

THE RHETORIC AND THE REALITY BEHIND THE STANDARDS DEBATE: HOW PROGRESSIVE OR TRADITIONAL ARE MATHEMATICS LESSONS?

IAN WOOD & MIKE OLLERTON UNIVERSITY
COLLEGE OF ST MARTIN, LANCASTER

Abstract

The debate on the 'Standards of Mathematics Teaching', the methods teachers deploy and the resulting affect upon children's learning of mathematics is omnipresent. Much rhetoric is written about progressive and traditional approaches and how one or the other fails to help children learn mathematics effectively. Headlines regularly appear, in the press and in international reports about the standards of mathematics teaching in this country, and teachers are left with the task of trying to unravel why it is that children are, seemingly, less skilled in comparison with children from past generations and from other countries.

In this paper we set out to explore the reality of some aspects of this debate. We also consider the feasibility and desirability of engaging in debate which labels and polarises methods of teaching and seeks to simplify highly complex issues related to the teaching of mathematics. In particular we looked at the organisation of classes into mixed-ability or setted groupings, the type of resource used and the proportion of lesson time used for whole class, teacher exposition and for students to work individually.

Data Collection

A selection of Heads of Mathematics in the North West region were contacted and invited to take part in a survey aimed at collecting information about mathematics lessons in their schools. Subsequently, meetings took place in Lancaster and Carlisle, and these resulted in teachers agreeing to ask their colleagues to take part in this research.

At these meetings a first, test-run pro-forma was devised to explore how it might be possible to gain information about the kind of events which occur in mathematics classrooms. Using these pro-formas, teachers from ten schools provided information over a two week period on their lessons. Once these were returned, a further meeting was held to discuss the information received and resulting from this meeting a second pro-forma was constructed. This was used for a second survey and 8 schools reported on lessons across 47 different classes, over a two week period. The results from an analysis of these returns are disseminated below.

Grouping students

Mixed ability or in setted classes

The government White Paper: *Excellence in Schools* (July 1997) advocates the notion of "setting pupils according to ability" as one way of "Modernising the comprehensive principle" (1997: 1)¹ The implication of this is that setting is a 'modern' idea providing children with greater opportunities to

learn mathematics. Unsurprisingly, our research shows that mixed-ability grouping, across the 11-16 age range is not prevalent, whereas setting is and has, for many years, been the norm.

Of the lessons in our survey 83%, in total, were taught in 'ability' sets. The percentage of classes taught in sets by year group are as follows:

Y7 - 43% Y8 - 62.5% Y9 100% Y9 - 100% Y 10 - 100% Y11 - 100%

This data is commensurate with the trend recognised by HMI and referred to by Ruthven (1987:244)². We argue, therefore, that setting pupils by ability cannot be viewed as a modernising strategy; indeed there exists evidence to the contrary, which indicates some Pacific Rim countries currently achieve high standards when pupils are taught in mixed-ability groups. For example in his comparison of mathematics teaching in Japan and America, Jones(1997:8)³ refers to TIMSS which shows that Y9 Japanese students pupils are taught in mixed ability groups and attain higher educational standards than Y9 American students who are taught in sets.

Types of resources used Published and non-published materials

Our survey provides the following information:

In 60% of lessons some form of published material was used, in the main this was a text book.

In 15% of lessons some form of *home-produced* worksheet was used.

In 25% of lessons, no published resource or home-produced worksheet was used. In the main, these lessons were described as teacher's writing questions on the board. There was little evidence of an investigational approach being used in these lessons.

Use of Equipment

In our survey teachers reported the use of equipment in 26% of lessons. The type of equipment listed, apart from rulers, pencils, protractors and compasses included: plastic money, specialist grid paper, tape measures, tins, calculators, scissors, computers, model making equipment (pipe cleaners, plastic tubes), glue. None of the returns mentioned the use of manipulatives such as: multi-link, geoboards, pegboards, geo-strips, Cuisenaire rods, paper folding activities, A TM Mats etc.

Whole class teaching and pupils working individually

Of the lessons surveyed, teachers reported working, on average, for 28% of lesson time with the whole class. For 61% of lesson time pupils worked either individually (66% of this time) or with another person (34% of this time); no specific reference to group work activity was reported. The remaining 11 % of lesson time was accounted for by lesson beginning's and ending's.

Problems of polarising debate into: Traditional v. Progressive teaching methods Turning to the debate over traditional and progressive methods used in schools. This has and continues to be a highly potent, political issue. Much has been written in the press about the supposed detrimental effect of 'progressive' methods in our education system.

He (Tony Blair) also signalled his commitment to traditional teaching methods by confirming that Chris Woodhead, Her Majesty's Chief Inspector of Schools, who has been a champion of the "back-to-basics" approach and the scourge of progressive teachers, would remain in his post. Sylvester (1997)⁴

There are three points we intend to raise here, they are:

- the criteria against which progressive or traditional methods are defined;
- the wisdom of engaging in a shallow, rhetorical debate in education about wholly progressive or traditional approaches;
- if consensus can be reached to define progressive and traditional practices, then at issue is how frequently such practices are used in mathematics classrooms; our research mirrors the concerns raised by Paul Ernest in his references to classroom experiences.

On the first point we believe it is extremely problematic to reach a clear and distinctive definition of these two notions. Indeed in Japanese classrooms, which are often perceived as traditional, a picture emerges of pupils engaging in problem-solving, discursive type approaches to their learning:

An example of a sequence of a Japanese Year 9 mathematics lesson is provided by Keiko Ito-Hino. The topic is introducing linear equations with two variables. At the start of the first lesson, the teacher shows the class two twelve sided dice and asks the students:

"Suppose you roll both dice at the same time. In what cases will the sum of two times A plus B equal fifteen?"

During the lesson the students work on the problem, discuss it with their peers, and volunteer to present their solutions to the class. The following lesson begins with the teacher saying:

"Today I want you to solve the dice problem by using numerical expressions."

During this lesson the students are encouraged, again through discussion and student presentations, to examine the similarities and differences between the solutions of an equation with two variables and the solution of an equation with one variable. And so the work develops.

Jones (1997:7)

On the second point we believe it is politically mischievous to attempt to polarise classroom practices in such ways. This is because the focus of debate shifts from researching the reality of ways in which effective teaching and learning occurs, to a rhetorical debate centred on misconceived versions of a previous golden age:

Discussion on mathematical education becomes frustrated by fruitless polarisation of 'progressive/reactionary' views which are over-simplistic and do not take fully into account the many differing objectives of learning mathematics and the research and experience which is available on how some of these can best be achieved.

Askew et. al. (1993:28)⁵

On the third point, Ernest, who defines progressiveness in terms of "problem solving and investigatory work." (1996:pp 6/7)⁶ draws attention to the dearth of good progressive practice: " ... the problem with the best progressive practices is that they are all too rarely done. "; our research concurs with his findings. If "trendy" or progressive practices can be classified as: students engaging in discovery methods, using equipment and being taught in mixed-ability classes, then our research indicates little of this type of activity is taking place, in those classrooms we surveyed. If traditional methods can be classified as: students practising and consolidating skills through exercises from text books and being taught in setted classes, then our research indicates that, in those classrooms we surveyed, much of this type of activity is taking place.

Conclusion

In compiling this report, we recognise the dangers of generalising from such a limited data sample. The intention behind this research is to raise questions about how mathematics is taught, to challenge misconceptions and to explore the grouping methods that are used. We also acknowledge there are issues about the validity of our data collection methods, i.e. the information was supplied by teachers and not by an outside researcher; here also there are important issues of trusting fellow professionals, and acknowledging and valuing integrity. Whilst we are therefore circumspect about the breadth and the robust nature of our research, we nevertheless believe that it raises issues about the way mathematics is taught, the types of resources used and how children are, in the main, grouped.

¹ OfEE (1997) Excellence in Schools. London: HMSO

² Ruthven, K. (1987) Ability stereotyping in mathematics, Educational Studies in Mathematics Vol. 18 Kluwer
³ Jones, K. (1997) Some lessons in mathematics: A comparison of teaching mathematics in Japan and America, Mathematics Teaching 159

⁴ Sylvester, R. (1997) Blair promises schools revolution, Daily Telegraph 13-01-g]

⁵ Askew, M., Brown, M., Johnson, D., Millett, A., Prestage, S., Walsh, A., (1993) Evaluation of the implementation of National Curriculum Mathematics at Key Stages 1, 2 and 3. London: SCAA

⁶ Ernest, P. (1996) The Negative Influences of 'progressive' Ideas on School Mathematics, Vol. 25 No.2.