

Evaluation Summary	
Age range	Primary (Year 1)
Number of pupils	c. 3,000
Number of schools	80 - 100
Design	Cluster randomised controlled trial, school-level randomisation
Primary Outcome	Maths

Evaluation of *Maths Mastery in Primary Schools* - Protocol

Significance

Mathematics Mastery is based on a simple way to teach mathematics originally developed by the Singapore Ministry for Education. The Mathematics Mastery model is distinctive in two ways. First, it aims to give pupils a thorough understanding of mathematical concepts, rather than a set of techniques or routines to get to the right answer. Mathematics Mastery shows that problems can be solved in a variety of ways, and ensures that pupils learn in sequence – first by manipulating real objects, then by drawing pictorial representations, and ultimately by using mathematical symbols. Second, Mathematics Mastery uses a 'mastery' approach, in which teachers do not move on until all pupils have acquired a basic understanding of the current topic. Additionally, the course is designed so that more able pupils can explore each topic in depth, and therefore remain engaged.

The Institute of Education will conduct an independent evaluation using rigorous design and methods. The evaluation focus is on establishing an unbiased estimate of impact of the intervention on short-term (after one year of 'treatment') and long-term (end of primary school) academic outcomes (performance on mathematics tests).

The study will include an impact evaluation.

Research plan: Impact evaluation

Research questions

The research question is - what is the impact of *Maths Mastery* on children's ability in mathematics over the short and long term?

Design

The design is a cluster randomised controlled trial, with random allocation at the school level. ARK will develop a pool of 40-45 COHORT 1 schools that would like to try Maths Mastery. 20-25 primary schools will be drawn at random from this pool of COHORT 1 primary schools and will be defined as the treatment group. The 20-25 primary schools (approximately) who are in the pool but who do not receive the programme initially will constitute the COHORT 1 control group. Therefore, in the first year 20-25 schools will receive the programme and 20-25 will not. Likewise in the second year ARK will select 40-45 COHORT 2 schools. 20-25 schools will receive the programme and 20-25 will have a delayed start (delayed by 1 year). All teachers in year 1 in a treatment school will be required to use the programme.

By summer 2012, ARK will have recruited all schools (treatment and control) that are part of the Maths Mastery primary school programme. The IoE team will then conduct the randomisation. In September 2012 there will be a treatment and a control group of year 1 pupils in these schools. For both groups, a math test will be conducted at the start of the school year and will act as the baseline assessment. The control and treatment group pupils will be tested again in July 2013 – once the treatment group has experienced one full academic year of the maths mastery programme. It is essential that the control schools receive no Maths Mastery intervention in the first year of the programme. The tests to be used are Number Line and Number Knowledge (available on request). An external contractor (National Centre for Social Research - NATCEN) will be responsible for the testing of pupils. Comparison will then be made between the achievement gains in mathematics of pupils in year 1 in the treatment and in the control schools.

The second cohort of schools in both the treatment and control groups will undertake a baseline assessment test in September 2013. Again after one year of maths mastery they will be re tested in July 2014.

In May / June 2017/18 children in treatment and control schools will sit key stage 2 maths exams. The IoE team will examine the long – run effectiveness of the Maths Mastery programme by investigating differences in school average maths test scores between treatment and control group. This information will be taken from the National Pupil Database, which the EEF will link to children’s Maths Mastery test scores (collected in 2012 and 2013).

Analysis

Our analytical strategy will be based on the notion of “intention to treat”. All children within the schools that are randomised will be included in the analysis. Even if a school withdraws from the intervention all the data on the children participating in the study will be collected (if possible) and included in the analyses, since that school was intended to be treated. The mean score will be compared between treatment and control groups, using robust standard errors that take into account clustering at the school level. This will be supplemented by additional analysis (e.g. OLS regression) if appropriate. A 95% confidence

interval for the differences in test scores between the intervention and control group will be reported. Progress measures (i.e. the change in test scores between baseline and follow – up) shall also be considered.

Personnel

Project leader – Professor Anna Vignoles

Statistical evaluation - Dr. John Jerrim

Mathematics expert - Professor Richard Cowan

Roles and responsibilities

Anna Vignoles will manage the project, liaise with stakeholders (including attending necessary project meetings with ARK and EEF) and undertake school visits. Anna will, along with Rebecca Allen, draft the final report. She will also undertake any necessary dissemination of project results.

Richard Cowan will determine the appropriate tests to use for the evaluation and provide advice on administering these tests to young children.

John Jerrim will carry out the data cleaning and statistical analyses.

Roles of the partner organisations

ARK

- Recruitment of treatment and control schools
- Liaison with schools throughout the programme and arranging the schedule for children to be tested in their schools
- Aid NATCEN in facilitating the testing of pupils
- Implementation of the Maths Mastery programme

NATCEN

- Organise and conduct all testing in treatment and control schools
- To mark all test data collected
- To provide the IoE team with data in CSV / Excel / STATA format from these tests

EEF

- Project overview
- To link the Maths Mastery test data to the NPD.