Protocol for Evaluation of Catch Up® Numeracy

Note: This protocol excludes aspects of the main internal evaluation that are the sole responsibility of Catch Up who are undertaking the main evaluation in collaboration with Dr Ann Dowker of Oxford University.

Intervention

Catch Up Numeracy is a one-to-one intervention for learners who are struggling with numeracy. It consists of two 15-minute sessions per week which are usually delivered by teaching assistants. To prepare them for delivering the intervention, teaching assistants are supplied with detailed session plans and receive three half-day training sessions. The intervention breaks numeracy down into ten components, assesses children's ability on each, and targets subsequent instruction so that the tutor always addresses the exact area of weakness. Components include counting procedures, counting principles, derived fact strategies, etc. The approach is based on research indicating that numeracy is not a single 'big' skill, but a compound of several 'little' skills that seem to be quite discrete. Children (and adults) may be very strong in some skills but very weak in others, and brain-imaging studies suggest that the different skills are handled by different parts of the brain. By recognising and building on this finding, the Catch Up Numeracy intervention enables tutors to diagnose and treat problems precisely and effectively.

Evidence of the efficacy of Catch Up Numeracy comes from a quasi-experiment conducted recently by its creators, Dr Ann Dowker of Oxford University and Dr Graham Sigley of Catch Up. Two hundred and forty-six pupils participated in the trial, each assigned by their school to one of three groups: 154 children received the Catch Up Numeracy intervention; 50 children received the same amount of one-to-one maths instruction with a teaching assistant (TA) but not using Catch Up; 42 children continued to receive classroom instruction as normal. All three groups sat a standardised test of numeracy before and after the intervention. Researchers found that pupils in the first group made substantially greater progress than those in the second or third groups. Catch Up Numeracy had an effect size of around 0.3 standard deviations compared to the matched-time intervention, and 0.4 standard deviations compared to the teaching-as-usual group. These differences are statistically significant and educationally important (around twice the effect size of peer tutoring).

Research Plan

Research Questions

The primary research question is: what is the impact of the Catch Up Numeracy intervention on pupil numeracy over the 30-week period where the intervention will be in schools?

Secondly, the research will explore the scalability of the intervention.

Design

NFER's project will be run as a randomised controlled trial (RCT), with two randomisation processes. To control for the potential effects of different TAs, primary schools will first provide names and contact details for two current TAs within their primary schools. These TAs will be randomised to

one of two groups; an intervention group delivering Catch Up Numeracy and an equivalent-time group that delivers the same amount of one-to-one support but not using the Catch Up Numeracy intervention. Following this, schools will provide a list of six pupils who meet the selection criteria and these will be randomised to one of three groups; Catch Up Numeracy, equivalent time or normal lessons.

Fifty primary schools will be recruited to undertake the intervention, which will result in 100 pupils being in each of three randomised groups.

The trial will be designed, conducted and reported to CONSORT standards (http://www.consort-statement.org/consort-statement/).

Inclusion Criteria

Year 2 to Year 6 pupils that are struggling with numeracy will be selected by schools for inclusion in the project.

Randomisation methods

Randomisations will be carried out by a statistician at NFER. A simple randomisation will occur on both processes, where TAs will be randomly allocated to the Catch Up Numeracy group or the equivalent-time group, and pupils will be randomly assigned to receive either Catch Up Numeracy, the equivalent-time sessions or normal class lessons. Pupil randomisation will occur after pupils sit the pre-tests.

Outcome Measures

The Basic Number Screening Test will be used by the evaluation to identify any changes in numeracy ability over the 30-week period that the intervention is in schools. Secondary outcome data will be collected by Catch Up and the University of Oxford on reading ability, using the Salford Sentence Reading Test, and on general ability, using the Non-Reading Intelligence Tests 1-3.

Sample size calculations
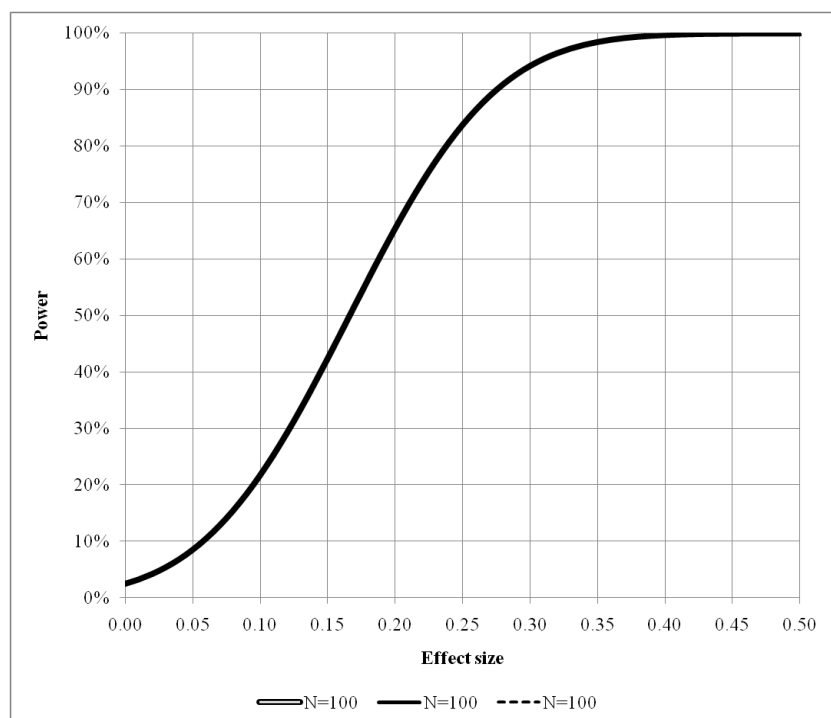
Randomisation will be conducted at a pupil level, and furthermore, we will be controlling for variation in baseline scores in the final analysis. Intra-class correlation (rho) is therefore likely to have a minimal impact on the effective sample size; we have conservatively assumed a value of rho=0.05 for the purposes of our calculations. The chart illustrates that the sample sizes will be sufficient to detect effect sizes at least of the order 0.25.

Analysis

The primary outcome will be numeracy ability as assessed by the Basic Number Screening Test.

We will undertake basic descriptive analysis of baseline test data to provide a check that the randomisation process has been carried out successfully. Whilst we would not expect treatment and control groups to exhibit identical characteristics, we will carry out statistical tests to verify that any small differences that do arise are consistent with what one might expect, assuming an unbiased randomisation.

We will then undertake our main analysis combining baseline and follow-up data. The definitive analysis will be 'intention to treat', reflecting the reality of how interventions are delivered in practice and avoiding attrition bias. We will use multi-level models to enable us to combine results across schools whilst accounting for clustering, and will include baseline data as a covariate in each of our models. Sub-group analysis will test hypotheses relating to the impact of the intervention on pupils of differing abilities through the inclusion of interaction terms in the modelling.

The main analysis is described above, but additional analysis will look to incorporate school-level variables based on the questions addressing the extent to which TAs feel they maintained fidelity to the intervention, and any perceived contamination of the control groups of pupils. This analysis, if

data obtained from TAs allows for the creation of reliable measures, would enable us to estimate a 'pure intervention effect' (net of any fidelity issues, contamination, or non-completion).

Process evaluation

The purpose of the process evaluation is to assess scalability of the intervention. For the NFER research team to fully understand the Catch Up Numeracy intervention, they will attend and observe each of the Catch Up Numeracy training events (N1: Introducing Catch Up Numeracy; N2: Delivering Catch Up Numeracy; N3: Managing Catch Up Numeracy and N4: Review and next steps). The following will take place:

1. Observing three regions' N2 and N3 training; this will enable the research team to observe the delivery of the training across different geographical areas and to a wide range of participating schools. This will help to understand any issues or concerns teachers/teaching assistants have.

2. Observing the N4 sessions in the three regions that were observed for N2. These observations will feed into the development of the interview schedule to be used below.

The team will need access to the training materials and (electronic) PowerPoint presentations. These materials remain secure and only one copy of the training materials, learning resources and progress booklet will be required.

In addition to the observations, the research team will carry out a set of qualitative telephone interviews:

- **Following** the N4 session; the research team will carry out telephone interviews during May to June 2013 with participants managing Catch Up Numeracy and the TAs delivering the intervention across the 50 schools. We will select a sample of 25 teaching assistants and 25 Catch Up coordinators from across the areas involved in the intervention(N=50). Telephone interviews will last for between 30 and 45 minutes each and will explore the process in relation to training and support; delivery in the classroom; incorporating the interventioninto existing timetabling; managing the intervention; and any evidence of the achievement of softer outcomes in relation to pupils' learning and confidence. These interviews will feed into the process and impact evaluations.

 A report will be produced in line with the EEF specification and will report on both the observation and telephone interview data. The process evaluation will be submitted as part of the main report.

Personnel

The project will be led by Dr Graham Sigley from Catch Up and Dr Ann Dowker from Oxford University. The impact evaluation will be led by Simon Rutt at NFER. The process evaluation will be led by Claire Easton at NFER. Camilla Neville will have overview of the evaluation at EEF and Emily Yeomans will oversee the grant.

Roles and responsibilities

Each person will carry out their duties with the assistance of teams at their respective institutions:

Dr Graham Sigley – Recruitment and retention of schools, delivery of intervention, supply of list of eligible pupils for randomisation, administration of tests (research assistants will be provided by Oxford University to administer tests within schools)

Simon Rutt – trial design, randomisation and analysis.

Claire Easton – process evaluation, telephone interviews and visits to training and review sessions.

Data protection statement

NFER's data protection policy is available at:

http://www.nfer.ac.uk/nfer/about-nfer/code-of-practice/nfercop.pdf

Timeline

Month	Activity
➢ **July 2012**	• Review research design and agree data collection arrangements with Catch Up
➢ **September/October 2012**	• Undertake pupil and TA randomisation • Attend training sessions and analyse evaluation forms
➢ **January 2013**	• First survey of teaching assistants
➢ **May - June 2013**	• Attend end-of-year meetings • Telephone interviews • Second survey of teaching assistants
➢ **June - July 2013**	• Telephone interviews
➢ **July – August 2013**	• Undertake impact analysis on pre- and post-test scores
➢ **October 2013**	• Draft report to EEF on impact analysis and process evaluation
➢ **November 2013**	• Final report to EEF

Risks

Risk	Assessment	Countermeasures and contingencies
Delay in recruiting schools/teaching assistants and gap between first and last is large	**Likelihood:** possible **Impact:** moderate	- Revise timetable for pre- and post-testing periods - Discussions on analysis would need to occur to discuss potential impact of different testing periods
Failure in recruiting schools	**Likelihood:** possible **Impact:** High	- Catch Up could make use of NFER's Research Operations Dept to recruit more schools (at an additional cost) - Timescale can be revised
Time between school recruitment and training sessions is too short for staff availability	**Likelihood:** possible **Impact:** moderate/high	- Catch Up informed of researcher availability. - NFER Project Leader will keep in regular communication with Catch Up to ensure there is adequate notice of events
Poor response to teaching assistant surveys	**Likelihood:** possible **Impact:** moderate	- Teaching assistants informed of surveys when recruited by Catch Up - NFER will write to schools in September and May to establish good channels of communication and continuity.
Researchers lost to project due to sickness or absence	**Likelihood:** possible **Impact:** minor	- NFER has a large research department with numerous researchers experienced in evaluation who could be redeployed. - Senior staff can stand in if necessary.