# Shared Maths

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| Evaluation Summary | |
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| **Age range** | Year 3 - 5 |
| **Number of pupils** | TBC |
| **Number of schools** | 80 |
| **Design** | Effectiveness trial |
| **Primary Outcome** | Maths |

Durham Shared Maths is a cross-age peer tutoring programme for Y3 and Y5 or Y4 and Y6 in primary schools. It involves whole year groups, separated by a two-year age gap, working together to answer maths questions, with the older children acting as tutors and the younger children being the tutees.

Shared Maths provides a structured framework to help teachers incorporate mathematics peer tutoring into their lessons. Importantly both tutee and tutor have been found to benefit from this process. In addition to improvement in attainment, research has indicated that there can also be social and emotional benefits from being involved in peer tutoring.

This takes place for 20 minutes each week for a 16-week block in the year. Shared Maths provides a structured framework to help teachers incorporate mathematics peer tutoring into their lessons. Importantly both tutee and tutor have been found to benefit from this process. In addition to attainment gains, research has indicated that there can also be social and emotional benefits to being involved in peer tutoring:

- Participating in a peer-tutoring programme can improve attitudes both to maths and to school generally;
- Peer-tutoring can increase motivation and confidence in maths;
- Working with a partner using peer-tutoring helps develop pupils' social, communication and teamwork skills;
- Peer-tutoring can increase social relationships within schools particularly for people who find it difficult to make friends.

The project carried out by Durham University is split into two phases. These phases seem to differ by the amount of support participants are provided by the Intervention Team (Phase 2 having less direct involvement) and Phase 2 will be slightly modified by lessons learnt during Phase 1.

NatCen Social Research proposes below an approach to the impact and process evaluation for this exciting project.

## Phase 1

NatCen Social Research proposes the following statistical analysis plan for this exciting project.

## Impact analysis

The intervention team will provide us with the pre and post intervention test scores for all of the pupils taking part in the RCT for phase 1. Pupils are in year 5 and year 3 in 84 schools in Medway, Durham, Leeds and Worcester, with an average class size of 45 pupils.

- Two schools dropped out after the randomization (82 schools remained). All analyses will be conducted in accordance with the Intention-To-Treat principle (ITT).This preserves the effect of the initial randomization by providing a conservative and unbiased estimate of the effect of the intervention. Analyses will be run first according to ITT and then including pupils who have both pre and post-test scores.

- We will be testing whether pupils who received the intervention made more progress. The primary outcome measure, which determines whether or not the intervention has been effective, will be taken from the InCAS general maths post-test scores provided to us by the intervention team. Secondary outcome measures will include literacy, developed ability and attitudes. Subgroup analyses will be conducted according to gender, FSM and EAL.

- We will use InCas scores to conduct statistical comparisons of test results across intervention and control schools. Effect sizes will be calculated according to Hedge's g and will be based on differences between groups at post-test.

- We will conduct a comparison of baseline characteristics and pre-test scores across intervention and control groups according to schools and geographical area (e.g., number of boys per group; average age; average pre-test score). This will be done using statistical tests such as the t-test and chi-square. Any significant differences between intervention and control schools and geographical area on key variables that are likely to be related to the primary outcome (post-test results) will be controlled for statistically using covariate and strata variables. Note: statistically significant baseline differences will only be adjusted for if they are found to predict the primary outcome in a way that affects our investigation of the intervention.

- Post-test scores will be compared across intervention and control groups. Regression based analyses (e.g., Linear / logistic and Analysis of Covariance – ANCOVA) including pre-test as a variable in the analysis (e.g. if baseline pre-test differences are found) will be conducted to assess the effect of the intervention on the primary outcome. We may include other variables that we think are important, such as age and gender (if these are found to potentially confound post test associations and intervention effects).

- Potential clustering effects that may result from the use of schools as the unit of allocation will be taken into consideration at all stages of the analysis. A simple approach is to treat each class or school as a single observation by using summary statistics such as mean scores and comparisons of means such as t-tests. Alternative methods such as multi-level modelling or the Huber-White method which can adjust for pre-test measures and include individual children in the analysis will be

conducted if clustering effects are significant and if the sample size can support these analyses.

- The intervention team will also provide NatCen with the Unique Pupil Reference Number (UPN) for every child involved in the project (both intervention and control). This will allow us to match their data with information from the National Pupil Database.

- We will analyse these test scores on the basis of whether the pupils received intervention or not, and for those in the intervention, if they were a tutor or tutee.

- We will also compare the scores, and progress made, of pupils eligible for free school meals compared to their counterparts in order to address the EEF focus on improving the attainment gap for disadvantaged pupils.

## Process evaluation

### Observation –

We will carry out an observation of a shared maths lesson in one of the schools in order to get a good understanding of how the programme works in a real-life setting before conducting depth interviews with teachers.

### Depth interviews –

As well as interviews with local coordinators to capture views on their role, the training and perceived impacts of the programme in their area, we will carry out interviews with teachers.

In total, we will carry out 7 telephone interviews and 1 face to face interview with a mix of year 3 and year 5 teachers who are carrying out the intervention in phase 1. The interviews will ask for their views about block 1 only.

Although we are aware that some small changes may be implemented into block 2, collecting views on block 1 only will allow us to ask about the entire 16 week block, capturing information about how the programme worked over time.

We will use suggestions from local coordinators along with demographic and survey responses to make up our sample and the interviews will capture views on:

- the preparation required before lessons

- the format of the training sessions for tutors and tutees

- the training and support received from local coordinators

- the format of the maths lesson (and differences between subgroups)

- monitoring pupil progress

- perceived impact on the tutors and tutees and
- overall view of the programme with any recommendations for improvement.

These interviews will take place in the autumn term and will be semi-structured depth interviews lasting around 45 minutes.

### Analysis

We will identify the key themes from all of the interviews around the identified topics, as well as being able to present case studies of how the shared maths programme works in schools. This will not only allow us to explore the findings of the impact evaluation in more detail (by being able to look at any variation in implementation of the programme or set up in schools) but also to pull out key lessons and suggestions for any future roll-out.

## Phase 2

### Impact Analysis

There will be no randomised control trial during phase 2 and therefore no impact analysis will be required. Any impact analysis within the final report will therefore be impacts observed from phase 1 of programme.

### Scoping Study

In order to fully understand the rationale behind phase 2 and the differences between the 2 phases both in terms of implementation and practice, a short scoping study will be necessary. Establishing what the differences are between the phases will allow us to look in more details at phase 2 is meeting its aims.
The scoping study will need to take place before the process evaluation of phase 2 and will involve 2 stages:

1. A short interview with both members of the Durham Maths team in order to establish the rationale behind the implementation of phase 2 and the key differences between this and the previous phase.
2. A short interview with the local coordinators in order to understand any differences in the initial teacher training provided to the teachers and any differences in the support role as compared with phase 1.

## Process evaluation

### OBSERVATIONS –

We will carry out 2 observations of a shared maths lessons in schools located in different areas. This will allow us to get a good understanding of how phase 2 works in a real-life setting and how the phases differ in practice before conducting depth interviews with teachers.

In addition we will visit school training sessions held by Durham before speaking with schools.

### DEPTH INTERVIEWS WITH LOCAL COORDINATORS –

We will firstly carry out depth interviews with all 4 local coordinators to establish how things have changed in the implementation of phase 2. We will capture views on a range of topics including:

- Their role within phase 2
- The nature of support needed from schools
- The perceived impacts of the programme in their area
- The training and any adaptations to training which have been made for phase 2
- Whether schools are continuing with the programme after the trial period from phase1 and if so, how this is working.
- Whether schools are expanding the programme into additional year groups and if so, how this is working
- How schools feel that the programme works in year 6, whilst pupils are preparing for SATs (where applicable).

Data from these interviews are likely to inform the topic guides for phase 2 teacher interviews.

### DEPTH INTERVIEWS WITH TEACHERS –

In total, for phase 2, we will carry out 4 telephone interviews and 2 face to face interviews with a mix of year 3 and year 5 teachers in all 4 areas who are carrying out the intervention. The interviews will ask for their views about phase 2 only.

It is expected that we will once again use suggestions from local co-ordinators about teachers who would be suitable to interview and will use the training sessions in order to arrange interviews and gather contact details. We will then run an opt-in process to establish our final sample.

The interviews with teachers will cover similar topics to the phase 1 interviews so that comparisons can be drawn within the analysis stage. Topics will include:

- the preparation required before lessons

- the format of the training sessions for tutors and tutees
- the training and support received from local coordinators
- the format of the maths lesson (and differences between subgroups)
- monitoring pupil progress
- perceived impact on the tutors and tutees and
- overall view of the programme with any recommendations for improvement.
- If teachers plan on continuing the programme with year 4 and 6. If not, why not?

These interviews will take place in the Spring term and will be semi-structured depth interviews lasting around 45 minutes.

### Analysis

We will identify the key themes from all of the phase 2 interviews around the identified topics, as well as presenting composite case studies of how the shared maths programme works in practice. The two phases will mostly be analysed and reported on separately however, any cross-over or comparisons made by teachers will be analysed to allow us to provide a complete picture of the programme.

The final report will also pull out key lessons, recommendations and suggestions for future roll out from both phases.

## Timetable

| Evaluation Timetable | |
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| Date | Tasks |
| **Sept – Dec 2013** | **Interviews and observation with Phase 1 teachers** |
| **December - Jan 2013** | **Scoping interviews with programme managers** |
| **Jan - March 2014** | **Impact analyses run (phase 1 only)** |
| **February 2014** | **Training session(s) observed** |
| **March 2014** | **Interviews with Local coordinators** |
| **March - May 2014** | **Interviews and observations with phase 2 teachers** |
| **May – July 2014** | **Analysis and reporting** |
| **July – Sept 2014** | **Feedback to EEF** |