieving pupils reported that the new methods of tackling maths problems they were taught through AMT helped them in their exams. These pupils felt that learning different maths strategies was useful because they could choose the one which they were most comfortable with. They found some of the methods taught by tutors easier to understand and use than methods taught as part of the school curriculum. This aided their understanding and ability to solve maths problems.

> *I feel like the tuition did help in our exams because we learned new methods of how to do stuff.* ***Pupil***

Tutors acknowledged that some approaches to teaching maths concepts and logic were different in India/Sri Lanka than in the UK. Despite receiving training in UK teaching methods, they reported that these differences made the tuition more challenging to deliver and recognised that less able pupils found using unfamiliar/ alternative methods confusing.

Improved engagement and enjoyment in maths

School staff reported that, in general, AMT had improved pupils' engagement and enjoyment in maths. They described pupils being able to focus on tuition sessions for longer than they had previously focused on maths lessons, suggesting a high level of engagement and enjoyment in the subject. Teachers also reported that pupils' general attitude towards maths and maths lessons had improved. Pupils' engagement in maths lessons increased, as demonstrated through pupils raising their hands to answer questions more often and helping other pupils with their maths work (something they would not have done prior to involvement in AMT). Teachers also reported that pupils were speaking about their maths lessons more positively since participating in the tuition.

Tutors also highlighted an improvement in pupils' engagement and enjoyment in maths. They described pupils coming to tuition sessions with lots of questions about maths, suggesting high levels of engagement and curiosity.

This view was reinforced by some pupils who described realising for the first time that maths could be fun.

> *I like Third Space because it helps me a lot with maths and it shows the easier way to do things and it also just makes me realise how fun maths actually is.* ***Pupil***

However, other pupils explained that they already enjoyed maths prior to participating in AMT, so the tuition sessions did not noticeably change their attitude to maths.

Both school staff and tutors suggested that the effort points rewarded in AMT sessions helped motivate pupils, reinforcing successes and boosting confidence in their maths skills. School staff also described how learning maths online, via a laptop, helped engage pupils. Online tuition provided a novel, more interactive and fun format, distinguishing the sessions from classroom learning, and sparking interest in maths in pupils who were previously disengaged.

Whilst school staff noted improvements in pupil engagement in maths overall, school staff reported frustration and disengagement for pupils who found the tuition sessions much too easy or too difficult. There was a view among teachers that the initial diagnostic test upon which session content was based was too often inaccurate. This led to tuition topics which were inappropriate for pupils' maths levels. As discussed, teachers suggested that basing session content on discussions with pupils' teachers would have led to better outcomes in terms of engagement and enjoyment in maths.

School staff also highlighted that frequent technical problems, as well as difficulties understanding tutors' accents, impacted pupil engagement because the sessions themselves were less enjoyable than they could have been. Too much time was spent on correcting technical issues, and pupils and tutors struggling to communicate. This led to pupils feeling frustrated and distracted, rather than engaged, and in some instances led pupils to withdraw from the programme altogether.

Tutors reported that some pupils were extremely disengaged and did not show any improvements with regards to enjoyment or engagement in maths. Tutors felt that consistently disruptive and frustrated pupils demonstrated the least progress in this area. They reported instances of pupils repeatedly shouting, ''I hate maths'' during tuition sessions, crying or refusing to do any work.

> *Sometimes we used to give feedback to the school that this learner is not engaged, and again, like in the next session, he or she is not engaged again, and this continues, and this goes on…There were some learners of mine where I did not complete even one single session with them because, after two weeks, you have to change to the next session, so two weeks with the same session not completed because the learner is not even listening to me.* ***Tutor***

School staff also described some issues with behaviour during AMT sessions and suggested that positive relationships between the pupil and the teacher or teaching assistant supervising sessions helped to mitigate poor behaviour.

Improved confidence in maths

There were views among school staff and tutors that AMT improved pupil confidence in maths if session content was pitched at an appropriate level. They reported improved confidence around pupils' weaker areas of maths in particular. They thought this confidence was in part facilitated through a productive relationship with the tutor, and tutors' positive reinforcement and encouragement in sessions (for example through rewarding "effort points"). These factors helped to tackle high levels of self-doubt among pupils, something which teachers described as a pronounced issue among intervention pupils due to their personal circumstances and family histories. Tutors also reported that positive reinforcement and issuing effort points helped to motivate pupils and improve confidence. This in turn helped tackle "fixed mindsets", whereby pupils thought they were naturally "bad at maths" and would struggle to improve.

Pupils reported that the AMT sessions provided a "safe space" to voice a lack of understanding or confusion without the pressures of a wider classroom or other pupils present. They thought this helped to quell pupils' maths anxiety and build confidence because they could talk through

maths problems one-on-one with the tutor and without judgement. School staff agreed that the AMT sessions allowed pupils to work without comparing themselves with their peers. This was particularly helpful in boosting confidence amongst lower-attaining pupils who tended to feel like they were behind in class.

> *She really enjoyed that one-to-one relationship because it was quite a safe place to not know the things that your peers know, not have to keep up or try and keep up with the pace that there often is in a classroom. This was really good for her because previously she had a lot of anxiety around maths.* ***School staff***

Teachers reported that improved confidence was demonstrated in maths lessons, as well as in AMT sessions, where pupils were speaking more confidently about maths and appeared more relaxed. School staff also reported that pupils were attempting more difficult maths problems, whereas they would have previously stuck to easier questions, and that pupils were using more varied problem-solving methods. Tutors also saw pupils becoming more ready to answer questions and assert themselves.

> *At first, he didn't want to explain anything because he was very shy to speak, and then till the time we reached the last session, I had 17 sessions with him, I think. Sixteen or 17 sessions, but at that time, he used to explain each and every thing, each and every step with him, so yes, he improved a lot with his confidence.* ***Tutor***

Pupils agreed that the tuition programme had provided them with confidence to participate in class more, as they felt better able to understand the maths being taught in class. They described how repetition of methods and strategies during AMT sessions built their confidence through familiarity with the different techniques.

However, school staff did report that where AMT content was too difficult for pupils, this left them feeling less able to understand and tackle maths questions. These pupils became withdrawn, or demonstrated poor behaviour in AMT sessions, suggesting low self-esteem.

Additionally, school staff expressed concern that in some cases, AMT was providing pupils with a false sense of self-confidence in maths because the reality was that they were still very far behind. These teachers were worried that the tuition was unfairly boosting pupils' expectations around how they might perform in class maths tests and in national assessments because the tuition did not reflect the difficulty of the curriculum.

Seeing maths as worthwhile

Pupils reported that their perception of maths as a worthwhile subject or skill increased as a result of participating in the AMT programme. They described learning how maths could help them with general life skills such as making payments, counting change and managing personal finances.

Costs

A spreadsheet form was developed to collect data on time and money spent supporting AMT sessions in intervention schools. The spreadsheet was sent to 122 schools receiving AMT where in the Summer term. One reminder email was sent to those who had not responded. Fifteen schools returned a completed costs form.

What resources have teachers and school leaders needed to contribute to the running of the intervention?

Financial cost

Fourteen schools reported incurring no hardware costs relating to taking part in AMT. One school, with two pupils receiving AMT, incurred hardware costs of £706 in supporting the tutoring sessions. Unfortunately, the teacher did not specify what these costs were for.

Four of the 15 schools reported incurring staff costs for supervising the sessions (Table 4). Broadly speaking, these costs were £10 to £15 per session for TA support, and £20 to £25 per session for other staff coverage (although it seems unlikely that the school reporting costs for supervision by an SLT member incurred additional costs – that school might have been reporting the opportunity cost of that SLT member supervising the AMT session).

Table 4: Staff costs for schools responding to the request

School	N pupils	Staff costs		Number of sessions attended	Costs per pupil session	Staff grade supervising
A	1	£200	Overall	21	£9.50	TA
B	2	£25	per session	45	£25.00	Not stated
C	1	£200	Overall	16	£12.50	TA
D	4	£648	Overall	28	£23.00	SLT member
Schools reporting no staff costs	23	£0	–	349	£0.00	–
All schools reporting	31	£2173	–	459	£4.73	–

A cost to schools outside the context of the AMT evaluation (where the tuition itself was provided at no cost to schools), is:

$$Cost\ to\ schools = Tuition\ costs + Hardware\ costs + Staff\ costs$$

As only 15 schools reported hardware and staff costs this is considered to be an imprecise estimate. The tuition costs under paid-for conditions (as provided by TSL) are £199 per pupil per term, which equates to £464.33 for 28 session. The staff costs per pupil, per session as reported by teachers in the evaluation, based on the number of sessions attended and the reported costs, amounted to £2,173 across 459 sessions, or £4.73 per session. A crude calculation of the average staff cost to schools of delivering the intended 28 sessions in a year would therefore be:

$$£4.73 \times 28 \approx £133$$

And the overall cost to schools per pupil would be:

$$£464.33\ tuition\ costs + £133\ staff\ costs = £597.33$$

Hardware costs have not been included in the estimates as it is unclear what the £706 reported by one school was spent on – all schools ought to have had the necessary hardware at the school or provided by TSL as part of the standard set-up.

Given that staff costs make up 22% of our estimated cost per pupil[4], and were very unevenly distributed across schools, this estimate of £597.33 per pupil is more useful for actors planning costs across a number of schools, for example at the level of local authorities, rather than for an individual school. If schools were able to deliver the intervention without incurring additional staff costs, its cost would be lower.

Time costs

Estimates of time spent supervising pupil sessions varied across the 15 responses from 0 minutes per pupil per week to 120 minutes per pupil per week, with a median estimate of 50 minutes. Ten schools reported that staff could do other tasks while supervising sessions, three said they could not, and one said they could only do certain other tasks. One school did not respond to this question. Median time spent setting up the pupil accounts was 10 minutes (range: 5 minutes to 120 minutes), and median time spent having ongoing contact with TSL per month was 25 minutes (range: 0 minutes to 480 minutes).

[4] Estimate based on a single participating pupil per school. Ratio of staffing costs to tuition costs will differ depending on the number of eligible pupils participating in the programme.

DISCUSSION

Discussion of Findings

The AMT programme offered a welcome approach to supporting disadvantaged pupils with maths learning. The format and nature of the intervention (specifically a tailored online one-to-one tuition service) offered a positive approach to tackling educational disadvantage. The programme was well received overall, with school staff and pupils often highlighting improvements in maths engagement, enjoyment and confidence.

There were, however, several barriers to delivery, limiting the potential of the programme to impact pupils' outcomes. These barriers were predominantly practical, with technical difficulties, lack of available space, staff resource constraints and pupil absence being raised by stakeholders. This was compounded by issues with awareness and engagement among some school staff, which limited their use of tools available as part of AMT.

It is also important to note that Covid-19 was a key barrier to the key elements of success of the programme, including fidelity, acceptability and mechanisms by which outcomes of tuition were achieved. This was primarily because school closures put many students with a lack of access to technology and parental support for learning at home at greater disadvantage to progressing with their learning via the AMT programme. It is likely that pandemic-related disruption also affected the level of engagement and ongoing attention school staff paid to the programme, even among those that remained part of the evaluation and did not withdraw.

Limitations

This evaluation faced significant challenges in answering the research questions, due to the disruption to the delivery of AMT and of the whole schooling environment for pupils, school staff and tutors alike as a result of Covid-19. However, staff and pupil absences, school closures, Covid-19 bubbles, and resource pressures on staff as a result of lost learning also impacted on the ability of stakeholders to engage with the evaluation. This is evidenced in the number of interviewees taking part in qualitive interviews at endline. It also significantly impacted the number of AMT sessions pupils were able to attend (i.e. dosage).

The overall findings on experiences of AMT were often positive but with some variation throughout. It is unlikely that in the absence of the pandemic the evaluation would have found a uniform experience, so it is possible that the results of the IPE do not differ dramatically from the hypothetical results of an evaluation conducted as intended. Crucially though it is not possible to place these IPE findings in the context of findings relating to maths attainment and maths anxiety.

There were some infidelities in the implementation of the evaluation that contributed to certain findings. Most notably, some pupils took part who ought not have been eligible for the programme due to having complex SEND. This is likely to have contributed to lower satisfaction among school staff, pupils and tutors than would have been the case if these pupils had been excluded during the onboarding process.

It is important to note that the evaluation as-was, including these pupils, may give a more accurate picture of the effectiveness of AMT for the population of "children who have had a social worker". Schools adopting it only for those pupils without complex SEND or achieving closer to their age-related expectations would mean schools would have to find additional extra provision for pupils with greater challenges. This may affect schools' interest in adopting

the programme. It is also important to note that schools' concerns about the diagnostic assessment were not restricted to pupils with complex SEND or who were performing below their peer group in maths.

Conclusions and Recommendations

Findings from the evaluation suggest that the AMT programme offers promise for children with a social worker, with some limitations and caveats. The evaluation highlighted several issues with delivery which could helpfully be addressed. This includes:

- Improving the quality of equipment provided as part of the intervention (such as headsets)
- Greater reliance (and perhaps further consideration of rewards, such as effort points), in order to improve pupil engagement
- Ensuring that pupils have the same tutor week on week
- Reconsideration of the 24-hour cancellation/ rescheduling policy to give school staff greater flexibility to reschedule AMT sessions
- Clearer communication with teachers around eligibility criteria to ensure that pupils abilities are better matched to the programme, and, in turn, that they can benefit
- Activities to promote engagement of school staff and encourage teachers to make better use of tools available to them as part of AMT. This will help teachers build closer connections between AMT and maths teaching in the classroom

Directions for Future Research

It is recommended that the AMT programme is evaluated with an impact evaluation and IPE once the context is more stable, and Covid-19 less of a mitigating factor in delivery. Any future impact evaluation should also consider and manage any potential confounders, for example, targeted catch-up programmes, such as the NTP.

It is also important that a future evaluation overcomes the limitations of this evaluation wherever possible. For example, although Covid-19 significantly disrupted attendance at AMT sessions, the design of the evaluation and the length of time needed for school recruitment would likely have impacted on dosage as part of the original evaluation design. Therefore, the recruitment and sign-up process could usefully be simplified and shortened. This may also reduce the number of schools who submit MOUs (expressing an interest in the evaluation) and uploading pupil information.

There may also be learning to take forward in terms of school engagement and recruitment, specifically that school staff taking part in the evaluation (necessarily) went through a streamlined set-up process. Under a more typical delivery model (where schools proactively approached TSL about tuition and made a per pupil payment), school staff would have more contact with the TSL team, where they would be given details of the tuition programme and the tools available to them. This is likely to have enhanced engagement with the programme and use of tools such as the data dashboard.

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APPENDICES

Appendix 1: Full project description

Affordable Maths Tuition

The aim of the Affordable Maths Tuition (AMT) programme is to reduce the maths attainment gap for disadvantaged pupils, by recruiting and training maths tutors in India and Sri Lanka to make online one-to-one tuition more affordable and accessible to children in English state schools. Importantly, the programme is specifically designed to make it easy for teachers to use online tuition within the school timetable to support their class teaching strategies.

Why: theory/rationale

Children who have had a social worker, either because they are or have been looked after, or because they have been identified as a Child in Need (CIN), have significantly lower attainment than their peers. Just over half (51%) of Looked After Children (LAC) and CIN (48%) achieve the expected standard in maths at KS2, compared with four-fifths (79%) of non-looked after children (DfE, 2020). This cohort of children also make less progress than their peers as they grow up (with average Progress 8 scores of -1.23 for LAC and -1.49 for CIN respectively, compared to -0.07 for non-looked after children) resulting in a wider attainment gap at KS4.

Previous research has indicated that one-to-one tuition can significantly improve academic attainment and act as a powerful educational tool. The Education Endowment Foundation (EEF) reports that one-to-one tuition can be highly effective, delivering, on average, five additional months' progress (EEF, 2020).

However, one-to-one tuition is typically expensive and therefore not a realistic prospect for many pupils. In particular, disadvantaged pupils whose families have lower incomes are less likely to be able to access this form of tuition. This may in turn lead to disadvantaged pupils making less progress with their education compared to non-disadvantaged pupils for whom one-to-one tuition is more likely to be a possibility if needed. Over time, this can lead to a widening of the attainment gap for disadvantaged pupils.

The cost and supply of tutors also makes tuition very hard for schools to use effectively. Research and best practice suggest that tuition should be directed by teachers to reinforce class teaching strategies to ensure the greatest academic benefit for each tutored pupil. Achieving this effectively across multiple students can add to the already high workload of teachers.

The AMT programme aims to overcome the barriers to schools accessing one-to-one tuition, helping them to target the academic and social need that underpins the maths attainment gap in a format that is teacher-led; using one-to-one lessons to target learning gaps as they arise in class and thus reinforce class teaching strategies.

What: procedures

The one-to-one tuition takes place exclusively online. Online tuition lessons are scheduled within the school timetable with pupils accessing the online tuition at school, though most often not during maths lessons.[5]

Teachers are able to select the topic for each tutoring session, either manually or by selecting a curriculum strand for an online diagnostic assessment that the pupil sits at the beginning of the programme. The results of this assessment are then used to develop a personalised lesson plan for that pupil that the teacher is able to track. AMT has developed an online curriculum of over 400 lesson plans, covering mathematical content across KS1 and KS2, helping to ensure quality, structure and transparency for all tutoring lessons.

AMT tutors are maths tutors based in Sri Lanka and India who have been recruited and trained by Third Space Learning's Academic Centres in the region, to provide online tuition to pupils who live in the UK. Each tutor completes police and background checks, and undergoes a full-time three-week training programme, supplemented by weekly development from a dedicated academic team manager. Every session is recorded for performance and safeguarding purposes.

Pupils receive one weekly 45-minute tutoring lesson. In standard delivery, each pupil is allocated to one tutor with all tutoring lessons taking place with this tutor. Lessons also take place at the same time each week for each pupil.

Schools each have their own online account with Third Space Learning, with teachers being given their own academic profile. Through this profile, the teacher can engage with the tutor and select the content of the pupil's lesson for the following week.

Furthermore, following each session, the online tutor provides session feedback to the pupil's teacher, allowing them to incorporate the feedback in their own teaching of the pupil and to guide them in selecting the following week's tailored session content.

What: materials

Pupils are provided with a headset along with a microphone to enable them to talk with their tutor within a secure virtual classroom. Both tutor and pupil also have access to a shared virtual whiteboard, which includes tools that enable the pupil to engage with the lesson's material, e.g. to answer questions or annotate content.

Who: recipients

To be eligible for the intervention pupils needed to be in Year 6 and in the past six years:

- a Child in Need
- subject to a Special Guardianship Order
- subject to a Child Protection Plan, or
- have been Looked After

Schools were asked to identify eligible pupils when signing up for the evaluation and intervention.

[5] For some pupils, the online tuition lessons can be accessed after school upon agreement with their tutors.

Who: provider

The programme was delivered by Third Space Learning (TSL), which has provided tailored online maths tuition to over 60,000 pupils from over 2,000 schools since 2013. 55% of their pupils are eligible for Free School Meals.

Where: location

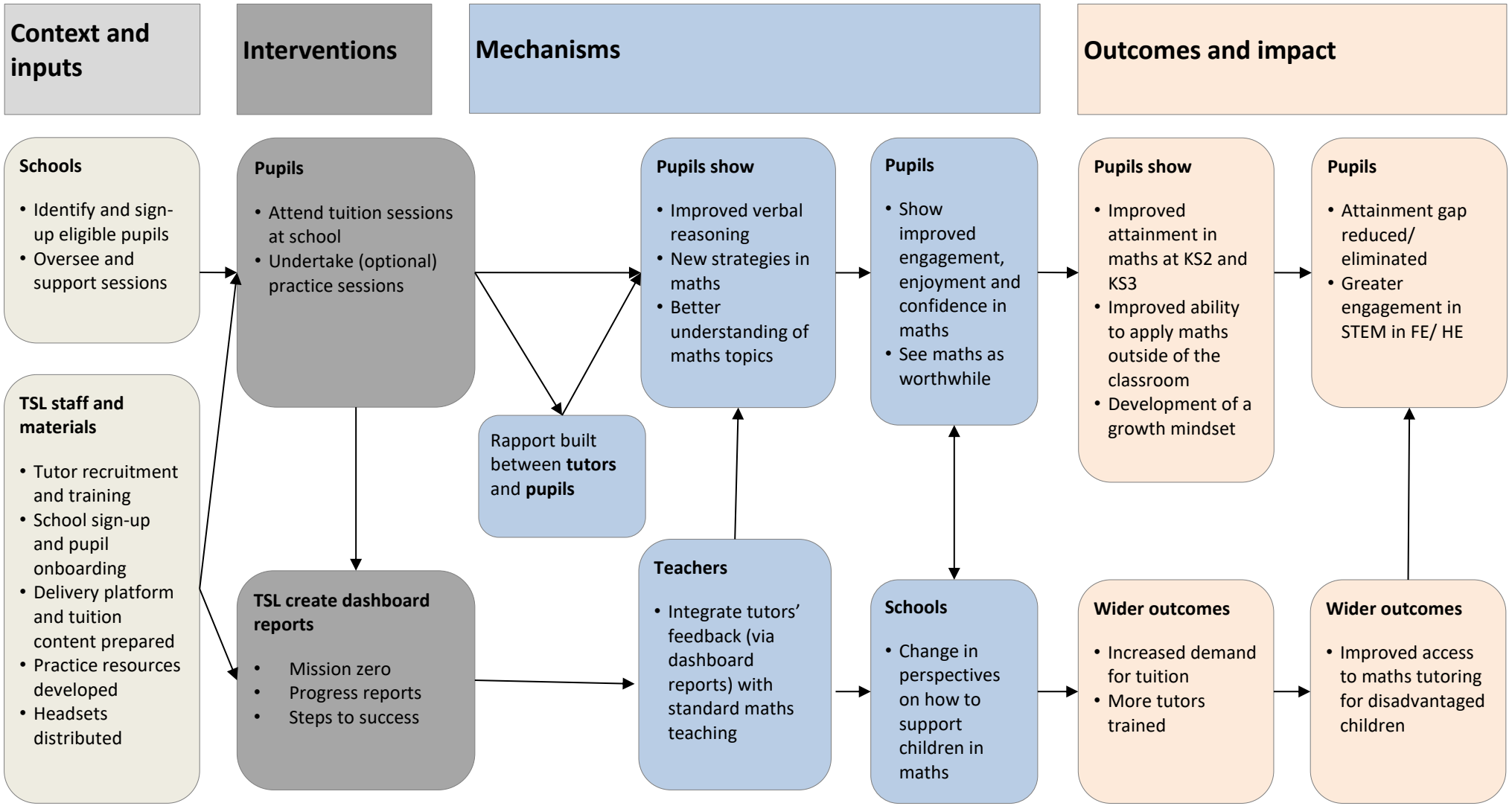
The evaluation included 231 schools from 53 local authorities (LA) across England.

The schools fell into three groups in line with the original RCT design, 137 with pupils in both the intervention or control group, 46 with control pupils only, and 52 with intervention pupils only. Thirteen (6%) of the original 231 schools originally recruited withdrew from the evaluation during the intervention period. The reasons for withdrawal were often connected to Covid-19, and the additional complications/ burden on teachers it placed on schools.

When and how much: dosage

The intervention was designed to deliver 28 tuition session over the course of the academic year. Recruitment for the evaluation meant a small delay in the start of the programme which was expected to limit dosage, specifically to delay the start of the intervention until November 2020. In practice Covid-19 restrictions and school closures meant that dosage was considerably lower than expected.

Appendix 2: Logic Model



Appendix 3: Memorandum of understanding with participating schools

Memorandum of Understanding (MOU): Agreement to participate in the evaluation of Affordable Maths Tuition

Please sign two copies of the MOU, returning one copy to the research team at NatCen affordablemaths@natcen.ac.uk by 11th September 2020, and keeping the second for your own records.

School Name: _____

Aims of the Evaluation
The aim of this project is to evaluate the impact of **Affordable Maths Tuition (AMT)**, an online tutoring programme designed to help children develop their maths skills. The intervention consists of weekly online one-to-one maths tuition lessons with a dedicated, specialist KS2 tutor. The results of this research will make an important contribution to understanding what works in improving maths attainment for children who have had a social worker in the last six years.

Affordable Maths Tuition
The programme will be delivered by Third Space Learning (TSL) and is being funded by What Works for Children's Social Care (WWCSC).

For eligible pupils, the programme starts with an online diagnostic assessment to identify their individual knowledge gaps in key areas identified by their teacher. The results of the assessment, alongside regular assessment throughout the term, help TSL select the best sequence of tutorial topics for each pupil.

Tutorial sessions are delivered online, once a week, via a PC or laptop. Each pupil works one-to-one with the same tutor each week. Pupils work through the maths concepts with their tutor at a pace that works for them.

All of TSL's tutors pass strict training and safeguarding procedures to support pupils in UK primary schools and each takes the time to build a relationship and rapport with pupils. For pupils who show a lack of engagement with their learning, having this tailored one-to-one support is incredibly important for boosting effort and enjoyment.

Pupil eligibility
The intervention is available for all Year 6 pupils who are:
- Looked After now or have been looked after in the last six years (Looked After Children, LAC)
- A Child in Need (CIN) now or in the last six years
- Subject to a child protection plan (CPP) now or in the last six years

The pupil must not have already enrolled to start with Third Space Learning in September 2020.

Please note that whilst the Affordable Maths Tuition programme is suitable for most pupils, including those with mild special educational needs, it is not advised for pupils with especially complex behavioural or educational needs, or those who are not able to use a computer/ laptop.

Allocation of pupils
All pupils eligible to take part in the intervention, and who's parents/ carers do not object to use of their data in the evaluation, will be randomly allocated to either the intervention or the control group. Children who have been placed in the intervention group will receive Third Space Learning's online tuition

programme. Children assigned to the control group will receive the school's normal programme of teaching (business-as-usual).

Pupils will not be notified about which group they have been assigned to. Teachers/ schools will be made aware of the allocation of pupils, as necessary in order to administer the tuition programme. It is very important for the validity of the evaluation that pupils are not treated differently as a result of their allocation to either the intervention or control groups (beyond intervention activities).

There are likely to be other educational support opportunities available to pupils in the 2020/21 academic year, including the National Tuition Programme. Pupils should be given access to these opportunities regardless of their participation in the Affordable Maths Tuition programme. Teachers and pupils will be asked about their use of other educational support as part of the evaluation.

The Evaluation
The evaluation is being conducted by an independent research team from NatCen Social Research.

Random assignment of pupils to either the intervention or control group is essential to the evaluation as it is the best way of outlining what effect the intervention has on pupils' outcomes. It allows the research team to compare progress made by pupils who receive Affordable Maths Tuition, versus pupils in the business-as-usual group, to see what impact the tuition has on confidence and attainment in maths. It is important that schools understand and consent to the random allocation process.

The evaluation timeline is outlined below:

Evaluation activities	**Group receiving AMT**	**'Business as usual' group**	**Timings**
Pupil and school information collected via the online platform	X	X	September 2020
Randomisation of pupils	X	X	October 2020
Online diagnostic assessment	X		October 2020
Telephone interviews with maths leads/ teachers	X		October – November 2020
AMT programme delivered	X		October 2020 – June 2021
Follow-up telephone interviews maths leads/ teachers	X		May - June 2021
Face-to-face group interviews with pupils	X		May - June 2021
Online interviews with tutors	-	-	May - July 2021
Survey with pupils	X	X	June - July 2021
Collection of cost data from teachers	X		June - July 2021

Use of Data
All data, including pupils' survey responses, will be treated in the strictest confidence. Pupil information will be collected by NatCen and shared with TSL for the purposes of setting up the tuition programme. At the end of the intervention period pupil data will be matched with the National Pupil Database (NPD) for analysis by the NatCen team. The data requested from NPD will include: Free School Meal (FSM) status, KS1 and KS2 attainment data. Data collected as part of the evaluation will also be shared in an anonymised form with WWCSC and the secure UK Data Archive. This archive is hosted by the Office of National Statistics (ONS) 'Secure Research Service'. WWCSC are the data controller and access to any data stored within the archive is controlled by the ONS and WWCSC.

Schools with pupils in the intervention group will need to agree to Third Space Learning's Terms of Service as part of the standard set up before tuition begins and may need to provide additional pupil information when creating the child's account to be able to provide a personalised learning experience.

Additional information about the pupil's experience of the programme, such as attendance and internal attainment data, may be shared securely with NatCen for use in the evaluation, and with the pupil's Virtual School (where applicable).

No individual school or pupil will be identified in any report arising from the research. No other parties will have access to the data collected.

Any transfer of personal data between parties will be performed in a secure manner (i.e. using password encrypted files).

Schools will need to provide the following school and pupil level information to NatCen in September 2020:

School information:

- School name
- School URN
- School LAESTAB
- Preferred time slots

Pupil information:

- Pupil UPN
- First name
- Last name
- Date of birth
- Looked after status
- Virtual School Responsible (if applicable)
- Virtual School Contact Email (if applicable)

Staff information:

- First and last name of a nominated staff member
- Email address of a nominated staff member
- Phone number of a nominated staff member

Responsibilities

The project team (Third Space Learning) will:

- Be responsible for delivering training for maths tutors
- Design the content of Affordable Maths Tuition lessons
- Be the first point of contact for any questions about Third Space Learning's programme or platform
- Provide on-going support to the schools as it relates to the programme delivered by Third Space Learning

The research team (NatCen) will:

- Provide schools with letters so they can send the parent/carer opt-out for NPD linkage
- Conduct the random allocation of students within participating schools
- Collect and analyse the data from the project to estimate the impact of the intervention
- Publish a report on the findings of the project

The school will:

- Supply data for all eligible pupils via an online platform (this includes pupil name, DOB and UPN)
- Consent to the random allocation of eligible pupils
- Consent to data provided to Third Space Learning to be shared with NatCen for the purposes of the evaluation
- Consent to data on pupil progress collected by Third Space Learning to be shared with the relevant Virtual School
- Agree to Third Space Learning's standard Terms of Service when prompted
- Release maths teachers/ subject leads for evaluation activities (a small number of teachers will be asked to take part in two hour-long interviews)
- Encourage a shared understanding of the project across the school and support of school staff taking part

Please sign below:

We, the school, commit to take part in the evaluation of 'Affordable Maths Tuition' as detailed above.

Full name: _____

Role: _____

Signature: _____

Date: _____

What Works *for* Children's Social Care

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