Maths Through Picture Books

Appendices

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The Education Endowment Foundation is an independent charity dedicated to breaking the link between family income and education achievement. We support schools, nurseries and colleges to improve teaching and learning for 2 – 19-year-olds through better use of evidence.
We do this by:

- **Summarising evidence.** Reviewing the best available evidence on teaching and learning and presenting in an accessible way.
- **Finding new evidence.** Funding independent evaluations of programmes and approaches that aim to raise the attainment of children and young people from socio-economically disadvantaged backgrounds.
- **Putting evidence to use.** Supporting education practitioners, as well as policymakers and other organisations, to use evidence in ways that improve teaching and learning.

We were set-up in 2011 by the Sutton Trust partnership with Impetus with a founding £125m grant from the Department for Education. In 2022, we were re-endowed with an additional £137m, allowing us to continue our work until at least 2032.

For more information about the EEF or this report please contact:

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Memorandum of Understanding for participating schools

The Education Endowment Foundation (EEF) is funding East London Research School (ELRS), based at Sheringham Nursery School, to pilot (try out) the Maths Through Picture Books (MTPB) intervention with 20 schools between February and June 2024.

The EEF have asked Oxford MeasurEd to independently evaluate the pilot. The evaluation team at Oxford MeasurEd, led by Dr Lydia Marshall, will carry out research to understand whether MTPB might support children's understanding of number and operations. The team will also investigate whether MTPB can be delivered in a way that is feasible and acceptable for schools, staff and children. These findings will inform the EEF's future decisions about whether the intervention can be delivered more widely and tested for wider impact.

This Memorandum of Understanding (MOU) sets out the plans for the pilot, and the responsibilities relating to the pilot and the evaluation for the ELRS (the delivery team), Oxford MeasurEd (the evaluators) and participating schools. Please read this MOU carefully before signing.

If you have any questions about the evaluation, please contact Lydia Marshall and the Oxford MeasurEd evaluation team at MTPB@oxfordmeasured.co.uk.

If you have any questions about the MTPB intervention, please contact Melissa Prendergast and Fliss James from East London Research School at melissa.prendergast@sheringham-nur.newham.sch.uk and fliss.james@sheringham-nur.newham.sch.uk.

Aims of the intervention

MTPB is a targeted intervention for children in reception who need extra support to develop a secure understanding of number and operations. The intervention provides training for Teaching Assistants (TAs) and teachers to equip them with improved knowledge of how children learn number and operations and the knowledge and skills required to engage a small group of targeted children in sustained multi-turn conversations about number and operations using picture books. The TAs, supported by teachers, then deliver a targeted series of small-group sessions with the aim of:

- helping selected children to develop a secure understanding of number and operations
- increasing selected children's enjoyment of and motivation towards maths

Aims of the evaluation

The evaluation will investigate whether the pilot of MTPB:

- provides promising indicative evidence that the intervention can deliver on its expected outcomes
- demonstrates that the intervention can be delivered using an approach that is feasible and acceptable for schools, staff and children
- suggests that the intervention is ready to be delivered at scale to test for wider impact

Evidence in these three domains will inform EEF's decisions about whether the potential impact of MTPB should be evaluated in a large-scale trial. The evaluation will also inform the

design of any such trial by providing a deeper understanding of the theory underpinning the intervention and potential outcome measures that could be used to evaluate impact.

Delivery of the intervention

MTPB is a 10-week targeted intervention. In each school, a TA will deliver MTPB sessions twice weekly to a group of five children in Reception. The 20-minute sessions involve shared reading of maths-focused picture books, supported by semi-structured prompts.

The delivery team from ELRS will train one TA and one teacher in each school. The training will involve an initial one-day in-person training, followed by two online sessions (one training for the teacher only and one optional drop-in for the TA and teacher) that aim to support delivery, maintain motivation and ensure fidelity to the intervention plans. There will also be a post-intervention half-day training in June 2024 to support TAs and teachers to embed practice. During delivery, teachers will observe the TA delivering the MTPB intervention three times, followed by reflection discussions. The TA and teacher will also have weekly planning meetings to ensure fidelity to the intervention plans and consistency between the targeted sessions and wider classroom practice.

Can my school take part?

Your school is eligible to take part as long as you are willing to fulfil the responsibilities set out in this MOU and your school is not taking part in any other EEF-funded projects in Reception this year.

What will the intervention involve for my school?

Your school will need to:

- nominate a reception TA and teacher to deliver the MTPB intervention
- provide contact details for the staff taking part in the intervention to the delivery team (who will also pass them to the evaluation team)
- commit to carrying out a short activity with all children in the class. This will be used to identify **five** reception children who need extra support in understanding number and operations. These children will then take part in the programme
- release the TA and teacher to attend the training sessions
- provide time for the TA to deliver the MTPB intervention
- allow time and space for the MTPB intervention sessions to be delivered at the same time, twice a week, for ten weeks from 4th March 2024 to 24th May 2024
- provide time for the TA and teacher to meet weekly to plan for the intervention and to complete weekly activity logs and reflection sheets
- ensure shared understanding and support of all school staff for the intervention

The participating TA will need to:

- attend a full-day in-person training in February 2024
- deliver 20-minute MTPB sessions to participating children twice a week for ten weeks
- have weekly planning and reflection meetings and complete weekly activity logs and reflection sheets with their paired teacher throughout 10-week intervention period
- be observed delivering MTPB sessions by their paired teacher three times and have reflection discussions after these observations
- attend a half-day in-person training in June 2024

The participating teacher will need to:

- attend a full-day in-person training in February 2024
- attend one online webinar in the Spring term of 2024
- identify **five** reception children who need extra support in understanding number and operations to take part in the programme, drawing on guidance provided by the delivery team
- have weekly planning meetings and complete weekly activity logs and reflection sheets with their paired TA throughout 10-week intervention period
- observe their paired TA delivering MTPB sessions three times and have reflection discussions after these observations
- attend a half-day in-person training in June 2024

What will the evaluation involve for my school?

All schools that take part in the pilot of MTPB must participate in the evaluation.

Your school will need to:

- provide details for the children taking part in the intervention to the evaluation team: children's name, postcode, date of birth, Unique Pupil Number, gender, ethnic identity and free school meals eligibility
- allow the TA, teacher, participating children and potentially a member of the Senior Leadership Team (SLT) to take part in the evaluation activities including maths assessments, interviews, online surveys and potentially observations and child discussion groups (all detailed below)
- support with logistical arrangements and allow the evaluation team to attend the school for evaluation activities (maths assessments and potentially observations and child discussion groups)
- send out Family Information Sheets and privacy notices to participating children' parents/carers
- ensure shared understanding and support of all school staff for the evaluation and encourage participation in evaluation activities

The TA and teacher in your school will need to complete a short online form providing background information about themselves: their qualifications and experience, their gender and their ethnic identity. While all participating staff need to complete the form, they can choose to skip any personal questions that they don't want to answer.

The TA and teacher in your school will also be invited to:

- complete a 20-minute post-intervention online survey in June 2024
- complete a 5-minute longitudinal follow-up online survey in October 2024

The evaluation team at Oxford MeasurEd will also analyse the complete weekly activity logs and reflection sheets that the TA and teacher complete.

Either the TA or the teacher in your school will be invited to take part in a 45-minute, online or in-person interview with a researcher from Oxford MeasurEd during the 10-week intervention.

All five participating children in your school will:

- complete a baseline maths assessment in January or February 2024
- complete an endline maths assessment in June or July 2024

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More information is provided in the "maths assessments" box overleaf.

Maths assessments

A qualified teacher managed by Oxford MeasurEd will come to your school to carry out one-to-one assessments with the five participating children in your school. They will be using the Pearson Wechsler Individual Achievement Test - Third UK Edition (WIAT-III UK) maths assessments for reception year children. These assessments are designed to be age appropriate and automatically adjust to children' abilities so that we can capture a wide range of abilities without asking children to address many questions outside of their proficiency range. The first assessment in January/February 2024 will take around 10 minutes to complete with each child, and the second assessment in the Summer term will take around 20 minutes. The assessor teacher will allow plenty of time to set up and make sure the child is comfortable.

Your school will need to liaise with the assessor teacher to arrange a suitable time and date for them to visit and carry out the assessments. They will pencil in a second date to come back in case any children are absent. You will need to arrange for a quiet, private space where the assessor teacher can sit and carry out the assessments and for a familiar adult to be present to ensure that children are comfortable. You will not need to provide any equipment. You will have a chance to ask the teacher any questions before they visit.

In a small number of selected schools, the five participating children will be invited to participate in a 25-minute child discussion group with a researcher from Oxford MeasurEd during the 10-week intervention. The researcher will be trained in working with this age group and will use age-appropriate techniques to facilitate children to share their feelings about being selected for the intervention, views on the books and session content and feelings about learning maths.

Your school may also be selected for additional qualitative research during the 10-week intervention. This would involve:

- an Oxford MeasurEd researcher observing a MTPB 20-minute session and the TA and teacher's weekly reflection and/or planning session
- a member of the SLT (Early Years Lead or subject lead) being invited to take part in a 45-minute, online or in-person interview

What support will my school receive?

To support your school to deliver the MTPB intervention, the delivery team from ELRS will provide:

- the training for school staff described above under the requirements for your school
- additional, optional drop-in support for TAs and teachers in the second week of the intervention
- ad hoc support for TAs, teachers and SLT members throughout the project
- access to resources to support delivery including two sets of books for classroom use, intervention handbooks, video exemplification and conversation scaffolds

To support your school's participation in the evaluation, the evaluation team at Oxford MeasurEd will:

- inform all participants about plans for the evaluation and how findings will be used
- carry out the evaluation in a way that causes minimum disruption and additional workload for all participants including school staff and children

- organise all data collection activities including maths assessments, interviews, child discussion groups, observations and surveys
- train a team of qualified teachers to carry out the maths assessments

All schools that complete all evaluation activities – including baseline and endline maths assessments and supporting other data collection as far as possible – will receive a financial incentive payment of £500 in recognition of the school's time and commitment to the evaluation.

The evaluation team at Oxford MeasurEd also commit to:

- submit the evaluation design for ethical review and approval from the Oxford MeasurEd ethics board
- ensure that all participation in the evaluation is based on voluntary and informed consent (see information on participant consent below)
- carry out and report on the evaluation in a robust and independent manner
- handle all data relating to the evaluation in accordance with the UK's General Data Protection Regulation (GDPR) and only for research purposes (see information on data protection below)

Participant consent

The participating TA and teacher should have been given the chance to read the MOU and attached School Information Sheet and Privacy Notice, and to have agreed to participate in the pilot before the MOU is signed and submitted. They should both sign the MOU.

TAs, teachers and SLT members will be provided with more information at the point of being invited to take part in interviews, observations and/or surveys and will have the right to choose not to take part in these activities, though we hope they will. They will also be able to change their mind about taking part in the activities, or to withdraw from their data being used for the evaluation (see attached privacy notice for more information).

The Oxford MeasurEd evaluation team understands schools to be in *loco parentis* and able to consent to observations and the maths assessments. Your school will need to provide the parents/carers of participating children with the attached Family Information Sheet and Privacy Notice and let us know if any parent/carer objects to their child's data being used for the evaluation using the Family Opt-Out Form. If your school is selected to take part in child discussion groups, the Oxford MeasurEd evaluation team will provide further information and parental consent letters.

Data Protection

ELRS and **Oxford MeasurEd** will collect personal data to meet the objectives of the intervention and the evaluation.

All personal data will be collected, processed and stored in line with the UK's General Data Protection Regulation (GDPR). Full details of how data will be collected, processed and stored, data processing roles and the legal bases for processing personal data can be found in the attached privacy notices, which can also be found online:

- ELRS privacy notice: https://www.sheringham-nur.org.uk/wp-content/uploads/2023/05/090523-DSR00104-SPH-Privacy-Notice-3.pdf
- Oxford MeasurEd privacy notice for the evaluation: https://www.oxfordmeasured.co.uk/projects/pilot-evaluation-of-maths-through-picture-books

For this evaluation, Oxford MeasurEd is a data controller who also processes data. Our legal basis for processing data for the evaluation is "legitimate interest". For special categories of personal data (namely school staff and children's ethnic identity), we are using the research exception.

All data will be treated with strictest confidence and no participant will be identified in any report arising from the research. All personal data will be stored securely and will be securely deleted once the evaluation is complete by December 2025.

Anonymised assessment data will be stored in the EEF's data archive at the end of the evaluation. At this point, the EEF and its archive manager (FFT Education) are responsible for controlling and processing the data for future research purposes. More information is provided in Oxford MeasurEd's privacy notice for the evaluation and the EEF's privacy notice for the archive can be found online at https://educationendowmentfoundation.org.uk/privacy-notices/privacy-notice-for-the-eef-data-archive.

In line with UK GDPR and data protection regulations, all school staff have a duty to keep all personal information secure and confidential and notify their school of any breaches as soon as possible.

If you have any concerns about data protection and the MTPB intervention, please contact the Data Protection Team at The Education Space at DPO@theeducationspace.co.uk. If you have any concerns about data protection and the evaluation, please contact Oxford MeasurEd's Data Protection Officer at michael.annoh@oxfordmeasured.co.uk.

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Key dates

Dates	Intervention activities	Evaluation activities
September - December 2023	• ELRS delivery team recruit schools and collect MOUs • Participating teacher selects five children to take part	• Oxford MeasurEd collect background information about participating TA and teacher
January 2024		• Team of assessor teachers managed by Oxford MeasurEd carry out baseline maths assessments • Parents given opportunity to opt their child out of the evaluation
February 2024	• Participating TA and teacher attend full-day in-person training on delivering the MTPB intervention with ELRS delivery team • Participating teacher participates in webinar on supporting colleagues' development with ELRS delivery team	• Oxford MeasurEd researcher observes training session
March - May 2024	• Participating TA delivers MTPB sessions twice weekly for 10 weeks • Participating teacher observes TA delivering intervention three times • Participating TA and teacher have weekly reflection meetings and complete weekly logs and reflection sheets • Optional online drop-in session with ELRS delivery team for participating TA and teacher	• Oxford MeasurEd researcher observes intervention session and teacher-TA weekly reflection meeting in some schools • Oxford MeasurEd researcher interviews teachers or TA, plus SLT member in some schools • Oxford MeasurEd researcher carries out child discussion group in some schools
June - July 2024	• Participating TA and teacher attend half-day in-person training on the EEF Improving Mathematics in Early Years and KS1 Guidance Report (https://d2tic4wvo1iusb.cloudfront.net/eef-guidance-reports/early-maths/EEF_Maths_EY_KS1_Guidance_Report.pdf?v=1670402844) and embedding practice with ELRS delivery team	• Oxford MeasurEd researcher observes training session • Participating TA and teacher complete post-intervention survey • Team of assessor teachers managed by Oxford MeasurEd carry out endline maths assessments
October 2024		• Participating TA and teacher complete longitudinal follow-up survey

Signature page

By signing below, you are indicating that you commit to the responsibilities outlined in this MOU on behalf of your school.

Please make sure the participating TA and teacher and the Head Teacher sign this MOU and **return it to the MTPB delivery team at** nazneen.patel@sheringham-nur.newham.sch.uk **by 1 December** at the latest.

If you have any questions about the Maths Through Picture Books intervention or the evaluation, please contact the following people:

Questions about the **Maths Through Picture Books intervention**? Please contact the delivery team at ELRS: Melissa Prendergast melissa.prendergast@sheringham-nur.newham.sch.uk Fliss James fliss.james@sheringham-nur.newham.sch.uk	Questions about the **evaluation?** Please contact the evaluation team at Oxford MeasurEd: MTPB@oxfordmeasured.co.uk

We commit to the MTPB pilot and evaluation as detailed above.

School details:

School name: Postcode:

Phone number: School ID (URN or LAESTAB):

Participating TA:

Signed: Print name: Date:

Phone number: Email:

Participating teacher:

Signed: Print name: Date:

Phone number: Email:

Head Teacher:

Signed: Print name: Date:

Phone number: Email:

This information will be shared with Oxford MeasurEd and used to organise MTPB and evaluation activities.

Appendix 2: Privacy notice

Evaluation of the Maths Through Picture Books Pilot

Privacy notice

In line with the UK General Data Protection Regulation (GDPR), there are certain things that we need to let you, as a research participant, know about how your information will be processed. In this privacy notice, we explain what personal data is being collected for the evaluation of the Maths Through Picture Books pilot, who will have access to your personal data, how your data will be used, stored, processed and deleted, the legal basis for data processing, and who you can contact in case of a query or a complaint.

Background

Maths Through Picture Books (MTPB) is a maths intervention/programme that uses storybooks to engage children in conversations to help reception-age children who do not yet have a secure understanding of numbers to develop their understanding of number and increase their enjoyment of and motivation towards numeracy.

The Education Endowment Foundation (EEF) is funding East London Research School (ELRS), based at Sheringham Nursery School, to pilot (try out) MTPB with 20 schools between February 2024 and June 2024. In each school, a Teaching Assistant (TA) and teacher will be trained and deliver MTPB to a group of five children in reception.

The EEF has asked Oxford MeasurEd to evaluate the pilot. The evaluation will investigate:

- whether there is evidence that MTPB can achieve what it aims to achieve
- whether MTPB can be delivered as intended in schools.

Results of the evaluation will inform a decision about whether MTPB could be used to support children in more schools.

Detailed plans for the pilot and evaluation – including the activities that participants will be asked to take part in – are set out in the Memorandum of Understanding (MOU) for schools and the Family and School Information Sheets.

Participants' personal data will be collected as part of ELRS's delivery of MTPB and for Oxford MeasurEd's evaluation. **This privacy notice covers data that will be collected for the evaluation.** You can find East London Research School's privacy notice about data collected during delivery of MTPB at https://www.sheringham-nur.org.uk/wp-content/uploads/2023/05/090523-DSR00104-SPH-Privacy-Notice-3.pdf.

What personal data is being collected for this evaluation?

The evaluation will involve collecting personal data from or about school staff (participating teachers, TAs and senior leadership team members), delivery team staff (people employed by ELRS involved in delivering MTPB) and participating children.

The two tables below set out the personal data that will be collected from or about school and delivery team staff and participating children.

Table 1 Personal data collected about school and delivery team staff

	Data collected
Contact details	• First name • Last name • Email address • Phone number • School name
Demographic and background information	• Job title • Qualifications • Age • Gender • Ethnic identity
Research data	• Interview recordings • Survey responses • Notes from training observations

Table 2 Personal data collected about participating children

	Data collected
Identifying information	• First name • Last name • Home postcode • Date of birth • Unique Pupil number (UPN) • School identifier, such as the Unique Reference Number (URN), LAESTAB (local authority establishment number)
Demographic and background information	• Gender • Ethnic identity • Free School Meals eligibility
Research data	• Answers to the WIAT-III maths assessment questions and resulting maths scores • Child discussion group recordings

Who will have access to my personal data?

During the evaluation, only the evaluation team at Oxford MeasurEd who are carrying out the evaluation and trained teachers working for Oxford MeasurEd to carry out maths assessments with children ("assessor teachers") will have access to personal data. After the evaluation, some data about participating children will be transferred to a secure archive. More information is provided on this below.

Table 3 and Table 4 set out how personal data will be collected and (where applicable) transferred outside of the evaluation team during the evaluation.

Table 3 How personal data about staff will be collected and transferred during the evaluation

	How data will be collected	How data will be transferred from Oxford MeasurEd
Contact details	ELRS delivery team will email contact details for their team members and school staff to Oxford MeasurEd in a password protected email.	Oxford MeasurEd will email school staff contact details to the assessor teacher in a password protected spreadsheet.
Demographic and background information	School staff will enter these into a secure online survey platform using personalised pseudo-anonymous ID.	n/a – only accessed by Oxford MeasurEd evaluation team.
Research data	Researchers will record interviews using video conferencing software or encrypted digital recorders. School staff will enter survey responses into a secure online survey platform using personalised pseudo-anonymous ID. Researchers will record notes from training observations in secure cloud storage that can only be accessed by named researchers.	n/a – only accessed by Oxford MeasurEd evaluation team.

Table 4 How personal data about children will be collected and transferred

	How data will be collected	How data will be transferred from Oxford MeasurEd
Identifying information	School staff will export this information from the School Information Management System (SIMS) and email it to a named researcher at Oxford MeasurEd in a password protected spreadsheet.	Oxford MeasurEd will email the first and last name of children in a password protected spreadsheet to the assessor teacher in a password protected spreadsheet.
Demographic and background information	School staff will export this information from the SIMS and email it to a named researcher at Oxford MeasurEd in a password protected spreadsheet.	n/a – only accessed by Oxford MeasurEd evaluation team.

Research data	The assessor teacher will enter children's maths assessment answers into a secure, password protected app owned by Pearson Education on an iPad. Oxford MeasurEd will download children's assessments from the secure system owned by Pearson Education directly into a folder in Oxford MeasurEd's secure cloud system that can only be accessed by named researchers. Pearson Education's privacy notice is online here: https://www.pearsonclinical.co.uk/legal/pearson-clinical-privacy-policy.html Researchers will record what children say in discussion groups using encrypted digital recorders.	n/a – only accessed by Oxford MeasurEd evaluation team.

How will the data be used?

Data use

The evaluation team at Oxford MeasurEd will only use the data collected for research purposes. The team will:

- use **staff names and contact details** to organise observations, interviews, maths assessments and surveys for the evaluation
- use **child names** to organise maths assessments and group discussions with participating schools
- use **demographic and background information about staff and children** to explore whether experiences of MTPB are different for different groups of people
- analyse **research data** from observations, focus groups, interviews and surveys to answer the evaluation questions

All data will be treated with the strictest confidence – the team will remove names and contact details from this research data before analysing it and will not identify any individuals in evaluation reports or presentations.

No personal information will be transferred outside of the European Economic Area (EEA).

Data storage

Oxford MeasurEd will securely store personal information about participants until the end of the evaluation. All data will be stored electronically in a folder in Oxford MeasurEd's secure cloud system that can only be accessed by named researchers.

Personal data transferred to the assessor teachers (staff contact details, children' first and last names) will be stored in password protected files on password protected iPads.

We will minimise our use of non-electronic (i.e., paper) documents containing personal data. Where these are needed – for example, paper copies of the school staff contact details or lists of children to be assessed held by researchers or the assessor teachers – documents will be kept on the individual's person and securely destroyed (shredded) the same day.

Oxford MeasurEd will securely delete all personal information about participants no more than six months after the submission of the final report of the pilot (by December 2025 at the latest).

Data archiving

At the end of the evaluation, Oxford MeasurEd will submit children's assessment data and identifying data to the EEF's archive manager using the EEF's secure portal.

The EEF's archive manager will then use the identifying data to request Pupil Matching References (PMRs) from the Department for Education (DfE) via a secure portal. These PMRs can be used in the future (instead of identifying data) to match the assessment data from this evaluation to information in the National Pupil Database (NPD), which is held by the DfE. Once the EEF's archive manager has received the PMRs from the DfE, they will transfer the assessment data and the PMRs to EEF's archive, which is stored in the Office for National Statistic (ONS)'s Secure Research Service (SRS) and managed by FFT Education. At this point, the EEF will become the data controller, and FFT Education the data processor, of the archived data. The identifying information that we collect about children will **not** be stored in the archive.

Once the EEF archive has been transferred to the ONS, anonymised assessment data will be accessible to the wider research community for secondary analyses that provide public benefit and are in line with the missions of the EEF, DfE and ONS.

The privacy notice for EEF's archive can be found here: https://educationendowmentfoundation.org.uk/privacy-notices/privacy-notice-for-the-eef-data-archive.

What is the legal basis for processing my data?

For this evaluation, Oxford MeasurEd is a data controller who also processes data. This means that we are responsible for deciding the purpose and legal basis for processing data.

Our legal basis for processing data for the evaluation is "legitimate interest". This means that we believe that there is a genuine reason for us to process this data (to evaluate the pilot), that this data is needed to fulfil this purpose (we couldn't evaluate the pilot without this information), and that using this data won't interfere with individuals' interests, rights, or freedoms. For special categories of personal data (namely school staff and children's ethnic identity), we are using the research exception.

What should I do if I don't want my/my child's personal data to be used for the evaluation?

You can withdraw from your/your child's data being processed for the evaluation at any time, by filling out the Family Opt-out form or emailing MTPB@oxfordmeasured.co.uk. We will not use any identifying information about you/your child from the moment you withdraw. We will not use research data (survey, interview or discussion responses, assessment data) that we have collected from you/your child up until that point unless it has already been anonymised for analysis. You can withdraw from your child's assessment data being archived in the EEF archive up until the point at which it is submitted to EEF's data archive manager (around October 2024).

We will also handle your or your child/children's personal data in accordance with the other rights given to individuals under UK GDPR. In certain circumstances, data subjects have the right to restrict processing, to rectification or erasure and to make a subject access request to see all the information held about them. To enquire about exercising any of your rights as a data subject, please contact Oxford MeasurEd's Data Protection Officer at michael.annoh@oxfordmeasured.co.uk.

Who can I contact with a query or a complaint?

If you have any questions about how this information will be processed, or about the evaluation, please contact us (the Oxford MeasurEd evaluation team) at MTPB@oxfordmeasured.co.uk.

To enquire about exercising any of your rights as a data subject, please contact Oxford MeasurEd's Data Protection Officer at michael.annoh@oxfordmeasured.co.uk.

Under UK GDPR, you have the right to raise any concerns with the Information Commissioner's Office (ICO) via their website at www.ico.org.uk/concerns.

Appendix 3: School information sheet

Evaluation of the Maths Through Picture Books Pilot

School Information Sheet

East London Research School (ELRS) is delighted to invite applications from primary schools in North East London and Essex to take part in a pilot evaluation (funded by the Education Endowment Foundation or EEF) to evaluate the Maths Through Picture Books programme. The programme has been designed by and will be delivered by Melissa Prendergast and Fliss James from ELRS.

What is Maths Through Picture Books?

Maths Through Picture Books is a 10-week intervention for children in reception who need extra support to develop a secure understanding of number and operations. The EEF Improving Mathematics in Early Years and KS1 guidance report highlights research evidence that suggests using picture books can be particularly effective in teaching mathematics. Picture books provide enjoyable and meaningful contexts to explore mathematical content and concepts, but the power is in the way the books are shared!

The Maths Through Picture Books programme provides training for reception class teaching assistants (TAs) and teachers to use interactive reading to actively engage children and promote sustained conversations about mathematical ideas in specially chosen picture books.

TAs, supported by teachers, deliver small-group shared reading sessions with maths-focused picture books twice a week for 10 weeks. Each session lasts 20 minutes with the aim of:

- helping children to develop a secure understanding of number and operations;
- increasing children's enjoyment of and motivation towards maths.

The programme will run from February 2024 – June 2024. Participants will have access to online resources and receive support from the ELRS team. Training includes a blend of face-to-face and online sessions to equip TAs and teachers with:

- improved knowledge and understanding of how children learn number and operations
- knowledge and strategies to engage a small group of targeted children in responsive multi-turn conversations (using the ShREC Approach: Share attention, Respond, Expand, Conversation) focused on number and operations using picture books

We are looking for 20 schools in Essex, Havering, Newham, and Redbridge who will be able to:

- commit to releasing one reception class TA and reception class teacher to attend 1.5 days of face-to-face training and one optional online drop-in session during the 10-week intervention period
- commit to releasing the reception class teacher to attend one online training session to support the professional development of the TA

- commit to carrying out a short activity with all children in the class. This will be used to identify **five** children who need extra support in understanding number and operations to take part in the programme
- provide an appropriate, dedicated space for the sessions to be delivered at the same time, twice a week, for 10 weeks
- provide time for the TA to deliver the twice-weekly sessions
- provide time for the teacher to observe three of these sessions during the 10-week intervention period
- provide time for the TA and teacher to meet on a weekly basis and record their reflections
- support the pilot evaluation by taking part in the research activities summarised below and detailed in the evaluation's Memorandum of Understanding (MOU)

Your school is eligible to take part in the Maths Through Picture Books Pilot as long as your school is not participating in any other EEF-funded projects in Reception this year.

What are the benefits for my setting?

- By taking part in this pilot evaluation, your setting is adding to the evidence base and knowledge on what works in early years education in England.
- Your setting will receive a promising approach that aims to improve children's mathematical development.
- There is a financial incentive of £500 for participating in the pilot evaluation. Schools will also keep the specially selected mathematical picture books.

You will receive the Maths Through Picture Books training for FREE.

How will the Maths Through Picture Books programme be evaluated?

The EEF have asked Oxford MeasurEd to evaluate Maths Through Picture Books. Oxford MeasurEd will carry out research to understand how well the programme works. All schools that take part in the pilot of Maths Through Picture Books will deliver the programme and **must** participate in the evaluation.

The evaluation will investigate whether the pilot of MTPB:

- provides promising indicative evidence that the intervention can deliver on its expected outcomes;
- demonstrates that the intervention can be delivered using an approach that is feasible and acceptable for schools, staff and children;
- suggests that the intervention is ready to be delivered at scale to test for wider impact.

Your school would be expected to take part in evaluation activities including online surveys and interviews of staff and maths assessments for the five children taking part. You might also be asked to take part in additional activities, including observations and child discussion groups. The full requirements of the evaluation are set out in the MOU and you will need to agree to take part in the evaluation if you want your school to take part in the Maths Through Picture Books Pilot.

What do I need to do now?

If you are interested in taking part in the pilot evaluation, please fill in the expression of interest form at https://forms.gle/LaCnPmHWs2dpsQJX7

The deadline for expression of interest is **24 November 2023.** Please note that schools will be selected **on a first come, first serve basis.**

For more information, email: nazneen.patel@sheringham-nur.newham.sch.uk

Where can I find out the results of this pilot evaluation?

At the end of the pilot evaluation, a final report will be written by the evaluation team. This report will be published on the EEF's website (educationendowmentfoundation.org.uk) in Spring 2025.

Who do I contact if I have further questions?

Questions about the **Maths Through Picture Books intervention**? Please contact the delivery team at ELRS: Melissa Prendergast melissa.prendergast@sheringham-nur.newham.sch.uk Fliss James fliss.james@sheringham-nur.newham.sch.uk East London Research School, Sheringham Nursery School and Children's Centre Sheringham Avenue, London E12 5PB	Questions about the **evaluation?** Please contact the evaluation team at Oxford MeasurEd: MTPB@oxfordmeasured.co.uk

Appendix 4: Family information sheet

Evaluation of the Maths Through Picture Books Pilot

Family Information Sheet

Dear Parent/Carer,

We are writing to you because your child has been chosen to take part in a maths programme at school called Maths Through Picture Books. We want to give you more information about the programme and some research that will be done about it.

What is Maths Through Picture Books?

Maths Through Picture Books is for children in reception who need extra support to develop a secure understanding of number and operations. It has been designed by East London Research School (ELRS).

ELRS is piloting (trying out) Maths Through Picture Books in 20 schools this year. Your school is one of those schools.

Your child will be part of a small group of children who spend time with a Teaching Assistant reading specially chosen picture books. They will do this twice a week for 10 weeks across this term and next term.

ELRS hope that during the programme your child will:

- have the chance to have fun conversations about numbers
- learn about numbers and things like counting and adding up
- get used to enjoying talking about and learning maths

The programme will take place in normal school time and you and your child won't need to do anything differently at home.

What is the evaluation?

The Education Endowment Foundation (www.educationendowmentfoundation.org.uk) have asked our team at Oxford MeasurEd to evaluate Maths Through Picture Books. That means carrying out research to understand how well the programme works.

Our team will talk to school staff and children to find out:

- how much the training provided to Teaching Assistants and teachers helps them to run the programme in schools and feel confident about teaching maths
- how much the programme helps children to enjoy and learn about maths

The research will help the Education Endowment Foundation decide whether the programme should be expanded to more schools.

What will the evaluation involve for my child?

All children who take part in Maths Through Picture Books will complete two child-friendly maths assessments: one will happen in January/February 2024 and one in June/July 2024.

A qualified teacher will visit your school to do the assessments. Your child will sit with them and answer some maths questions and complete some tasks. It will take between 10 and 20 minutes and your child will not be asked to answer lots of questions they find difficult.

If your child does not want to do the assessment on the day, they do not have to. A familiar staff member will be there to make sure your child feels comfortable.

We might invite children at your school to talk to one of our researchers about Maths Through Picture Books and how they feel about maths. If this happens, we will write to you to give you more information and make sure you are happy for your child to talk to us.

How will you use data about my child?

We will collect information about your child for our research. This includes their name, birth date, postcode, Unique Pupil Number, gender, ethnicity, FSM eligibility and maths assessment results. We will store this information (data) carefully and it will only be used for research. The evaluation Privacy Notice attached to this letter includes more detail about what data will be collected about your child, who will have access to the data and how it will be used. It also explains how we will meet the requirements of data protection laws including the UK General Data Protection Regulation (GDPR).

Who can I contact if I have questions?

If you have questions about the **Maths Through Picture Books programme**, please contact the delivery team at **East London Research School**:

Melissa Prendergast
Delivery Lead
melissa.prendergast@sheringham-nur.newham.sch.uk

Fliss James
Delivery Lead
fliss.james@sheringham-nur.newham.sch.uk

If you have questions about the **evaluation**, please contact the evaluation team at **Oxford MeasurEd:**
MTPB@oxfordmeasured.co.uk

Jonah Bury
Senior Evaluator
jonah.bury@oxfordmeasured.co.uk

Lydia Marshall
Evaluation Director
lydia.marshall@oxfordmeasured.co.uk

What next?

You don't have to do anything for your child to take part in the Maths Through Picture Books programme. It will happen as a normal school activity during the school day.

If you are happy for your child's data to be used for this evaluation, you do not need to do anything. If you do **not** want your child's data to be shared, stored and used for the evaluation, please complete the form below and return it to your child's school by **5 January 2024**. If you decide later on that you do not want your child's data to be used, please tell your child's teacher or follow the advice in the Privacy Notice.

If you have any queries, please email us at MTPB@oxfordmeasured.co.uk

Yours sincerely,

Lydia Marshall
Evaluation Director
Oxford MeasurEd

Evaluation of the Maths Through Picture Books Pilot

Family Opt-Out Form

Reminder: You only need to complete this form if you **do not** wish your child's data to be shared, stored, and used for the evaluation.

I DO NOT give permission for information about my child that is collected as part of the evaluation of Maths Through Picture Books to be shared, stored or used for research purposes.

Child's name: _____

Child's class: _____

Name of school: _____

Your full name: _____

Signature: _____

Date: _____

Appendix 5: Review and Analysis of Outcome Measures

This note outlines the findings of a review of the availability and suitability of different numeracy outcome measures for the MTPB pilot evaluation. It details the selected outcome measure and presents the results from its pilot implementation.

Review of outcome measures

This section outlines the methodology and findings of the review conducted on the availability and suitability of various numeracy outcome measures for the MTPB pilot evaluation.

Identification of outcome measures

In the first stage we identified potential numeracy outcome measures that are designed for use with reception age pupils (four to five years old). The measures were identified from multiple sources:

- Education Endowment Foundation (EEF) literature and guidance, such as the review of assessment measures in the early years and early years measures database.
- Commercial assessment providers such as GL Assessment and Hodder Education.
- Outcome measures used in previous evaluations of early years numeracy.
- Existing national assessments: the only assessment conducted with this age group is the Reception Baseline Assessment (RBA). However, this data will not be available to schools or to researchers in the National Pupil Database (NPD) at pupil level and was therefore excluded.

In total, 22 outcome measures were identified for the long list.

Assessing suitability and quality

Suitability was determined by whether the assessment has been developed for use with pupils in this age group, that it covers the domains of numeracy (understanding of number and operations) that the MTPB programme is aiming to change and whether it has been designed for use in the UK. It also included logistical considerations such as how the test is administered (for example, oral or paper administration), and who can administer the test (such as school staff or an external assessor).

Quality was determined by the sample the measure was previously developed/tested with, validity and reliability.

Use of tool was assessed by exploring what the measure had previously been used for (i.e., ongoing assessment, to inform teacher practice, national benchmarking or evaluation).

Suitability, quality and use was screened using a bespoke screening tool developed for the outcome scoping exercise.

Challenges

There are several challenges with identifying an appropriate outcome for this age group. The key challenges that were encountered were:

- Finding a measure that is appropriate for use with 4-year-olds, which is particularly problematic for baseline measurement.
- Finding measures that were suitable for use in the UK, as many measures were developed in the US.
- Finding detailed information about the specific domains of numeracy that are captured by different measures as very limited information is published.

A key consideration for the evaluation was whether we could use the same outcome measure at baseline and endline. We therefore considered options for baseline and endline measurement separately.

Shortlisted baseline measures

The shortlisted baseline measures and their relative strengths and limitations are outlined in Appendix Table 1.

Appendix Table 1 Shortlisted baseline outcome measures

Measure	Strengths	Limitations
New Progress in Understanding Mathematics Assessment (PUMA)	• 4 – 11 years • Has been designed for use in the UK • UK norms tested • Separate tests available for autumn, spring, summer terms • Can be administered digitally • 30 – 40 minutes to assess whole class • £17.50 per 10-copy pack of termly tests • Tested on a sample size of 10,000 in 2019/20[1] • Excellent construct validity	• Domains covered unclear • Administered as a group but individual reports available • Information on reliability not available
Pearson Wechsler Individual Achievement Test - Third UK Edition (WIAT-III UK)	• Suitable for 4 – 25 years 11 months • Has been designed for use in the UK • UK norms tested • Covers required domains of numeracy and basic operations • Can be administered digitally • 10 minutes to administer each subtest • Tested on a sample size of 3,000[2] • Moderate – strong construct validity • Good – excellent internal consistency	• £783.55 for 25 tests – discount may be possible for large scale assessment (i.e., efficacy trial) • Unclear if only one subtest can be bought and administered (clarification sought) • Only the Math Problem Solving subtest is suitable for 4 – 17+ years, Numeracy subtest is suitable for 5 – 17+ years, Maths fluency for 6 – 17+ years

Shortlisted endline measures

The shortlisted endline measures and their relative strengths and limitations are outlined in Appendix Table 2.

[1] More information about New PUMA can be found on the publisher's website **here.**
[2] More information about WIAT-III UK can be found on the EEF website **here.**

Appendix Table 2 Shortlisted endline outcome measures

Measure	Strengths	Limitations
PUMA	• 4 – 11 years • Has been designed for use in the UK • UK norms tested • Separate tests available for autumn, spring, summer terms • Can be administered digitally • 30 – 40 minutes to assess whole class • £17.50 per 10-copy pack of termly tests • Tested on a sample size of 10,000 in 2019/20 • Excellent construct validity	• Domains covered unclear • Administered as a group but individual reports available • Information on reliability not available
WIAT-III UK	• Suitable for 4 – 25 years 11 months • Has been designed for use in the UK • UK norms tested • Covers required domains of numeracy and basic operations • Can be administered digitally • 10 minutes to administer each subtest • Tested on a sample size of 3,000 • Moderate – strong construct validity • Good – excellent internal consistency	• £783.55 for 25 tests – discount may be possible for large scale assessment (i.e., efficacy trial) • Unclear if only one subtest can be bought and administered (clarification sought) • Only the Math Problem-Solving subtest is suitable for 4 – 17+ years, Numeracy subtest is suitable for 5 – 17+ years, Maths fluency for 6 – 17+ years
Wide Range Achievement Test – Fifth Edition (WRAT5)	• UK norms tested • Covers required domains of numeracy and basic operations • Can be administered digitally • Approximately 15 – 25 minutes for ages 5 – 7 • Tested on a sample size of 2,000[3] • Excellent construct validity • Average – excellent reliability • $431 for 25 tests, possible to buy only Maths subtest (price unclear)	• 5 – 85+ years

Recommendations

Based on the available information, the **WIAT-III UK** assessment was deemed most suitable for the MTPB evaluation.

The WIAT-III has three subtests related to mathematics, which are:

- **Maths Problem-Solving** (4 – 17+ years) - Measures untimed maths problem-solving skills in the following domains: basic concepts, everyday applications, geometry, and algebra. The student provides oral and pointing responses.

[3] Pearson provide a more comprehensive overview of WRAT5 UK, which can be accessed **here**.

- **Numeracy** (5 – 17+ years) - Measures untimed, written maths calculation skills in the following domains: basic skills, basic operations with integers, geometry, algebra, and calculus.
- **Math Fluency** (6 – 17+ years) - Measures the speed and accuracy of a student's maths (addition) calculations. The student solves written addition problems within a 60-second time limit.

At baseline, only the math problem-solving subtest is appropriate given the age of the cohort being tested. At endline, both the math problem-solving subtest and numeracy subtest could be used. It may be beneficial to use both subtests as it covers a greater range of mathematics skills and may reduce the likelihood of encountering ceiling effects.

The WIAT-III UK maths problem-solving subtest uses a picture prompt, where the assessor asks a question related to an image. The assessment has a large number of items but uses a stop rule; when three or more questions are answered incorrectly, the test ends. This means it is unlikely to suffer from ceiling effects. It covers basic understandings of shape and number, with limited application of operations. The numeracy subtest provides further assessment of understanding of operations using a response booklet that the child will complete.

Contrastingly, the WRAT5 uses a response booklet, and the questions are more similar to the numeracy subtest of WIAT-III UK. Based on demo materials shared by Pearson Education, it is not suitable for use with the sample at baseline for this reason.

Consequently, we proposed to pilot the WIAT-III UK maths problem solving subtest at baseline, and both the WIAT-III UK maths problem solving and numeracy subtests at endline. While the test is relatively expensive compared with other measures, we concluded it was best placed and most appropriate to test the intended outcomes set out in the MTPB theory of change. This was agreed with the EEF. The problem-solving subtest was administered digitally, and the numeracy subtest was administered with a paper copy.

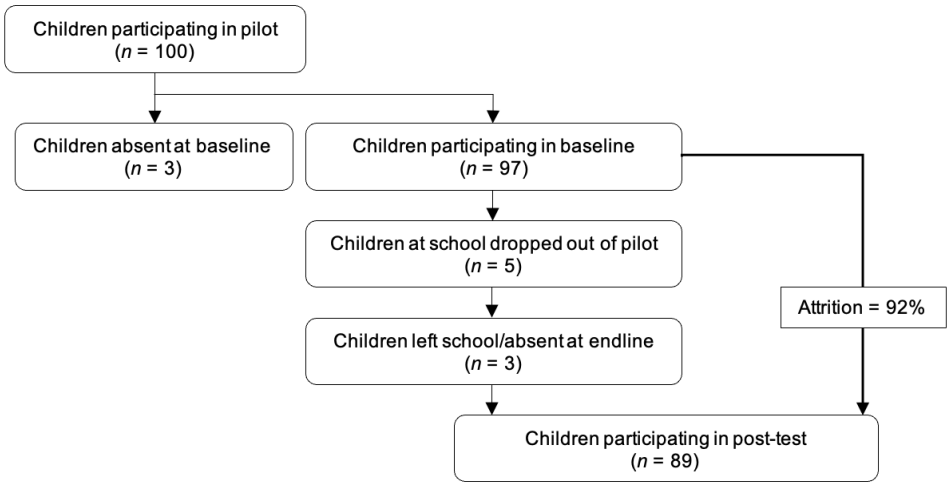
Analysis of outcome measures

We collected outcome data using the WIAT-III UK Maths Problem Solving subtest at baseline in January and February 2024 and outcome data from the WIAT-III UK Maths Problem Solving and Numeracy subtests at endline in June 2024. The following section presents the findings from the piloting of the selected numeracy outcome measure, highlighting its performance and feasibility.

Attrition

Attrition was assessed by calculating the proportion of pupils who participated in the baseline but did not take part in the endline. **Error! Reference source not found.** shows that out of the 97 children who initially took part in baseline, 5 children were at a school that dropped out of the evaluation. Of the remaining sample, 3 pupils who were tested at baseline were not tested at endline because they had either left their schools or were absent during two school visits. Children who were not assessed at both baseline and endline were excluded from the analysis. Consequently, the attrition rate was calculated to be 92%, indicating an acceptable retention rate.

Figure 1 Attrition between baseline and endline



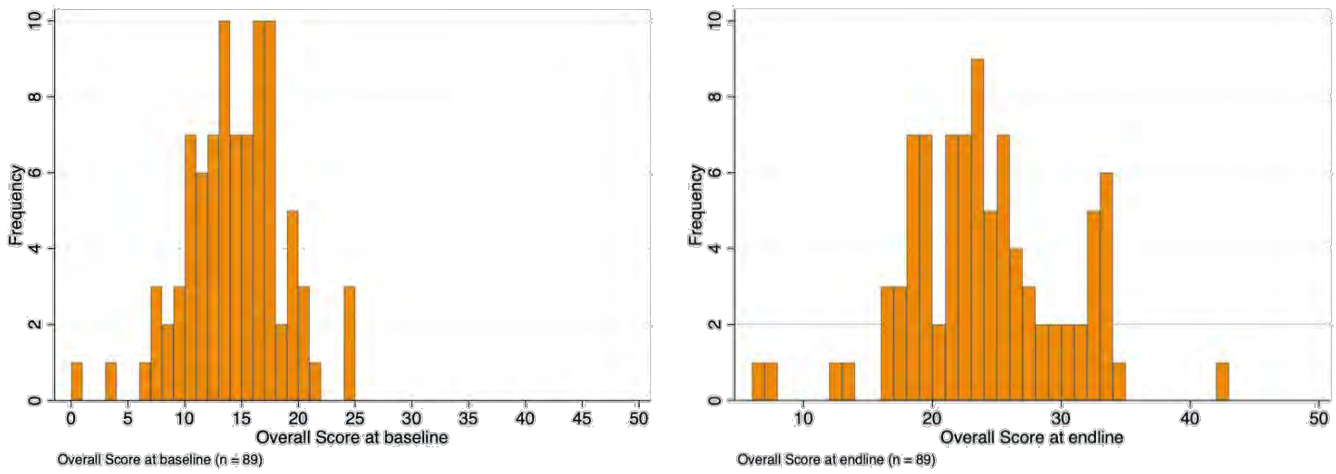
Missingness

The assessment uses a stop rule, so that the test is stopped when a child answers four consecutive items incorrectly. The remaining items are therefore considered to be missing. It was observed that, for complete cases, missing values increased as the test progressed, reflecting the increasing difficulty of the items, with no other patterns arising from missing data. There were some challenges with the application of the stop rule (see below). The discontinue rule for both the problem-solving and numeracy subtests required discontinuing the assessment if the child answered four consecutive items incorrectly. However, the numeracy assessment could also be discontinued if the child indicated they were finished, in which case assessors were advised to leave a note on the assessment indicating this. No errors were detected in applying the stop rule for the problem-solving subtest, largely because it was automatically scored based on the children's responses entered on their iPads. In contrast, 20% of the numeracy assessments (18 assessments) did not follow the stop rule. Upon investigating the assessment booklets, it was found that of these 18 assessments, 3 had notes indicating that the child wanted to finish the assessment, and in an additional 3 cases, the discontinue rule had been met on the booklet but was not recorded during scoring. The remaining 12 assessments did not follow the stop rules, and no notes were included. Assessors reported that these assessments were discontinued because the child indicated they did not wish to continue, but this was not documented as a note. As such, the data for 15 numeracy subtests was incorrectly entered, resulting in an error rate of approximately 17%. These observations were included in the analysis after confirming the correct stop point by examining transcripts.

Primary Outcome analysis

To assess for floor and ceiling effects, the distribution of scores for both baseline and endline was examined through histograms (**Error! Reference source not found.**). For the baseline, the distribution was unimodal with a slight left skew. This distribution suggested a fairly standard spread of scores with no floor or ceiling effects evident, indicating that the test items were appropriately challenging for all participants. The distribution for the endline exhibited a bimodal pattern. The presence of two distinct peaks, one around the 24 and another around the 34, is indicative of the fact that the endline includes two subtests. As with the baseline, there is no indication of a floor or ceiling effect.

Figure 2 Baseline and endline distribution of primary outcome measure



Appendix Table 3 provides the key descriptive statistics for the outcome measure at baseline and endline. At baseline, the mean score was 13.96 with a standard deviation of 4.36. The endline, which included two subtests compared to the single baseline, showed a higher mean score of 23.54 with a standard deviation of 6.15, with scores ranging from a minimum of 6 to a maximum of 43. The higher endline mean and median can be attributed not only to the intervention but also to the greater number of items assessed in the endline.

Appendix Table 3 Baseline and endline descriptive statistics of primary outcome measure

Stats	Endline	Baseline
Measure	WIAT-III UK (Problem-solving and numeracy subtest) [Total raw score, 0-133]	WIAT-III UK (Problem-solving subtest) [Total raw score, 0-72]
N	89	89
Mean	23.54	13.96
Standard deviation	6.15	4.36
Median	23	14
Min	6	0
Max	43	25

The next step in the analysis was to examine correlations at baseline and endline. The Pearson correlation coefficient between baseline and endline scores was estimated at 0.688, indicating a strong positive correlation. This high correlation was statistically significant. This strong relationship underscores the suggests consistency in measurement at baseline and endline.

To further explore the relationship between baseline and endline scores, a multi-level linear regression model was employed, with the endline outcome regressed against the baseline outcome. The regression analysis included a random intercept for schools to account for clustering within groups.

A simple linear regression model (Appendix Table 4) revealed that baseline performance significantly predicted endline performance, with a coefficient of 0.97. The model explained 47.26% of the variance in the endline scores (R-squared = 0.4726), indicating that nearly half of the variability in endline scores could be attributed to differences in baseline scores, emphasising the importance of initial ability levels in determining subsequent performance.

Appendix Table 4 Simple regression analysis for baseline primary outcome measure on endline

Endline	Coefficient	Standard error	t	Sig.	95% conf. interval

Baseline	.97	.11	8.83	0.000	.75	1.19
Constant	10.01	1.60	6.24	0.000	6.81	13.20
R-squared = 0.4726						
Adj R-squared = 0.4666						
Observations = 89						

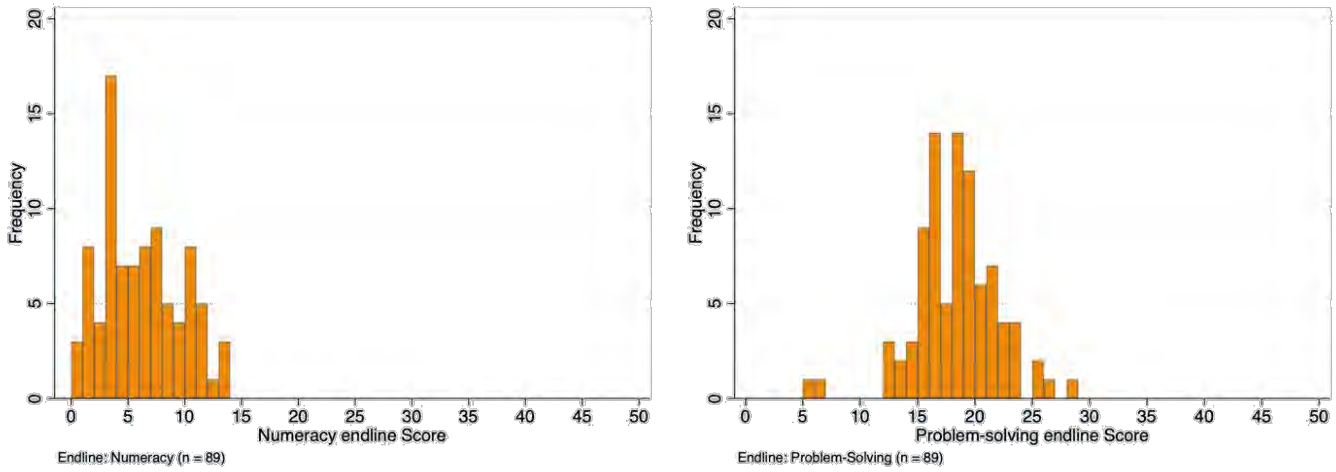
The degree of clustering within schools was evaluated using the Intraclass Correlation Coefficient (ICC), estimated from the multi-level regression model. The ICC was calculated to be 0.124, indicating low to moderate clustering of children within schools. The ICC value, though relatively modest, highlights the need to account for school-level clustering in future trials.

Secondary outcome analysis

Our secondary outcome analysis mirrors the primary outcome analysis, by estimating the parameters outlined above for each subscale.

Error! Reference source not found. shows the distribution of scores for endline for each of the subscales. The baseline distribution remains the same as reported in **Error! Reference source not found.** for the problem-solving subscale, which was the only sub-scale administered at baseline. The numeracy endline distribution was unimodal with a right skew. This distribution suggests more children scoring at the lower end of the distribution. However, there is no indication of a floor or ceiling effect, with the subscale appropriately targeting all ability levels. The problem-solving endline distribution is generally centred with few children scoring very low or very high scores, with no indication of a floor or ceiling effect.

Figure 3 Distribution of endline scores on secondary outcome measure



The key descriptive statistics for the secondary outcome measures at baseline and endline are given in Appendix Table 5. At baseline, the mean score was 13.96 with a standard deviation of 4.36. For the same subtest (problem-solving), the endline mean score 17.88 with a standard deviation of 3.70, indicating an improvement in problem-solving subtest ability between pre- and endline. The endline numeracy subscale, the mean score of 5.66 is significantly lower. Moreover, the maximum score on this subtest is 23% (14 out of 61) compared to the maximum score on the problem-solving subtest of 40% (29 out of 72), possibly indicating towards the difficulty of this sub-test (cross-reference to qualitative analysis of outcome measure?). The lower standard deviation on the problem-solving subtest between baseline and endline could indicate that the intervention has worked to reduce the gaps between higher and lower performers.

Appendix Table 5 Descriptive statistics of baseline and endline scores on secondary outcome measure

Stats	Endline		Baseline
Measure	WIAT-III UK (Numeracy subtest) [Total raw score, 0-61]	WIAT-III UK (Problem-solving subtest) [Total raw score, 0-72]	WIAT-III UK (Problem-solving subtest) [Total raw score, 0-72]
N	89	89	89
Mean	5.66	17.88	13.96
Standard deviation	3.48	3.70	4.36
Median	5	18	14
Min	0	5	0
Max	14	29	25

An examination of the Pearson correlation coefficient between baseline and endline scores for each subscale shown in Appendix Table 6 reveals that there is a statistically significant positive correlation between performance on the subscales. Unsurprisingly, at 0.677, the correlation between baseline and endline scores on the problem-solving is stronger than the correlation between the baseline problem-solving and endline numeracy scores of 0.494 or the correlation between endline scores on the problem-solving and numeracy subtest of 0.465, although all correlations are statistically significant. This strong relationship underscores the suggests consistency in measurement at pre- and endline as well as within the subscales.

Appendix Table 6 Correlation between baseline and endline secondary outcome measure

	Correlation
Endline problem-solving subtest with endline numeracy subtest	0.465**
Baseline problem-solving subtest with endline numeracy subtest	0.494**
Baseline problem-solving subtest with endline problem-solving subtest	0.677**

*Note: ** $p < 0.001$, $n = 89$*

A simple linear regression model using the secondary outcome measures revealed that baseline performance significantly predicted endline performance on both subscales, with a coefficient of 0.58 and 0.39 for problem-solving and numeracy subtests respectively (Appendix Table 7). The baseline scores on the problem-solving subtest explained 45.87% of the variance in the endline problem-solving scores (R-squared = 0.4587) and 24.42% of the variance in the endline numeracy scores (R-squared = 0.2442), indicating that nearly half of the variability in endline scores on the problem-solving subscale could be attributed to differences in the baseline scores on the problem-solving subscale and nearly a quarter of the variability in endline scores on the numeracy subscale.

Appendix Table 7 Simple regression analysis for baseline secondary outcome measure on endline

Endline problem-solving	**Coefficient**	**Standard error**	**T**	**Sig.**	**95% conf. interval**	
Baseline	0.58	0.07	8.59	0.000	0.44	0.71
Constant	9.85	.98	10.06	0.000	7.90	11.80
R-squared = 0.4587						
Adj R-squared = 0.4524						
Observations = 89						
Endline numeracy						
Baseline	0.39	0.07	5.30	0.000	0.25	0.54
Constant	0.16	1.09	0.14	0.886	-2.00	2.32

R-squared = 0.2442
Adj R-squared = 0.2355
Observations = 89

As for the primary outcome measure, the degree of clustering within schools was evaluated using a multi-level linear regression model with a random intercept for schools. The ICCs estimated from the multi-level regression model were calculated to be 0.019 for the numeracy subscale and 0.138 for the problem-solving subscale. While the ICC value indicates low to moderate clustering for the problem-solving subscale, the ICC value for numeracy subscale is very low, indicating no clustering within schools. This implies that school-level clustering in future trials may only be required when using the problem-solving subscale.

Views on the outcome measure

This section explores the perspectives of teachers and assessors on the selected numeracy outcome measure on its practicality and relevance to the classroom context.

The content, format and guidelines of the problem-solving subtest of the WIAT-III UK were broadly acceptable to teachers and assessors, with some item-specific challenges. In contrast, the numeracy subtest's paper-based format and abstract content was less well-received by both children and assessors.

Problem-Solving Subtest

Content – Teachers and assessors reported that the problem-solving subtest covered a variety of mathematical content similar to what children learnt in reception classes. Teachers liked this variety, noting that it included numbers, shapes, and measures, all of which is covered by the EYFS framework. However, they noted that some items were unfamiliar to reception-aged children. For example, certain word problems, such as those involving pictograms, were not typically introduced at this stage.

The subtest included a range of difficulty levels, from easier to more complex items; however, an assessor noted that some easier items followed more difficult items, which does not follow best practice.

Teachers noted the problem-solving subtest's similarity to the RBA, with the main difference being that the RBA uses physical objects instead of a digital screen for counting. They regarded the physical format as more age-appropriate for reception-aged children in reception, who might struggle with abstract digital representations. Because of the resemblance with the RBA teachers felt confident about their ability to administer the subtest themselves if required.

Format – Teachers and assessors liked the clarity and user-friendliness of the subtest. The questions were laid out clearly, making the subtest easy to follow. There was a view that the iPad engaged children more effectively than a paper-and-pencil assessment; children enjoyed the interactive nature of the iPad, making the assessment feel more like a 'game'. However, assessors noted some challenges with the user interface and the way items were presented on-screen. For instance, when children selected responses, these were not highlighted, and there was no on-screen feedback to confirm their choices. Moreover, assessors explained that those items which featured only numerals were less age-appropriate, as abstract numbers without pictorial representations could be challenging for young children to grasp.

Scripted Guidelines – Teachers and assessors liked the availability of the script, as it meant assessors did not have to think of instructions on the spot and ensured consistency. However, some assessors regarded the instructions as too "test-like", which they thought could influence how children perceived the assessment. For example, the script included an instruction that children can 'use a paper and pencil', thus conveying the impression of a formal test rather than a game that the children were told they were playing.

Moreover, teachers and assessors highlighted that the strict adherence to the script prevented them from providing minimal prompts that might have helped some children perform better. For example, a teacher noted that some children could have answered questions correctly with a little encouragement, but the script did not allow for any deviation. They implied that the performance on the assessment may not be a true reflection of child ability due to this. There was a

suggestion that using questions like "How do you know?" or "What is the same/different?" could capture a better picture of children's understanding than the type of close-ended items in the assessment.

Due to the availability of a script, teachers reported that they would feel confident in their ability to administer the subtest, although they noted there was a risk of bias in teachers administering the assessments rather than external assessors. Teachers recognised though that not every member of staff might be as comfortable with the script without proper training and suggested seeing the assessment modelled would be beneficial for those less familiar with the process.

Item-specific challenges – Assessors reported that instructions for a few items were too long and complex, causing children to lose focus partway through. This issue was particularly problematic for items that were not typically covered in reception, such as the items with the pictogram, leading to confusion and inaccurate responses. For a small proportion of other items, the language did not mirror the terminology commonly used in classrooms, which could confuse children. For example, the assessment used terms like "in order" instead of the more familiar "smallest to largest" and "total" instead of "altogether". Teachers saw this discrepancy between classroom language and assessment language as a barrier to accurately assessing children's abilities. Children with EAL found some of the long and complex instructions and unfamiliar terminology particularly challenging.

Additionally, some items were presented in a way that could easily confuse children. For example, a question involving balloons led children to focus on the word "two" rather than understanding the concept of "same," resulting in incorrect answers; the misunderstanding remained even with the assessor emphasising 'same' instead of 'two' when reading the instructions.

Numeracy Subtest

Content – While teachers liked some items in this subtest, there was an overall view that the assessment did not reflect typical numeracy-based activities done in reception classes. For example, the subtest included written sums, which are not commonly used in reception, where more concrete tasks involving physical objects are commonly used. Teachers concluded that the disconnect between the subtest content and classroom practices explained that some children found this assessment particularly challenging, even where assessors made a concerted effort to present the instructions slowly and clearly to help children understand.

Format – Assessors and teachers were less positive about the paper-based format of the problem-solving subtest. They observed that children reacted less favourably to the paper booklets, likely due to their unfamiliarity with worksheet-based tasks in reception classes. Moreover, a teacher reported that children were not confident using pencils, as they had not had much practice with writing numerals. Assessors noted that some children seemed to know how to solve the problems but were reluctant to attempt them in the unfamiliar setting of a paper-based assessment; teachers agreed that children’s performance did not reflect their true mathematical potential.

The paper-based format of the numeracy subtest meant that the assessors had to mark the assessment manually as the child progressed through the assessment. As a result, assessors had to simultaneously mark and observe children. Assessors found multitasking challenging, as they needed to switch between accurately recording responses and monitoring the children's behaviour and engagement. This increased their cognitive load and potentially affected the accuracy and consistency of the assessment. Error-rate checking revealed that there were issues with data entry in 20% of the numeracy assessments administered (see above).

Many children experienced cognitive overload during this assessment due to the number of items on a single page and the multiple skills required to complete the tasks. Some children became overwhelmed, expressing unease with comments like ‘I don't know’ and ‘I don't want to do this’. The need to listen to instructions, process them, and write responses involved multiple skills, further contributing to their cognitive overload. As with the problem-solving subtest, teachers felt confident about their ability to administer this subtest due to its similarity to how the RBA is administered, but they expressed reluctance towards the numeracy subtest because of its overwhelming nature.

Scripted instructions – Assessors found the scripted instructions for the paper-based numeracy subtest less user-friendly compared to those for the problem-solving subtest. They attributed this to the paper-based nature of the assessment. They highlighted the challenge of balancing friendliness with objectivity; they perceived the language in the scripts to be ‘cold’, prompting some assessors to slightly reword instructions to make them friendlier.

Assessors also noted the lack of clear guidelines on how to handle unexpected scenarios during the assessment. This left assessors unsure about how to respond to various situations. The assessment only went as far as providing the following instruction to children: “If you come to a problem you don’t know, just skip it. If you finish the page, turn to the next page. Tell me when you’re finished”. While assessors were aware that unexpected scenarios might arise and found the guidelines around prompting provided by the evaluation team helpful, they still encountered unexpected scenarios and challenges in responding appropriately. For example, children sometimes did not indicate when they had finished a task until prompted by the assessors.

Appendix 6: Child Selection Guidance and Observation Grid

Child selection guidance

To help you to select the **5** children that would benefit most from taking part in the Maths Through Picture Books pilot we would like you to carry out a task with **all** children in your reception class.

This is a short and engaging task, based on current research that identifies two key important indicators which can predict later success in mathematics: *counting out a specific amount from a larger group of objects and understanding number symbols.*

The aim of the task is for the child to:

- *count out a set of a given number;*
- *match the correct corresponding numeral.*

What you will need:

- Teddy bear or other soft toy/puppet
- Pennies (or other objects such as buttons or jewels) in a pile
- Wooden/plastic numerals 1-9
- Observation grid to record the child's responses.

Task instructions:

Each child will be asked to engage in the following task which involves giving a teddy bear (or other soft toy or puppet) a specific number of pennies from a larger amount:

"Can you give Mr Bear 3 pennies?"

Observe what the child does and record the child's response on the observation grid provided. Circle the number if they gave the correct amount. Briefly note how the child engages in the activity for example are they confident to join in?

Once the child has given you the pennies, ask them to find the right numeral to go with that amount:

"Mr Bear has 3 pennies...I wonder if you can help Mr Bear find the right number to go with his pennies?"

Record the child's response in the second column of the grid. Circle the numeral if they matched it correctly.

It will be helpful if you note down anything the child says or any particular strategies they use when engaging in the task.

If you identify more than five children who find the tasks challenging, please use your professional judgement and knowledge of each individual child to make your decision as to which children would benefit most from participating in the pilot.

Observation grid			
Child's name	**Give number**	**Match numeral**	**Notes** ● *Circle which numbers they give successfully.* ● *Circle which numerals they match correctly.* ● *Pay attention to the child's attitude and confidence.*
Example: *Adam*	3 5 9	3 5 9	Happy and confident to join in with the activity. Counted 3 pennies and found numeral 3. Counted to 5 but produced 4. Identified the numeral 4. When asked to count out 9 he grabbed a handful of pennies commenting "I got lots!" When counting beyond 5, skipped some numbers: '5,6,8,10.'

Appendix 7: Exemplar topic guide

MATHS THROUGH PICTURE BOOKS PILOT EVALUATION

Topic Guide – Teaching Assistants (TAs)

Maths Through Picture Books (MTPB) is a 10-week intervention for children in reception who need extra support to develop a secure understanding of number and operations. The programme provides training for reception class teaching assistants (TAs) and teachers to use interactive reading to actively engage children and promote sustained conversations about mathematical ideas in specially chosen picture books.

The East London Research School (ELRS) is implementing a pilot of MTPB funded by Education Endowment Foundation (EEF). EEF have asked Oxford MeasurEd to carry out a formative evaluation of the pilot.

Oxford MeasurEd will carry out research to understand how well the programme works. It will investigate the programme's **promise, feasibility, and readiness for trial (scalability).** EEF intends that findings in these three domains will inform EEF's decisions about whether the potential impact of MTPB should be evaluated in a large-scale trial. The evaluation will also inform the design of any such trial by providing a deeper understanding of the theory underpinning the intervention and potential outcome measures that could be used to evaluate impact.

The purpose of the qualitative interviews with the TAs is to gather information and reflections from their perspective on:

- their experiences of the programme,
- their perceptions of the programme's acceptability and effectiveness,
- their perceptions about how different the model is to 'business as usual'
- any barriers to participation and engagement, and
- recommendations for the future.

The interviews will be conducted remotely or in-person via Teams or Zoom by a member of the Oxford MeasurEd evaluation team. They will last approximately **45 minutes**.

The following guide does not contain pre-set questions but rather lists the key themes and sub-themes to be explored with participants. It does not include follow-up questions like `why', `when', `how', etc. as it is assumed that participants' contributions will be fully explored throughout in order to understand the how-s and why-s.

INTRODUCTION

Aim: to explain the aims of the research, how the interview will be conducted and how the data will be used.

- Introduction to participant:
  - Hello, [INTERVIEWEE NAME]. I hope you are having a good day. My name is [YOUR NAME].
  - I am here on behalf of Oxford MeasurEd, an independent research organisation focussed on education.
  - Thank you for agreeing to speak to me today.
- Explanation of the research:
  - EEF have asked Oxford MeasurEd to evaluate the MTPB programme, which your school has been involved in.

  - We will be carrying out research activities with teachers, TAs, SLT, the delivery team and the children receiving the intervention to help us understand how well the programme works. This will inform decisions about whether the programme should be rolled out more widely.
- Explanation of the interview:
  - The purpose of today's interview is to help us get a better idea of how MTPB has been implemented in your school. We are also interested in your experience of the pilot so far, including the support you have received, any challenges you have faced, any perceived benefits of the programme and your reflections on lessons learned for future implementation of the MTPB programme.
  - The interview should last around 45 minutes.
  - There are no right or wrong answers – we are only interested in your experience and opinions about the pilot, both positive and negative. I hope it will feel like a natural conversation.
- Explanation of how the data will be used:
  - What you share with me will be used by the evaluation team to write our evaluation report.
  - You will not be named in the report, and we will take steps to ensure that what you say is kept anonymous. We will not tell others from your school staff or the delivery team what you share with me today. However, due to the small number of educators involved in the pilot, there is a possibility that people who know you might be able to recognise you from a quote in the report. If there is something you say that you don't want us to potentially include in the report, that's fine – we will revisit this at the end of the interview.
  - Participation is voluntary. You can choose not to discuss any issue and to end the interview at any point. You can also ask me to skip or rephrase a question.
  - We would like to audio-record the interview, so we have an accurate record of what you share. Only the evaluation team will have access to the recorded interview. All recordings will be securely deleted six months after the submission of the final report of the pilot and by December 2025 at the latest.
- Explanation of disclosure:
  - I also need to let you know that if you were to tell me anything that was a cause of concern that you or someone else was at risk of harm, I would need to report this to the Project Director who would decide how we act on the information shared. This might involve contacting the delivery team. We would let you know if that was the case.
- Any questions?
- Recording consent:
  - Ask for permission to start recording and for interview to be transcribed.

[start audio recording in Teams/Zoom]

- Obtain verbal consent to participate.

BACKGROUND (approx. 5 minutes)

Aim: to 'warm up' the participant, understand the context of the setting, motivations for taking part and what usual practice looks like in their school.

- Professional role
  - Day-to-day role
    - Role with respect to teaching maths
    - How long in role
  - Role in delivering MTPB
- School context

  - Number of reception classes
  - Class size
  - Profile of children (e.g., proportions of pupils on FSM, SEND etc.)
- Maths provision
  - Approaches typically used to teaching maths to reception-aged children
  - Involvement in any other early years maths intervention
    - this year
    - previously
- Participation in MTPB pilot
  - When first heard about programme
  - Whether involved in decision to take part
  - Motivations for taking part

EXPERIENCE OF MTPB TRAINING AND SUPPORT

Aim: to understand how TAs have experienced the training and support received during the programme, including what has helped/hindered the provision of support.

TRAINING AND SUPPORT FROM ELRS (approx. 7 minutes)

- Training attendance
  - What training they have attended so far
    - 1 day in person training
    - Online drop-in session (for teachers and TAs)
  - *If did not attend training:*
    - Why not
- Description of training from ELRS (fidelity)
  - Overview of training received (in-person and online)
    - Who from setting attended training
    - Who delivered training
    - Content of training
    - Resources used
  - Any other support received from ELRS
- Views on training - Accessibility and usefulness
  - What they liked/liked less
    - Views on accessibility of training/physical resources/additional support (e.g. ease of attending training, approachability of delivery staff, user-friendliness of resources
    - Views on usefulness of training and additional support (incl. WhatsApp group)
    - Views on relevance to practice, including supporting practitioners to include and support disadvantaged children
  - Which sessions in the training were least/most useful
- Barriers and facilitators
  - Anything that has made it easier/more difficult to access training and support, if not already mentioned
    - Senior Leadership Team (SLT)/ ELRS support
    - Resources
    - Technology
    - Costs
    - Travel

TRAINING AND SUPPORT FROM TEACHERS (approx. 8 minutes)

- Description of support (planning meetings and observations) received from teachers (fidelity)
    - Planning meetings
        - Content (including modelling)
        - Frequency
        - Duration
    - Observations
        - Process (e.g., using the ShREC framework while observing)
        - Frequency
        - Duration
    - Reflection sessions
        - When given
        - Process (e.g., joint reflections recorded and uploaded to Drive)
    - Other support provided by teachers
- Any adaptations made
    - *If anything was different to the design specified/recommended as listed below, probe why the adaptation was needed/made for each adaptation made*

- Weekly planning session
- Teacher observations of intervention in Weeks 1, 4 and 10
- Same day reflection session after observations

- Views on support - Accessibility and usefulness
    - Accessibility of support
        - Ease of getting support
        - Ease of fitting it into day job
        - Approachability of teacher
        - User-friendliness of resources (e.g., planning template, ShREC framework etc.)
    - Usefulness of support
        - Planning sessions
        - Feedback received
        - Format of feedback
- Barriers and facilitators
    - Anything that has made it easier or difficult to access support, if not already mentioned
        - SLT support
        - Teacher's knowledge
        - Time
        - Personal/teacher's motivation/commitment
        - Technology

EXPERIENCE OF MTPB DELIVERY (approx. 8 minutes)

Aim: to understand how TAs have experienced programme delivery, including what helped and hindered delivery.

- Description of intervention activities delivered by TAs (fidelity).
    - Description of how they deliver sessions
        - Number of sessions per week
        - Duration
        - Location
        - Use of ShREC technique

- Any adaptations made
    - Any changes made to guidance and why
        - Use of ShREC technique
        - Order of using books
        - Other resources used
        - Use of manipulatives

- Two sessions a week
- 20-minute sessions each
- Use of ShREC technique as planned in planning sessions
- Order in which books were used
- Dedicated space that was the same each day
- Same time of the day

- Barriers and facilitators
    - Anything that has made it easier/more difficult for the sessions to be delivered
        - Training
        - Resources (e.g., programme handbook, planning template, picture book scaffold)
        - ELRS/Teacher/SLT support
        - Pupil groups (e.g., pupils with EAL, SEND etc.)
- Pupil selection
    - Were they involved in pupil selection
      If no:
    - Were the right pupils selected and why/why not
      If yes:
    - How they selected pupils
        - Using Give N task
        - **If did not follow guidance**: why not
    - Views on pupil selection
        - Whether task/approach helped them identify children who were falling behind furthest in Maths
        - Whether guidance allowed equitable selection of disadvantaged pupils into the programme
        - Whether the selected children are those who can benefit most from the programme
    - Anything that has made it easier/more difficult to select pupils, if not already mentioned
        - Guidance and task
        - SLT/ELRS support
        - TA/teacher knowledge about pupils
        - Timing of pupil selection

PERCEIVED BENEFITS AND CONSEQUENCES FOR TAs (approx. 6 minutes)

Aim: to understand perceived impacts and unintended consequences and identify elements with best promise

- Benefits for TAs
    - Whether you have benefited from the programme. If yes, how
        - Improved understanding of how children learn about numbers/operations

        - Improved confidence in teaching number/operations
        - Improved understanding of how to use picture books interactively
        - Use of ShREC outside the intervention
        - Improved ability to respond flexibly when using picture books
        - Improved child-adult relationships
    - *For each benefit, probe:*
        - For specific examples
        - What activities/processes led to these benefits

- Negative unintended consequences
    - Whether there were any negative unintended consequences of the programme for practitioners. If yes, what
        - Practitioner time away from other activities
        - Pupils missing out on high quality teaching in the classroom
    - *For each consequence, probe:*
        - For specific examples
        - What activities/processes led to these consequences.
    - Views on whether benefits outweighed negative consequences

PERCEIVED BENEFITS AND CONSEQUENCES FOR PUPILS (approx. 6 minutes)

Aim: to understand perceived impacts and unintended consequences and identify elements with best promise

- Benefits for pupils
    - Whether pupils have benefited from the programme. If yes, how
        - Engage in number talk
        - Increased enjoyment of maths
        - Increased motivation towards learning maths
        - Improved child-adult relationships
        - Improved socio-emotional skills
        - Improved language and communication skills
    - *For each benefit, probe:*
        - For specific examples
        - What activities/processes led to these benefits
    - Benefits specific to different pupil groups (e.g., EAL pupils)

- Negative unintended consequences
    - Whether there were any negative unintended consequences of the program for pupils. If yes, what
        - Pupil time away from other activities
        - Stigma if selected or feeling left out if not
    - *For each consequence, probe:*
        - For specific examples
        - What activities/processes led to these consequences
    - Consequences specific to different pupil groups
        - FSM pupils
        - Pupils with EAL
    - Views on whether benefits outweighed the negative consequences

FINAL REFLECTIONS FOR THE FUTURE (approx. 7 minutes)

Aim: to obtain recommendations and lessons learned for the future and give participants an opportunity to provide overall reflections and share anything they think is important for the evaluation

- Comparison of the MTPB programme to business as usual (BAU)
    - Key differences to BAU
        - Aspects that work better/poorer in comparison
- Intention to sustain practice
    - Practices that the practitioner intends to continue using, if any
        - Use of MTPB as delivered in the pilot
        - Use of picture books to teach maths
        - Use of principles around selecting picture books to teach maths
        - Use of ShREC
- Reflections
    - Activities/processes that:
        - should be kept the same and why, if not already discussed
        - should be done differently and why, if not already discussed
        - were not included but could have been useful
    - Final closing comments – anything else that has not been covered
    - **[turn off audio recording in Teams/Zoom]**

Close

- Any questions?
- Thank participant for taking part
- Reiterate confidentiality and anonymity
- Check whether there is anything which they would not like to be included in the write up of the findings
- We are also interested in quantifying the experiences and views of all participants on the implementation of the programme and their perceptions on the benefits of the programme. We will be in touch again through email shortly after the end of the 10 weeks of the programme to invite you to anonymously complete a short, online post-delivery survey and again in October 2024 to carry out a similar longitudinal survey to capture whether practices from this programme have been sustained. The findings from these interviews and surveys will be used in our final research report. We hope you will help us in our research by completing these surveys.

Appendix 8: Child discussion group reflections

Aims of the child group discussions

The aim of the child discussion groups was to explore children's:

- feelings about being selected for the intervention
- views on the session content
- enjoyment of/motivation towards learning mathematics

Key considerations

Given the children's age, we agreed from the outset that the child discussion groups were somewhat experimental. However, we believed it would be worth incorporating children's perspectives ahead of a possible wider roll-out of the programme and to consider whether similar methods would be useful in a trial of MTPB.

In preparing for data collection activities we drew on good practice guidance (see for example Brady and Graham 2019) and included key considerations such as:

- keeping activities as brief as possible to maintain focus
- being flexible and planning a range of alternative activities in advance
- using projective techniques to elicit children's feelings about taking part in MTPB and about maths in general
- using age-appropriate language, e.g., talking about numbers and about the books they look at with [named TA], rather than asking for example how much they enjoy maths

Ahead of the interviews, we shared the topic guide with the delivery team to ensure it was suitable to the age group and relevant to the overall aims of the research. The delivery team provided some useful feedback, in particular raising concerns about:

- the proposed duration of the session (20 min), particularly considering that some of the children taking part in the group discussion would have been struggling with their learning anyway
- children's ability to verbalise what maths they have learnt, as this requires a degree of metacognition they would be unlikely to possess

In response to the feedback, we decided to prioritise those areas we wanted to cover and agreed we would get together as a team throughout the fieldwork period to reflect on the overall approach

Fieldwork reflections

We collectively made the decision to stop the child discussion groups after completing the third discussion group, meaning that we only completed 3 out of 5 child discussion groups. We made this decision as both approaches were unsuccessful.

Approach 1 - The first approach included the use of projective techniques by introducing a bunny and a gingerbread man to get children to talk about a) their feelings about being selected and b) their views on the content of the session. The underlying idea was that we believed children would find it easier/feel less shy in front of others to express themselves by projecting their thoughts onto the two fictitious characters who we suggested attended the preceding maths session with them.

In the two settings where we trialled this approach, children struggled to focus on the questions about the sessions that bunny and gingerbread attended, instead getting side-tracked by unrelated questions (e.g., why is the bunny not eating carrots). Some children were also more reluctant than others to contribute to a group discussion. We concluded that this

approach was not working to explore feelings about being selected and views on session content, and in particular that the projective approach was not working with this age group. We decided to try a different approach for the third group discussion.

Approach 2 – The second approach involved inviting children to draw a picture of a time they were reading one of the picture books, having two researchers circulating to talk to children individually about their feeling about being selected and/or taking part. Some children found it difficult to describe their drawing, which we wanted to use to find out more about their views and feelings of the session. Some did share high level feelings – e.g. “I felt happy” but struggled to articulate the reasons behind these. Some were quite reluctant to talk to an unfamiliar adult and we did not push them in this case.

Findings

Overall, children talked about enjoying the stories and pictures, which suggests that they found the storybooks engaging. However, we did not manage to elicit more depth of findings than this. We think this can be attributed to the following factors:

- the age of the children

- our short time with them – children had not met any of the researchers prior to the fieldwork encounter, and so were understandable a bit shy and reluctant to engaged

- the nature of the intervention – from what we’ve seen, children in Reception experience this as one of the many things that happen at school and don’t have particularly strong feelings about it in either direction.

- complexity of the task - Linking it to broader feelings about maths and number has also been difficult, because children are focused and engaged on the books and the experience of reading them as a group, and don’t necessarily see it as – for example – a counting activity.

Key considerations for future group discussions

- **Having two members of staff present** - It did not feel like two interviewers were needed. The person leading the focus group managed to give out instructions and carry out the discussion independently. It was not hard to keep an eye out for all children, especially with a trusted adult from the school present. However, it was useful to have reflections from the other interviewer present.

- **Consider how children can communicate they no longer want to take part -** The use of traffic signals to indicate they did not want to be there any longer did not seem very effective. It gave children a distraction and a child kept asking if these will be used. The traffic signals were eventually used by two children, but it could have been possible to provide children with an alternative method with less distraction to do the same.

- **Be less ambitious –** focus on one overall activity only – possible that we tried to do ‘too much’

- **Create rapport with children –** might be best for a researcher to visit the school and meet the children before carrying out the interview. This would enable the teacher or teaching assistant to introduce them to the children and create more familiarity

Appendix 9: Follow-up teacher survey

MATHS THROUGH PICTURE BOOKS

Follow-up survey

Welcome to our follow-up survey to the Maths Through Picture Books (MTPB) programme. We are inviting all Teaching Assistants (TAs) and teachers who have taken part in the MTPB pilot to complete this survey. The survey should take around **15-20 minutes** to complete.

This is the first of two surveys that will be used to help us understand how well the MTPB programme has worked in schools. We will email to invite you to complete the second survey in October 2024, which will be approximately 5 minutes long.

There are no right or wrong answers – we are interested in how the programme works and how useful it has been. Please answer as honestly as you can. Your responses will only be visible to the evaluation team at Oxford MeasurEd.

You can find out more about our evaluation and the surveys in the email we sent you inviting you to take part in the survey. You can find out more about how we will use your data in the privacy notice.

If you have any questions or concerns about the evaluation, please contact the Project Director, Lydia Marshall, at **mailto:**MTPB@oxfordmeasured.co.uk.

Q1 Please enter the unique ID assigned to you. You can find this in the email which contained the link to this survey.

Q2 Are you happy to continue?
Yes >> Q3
No

Thank you – opt out

Thank you for your interest in the evaluation. If you change your mind about taking part in the survey, you can come back using the same link to complete the survey.

CHILD SELECTION

First, we want to ask for your feedback on the child selection task for the MTPB programme.

Q3 Did you receive guidance from the MTPB delivery team on how to use the **Give-N task** to select children for the MTPB programme?

- Yes >> Q4
- No >> Q6

Q4. Did you **follow that guidance** to select the children for the MTPB programme?

- Yes >> Q5

- No >> Why not? (text box on selecting) >> Q6

Q5. How **useful** would you say was the guidance for child selection in selecting children for the MTPB programme?

- Not useful at all
- Somewhat useful
- Useful
- Very useful

Q6. Looking back now, would you say the **right** children in your class were selected for the MTPB programme?

- No, none of the children selected were right for the programme
- Yes, some of the children selected were right for the programme
- Yes, all of the children selected were right for the programme

TRAINING AND SUPPORT

In this section, we want to know about how you found the training and support you received to deliver the MTPB programme.

Q7. What **training/support** did you access? Select all that apply.

- Full-day in-person professional development on 1st March 2024
- Implementation and support for colleagues online session on 7th March 2024
- Online drop-in support session on 21st March 2024
- Half-day in-person professional development on 14th June 2024
- None of these

Q8. How **useful** would you say the training and support from the MTPB delivery team (Fliss James and Melissa Prendergast) has been?

- Not useful at all
- Somewhat useful
- Useful
- Very useful

Q9. How **confident** would you say you felt about **planning the MTPB classroom sessions** after the initial training and support you received from the MTPB delivery team?

- Not at all
- Somewhat
- Quite a bit
- A lot

Q10. How much would you say you **understood** about **how the TA should deliver the MTPB classroom sessions** after the initial training and support you received from the MTPB delivery team?

- Not at all
- Somewhat
- Quite a bit
- A lot

Q11. How **confident** would you say you felt about **carrying out observations and sharing reflections with the TA** after the initial training and support you received from the MTPB delivery team?

- Not at all
- Somewhat
- Quite a bit
- A lot

Q12. Did anything make it **harder** for you to access the **training/support** from the MTPB delivery team? Select all that apply.

- Lack of support from the MTPB delivery team
- Lack of support from your Senior Leadership Team (SLT)
- Lack of resources
- Lack of time
- Other commitments/priorities
- Other, please specify

Q13. Did anything make it **easier** for you to access the **training/support** from the MTPB delivery team? Select all that apply.

- Support from the MTPB delivery team
- Support from your Senior Leadership Team (SLT)
- Resources (e.g., programme handbook, video exemplifications)
- Other, please specify

PLANNING

Next, we want to know about your experiences while planning the MTPB classroom sessions.

Q14. How often did you have **weekly planning sessions** with your TA throughout the 10-week period of the pilot?

- Every week
- At least every second week
- Fewer than every second week
- Only once or twice
- Never

Q15. How much time did you spend on **weekly planning sessions** on average?

- Less than 15 minutes
- 15 – 30 minutes
- 31 – 60 minutes
- More than 1 hour

Q16. Did anything make it **harder** to have the **weekly planning sessions**? Select all that apply.

- Lack of support from Senior Leadership Team (SLT)
- Lack of resources
- Lack of time
- Other commitments/priorities
- Other, please specify

Q17. Did anything make it **easier** to have the **weekly planning sessions**? Select all that apply.

- Support from Senior Leadership Team (SLT)
- Resources (e.g., programme handbook, video exemplifications)
- Other

DELIVERY

Now, we would like to learn about what the classroom delivery of MTPB looked like in your school. We want to know what worked in practice – so please answer honestly.

Q18. How often did **two** MTPB classroom sessions take place in a week throughout the 10-week period of the pilot?

- Every week
- At least every second week
- Fewer than every second week
- Only once or twice
- Never

Q19. Did the MTPB classroom sessions last for **20 minutes** each?

- No, they were less than 20 minutes long
- No, they were more than 20 minutes long
- No, they varied (sometimes less than and sometimes more than 20 minutes long)
- Yes, they were always 20 minutes long

Q20. Did the sessions run in **a dedicated, quiet space** away from the classroom?

- No, never
- Yes, sometimes
- Yes, always

Q21. In the classroom sessions you observed, did the TA deliver the programme using the **Share attention, Respond, Expand, Conversation (ShREC) framework**?

- No, never
- Yes, sometimes
- Yes, always

Q22. Do you think anything made it **harder** for the TA to **deliver** the MTPB classroom sessions? Select all that apply.

- Poor child selection
- Lack of support from Senior Leadership Team (SLT)
- Lack of resources
- Lack of time
- Other commitments/priorities
- Other, please specify

Q23. Do you think anything made it **easier** for the TA to **deliver** the MTPB classroom sessions? Select all that apply.

- Support from you
- Support from your Senior Leadership Team (SLT)
- Resources (e.g., programme handbook, video exemplifications)
- Other

IN-CLASS FEEDBACK AND COACHING

In this section, we would like to learn more about how the teacher-led observation and in-class feedback and coaching session took place.

Q24. Did you have **in-class feedback and coaching sessions** with your TA?

- Yes >> Q25
- No >> Q29
- Sometimes >> Q25

Q25. Did the **in-class feedback and coaching session sessions** with the TA take place on the **same day** as the observation you led?

- Yes
- No
- Once or twice

Q26. How much time did you spend on **in-class feedback and coaching sessions** with the TA on average?

- Less than 15 minutes
- 15 – 30 minutes
- 31 – 60 minutes
- More than 1 hour

Q27. Did anything make it **harder** to carry out the **in-class feedback and coaching sessions**? Select all that apply.

- Lack of support from your Senior Leadership Team (SLT)
- Lack of resources
- Lack of time
- Other commitments/priorities
- Other, please specify

Q28. Did anything make it **easier** to carry out the **in-class feedback and coaching sessions**? Select all that apply.

- Support from your Senior Leadership Team (SLT)
- Resources (e.g., programme handbook, video exemplifications)
- Other

OUTCOMES FOR TEACHERS AND TAs

Now, we want to ask you about any potential benefits and consequences for teachers and TAs as a result of taking part in the MTPB programme.

Q29. Has your own **understanding** of how children learn about numbers and operations improved as a result of taking part in the MTPB programme?

- No, not at all
- Yes, somewhat
- Yes, quite a bit
- Yes, a lot

Q30. Has your own **confidence** in teaching maths improved as a result of taking part in the MTPB programme?

- No, not at all
- Yes, somewhat
- Yes, quite a bit
- Yes, a lot

Q31. Would you say your **TA's understanding** of how children learn about numbers and operations improved as a result of taking part in the MTPB programme?

- No, not at all
- Yes, somewhat
- Yes, quite a bit
- Yes, a lot

Q32. Would you say your **TA's confidence** in teaching maths has improved as a result of taking part in the MTPB programme?

- No, not at all
- Yes, somewhat
- Yes, quite a bit
- Yes, a lot

Q33. Were there any **other benefits** for teachers and TAs as a result of taking part in the MTPB programme? Please specify.

Q34. Have you noticed any change in the **relationships** your TA has with the children in your class as a result of their involvement in the MTPB programme?

- No, not at all
- Yes, they have got a bit worse
- Yes, they have got a lot worse
- Yes, they have got a bit better
- Yes, they have got a lot better

Q35. Were there any **negative consequences** for teachers and/or TAs as a result of taking part in the MTPB programme? Please specify.

OUTCOMES FOR CHILDREN

Next, we want to ask you about the potential benefits and consequences for children as a result of taking part in the MTPB programme.

Q36 For how many of the children participating in the programme would you say their **enjoyment** of maths has increased as a result of taking part in the MTPB programme?

- None
- 1 or 2
- 3 or 4
- All of them

Q37. For how many of the participating children would you say their **motivation** towards learning maths has increased as a result of taking part in the MTPB programme?

- None
- 1 or 2
- 3 or 4
- All of them

Q38. Were there any **other benefits** for participating children as a result of taking part in the MTPB programme? Select all that apply.

- Improved social emotional learning
- Improved language and communication
- Improved child-adult relationships
- Other, please specify

Q39. Were there any **negative consequences** for participating children as a result of taking part in the MTPB programme? Select all that apply.

- Time away from other activities
- Stigma of being selected
- Feeling left out for not being selected
- Reduced enjoyment of maths
- Reduced motivation towards learning maths
- Other, please specify

Q40. Do you think any groups of participating children **benefitted more** from the MTPB programme than other participating children?

- Children with English as an Additional Language (EAL) benefitted more than others
- Children with Special Educational Needs (SEN) benefitted more than others
- Children entitled to Free School Meals (FSM) benefitted more than others
- Other group(s) benefitted more than others, please specify
- No group benefitted more

Q41. Do you think any groups of participating children **benefitted less** from the MTPB programme than other participating children?

- Children with English as an Additional Language (EAL) benefitted less than others
- Children with Special Educational Needs (SEN) benefitted less than others
- Children entitled to Free School Meals (FSM) benefitted less than others
- Other, please specify
- No group benefitted less

INTENTION TO SUSTAIN

We are interested in whether you will continue using some of the practices you have learned from the MTPB programme.

Q42. Do you intend to **continue** using any of the following practices now that the MTPB programme has ended? Select all that apply.

- Use of picture books to teach maths
- Use of ShREC technique
- Small-group reading of maths picture books to support children falling behind
- None of these

COSTS

We are now interested in finding out if you, as an individual, incurred any costs as a result of taking part in the programme. Please do **NOT** include the costs incurred by the school, e.g., the cost of a cover while you attended training.

Q43. Did you face any costs for taking part in and delivering the programme?

- Yes >> Q44
- No >> Q46

Q44. Please list the costs you incurred.

Q45. How much did you spend in total?

_____

SCHOOL INFORMATION

Finally, we want to ask some information about how maths is normally taught at your school.

Q46. How **different** is the MTPB programme to how maths is normally taught to reception-age children?

- Very different
- Somewhat different
- Somewhat similar
- Very similar

Q47. Why?

Q48. Is your school currently involved in any **other** early years maths programmes?

- Yes, please specify
- No
- Don't know

Thank you

Thank you for completing this survey. Your answers will be really valuable to the evaluation and we appreciate your time.

If you have any questions, please contact the project director, Lydia Marshall, at **mailto:**MTPB@oxfordmeasured.co.uk.

Appendix 10: Follow-up TA survey

MATHS THROUGH PICTURE BOOKS

Follow-up survey

Welcome to our follow-up survey to the Maths Through Picture Books (MTPB) programme. We are inviting all Teaching Assistants and teachers who have taken part in the MTPB pilot to complete this survey. The survey should take around **15 minutes** to complete.

This is the first of two surveys that will be used to help us understand how well the MTPB programme has worked in schools. We will email to invite you to complete the second survey in October 2024, which will be approximately 5 minutes long.

There are no right or wrong answers – we are interested in how the programme works and how useful it has been. Please answer as honestly as you can. Your responses will only be visible to the evaluation team at Oxford MeasurEd.

You can find out more about our evaluation and the surveys in the email we sent you inviting you to take part in the survey. You can find out more about how we will use your data in the privacy notice.

If you have any questions or concerns about the evaluation, please contact the Project Director, Lydia Marshall, at **mailto:**MTPB@oxfordmeasured.co.uk.

Q1 Please enter the unique ID assigned to you. You can find this in the email which contains the link to this survey.

Q2 Are you happy to continue?
Yes >> Q3
No

Thank you – opt out

Thank you for your interest in the evaluation. If you change your mind about taking part in the survey, you can come back using the same link to complete the survey.

TRAINING AND SUPPORT

In this section, we want to know about how you found the training and support you received to deliver the MTPB programme at your setting.

Q3. What **training/support** did you access? Select all that apply.

- Full-day in-person professional development on 1st March 2024
- Online drop-in support session on 21st March 2024
- Half-day in-person professional development on 14th June 2024
- None of these

Q4. How **useful** would you say the training and support from the MTPB delivery team (Fliss James and Melissa Prendergast) has been?

- Not useful at all
- Somewhat useful
- Useful
- Very useful

Q5. How **confident** would you say you felt about **planning the MTPB classroom sessions** after the initial training and support you received from the MTPB delivery team?

- Not at all
- Somewhat
- Quite a bit
- A lot

Q6. How much would you say you **understood** about **how you should deliver the MTPB classroom sessions** after the initial training and support you received from the MTPB delivery team?

- Not at all
- Somewhat
- Quite a bit
- A lot

Q7. Did anything make it **harder** for you to **access the training/support** from the MTPB delivery team? Select all that apply.

- Lack of support from the MTPB delivery team
- Lack of support from your Senior Leadership Team (SLT)
- Lack of resources
- Lack of time
- Other commitments/priorities
- Other, please specify

Q8. Did anything make it **easier** for you to **access the training/support** from the MTPB delivery team? Select all that apply.

- Support from the MTPB delivery team
- Support from your Senior Leadership Team
- Resources (e.g., programme handbook, video exemplifications)
- Other, please specify

PLANNING

Next, we want to know about your experiences while planning the MTPB classroom sessions.

Q9. How often did you have the **weekly planning sessions** with your teacher throughout the 10-week period of the pilot?

- Every week
- At least every second week
- Fewer than every second week
- Only once or twice
- Never

Q10. How much time did you spend on **weekly planning sessions** on average?

- Less than 15 minutes
- 15 – 30 minutes
- 31 – 60 minutes
- More than 1 hour

Q11. How **useful** would you say was the support you received from the teacher in planning sessions?

- Not useful at all
- Somewhat useful
- Useful
- Very useful

Q12. Did anything make it **harder** to have the **weekly planning sessions**? Select all that apply.

- Lack of support from teacher
- Lack of support from Senior Leadership Team (SLT)
- Lack of resources
- Lack of time
- Other commitments/priorities
- Other, please specify

Q13. Did anything make it **easier** to have the **weekly planning sessions**? Select all that apply.

- Support from teacher
- Support from Senior Leadership Team (SLT)
- Resources (e.g., programme handbook, video exemplifications)
- Other

DELIVERY

Now, we want to learn about what the classroom delivery of MTPB looked like in your school. We want to know what worked in practice – so please answer honestly.

Q14. How often did **two** MTPB classroom sessions take place in a week throughout the 10-week period of the pilot?

- Every week
- At least every second week
- Fewer than every second week
- Only once or twice
- Never

Q15. Did the MTPB classroom sessions last for **20 minutes** each?

- No, they were less than 20 minutes long
- No, they were more than 20 minutes long
- No, they varied (sometimes less than and sometimes more than 20 minutes long)
- Yes, they were always 20 minutes long

Q16. Did the sessions run in **a dedicated, quiet space** away from the classroom?

- No, never
- Yes, sometimes
- Yes, always

Q17. Did you deliver the MTPB classroom session using the **Share attention, Respond, Expand, Conversation (ShREC) framework**?

- No, never
- Yes, sometimes
- Yes, always

Q18. Do you think anything made it **harder** for you to **deliver** the MTPB classroom sessions? Select all that apply.

- Poor child selection
- Lack of support from teacher
- Lack of support from Senior Leadership Team (SLT)
- Lack of resources
- Lack of time
- Other commitments/priorities
- Other, please specify

Q19. Do you think anything made it **easier** for you to **deliver** the MTPB classroom sessions? Select all that apply.

- Support from your teacher
- Support from your Senior Leadership Team (SLT)
- Resources (e.g., programme handbook, video exemplifications)
- Other, please specify

IN-CLASS FEEDBACK AND COACHING SESSIONS

In this section, we would like to learn more about how the teacher-led observation and Teacher-TA reflection sessions took place.

Q20. Did you have **in-class feedback and coaching sessions** with the teacher?

- Yes >> Q21
- No >> Q26
- Sometimes >> Q21

Q21. Did the **in-class feedback and coaching session** with the teacher take place on the **same day** as the observation by teacher?

- Yes
- No
- Sometimes

Q22. How much time did you spend on the **in-class feedback and coaching session** with the teacher on average?

- Less than 15 minutes
- 15 – 30 minutes
- 31 – 60 minutes
- More than 1 hour

Q23. How **useful** would you say were the **in-class feedback and coaching sessions** from the teacher?

- Not useful at all
- Somewhat useful
- Useful
- Very useful

Q24. Did anything make it **harder** to carry out the **in-class feedback and coaching sessions**? Select all that apply.

- Lack of support from your Senior Leadership Team (SLT)
- Lack of resources
- Lack of time
- Other commitments/priorities
- Other, please specify

Q25. Did anything make it **easier** to carry out the **in-class feedback and coaching sessions**? Select all that apply.

- Support from your Senior Leadership Team (SLT)
- Resources (e.g., programme handbook, video exemplifications)
- Other

OUTCOMES FOR TAs

Now, we want to ask you about any potential benefits and consequences for you as a TA as a result of taking part in the MTPB programme.

Q26. Has your own **understanding** of how children learn about numbers and operations improved as a result of taking part in the MTPB programme?

- No, not at all
- Yes, somewhat
- Yes, quite a bit
- Yes, a lot

Q27. Has your own **confidence** in teaching maths improved as a result of taking part in the MTPB programme?

- No, not at all
- Yes, somewhat
- Yes, quite a bit
- Yes, a lot

Q28. Were there any **other benefits** for you as a TA as a result of taking part in the MTPB programme? Please specify.

Q29. Have you noticed any change in your **relationships** with children in your class as a result of taking part in the MTPB programme?

- No, not at all
- Yes, they have got a bit worse
- Yes, they have got a lot worse
- Yes, they have got a bit better
- Yes, they have got a lot better

Q30. Were there any **negative consequences** for you as a TA as a result of taking part in the MTPB programme? Please specify.

OUTCOMES FOR CHILDREN

Next, we want to ask you about the potential benefits and consequences for children as a result of taking part in the MTPB programme.

Q31. For how many of the participating children would you say their **enjoyment** of maths has increased as a result of taking part in the MTPB programme?

- None
- 1 or 2
- 3 or 4
- All of them

Q32. For how many of the participating children would you say their **motivation** towards learning maths has increased as a result of taking part in the MTPB programme?

- None
- 1 or 2
- 3 or 4
- All of them

Q33. Were there any **other benefits** for participating children as a result of taking part in the MTPB programme? Select all that apply.

- Improved social emotional learning
- Improved language and communication
- Improved child-adult relationships
- Other, please specify

Q34. Were there any **negative consequences** for participating children as a result of taking part in the MTPB programme? Select all that apply.

- Time away from other activities
- Stigma of being selected
- Feeling left out for not being selected
- Reduced enjoyment of maths
- Reduced motivation towards learning maths
- Other, please specify

Q35. Do you think any groups of participating children **benefitted more** from the MTPB programme than other participating children? Select all that apply.

- Children with English as an Additional Language (EAL) benefitted more than others
- Children with Special Educational Needs (SEN) benefitted more than others
- Children entitled to Free School Meals (FSM) benefitted more than others

- Other group(s) benefitted more than others, please specify

Q36. Do you think any groups of participating children **benefitted less** from the MTPB programme than other participating children? Select all that apply.

- Children with English as an Additional Language (EAL) benefitted less than others
- Children with Special Educational Needs (SEN) benefitted less than others
- Children entitled to Free School Meals (FSM) benefitted less than others
- Other, please specify

INTENTION TO SUSTAIN

We are interested in whether you will continue using some of the practices you have learned from the MTPB programme.

Q37. Do you intend to **continue** using any of the following practices now that the MTPB programme has ended? Select all that apply.

- Use of picture books to teach maths
- Use of ShREC technique
- Small-group reading of maths picture books to support children falling behind

COSTS

We are now interested in finding out if you, as an individual, incurred any costs as a result of taking part in the programme. Please do **NOT** include the costs incurred by the school, e.g., the cost of a cover while you attended training.

Q38. Did you face any costs for taking part in and delivering the programme?

- Yes >> Q39
- No >> Q41

Q39. Please list the costs you incurred.

Q40. How much did you spend in total?

SCHOOL INFORMATION

Finally, we want to ask some information about how maths is normally taught at your school.

Q41. How **different** is the MTPB programme to how maths is taught normally to reception-age children?

- Very different
- Somewhat different
- Somewhat similar
- Very similar

Q42. Why?

Q43. Is your school currently involved in any **other** early years maths programmes?

- Yes, please specify
- No
- Don't know

Thank you

Thank you for completing this survey. Your answers will be really valuable to the evaluation and we appreciate your time.

If you have any questions, please contact the Project Director, Lydia Marshall, at **mailto:**MTPB@oxfordmeasured.co.uk.

Appendix 11: Longitudinal survey

MATHS THROUGH PICTURE BOOKS

Follow-up survey

Welcome to our follow-up survey of the Maths Through Picture Books (MTPB) programme. We are inviting all Teaching Assistants (TAs) and teachers who took part in the MTPB pilot to complete this survey. The survey is very short and should take you around **2-3 minutes** to complete.

There are no right or wrong answers – we are interested in how useful the programme has been for you and whether you have continued with any of the practices from the programme. Please answer as honestly as you can. Your responses will only be visible to the evaluation team at Oxford MeasurEd. You can find out more about how we will use your data in the privacy notice.

If you have any questions or concerns about the evaluation, please contact the Project Director, Lydia Marshall, at **mailto:**MTPB@oxfordmeasured.co.uk.

Q1 Please enter the unique ID assigned to you. You can find this in the email which contained the link to this survey.

Q2 Are you happy to continue?
Yes >> Q3
No

Q3 What was your role when you took part in the MTPB programme?

- Teacher
- TA >> Do not display Q8 – Q10

Thank you – opt out

Thank you for your interest in the evaluation. If you change your mind about taking part in the survey, you can come back using the same link to complete the survey.

OUTCOMES FOR PRACTITIONERS

First, we want to ask you about how you currently feel about teaching maths.

Q4. Has your own **understanding** of how children learn about numbers and operations improved **as a result of** taking part in the MTPB programme?

- No, not at all
- Yes, somewhat
- Yes, quite a bit
- Yes, a lot

Q5. And would you say your understanding of how children learn about numbers and operations has **changed** since **after the end of** the MTPB programme (i.e. since June this year)?

- No, it has stayed the same
- Yes, it has got better
- Yes, it has got worse

Q6. Has your own **confidence** in teaching maths improved **as a result of** taking part in the MTPB programme?

- No, not at all
- Yes, somewhat
- Yes, quite a bit
- Yes, a lot

Q7. And would you say your confidence in teaching maths has **changed** since **after the end of** the MTPB programme (i.e. since June this year)?

- No, it has stayed the same
- Yes, it has got better
- Yes, it has got worse

Q8. We are also interested in your TA's understanding and confidence. Do you still work closely with the TA who took part in the MTPB programme with you?

- Yes >> Go to Q9
- No >> Go to Q11

Q9. Would you say your **TA's understanding** of how children learn about numbers and operations has improved **as a result of** taking part in the MTPB programme?

- No, not at all
- Yes, somewhat
- Yes, quite a bit
- Yes, a lot

Q10. Would you say your **TA's confidence** in teaching maths has improved **as a result of** taking part in the MTPB programme?

- No, not at all
- Yes, somewhat
- Yes, quite a bit
- Yes, a lot

SUSTAINED PRACTICE

We are interested in whether you have continued using some of the practices you learned from the MTPB programme.

Q11. Have you **continued** using any of the following practices now that the MTPB programme has ended? Select all that apply.

- Use of picture books to teach maths
- Use of ShREC technique
- Small-group reading of maths picture books to support children falling behind
- None of these

Q12. 4 months after the MTPB programme ended, is there **anything else you would like to tell us** about how you feel about the programme and any changes it might have led to?

Thank you

Thank you for completing this survey. Your answers will be really valuable to the evaluation and we appreciate your time.

If you have any questions, please contact the Project Director, Lydia Marshall, at **mailto:**MTPB@oxfordmeasured.co.uk.

Appendix 12: Survey results tables

Table 1 Training attendance rates from programmatic data

	Teacher*	TA**	Total***
Training attendance	**Freq.** ***Percent***	**Freq.** ***Percent***	**Freq.** ***Percent***
Full day in person	19	17	36
	100	*89*	*95*
Online implementation for teachers	17	N/A	17
	89	*N/A*	*89*
Final half-day in-person	17	15	32
	89	*79*	*84*

***Base:** All participating teachers (*n*=19)
****Base:** All participating TAs (*n*=19)
*****Base:** All participants (*n*=38)
Source: Programmatic data
Some values have been suppressed to reduce the risk of disclosure

Table 2 Planning session fidelity

How often do you have weekly planning sessions with your teacher?	Freq ***Percent***
Every second week or less*	4
	15
Every week	22
	85
Total	26
	100

Base: All respondents of the post-delivery survey (*n*=26)
Source: Post-delivery survey
**This includes the following responses: “At least every second week”, “Fewer than every second week”, “Only once or twice” and “Never”.
Some values have been suppressed to reduce the risk of disclosure

Table 3 Reflection session fidelity

Did you have in-class feedback and coaching sessions with the teacher?	**Freq** ***Percent***
Sometimes or No	8
	31
Yes	18
	69
Total	26
	100
Did the in-class feedback and coaching session with the teacher take place on the same day?	**Freq** ***Percent***
Sometimes or No	9
	37
Yes	15
	63
Total	24
	100

Base: All respondents of the post-delivery survey (*n*=26)
Source: Post-delivery survey
Some values have been suppressed to reduce the risk of disclosure

Table 4 Classroom delivery fidelity

Did the MTPB classroom sessions last for 20 minutes each?	**Freq** ***Percent***
No*	11
	42
Yes, they were always 20 minutes long	15
	58
Did the sessions run in a dedicated, quiet space away from the classroom?	
Not always**	4
	15
Yes, always	22
	85
Total	26
	100

Base: All respondents of the post-delivery survey (*n*=26)
Source: Post-delivery survey
*This includes the following responses: “No, they were more than 20 minutes long”, “No, they were less than 20 minutes long” and “No, they varied (sometimes less than and sometimes more than 20 minutes long)”
**This includes the following responses: “Yes, sometimes” and “No, never”
Some values have been suppressed to reduce the risk of disclosure
First row has *frequencies,* and second row has *percentages of total n*

Table 5 Classroom delivery fidelity

Did you deliver the MTPB classroom session using the ShREC approach?	Freq *Percent*
Not always*	4
	15
Yes, always	22
	85
Total	26
	100

Base: All respondents of the post-delivery survey (*n*=26)
Source: Post-delivery survey
*This includes the following responses: “Yes, sometimes” and “No, never”
Some values have been suppressed to reduce the risk of disclosure

Table 6 Facilitators to training

Did anything make it easier for you to access the training/support?		Freq. *Percent*
Support from DT	Yes	17
		65
	No	9
		35
Support from SLT	Yes	7
		27
	No	19
		73
Availability of resources	Yes	18
		69
	No	8
		31

Base: All respondents of the post-delivery survey (*n*=26)
Source: Post-delivery survey
First row has *frequencies,* and second row has *percentages of total n*

Table 7 Lack of time as a barrier to training

Did anything make it harder for you to access the training/support?	Freq. *Percent*
Yes	11
	42
No	15
	58
Total	26
	100

Base: All respondents of the post-delivery survey (*n*=26)
Source: Post-delivery survey
Other barriers have been suppressed to reduce the risk of disclosure

Table 8 Support from SLT as a facilitator to training

Support from SLT as a facilitator to training	**Freq** ***Percent***
Yes	7
	28
No	18
	72
Total	25
	100

Base: All respondents of the post-delivery survey who responded to this question (*n*=25)
Source: Post-delivery survey
Other facilitators have been suppressed to reduce the risk of disclosure

Table 9 Barriers to planning

Barriers to planning		**Freq.** ***Percent***
Other commitments	Yes	5
		19
	No	*21*
		81
Lack of time	Yes	17
		65
	No	9
		35

Base: All respondents of the post-delivery survey (*n*=26)
Source: Post-delivery survey
Other barriers have been suppressed to reduce the risk of disclosure
First row has *frequencies,* and second row has *percentages of total n*

Table 10 Resources as a facilitator to planning

Resources as a facilitator to planning	**Freq.** **Percent**
Yes	14
	54
No	12
	46
Total	25
	100

Base: All respondents of the post-delivery survey for whom background information available (*n*=25)
Source: Post-delivery survey
Other facilitators have been suppressed to reduce the risk of disclosure

Table 11 Lack of time as a barrier to reflection

Lack of time as a barrier to reflection	Freq. *Percent*
Yes	15
	63
No	9
	37
Total	24
	100

Base: All respondents of the post-delivery survey who responded to this question (*n*=24)
Source: Post-delivery survey
Other barriers have been suppressed to reduce the risk of disclosure

Table 12 Facilitators to reflection

Did anything make it easier to carry out the in-class feedback and coaching sessions?		Freq. *Percent*
Support from SLT	Yes	5
		21
	No	19
		79
Resources	Yes	13
		54
	No	11
		46

Base: All respondents of the post-delivery survey who responded to this question (*n*=24)
Source: Post-delivery survey
Other facilitators have been suppressed to reduce the risk of disclosure
First row has *frequencies,* and second row has *percentages of total n*

Table 13 Lack of time as a barrier to delivery

	Freq. *Percent*
Yes	9
	35
No	17
	65
Total	26
	100

Base: All respondents of the post-delivery survey (n=26)
Source: Post-delivery survey
Other barriers have been suppressed to reduce the risk of disclosure

Table 14 Facilitators to delivery

		Freq. *Percent*
Support from SLT	Yes	4
		15
	No	22
		85
Resources	Yes	14
		54
	No	12
		46

Base: All respondents of the post-delivery survey (*n*=26)
Source: Post-delivery survey
Other facilitators have been suppressed to reduce the risk of disclosure
First row has *frequencies,* and second row has *percentages of total n*

Table 15 Pupil selection

Did you receive guidance from the MTPB delivery team on how to use the Give-N task?	**Freq.** ***Percent***
Yes	16
	100
No	0
	0
Total	16
	100
Did you follow that guidance to select the children for the MTPB programme?	
Yes	16
	100
No	0
	0
Total	16
	100

Base: All teachers responding to the post-delivery survey (*n*=16)
Source: Post-delivery survey
First row has *frequencies,* and second row has *column percentages*

Table 16 Usefulness of pupil selection guidance

How useful would you say was the guidance for child selection?	**Freq.** ***Percent***
Not useful at all	0
	0
Useful or Somewhat useful	9
	56
Very useful	7
	44
Total	16
	100

Base: All teachers responding to the post-delivery survey (*n*=16)
Source: Post-delivery survey
Some values have been suppressed to reduce the risk of disclosure

Table 17 Pupil suitability

Looking back now, would you say the right children in your class were selected for the programme?	Freq. *Percent*
No, none of the children selected were right for the programme	0
	0
Yes, some of the children selected were right for the programme	6
	37
Yes, all the children selected were right for the programme	10
	63
Total	16
	100

Base: All teachers responding to the post-delivery survey (*n*=16)
Source: Post-delivery survey

Table 18 Confidence to plan following training

How useful would you say the training and support from the MTPB delivery team was?	Freq. *Percent*
Not at all	0
	0
Somewhat	0
	0
Quite a bit	15
	58
A lot	11
	42
Total	26
	100

Base: All respondents to the post-delivery survey (*n*=26)
Source: Post-delivery survey

Table 19 Understanding of how to deliver following training

How much would you say you understood about how you should deliver the MTPB classroom session following the training?	Freq. *Percent*
Not at all	0
	0
Somewhat	0
	0
Quite a bit	7
	27
A lot	19
	73
Total	26
	100

Base: All respondents to the post-delivery survey (*n*=26)
Source: Post-delivery survey

Table 20 Confidence to observe following training

How confident would you say you felt about carrying out observations and sharing feedback following the initial training?	Freq. *Percent*
Not at all	0
	0
Somewhat	8
	50
Quite a bit or A lot	8
	50
Total	16
	100

Base: All teachers responding to the post-delivery survey (*n*=16)
Source: Post-delivery survey

Table 21 WhatsApp sign-ups

WhatsApp sign-ups	Freq. *Percent*
Teachers*	19
	100
TAs**	15
	79
Overall***	34
	89

***Base:** All participating teachers (*n*=19)
****Base:** All participating TAs (*n*=19)
*****Base:** All participants (*n*=38)
Source: Programmatic data
First row has *frequencies,* and second row has *percentages of total n*

Table 22 Time spent on planning sessions

How much time did you spend on weekly planning sessions on average?	Freq. *Percent*
15-30 minutes	18
	69
Less than 15 minutes or more than 30 minutes*	8
	31
Total	26
	100

Base: All respondents of the post-delivery survey (*n*=26)
Source: Post-delivery survey
*This includes the following responses: “Less than 15 minutes”, “31-60 minutes” and “More than 1 hour”
Some values have been suppressed to reduce the risk of disclosure

Table 23 Time spent on reflection sessions

How much time did you spend on weekly planning sessions on average?	Freq. *Percent*
15-30 minutes	19
	79
Less than 15 minutes or more than 30 minutes*	5
	21
Total	24
	100

Base: All respondents of the post-delivery survey who responded to this question (*n*=24)
Source: Post-delivery survey
*This includes the following responses: “Less than 15 minutes”, “31-60 minutes” and “More than 1 hour”
Some values have been suppressed to reduce the risk of disclosure

Table 24 Overall practitioner understanding

Has your own understanding of how children learn about numbers and operations improved?	Freq. *Percent*
No, not at all	0
	0
Yes, somewhat	4
	15
Yes, quite a bit	13
	50
Yes, a lot	9
	35
Total	26
	100

Base: All respondents to the post-delivery survey (*n*=26)
Source: Post-delivery survey

Table 25 Outcome averages for practitioner understanding

Variable	Mean	Std. Dev.	Min	Max
Teacher-reported TA understanding*	2.375	.719	1	3
Self-reported TA understanding**	2	.667	1	3
Self-reported teacher understanding*	2.312	.704	1	3

***Base:** All teachers responding to the post-delivery survey (*n*=16)
****Base:** All TAs responding to the post-delivery survey (*n*=10)
Source: Post-delivery survey

Table 26 Overall practitioner confidence

Has your own confidence in teaching maths improved?	Freq. *Percent*
No, not at all	0
	0
Yes, somewhat	5
	20
Yes, quite a bit	10
	40
Yes, a lot	10
	40
Total	25
	100

Base: All respondents to the post-delivery survey responding to this question (*n*=25)
Source: Post-delivery survey

Table 27 Outcome averages for practitioner confidence

Variable	Mean	Std. Dev.	Min	Max
Teacher-reported TA confidence*	2.5	.632	1	3
Self-reported TA confidence**	2.2	.789	1	3
Self-reported teacher confidence*	2.2	.775	1	3

***Base:** All teachers responding to the post-delivery survey (*n*=16)
****Base:** All TAs responding to the post-delivery survey (*n*=10)
Source: Post-delivery survey

Table 28 Child outcomes

For how many of the participating children would you say their enjoyment of maths has improved?	Freq. *Percent*
None	0
	0
1 or 2	0
	0
3 or 4	10
	38
All of them	16
	62
Total	26
	100
For how many of the participating children would you say their motivation towards learning maths has improved?	**Freq. *Percent***
None	0
	0
1 or 2	0
	0
3 or 4	11
	44
All of them	14
	56
Total	25
	100

Base: All respondents of the post-delivery survey responding to this question (*n*=26 or 25)
Source: Post-delivery survey

Table 29 Differential child outcomes

	Benefitted more or less	
Do you think any groups of participating children benefitted more/less from the MTPB programme?*		**Freq. *Percent***
Children with EAL	Yes	18
		69
	No	8
		31
Children with SEN	Yes	6
		23
	No	20
		77

Base: All respondents of the post-delivery survey *(n*=26)
Source: Post-delivery survey
*The survey asked for whether any groups of participating children benefitted more or less from the MTPB programme separately. Results have been combined here to reduce the risk of disclosure
First row has *frequencies,* and second row has *percentages of total n*

Table 30 Unintended consequences

Unintended consequences		**Freq** ***Percent***
Improved SEL	Yes	17
		65
	No	9
		35
Improve language and communication	Yes	26
		100
	No	0
		0
Improved child-adult relationships	Yes	21
		81
	No	5
		19

Base: All respondents of the post-delivery survey (*n*=26)
Source: Post-delivery survey

Table 31 Negative unintended consequences

Negative unintended consequences		**Freq.** **Percent**
Time away from other activities	Yes	4
		16
	No	21
		84

Base: All respondents of the post-delivery survey who responded to this question (*n*=25)
Source: Post-delivery survey
Some values have been suppressed to reduce the risk of disclosure

Table 32 Difference to business as usual

How different is the MTPB programme to how maths is taught normally to reception?	**Freq.** ***Percent***
Similar*	9
	35
Somewhat different	10
	38
Very different	7
	27
Total	26
	100

Base: All respondents of the post-delivery survey (*n*=26)
Source: Post-delivery survey
*This includes the following responses: “Somewhat similar” and “Very similar”
Some values have been suppressed to reduce the risk of disclosure

Appendix 13: Original TiDIER checklist

BRIEF NAME

Maths Through Picture Books (MTPB)

WHY

In Maths, the gap between low and high attainers in England is very wide by international standards (Ofsted, 2021). Gaps that are apparent by the end of Early Years double by the end of primary school. Most children do not catch up by the end of compulsory education and this is particularly true for disadvantaged children (EEF, 2018). There is evidence for the need to develop practitioners' understanding of how children learn mathematics, including knowledge of mathematics, children's mathematical development, and effective mathematical pedagogy (EEF, 2021a). Studies also show the significant positive impact of using teaching assistants (TAs) to provide one-to-one or small group intensive support using structured interventions (EEF, 2021b; Higgins et al., 2013; Nicoletti and Rabe, 2014).

There is a small but growing body of evidence to support the use of storybooks to teach mathematics, most of it involving the specific use of talk. The Education Endowment Foundation (EEF)'s evidence review of Early Years and Key Stage 1 Mathematics Teaching identified this as a promising approach, with six studies providing a large positive aggregate effect. All included studies conducted in early years settings involved the use of specially chosen or designed storybooks and involved guidance to support mathematical talk and educator questioning (Casey et al., 2008; Hassinger-Das et al., 2015; Purpura et al., 2017; van den Heuvel-Panhuizen et al., 2016).

The aim of the programme is to equip reception teachers and TAs with:

- improved knowledge of how children learn number and operations
- the knowledge and skills to engage a small group of targeted children in sustained multi-turn conversations about number and operations using picture books and the 'ShREC approach' (see below)

For children, the programme aims to:

- improve enjoyment of and motivation towards learning mathematics among children
- have children talk about number and operations during the intervention

WHAT

Procedures: In each school one TA and one teacher will be trained by the team from the East London Research School (ELRS). Training will involve a full-day in-person training in February 2024 and a half-day in-person training in June 2024. Training will include a focus on how children learn about number and operations, interactive reading, the EEF's Improving Mathematics in the Early Years and Key Stage 1 guidance report and embedding techniques in wider classroom practice. Additionally, during the ten-week intervention period, there will be an online session for teachers on supporting their TAs, and an online drop-in session for all teachers and TAs to support delivery. Attendance at the online session for teachers will be recorded by ELRS and teachers directed to watch the recording of the session if they are unable to attend.

TAs run 20-minute sessions doing dialogic book reading with a set of nine specially chosen maths-focused picture books, supported by semi- structured prompts for the TA. Conversations are structured using the ShREC framework. The aim of the ShREC framework is to provide early years practitioners with a simple and memorable set of evidence-informed strategies that can be embedded into everyday practice (EEF 2022b). This includes:

- **Sh**aring attention – being at the child's level and paying attention to what they are focused on

- **R**espond – following the child's lead and responding to their non-verbal and verbal communications
- **E**xpand – repeating what the child says and building on it by adding more words to turn it into sentences
- **C**onversation – having extended back and forth interactions and giving children time to listen, process and reply

The TA and teacher will have weekly planning meetings to ensure fidelity to the programme and consistency between the targeted sessions and wider classroom practice. At each planning meeting, the TA and teacher will reflect on the previous week's sessions, recording children's attendance, any challenges, and child-specific reflections. They will then prepare for the following week's sessions by looking through the new book, reading the scaffold and discussing the sessions in advance. This will include identifying the mathematical focus of the sessions and using the ShREC framework to structure potential conversations, as well as discussing what the TA will be intentionally focusing on for each child. Finally, they will think through links to the classroom and opportunities to revisit, reinforce and rehearse the mathematical focus in wider practice. The teacher will model the sessions if required. This will all be recorded on a planning template that will be uploaded to the school's secure Google Drive. The TA and teacher have the option of a) typing the information directly into the planning template in the secure Google Drive or b) printing out a planning template, filling it in by hand, then scanning and uploading it to the Google Drive.

During delivery, teachers will observe the TA delivering the programme three times (in Weeks 1, 4 and 10). Teachers will use the ShREC framework while they are observing the session and make notes in an observation template. The teacher will have a professional conversation with the TA on the same day, providing feedback and supporting the TA to reflect on the session using the ShREC framework. Teachers will use techniques that they have been taught in the module on implementation and support for colleagues. Their joint reflections will be recorded on the observation template and uploaded into the school's secure Google Drive.

Materials: Schools are provided with resources to support delivery and two sets of nine books for classroom use (one for the intervention and one for use in the classroom outside of the intervention). Resources include a programme handbook, planning template, observation template, ShREC framework, video exemplification and the picture book scaffolds. All resources, templates and frameworks will be found in the handbook and on Padlet.

WHO PROVIDED

ELRS will provide the training and support for schools. Fliss James and Melissa Prendergast are highly experienced early years teachers and leaders. They have significant expertise in designing and delivering high quality evidence-informed professional development. TAs will deliver the in-school intervention sessions, supported by teachers.

HOW

The intervention is delivered face-to-face to groups of five children who teachers have identified as requiring extra support. To select children for the pilot, the participating teacher will carry out a short activity based on the Give-N task (see Appendix 3),[4] with all children in the reception class. This activity will enable the teachers to identify children who have not yet developed a secure understanding of cardinality, i.e., being able to count numbers in a set. Teachers are provided with a Padlet which contains guidance on how to carry out the activity and an observation grid for recording the key information (see Appendix 3). Where teachers identify

[4] The Give-N task is widely used in the field of Developmental Psychology to indicate young children's knowledge or use of the cardinality principle, wherein the last number word used in the counting process indicates the total number of items in a collection (see Baroody and Lay 2022).

more than five children who find the task challenging, they are encouraged to use their professional judgement and knowledge of each individual child to select those children they believe would benefit most from the programme.

WHERE

MTPB sessions run in a dedicated, quiet space away from the classroom. The participating schools need to be big enough to support this requirement.

To enable the in-person training and to cover a diverse sample, the delivery will be in primary schools in London Boroughs of Redbridge, Havering, and Newham and in Essex.

WHEN and HOW MUCH

MTPB sessions are delivered twice per week for ten weeks. The sessions will last for 20 minutes and will happen at the same time every week.

TAILORING

The intervention should be delivered as intended without any significant adaptations being made.

MODIFICATIONS

During a formative evaluation of the programme's early-stage development work, some alterations were found to be made in classrooms, such as including manipulatives[5] in the small group reading sessions, that have highlighted the need to be more explicit in the communications around acceptable adaptation by the delivery team. Some elements of the programme are flexible, such as the day the sessions are held, the addition of extra sessions to share the same book and sending the book home or adding it to the class library. The evaluation will monitor any adaptations being made.

HOW WELL

In the first training session, ELRS will systematically talk though the programme using a simple logic model, ensuring that participants have a clear understanding. Participants will understand where there is room for them to make adaptations and the aspects of the programme that must always be present. The handbook and Padlet will provide step by step instructions and support so that schools can run the programme with fidelity. ELRS will monitor the fidelity with which the programme is delivered each week using the planning templates that TAs and teachers will be submitting. This will enable ELRS to identify practice that is in line with expectations, identify barriers, and provide support as appropriate.

[5] Mathematical manipulatives are artifacts used in mathematics education, enabling children to explore or investigate mathematical concepts or processes and to perform problem-solving activities. An example is plastic blocks that click together, often used to learn addition and subtraction. Images of these are included in one of the storybooks and practitioners have improvised to include real-life blocks while conversing with children.

Appendix 14: Overview of selected books

This document is available for download at https://educationendowmentfoundation.org.uk

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