

## **HAVE DAILY MATHEMATICS LESSONS ENHANCED PUPIL CONFIDENCE AND COMPETENCE?**

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*A systematic review group for mathematics education funded by the DfES was established at the University of York in October 2003. Its first review question was "Has the Daily Mathematics Lesson, in the context of the National Numeracy Strategy for primary schools in England, helped pupils to develop confidence and competence in early mathematics?" This paper reports on the processes and dilemmas involved in conducting a systematic review, and reports early findings.*

### **INTRODUCTION**

A Systematic Review Group for Mathematics Education was established in October 2003 with funds from the DfES to be coordinated by Maria Goulding and Chris Kyriacou at the University of York Department of Educational Studies. The purpose of such review groups is to carry out a systematic review of the literature on questions of importance for policy and practice. The review group, includes teachers, teacher educators, researchers and policy makers. The first review question undertaken by the group was "Has the Daily Mathematics Lesson, in the context of the National Numeracy Strategy for primary schools in England, helped pupils to develop confidence and competence in early mathematics?".

### **WHY THE NEED FOR A SYSTEMATIC REVIEW?**

One of the problems facing researchers is how best to draw to the attention of practitioners and policy makers the research evidence that can inform their decision making and practice. Reviews of the literature on key areas of interest to practitioners and policy makers is one such method. However, reviews of the literature are often carried out by academic researchers acting alone who tend to focus on those aspects of the topic which is of most interest and relevance to them personally. In addition, the review of the literature that they produce is heavily influenced by the search strategies they adopt for finding relevant literature, which can be biased towards what is available in those libraries and publications that they are aware of and have easy access to. As such, it is not unusual to find that when two researchers working independently on a review of the literature on the same topic provide a list of references at the end of their review, these two lists may contain few publications in common.

In order to address the problems involved in conventional reviews of the literature, the systematic review approach has been developed with the primary intention of enabling such reviews to better inform practitioners and policy makers (as well as other 'user groups', which in the case of educational research might include pupils, teachers, parents, governors, teacher educators, and research students).

In the U.K. an Evidence Informed Policy and Practice Initiative (EPPI) in Education has been funded by the DfES and an Evidence for Policy and Practice Information and Coordinating Centre (EPPI-Centre) was established in 2000, based at the University of London Institute of Education, to undertake a five year programme of work to guide, oversee and moderate the work of 'review groups' commissioned by government agencies to undertake a systematic review of the literature in areas of importance for policy and practice in Education.

The systematic review approach involves a number of key characteristics and stages.

1. A review group is established comprising members from the different user groups for the review, and in addition, if appropriate, an advisory group may also be established to provide the review group with helpful advice and comments as and when needed.
2. The work of the review group is guided, overseen and moderated by staff at the EPPI-Centre; this includes regular meetings and training sessions at the EPPI-Centre where different review groups come together.
3. The review group formulates a 'review question' to address; this stage will involve consultation with various users and user groups.
4. The review group formulates a search strategy to trace relevant publications, and the publications identified in this way are then filtered down by using an explicitly stated set of criteria for the inclusion/exclusion of these publications, which eventually leads to the identification of a set of relevant publications that are to be analysed in-depth for the purpose of addressing the review question.
5. The stages involved in carrying out a systematic review involve the use of a standard format and procedure for recording and reporting the work of the review group based on software maintained by the EPPI-Centre and their work at various stages is made publically available on the EPPI-Centre website (<http://eppi.ioe.ac.uk>)

### **WHY THIS REVIEW QUESTION?**

Ensuring that pupils make early progress in mathematics and develop self-confidence in themselves as learners of mathematics is one of the key challenges facing mathematics education. As such any approach that can enhance pupils' early progress can help to provide a solid foundation for later success. One of the principal claims made for the introduction in September 1999 of the National Numeracy Strategy (NNS) was that it would help raise standards in primary school mathematics. One of the key features of the NNS was the introduction of a daily mathematics lessons in primary schools lasting between 45 and 60 minutes, based on a three-part lesson structure (an oral/mental starter; the main teaching and pupil activities; and a plenary) with an emphasis on the use of interactive whole class teaching. The review question sought to examine the research evidence bearing upon the success or otherwise of this

approach in developing pupil confidence and competence in key stage 1 (i.e. in years 1 and 2).

## **METHODS USED IN THE REVIEW**

Identifying relevant studies involved carrying out an electronic search using keywords with bibliographic data bases, handsearching through key journals and conference proceedings, citations, and publications recommended by contacts. This resulted in 18 papers being identified for the in-depth analysis (Aubrey *et al.*, 2003; Baker and Street, 2003; Basit, 2003, Bibby *et al.*, 2003; Bills, 2003; Brown *et al.*, 2001; Brown *et al.*, 2003; Denvir and Askew, 2001; Earl *et al.*, 2002; Evans, 2001; Hardman *et al.*, 2003; Hopkins and Pope, 2000; Huckstep *et al.*, 2002; Jones, 2003; McSherry and Ollerton, 2002; Myhill, 2002; Pinel, 2002; Raiker, 2002).

## **FINDINGS AND IMPLICATIONS EMERGING FROM THE IN-DEPTH ANALYSIS**

The key features of the daily mathematics lesson have been well received by teachers and widely implemented, and there is some evidence that this has enhanced pupil confidence and competence in early mathematics. However, a closer examination of the situation as evidenced by the studies included in this systematic review have highlighted a number of problematic issues. Firstly, the intention that whole class teaching needs to be 'interactive' and promote higher quality dialogue, discussion and strategic thinking, has not been realised. Indeed, there is some evidence to indicate that the increased use of 'traditional' whole class teaching with 'pace', is in fact undermining the development of a more reflective and strategic approach to thinking about mathematics, and may be creating problems for lower attaining pupils. Secondly, there is evidence that the stricter time management involved may pose particular problems for lower attaining pupils, Thirdly, the overall enhanced gains in pupil competence may in large measure be a reflection of a closer match between what is being taught and what is being tested, rather than a greater pupil gains in their understanding of mathematics.

The data considered in this systematic review have three major implications for the NNS:

- (i) there is a need for in-service training for primary teachers to highlight the purpose and nature of 'interactive' teaching in fostering higher quality dialogue, discussion and strategic thinking;
- (ii) there is a need for in-service training to strengthen teachers' subject matter knowledge of mathematics, so that in the classroom context that can take better advantages of opportunities to enhance pupils' understanding of the mathematics they are engaged in;
- (iii) there is a need to consider how the national assessment of pupil progress in mathematics can occur without constraining time and pedagogy in ways that undermining the development of pupils' mathematical understanding.

## MEMBERSHIP OF THE REVIEW GROUP

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