

Protocol for evaluation of 'Maths Counts for Teaching Assistants'

Evaluation Team

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Project Team

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EVALUATION SUMMARY

Evaluation Summary	
Age range	Year 3 to Year 6
Number of pupils	540
Number of schools	30 primary
Design	Randomised controlled trial, with randomisation at the individual level within school
Primary Outcome	Post test scores on GL Assessment Progress Test in Maths

BACKGROUND

The project to be evaluated is an intervention called 'Maths Counts for Teaching Assistants' developed by Mead Community Primary School. The intervention is a progression from the Numbers Counts Programme, developed by Edge Hill University, working in partnership with Lancashire County Council.

Numbers Count is delivered by specially trained teachers to children, usually in KS1, who find mathematics extremely difficult and may not reach Level 3 at the end of Key Stage 2. It is intended to help them to get back on track and catch up with their peers. Over 50,000 children have taken part in Numbers Count since 2008. A Numbers Count teacher receives intensive training and support for 2 terms from a local ECC Teacher Leader, and ongoing support thereafter. Their role is to liaise closely with the child's class teacher to share information about and plan together for the child's progress, set regular homework and meets parents to discuss how they can support their children's learning at home.

Every child has a programme of at least 40 half hour Numbers Count lessons over 3 or 4 months, while continuing to take part in their normal class mathematics lessons. Teachers decide whether to teach each lesson individually or to 2 or 3 children together. Lessons take place in a dedicated teaching area where children can use a wide variety of resources. The teacher begins by making a detailed diagnostic assessment of what each child knows and then plans an individualised programme to help each one to move forward. Lessons focus on number and calculation, follow a set routine and are rigorous and active. The teacher aims to help each child to become numerate

and confident, to enjoy actively learning mathematics and to develop the skills and positive attitudes needed to continue to make good progress in normal class mathematics lessons after completing Numbers Count.

Maths Counts, which is a progression from Every Child Counts 'Numbers Count' programme, is developed by The Mead Community Primary School, a National Teaching School based in Trowbridge, England. As funding for Numbers Count was withdrawn, The School developed their own version, called Maths Counts which has evolved over three years. The School has been using this approach successfully, although not the digital version, and believes that other schools could benefit from it. In this evaluation they will be conducting the small trial over a slightly shorter time than Numbers Count, and making greater use of Teaching Assistants.

This should reduce the overall cost, and would be efficient if a similar positive impact could be demonstrated.

Prior evidence

A summary of the effectiveness of maths teaching interventions for low-achieving pupils found 15 studies that met its criteria for rigorous RCTs (Baker et al 2002). The review suggests that interventions providing data and feedback on maths performance to teachers and pupils are more effective than those focused solely on quality of teaching. This is the approach proposed by Mead School.

More generically, there is already evidence that training TAs better to help with pupils underachieving in maths can be beneficial (Holmes and Dowker 2013). And the proposed evaluation team has already worked on a similar intervention, but with a literacy focus, that demonstrated the usefulness of TAs in working with small groups of pupils for catch up (Gorard et al. 2015). In fact, this successful project which took a longer and more expensive intervention (Reading Recovery) and made it work over a shorter time and with the help of TAs, is referenced by the developers as a model for their approach. However, because the specific intervention has not been tested directly, the study begins with a year of development and piloting.

The intervention

The Maths Counts programme is a teaching assistant-led intervention. In the context of Maths Counts project, teaching assistants are referred to as 'Learning Partners'. Maths Counts an intensive intervention delivered three times a week over 10 weeks preferably on a one-to one basis but could be one-to two by trained Learning Partners. Each session lasts 30 minutes and involves the use of a digital platform called the 'Digital Maths Tool', which is interactive for pupils and also contains resources for teachers and families. The Digital Tool helps pupils and staff to monitor progress, identify strengths and areas for improvement. Children progress at their own pace and this helps build their confidence and 'learning to learn skills' as they will not be made to work on problems beyond their capability. It includes home learning as well, so parents and siblings can practice with the children at home.

The project involves two phases: a pilot phase with 12 schools (6 intervention and 6 comparison schools), and an efficacy trial involving 30 schools.

The pilot (November 2015 to May 2016)

The aim of the pilot is to trial the intervention materials, such as the Digital Tool (including adapting the materials for the new maths curriculum), the instructional manual for TAs and the training regime. The pilot will also help inform decisions on dosage, and additional ongoing support for LPs

that could be maintained at a larger scale. There will be no comparison with a control group for the pilot. Comparisons will be made with other similar schools nearby.

At the pilot phase, target children will be identified on the basis of teachers' professional judgements (through a process of formative assessment) and information held regarding attendance records, EAL, Pupil Premium eligibility. Renaissance Learning Star Assessment data will be used only with the schools in phase one of the pilot as this is already in use and supporting the identification of children requiring intervention.

During phase one of the pilot, the Sandwell (pre-test and post-test) will be administered to the treatment group to provide a gain score. The use of the Sandwell test will be reviewed at the end of the phase one pilot in relation to the time and capacity needed for delivery.

The pilot phase will start in November 2015 with the launch of the Phase 1 pilot. This involves testing the paper version of the Digital Tool with three Mead Community Trust schools.

Phase 2 of the pilot starts with the training of the Learning Partners (LPs), identification of eligible pupils, collection of background data. The Mead team will recruit six schools to receive the intervention and another six schools as the comparison schools. These schools will not be used in the main trial. Names of eligible pupils and their background data (including KS1 test results) will be sent to the evaluation team. There will be just one cycle in four months in the Phase 2 pilot.

Delivery of the programme begins immediately after eligible pupils are identified. Light touch process evaluation of implementation in the classroom will be carried out by Durham University. This will primarily be in the form of participant observations. The evaluators will talk to staff and pupils in the pilot schools to identify potential barriers to implementation, possible resistance and also any potential risks. Formative feedback on the training, delivery of intervention, teaching materials and content will be relayed back to the project team.

Assuming a 4-month cycle as proposed by the developers, schools will conduct a post-test, using Progress Test in Maths (PTM) in early April 2016. This will help to judge a likely effect size, and to see whether such testing is feasible for primary schools. Durham University will observe the pilot test in a couple of schools.

PTM is the test of choice because STAR Maths (which is currently used in the Mead Community Trust schools) comes with the training package Accelerated Maths. There is thus a risk that some schools may train their pupils using Accelerated Maths. This is difficult to police and Renaissance Learning is not able to confirm if they could switch off the training part of the package. PUMA from Hodder was also offered to Mead as a choice, but it does not currently have the digital version and electronic marking, which the Mead School finds attractive.

A major outcome from this stage, and the ensuing process evaluation will be advice on how this intervention could be rolled out into wider practice, if found to be successful. For example, a major determinant of cost is the training of staff so it will be interesting to see to what extent schools, clusters or chains could provide their own training. The survey instrument, the trial materials and the mode of delivery will be revised in the light of the formative feedback.

A brief report on the development, scalability and recommended outcomes will be presented in May/June. There will also be a brief impact assessment of the pilot and, comparing results for the six schools with another six schools to be recruited by the developers. This will help to judge a likely effect size, and to see whether such testing is feasible for primary schools.

The main trial (January 2016 to December 2017)

Recruitment to main trial will take place concurrently as the pilot progresses. This time will also be used to co-operate with the developers in recruiting schools for a prompt start to a trial in September 2016.

June/July 2016

Schools will identify eligible pupils for the main trial and send names of these pupils and their background data, including KS1 test results to the evaluation team. Eligibility is assessed using a combination of teacher judgments of which pupils are deemed to be unlikely to meet the Y2 programme of study and a list of criteria spelt out in the Ofsted framework grade indicators for pupil outcomes. Schools will use their usual tracking tools to draw up a list of pupils who have the lowest attainment. Priority will be given to:

- Pupils at risk of not achieving the nationally expected levels
- Lowest attaining pupils
- Younger pupils will also be given priority as they are deemed to have most to gain from earlier intervention
- Pupil Premium pupils

Evaluation team will randomise eligible pupils to Maths Counts or business as usual control immediately after eligible pupils have been identified. As part of the intervention, the treatment schools will also use the Sandwell diagnostic test to assess progress among their pupils. There will be no pre-test as such, so the KS1 scores will be used as a check for balance.

Training of Learning Partners will take place in mid-September 2016. Evaluation team will observe the training of LPs to evaluate LPs's reaction to training and fidelity to training.

Light touch process evaluation of the delivery of the programme involving interviews and focus groups with project members, teaching staff and pupils will be conducted by the Durham University evaluation team as part of an ongoing evaluation process.

Schools to send updated background data of pupils and names of school leavers to the evaluation team. The evaluation team, with the assistance of GL Assessment will arrange the set up of post testing in schools.

Pupils will take the post-test PTM (assuming that this is still deemed suitable after the pilot) in the summer term. The evaluation team will send researchers to schools to observe the post-testing. In addition, intervention pupils also take the Sandwell test as part of the intervention to monitor progress.

Evaluation team will analyse the PTM test. These will be synthesised with the process evaluation data.

The completed full report will be handed over to EEF in December 2017.

Report will be published by EEF in Spring 2018

RESEARCH PLAN

Research questions

How effective is the individualised Maths Counts programme in improving the maths skills of primary school children struggling in maths compared with a 'business as usual' control group?

Design

The main trial under evaluation here is a one-year efficacy trial using a 2-armed comparison group. Pupils identified as eligible will be randomly allocated to one of 2 groups: Maths Counts or business as usual.

The aim of the project is to see if pupils receiving the additional individualised maths lessons make more progress than pupils who do not. If found to be effective, future trials could include an matched timed control to test whether it the active ingredient is Maths Counts programme or just simply more individualised time for maths instruction.

Pupils will be individually randomised within schools. This means that all schools are intervention schools, so eliminating post-allocation demoralisation. Each participating school must be 'clean' to the intervention and to related interventions such as Numbers Count. Individual randomisation within schools runs a slight risk of diffusion, but this can be minimised as long as the digital resources are password protected, and more importantly the Learning Partners selected to deliver the intervention are not also involved in supporting the control pupils.

Participants

Participants will be pupils from Y3 to Y6 identified as eligible. The Mead School team will recruit c. 30 schools with a high proportion of FSM pupils to the trial.

The evaluation team from Durham will be present at recruitment/training events to talk to schools about what is required of schools (e.g. provision of data, updating project team on attrition, training of teachers and maintaining contact with the teams) and how the three parties (school, project team and evaluation team) can work together.

Randomisation

Randomisation will be at the individual level within the school. To minimise the risk of diffusion, the digital resources are password protected and TAs selected to deliver Maths Counts should be dedicated exclusively to only support children on these programmes.

Randomisation will be carried out once eligible pupils are identified and names given to the evaluation team. A random number generator (e.g. random.org programme) will be used and this process will be performed in the presence of colleagues in the School of Education.

Sample size calculations

The sample size calculation is based on the assumption that there are 30 schools and four year groups (Years 3, 4, 5 and 6). The Mead School envisaged that there would be an average of about 3 eligible pupils per class. Assuming 1.5 classes per year group, and 3 eligible pupils per class, there will be 18 pupils per school. This will give a total sample of 540 or 270 per arm, which is sufficient to detect an effect size of around +0.24 (or 3 months additional progress) using Lehr's approximation (Gorard 2013). In reality the situation would be better than this because prior attainment scores (KS1 or PTM pre-test) would be available and could be included in the analysis. This would be sufficient for an efficacy trial.

Whatever the sample size, it is important that all allocated cases are retained (the concept of over-sampling in order to cater for subsequent attrition is a dangerous illusion). The schools used for the pilot will not be used in the main trial. The evaluation team are happy to attend and address school recruitment events and to explain how the trial will work and the importance of commitment for the duration.

Once identified schools will send the list of these pupils to the evaluation team for arranging the groups for treatment. How this is to be done is left to the school depending on their time-tabling and how they deploy their TAs. It is important that this list does not change after randomization.

Background data

The two groups will be checked for balance at the outset using KS1 maths results. Balance will also be considered in terms of other relevant and available data such as pupil sex, ethnicity, date of birth, first language, SEN and FSM status. The latter will all be collected as a routine part of the evaluation (via unique pupil numbers - UPNs), and used in the analysis phase (see below). To a great extent, the limitation here is how much of this information the DfE and the schools will allow access to, given that it will be individually linked to additional scores and measures.

Outcome measures

Primary outcomes

Given these year groups, no official outcome measure such as KS2 results will be available for all within a one-year trial. The primary outcomes would be post-test scores in PTM. KS1 results will be used to check for initial balance between groups.

The GL Assessment Progress Test in Maths (PTM) is the test of choice of the Mead School because they believe that this is more in line with what they want to measure. An added advantage of using PTM is that it was the test used in the DfE trial of Numbers Count (see above) and so would allow a more direct comparison of the effect size with the 'parent' intervention. Other advantages of the PTM are that it will be more independent of the intervention than the Sandwell test and it also correlates strongly with KS2 outcomes.

Other data

Other relevant data on pupils' prior attainment (KS1 results), and background characteristics such as age, date of birth, sex, ethnicity, first language, SEN, and FSM will also be collected as a routine part of the pre-testing. These data will be uploaded for all pupils at the outset from each school's SIMS or similar. These will eventually be linked via UPN to the individual post-test scores.

Analysis

Primary outcome

Assuming the two groups are balanced at the outset, the analysis will be based on the difference between groups on post-test scores only. Comparisons will be made between Maths Counts and the business as usual group.

The main outcome measure will be converted into standard 'effect' sizes by dividing the difference in the means of the Age Standardised scores of PTM between treatment and control by the overall standard deviation of the post-test scores. This will be the headline attainment result. If the groups are not balanced initially in terms of attainment, it may be necessary to consider another option.

Subgroup analysis

Subgroup analysis will also be conducted for FSM pupils only.

Multivariate regression analyses will also be conducted using post-test scores as the dependent variables and prior test scores and all available pupil background data, including sex, ethnicity, date of birth, first language, SEN, FSM as predictors in the first stage. In the second stage, variables representing the treatment group and any available estimate of dosage/fidelity will be added as

further predictors to see how much variance could be explained by treatment allocation. These results will be indicative only, and will not form part of the headline findings.

Process evaluation

The process evaluation for the intervention forms the bulk of the fieldwork, with the aim of providing formative evidence on all phases and aspects of the intervention from the selection and retention of schools, through initial training and conduct of the intervention, to evaluating the outcomes. The process data will be used to help assess fidelity to treatment, that is, whether TAs deliver the intervention as trained and according to the protocol, and whether the required number of sessions is delivered. It will also help assess changes in pupils' attitude and self-esteem and evaluate the teaching materials. In addition, the process evaluation will assess the effects of taking TAs away from support for other children.

The main method of data collection will be observations of teaching in the Maths Counts plus observations of training and testing. These will all be as simple and integrated and non-intrusive as possible. Interviews with staff and focus groups with pupils will also be conducted to assess participants' perceptions of the intervention including any resentment or resistance, and to advise on improvements and issues for any future scaling up. Potential adverse effects on staffing will also be assessed through interactions with headteachers, maths leads and TAs.

A sample of 10 schools (a third of the schools) will be selected at random for observations. The schedule of visits will be agreed with the developers and the selected schools. Schools will agree to be part of this evaluation when agreeing to be part of the intervention.

To ensure that the intervention is carried out properly, developers will send trainers to schools to monitor and support the Learning Partners. Trainers will provide feedback on the regularity and quality of the sessions for each participating school using a simple rating from: High, Medium to Low. The criteria will be objective and measurable. The fidelity to the protocol of the intervention will be further assessed using a Learning Partner self-assessment survey where Learning Partners record the number of sessions conducted per week, the average duration of each session, and their feedback on the effectiveness of the intervention, challenges and barriers to implementation (e.g. time-tabling, technical difficulties with accessing the Digital Tool or pupils' difficulties with using the Tool). The teacher survey will also be used to assess teachers' perceptions of pupils' attitude and academic self-esteem. The developers will be responsible for the Learning Partner survey (which could be an online survey).

This evaluation will be conducted in conjunction with the developers, and their own evidence can be valuable for the analysis. In particular, we will rely on them for an estimate of the overall and per pupil costs for the intervention (independent of the development and evaluation components).

Costs

The costs of the trial will be the amount that the school will incur if they were to implement the intervention in their school. This will be calculated for per pupil using the following estimates:

Cost of setting up

- Cost of delivering training to Learning Partners
- Cover for teachers to attend the one-day training
- Licence for use of Sandwell diagnostic test

Cost of delivery

- Subscription for use of the Digital Tool
- Teaching materials and resources
- Stationery costs
- Printing worksheets
- Day rates for Learning Partners and maths leads
- On-going monitoring and support
- Sandwell tests

Other non-monetary costs

Time taken away from regular lessons for organising the administration and collection of the teaching materials and setting up the programme. Once set up the time taken will be reduced.

Such information will be collected with input from the project team, interviews with LPs and feedback gathered from the pilot.

ETHICAL ISSUES

This evaluation, as distinct from the intervention to be conducted by the developers, raises relatively few additional ethical issues. The kinds of tests involved, such as PTM, are routine in schools; indeed many participating schools may already be using this test or something very like it. All participants in interviews and observations will be informed that participation is voluntary and that they can withdraw consent at any stage. The work will be conducted in accordance with BERA's professional Code of Practice, and approved by Durham University's Ethics Committee. Durham University will work with the developers and EEF to prepare a MOU for schools, and to ensure opt-out consent from parents for participation and subsequent data linking concerning their child. Parental opt-out consent forms will also be used to indicate agreement to participate.

Durham University's data protection policy is publicly available at:
<http://www.dur.ac.uk/resources/data.protection/dataprotectionpolicy.pdf>

"Durham University is committed to protecting the rights and freedoms of individuals in accordance with the provisions of the Data Protection Act 1998. The requirements to which University staff and student who process personal data must adhere are set out in the University's Data Protection Policy"

PERSONNEL

Evaluation Team

Professor Stephen Gorard will be responsible for the project, assuring final delivery of all outputs, and meeting deadlines. He will lead on the design and analyses of the impact evaluation, communicating with EEF, and will assist with all other elements, especially report writing.

Dr Nadia Siddiqui will lead in the day-to-day organisation of the study, arranging fieldwork, collecting data for the impact evaluation, the model for incorporating the process evaluation, and report writing. She will assist with all other elements of the study, especially communication with the developers. Her role is dedicated to EEF evaluations and similar opportunities.

Dr Beng Huat See will lead on the testing, school and pupil data, and outcome measures, especially communication with the test developers. She will assist with fieldwork, data collection and cleaning, arranging fieldwork, analysis and report writing. Her role is dedicated to EEF evaluations and similar opportunities.

Research assistants will be employed as and when needed for parallel fieldwork cleaning and preparing data, coding, and literature searches. They will play a large part in any delivery/monitoring of the post-testing process (since they can be 'blind' as to allocation at this stage).

Intervention Team

The intervention team from The Mead Community Primary School will be responsible for school recruitment, collecting opt-out consent from parents and on-going relationships with schools and keeping parents informed of the intervention (if necessary). They will be responsible for the training of Learning Partners, delivery of the intervention, monitoring and supporting TAs in the delivery. They will work with schools to collect baseline data including KS1 results. These tasks will be conducted with the support of the Durham team (independent evaluators).

ISSUES AND RISKS

As a team, we have conducted scores of evaluations, and have always completed them successfully and on time. The biggest risk to the evaluation probably stems from temporary unavailability of any of the evaluating team, through illness for example. To a very great extent they can substitute for each other, with the assistance of senior colleagues from Durham University such as Carole Torgerson, Steve Higgins or Christine Merrell (or Professor Emma Smith and her team from Leicester University, working with Durham on the EEF-funded YSA trials). A pool of researchers with the relevant skills is available.

A more substantial risk is that the intervention fidelity may not be maintained. Other risks (discussed above) include the risk of due to the way Learning Partners are deployed and possibility of control pupils accessing the training resources.

The PTM test is an hour long. In addition, pupils also take a Sandwell progress test. Schools may consider this burdensome. The likely result may be non-response and drop out. The most likely risk is therefore schools dropping out or not cooperating in providing data or conducting the survey. Maintaining good relationships with schools is to get their full commitment is key to minimising this risk. It is thus important to explain all aspects of the potential burden to schools in the recruitment communication and the MOU.

SUMMARY TIMELINE FOR EVALUATORS

Pilot commences in November 2015 with the training of Learning Partners, identification of eligible pupils and collection of background information.

There will be two pilot phases: Phase 1 with 3 Mead Community Trust schools using paper version of the Digital Tool; Phase 2 will test the digital version of the tool using the 3 Mead schools and another 3 other schools

Pilot phase

29 Sept 2015	Phase 1 briefing
3 Nov 2015	Launch of Phase 1 pilot
Nov 2015 to Feb 2016	Phase 1 pilot with 3 Mead Community Trust schools using paper version of the Digital Tool Light touch observation of intervention development
13 Jan 2016	Phase 2 pilot with 3 Mead Schools + 3 other schools using the Digital Tool Same 3 Mead schools but with new children Training of TAs/LPs and maths leads, identification of eligible pupils and collection of pupil background data

Jan 2016 to Mar 2016	Light touch observation of implementation of intervention and evaluation of teaching materials and content
Apr 2016	Post test of PTM
May 2016-	Conduct brief impact assessment of the pilot Brief report on development, scalability and recommended outcomes

Main trial

Jan 2016 to May 2016	Recruitment of schools for main trial (to be carried out by the project team)
Jun to July 2016	Project team identifies TAs/LPs and informs evaluation team Training of TAs/LPs
September 2016	Schools identify eligible pupils for main trial and send pupil background data to the evaluation team Randomise eligible pupils to either Maths Counts or control Observation of training for intervention for schools
Sept 2016-June 2017	Light touch observation in ongoing process evaluation Interviews with project members, staff and pupils Update background data on schools and pupils
June 2017-	Administer PTM post-test Observe testing in all schools, where needed Chase up school leavers where possible Collect and assess final outcomes Analyse outcome data
July to Nov 2017	Synthesise with process evaluation data
December 2017-	Complete full EEF report.

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