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"Now my son makes me run to school every morning." The impact of a numeracy intervention on low attaining young children's attitude to learning

Nick Dowrick, [Victoria Jackson](#)

Edge Hill University, Lancashire, United Kingdom

Background

This paper reports upon the findings of a research project linked to the Every Child Counts initiative. The project has researched the impact of a numeracy intervention project on low-attaining 6 and 7 year-old children's attitudes towards mathematics and their wider well-being. This paper is therefore relevant to a wide range of people involving those interested in mathematics education, Key Stage 1 education and inclusion. This research will also be of interest to policy makers and educational managers and links into the Mathematics Education Special Interest Group.

Research Questions

While the primary goal of Numbers Count is to raise attainment in mathematics, a secondary goal is to improve low-attaining children's confidence in and attitudes towards mathematics, both as a step towards the primary goal and as a worthwhile goal in its own right which could be expected as an outcome of a successful intervention (Willey et al., 2008). This paper presents the results of a study that had four aims:

- 1. to develop and evaluate a simple tool for measuring young children's attitudes towards mathematics
- 2. to evaluate the impact of the intervention upon children's attitudes towards mathematics
- 3. to investigate the relationship between children's attitudes and their mathematical development
- 4. to investigate the wider impact of the intervention upon children's well-being.

Methods

Investigating the attitudes of 6- and 7-year-old children is problematic. Most research has investigated teachers' perceptions of children's attitudes, rather than children's own reports or demonstrations of their attitudes, justified by doubts about children's self-awareness (Smith, Duncan & Marshall, 2005) or their cognitive ability to process and respond to structured questions (Christensen & James 2008). However, some studies have found that children can successfully report on their own attitudes, particularly when the researcher is well known to them (Smith, Duncan & Marshall 2005) and talks to them in their own homes (Maddock, 2006). While these advantages are not available to Numbers Count Teachers, a more practicable approach was suggested by the work of Cunningham (2008), who asked 5 and 6 year-olds to point to pictures of smiling or frowning faces in response to questions.

A simple attitude survey was devised for Numbers Count. Children, their teachers and their parents separately answered questions about the child's attitude to and confidence in mathematics; the children pointed at one of five faces to indicate their response while the adults used a five-point scale. The responses of all participants were scored and totalled to give an overall score for each child on entry to and exit from the programme.

A triangulation approach was employed within an interpretivist methodology, using a combination of qualitative and quantitative data collection tools to address the aims of the study. The attitude survey was administered for 8,000 children in 700 schools. 400 intervention teachers responded to an online questionnaire, and 200 of them kept weekly logs of children's progress during the intervention. 30

intervention teachers and 30 class teachers were also interviewed about children's progress during and after the intervention. In order to obtain the children's perspective, 30 children were interviewed with their parents.

In relation to the aims of the study:

- 1. Data from the attitude survey was matched to teachers' logs of children's progress, which enabled a detailed item analysis of the survey. The teachers' questionnaire responses were used to check and interpret the outcomes of this analysis and to identify suggestions for improvement.
- 2. Attitude survey data was used to give an overall analysis of the frequency and direction of changes in children's attitudes. The teachers' weekly logs gave an insight into the timing, cause and nature of changes during the intervention, while the interviews with adults and children gave were used to analyse and explain its overall impact.
- 3. Data from the attitude survey and from the weekly attitude logs was matched to number test outcomes and to weekly attainment logs. Relationships between initial attitudes and attainment and between progress in attitude and attainment were analysed.
- 4. Interviews and questionnaire responses were analysed to extract the most frequently mentioned wider benefits of the intervention and the explanations given for them.

Frame

A triangulation approach was employed within an interpretivist methodology, using a combination of qualitative and quantitative data collection tools to address the aims of the study. The attitude survey was administered for 8,000 children in 700 schools. 400 intervention teachers responded to an online questionnaire, and 200 of them kept weekly logs of children's progress during the intervention. 30 intervention teachers and 30 class teachers were also interviewed about children's progress during and after the intervention. In order to obtain the children's perspective, 30 children were interviewed with their parents.

Research findings

Preliminary results indicate that:

- 1. The attitude survey was simple and straightforward to use. However, whilst it gave an acceptable indication of the direction of attitude change in children, it was limited in indicating the scale or the precise nature of the change.
- 2. Children's confidence and attitudes towards mathematics improved significantly during the intervention. Children participated keenly in their Numbers Count lessons and showed a greater willingness to engage in whole-class mathematics lessons and to talk about mathematics about home.
- 3. Children's attitudes towards mathematics were positively correlated with their initial levels of attainment. Progress in their attitudes was positively correlated with gains in attainment and generally took place at the same time as or before the latter.
- 4. Children became more confident learners across the whole curriculum and their relationships with parents, siblings and classmates improved. Teachers and parents attributed this to the individual attention that they received and to the teaching strategies employed during the intervention.