TRAINING NON-SPECIALISTS TO TEACH NUMERACY

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This paper explores the challenge of developing a whole school numeracy strategy involving all staff (including non-teaching staff) of a secondary school for boys with emotional and behavioural difficulties. The first stage is to test all pupils for numeracy. The second stage is to place all pupils in 3 bands and set targets for each band. Thirdly, the aim is to begin numeracy sessions, initially of 20 minutes twice a week. This paper will outline possible approaches to preparing staff for the delivery of the numeracy programme.

'TRAINING' VERSUS 'TEACHING'

The words 'training' and 'teaching' are interchangeable as dictionary definitions yet each holds different connotations. 'Teaching' implies guidance towards a greater level of knowledge and understanding; 'training' implies demonstrating "how to" acquire a new skill – it is more directive than teaching.

Anyone who has studied the management of change in schools, will know that effective change results from including participants in the decision-making process (Everard and Morris, 1990). In this way each person feels part-ownership of the project. Any attempt to impose change within an institution will meet resistance unless there is general agreement on the need for the initiative. Therefore, it is better to attempt to reach a degree of consensus at the planning stage.

Writing about the role of Learning Support Assistants in the mathematics classroom, Watson states:

> "…non-specialist teachers and LSAs, whose own experience of mathematics might be of techniques and procedures, and associated fears or failures, cannot automatically see ways in which the support they so ably offer in other subjects can be given in mathematics. The temptation is to resort to demonstrating how to do things rather than using adult-pupil interactions which allow more sophisticated knowledge to develop."
>
> (Watson, 2001, p.2)

Houssart (2001) raised the important question of

> "what LSAs need to know in order to best support children in mathematics lessons and how they can be helped to gain such knowledge and understanding."
>
> (Houssart, 2001, p.14)

Houssart goes on to answer that training is necessary for LSAs to encourage children to make use of calculation strategies.

Both researchers identify a need to involve LSAs in a *teaching* capacity. Therefore, why can they not be taught to teach numeracy? The term *training* was chosen in

response to the needs and desires of the staff driven by their status as non-mathematicians and expressed anxiety (even refusal to participate).

NUMERACY

The term 'numeracy' is used so frequently that there appears to be a consensus of opinion on what it means. However, a working definition is hard to find. The National Numeracy Strategy produced a necessarily detailed definition:

> "…the proficiency in number that involves a confidence and competence with numbers requiring an understanding of the number system, a repertoire of computational skills and an inclination and ability to solve number problems in a variety of contexts."
>
> (DfEE, 1998)

To adapt this to a working definition, a numerate person understands number, computes and solves problems, which aggregates to a facility with number. The dictionary definition:

> "an acquaintance with the basic principles of mathematics" (OED, 1982)

is not strong enough (the numerate would be more than just 'acquainted') and lacks clarity (what *are* the basic principles of mathematics?). The aim within schools should be to improve each child's facility (ease) with number. In the act of scanning mathematics for its numerate aspects it is difficult to find any that have no relation to number. Therefore, the initial numeracy programme will be necessarily selective.

Writing on Numeracy Recovery for young children, Dowker (2001, p.7) describes the 8 components of the scheme, which can be adapted for older children. A six week programme might cover the following aspects:

1. place value;
2. memory for number facts;
3. estimation;
4. word problems;
5. transference from concrete to verbal to numerical;
6. derived fact strategies for calculation.

Take point 2. memory for number facts. The adult and child can play memory games, such as pairs. Multiplication cards (4x3) have to be matched to the correct answer card (12). This tests the adult's memory as well as the child's.

However, any scheme must be suited to the particular needs of the pupils.

STAGES OF STRATEGY

Questionnaire on learning styles

At the pre-testing stage (February/March 2001) a questionnaire [1] was given to all (20) staff and (56) pupils at Boxmoor House School (an EBD school for boys) with the aim of determining each person's predominant learning style, visual, auditory or kinaesthetic. It was hoped that the resulting information could be used to match staff and pupils with the same learning styles, although other factors, such as mathematical ability of pupil (which band) and member of staff and the affective (who gets on with whom) will also be considered.

In fact, analysis of the data reveals a majority of visual learners amongst staff (79%) and pupils (45%) which is hardly surprising as human beings are essentially visual. The next largest group among pupils is kinaesthetic learners (24%) then auditory (19%). The rest were combination learners and one boy scored equally as visual-auditory-kinaesthetic. The boys were interested in the results and adopted their style of learning quite seriously. Before introducing (or 'selling') the numeracy programme to them, further reference will be made to this data.

Testing for Numeracy

The QCA optional tests (available by March 31 2001) were chosen for KS3 on the advice of the county mathematics advisor. Only Year 10 will be tested in KS4 using a GCSE (OCR) non-calculator paper. The optional tests take the form of two 50-minute multiple choice papers and should be completed by the end of the spring term 2001. (Timing may be delayed due to staff shortages.)

Banding

From the test results 3 bands will be created such that the middle band (2) will be the largest and bands 1 and 3 smaller (a normal distribution). Targets towards improving numeracy scores (as given by the optional tests) will then be set for each band. It is anticipated that targets will be in the form of x percent of a band raising their score by y percent. All pupils will need to be retested (using the same tests) at the end of the summer term.

Numeracy Programme

The numeracy programme will be devised to reach the targets set and to meet the particular needs of the pupils in each band. However, the programme will also need to suit the staff who will be implementing it. That is why it is important to consider all factors when pairing child and adult. At the time of writing, all teachers, LSAs and care workers are involved in literacy sessions four mornings a week for 20 minutes each morning. This takes the form of listening to the child read, keeping a record of the book, how many pages are read and words for the child to learn. The only real difficulties that arise from this programme are when children are reluctant to read. In general, the participating adults perceive literacy to be less challenging to them than numeracy - many are unsure of what will be expected of them in a numeracy session.

Staff Training

How do the managers of the programme ensure that each adult is confident about delivering it to their chosen pupil? It is a question of how best to present the initiative so that they feel able to meet a set of agreed aims.

Staff will be more likely to accept the need for the initiative if they agree with its aims. However, they may still feel that they are not qualified to achieve such aims and that a mathematics teacher is the best person to deliver numeracy. It has already been mooted that the mathematics teacher and the I.T. teacher will teach the pupils in band 3 with the greatest difficulties. However, those in band one are possibly in greater need of an able mathematician to provide them with an adequate challenge.

First Step

The first step may be to invite the participants to share their fears and expectations with each other and the managers, who then have the opportunity to allay the majority of the fears and any false expectations. Reassurances need to be given that no-one will be asked to do anything about which they feel unhappy. If they are, the programme simply will not work. To be successful, the adults must feel that their actions will make a difference to the child's understanding of number. Planning and preparation is the key. At this point the numeracy consultant for the local authority will become involved in explaining the National Numeracy Strategy to those unfamiliar with it. Once the aims and objectives of the Strategy are set out, the teachers with mathematical backgrounds can (through consultation) adopt the parts of the programme that are best suited to the needs of the pupils in the school.

Second Step

Initially, when considering the details of the school programme, the question is how to present it to the staff. Among the options are two extreme approaches.

1. To be entirely prescriptive and present the contents as a package with detailed instructions on how to teach each session to the children.
2. To take a laissez-faire approach and provide an aim for each session (eg. practise their times tables) and leave it to staff to decide how they will achieve this.

In reality, the approach should be somewhere between the two extremes, although it is tempting to take a more prescriptive approach in order to guide the less confident adults.

Training Requirements of Staff

The inset should be tailored to the different training needs of the staff, in the same way that the numeracy programme should suit the needs of the pupils. Those adults with more mathematical knowledge will need less input and be able to take on the role outlined by Watson, developing the child's knowledge through the quality of their interactions and interventions.

Everyone will be given time to consider the objectives and content for each session, so that they are fully prepared. This is a luxury for most LSAs as they are usually in the same position as the pupils, moving between subjects, adapting to the differing demands of those subjects. Pupils like to know what they will be doing in today's lesson but they are not usually told until they walk through the classroom door – the same can be said for LSAs. It is vital that LSAs and RSWs feel fully prepared for their new role.

SUMMARY

In setting out the task in terms of planning stages, the intention has been to break down the challenge of implementing the aims of a whole school numeracy strategy into manageable 'chunks'. No conclusion has been reached on the 'best' approach to preparing staff. Instead, a strategy that aims to harness the existing skills and knowledge of each adult in an agreed programme, planned in consultation with staff, is seen as most desirable.

POSTSCRIPT

The follow-up to this paper will chart the progress of the school strategy and it is hoped that this will be reported in November 2001.

ENDNOTE

[1] Courtesy of Tom Harwood, learning consultant

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