

Y9 BOOSTER KIT: MATHEMATICS, MUTTON DRESSED AS LAMB?

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In this paper we discuss the pedagogy implicit within the Y9 booster kit: mathematics. Within the document, supposedly, are twelve lessons, designed for use in revision classes with Year 9 (13-14 year olds) pupils, to 'boost' their performance in national tests. Detailed analysis of one of the lessons reveals a misunderstanding of the relationship between teaching and learning and between learning and 'revision'. The 'kit' highlights the inadequacy of distance education materials.

The introduction of the National Strategy (DFEE, 2001) has seen an irritating proliferation of metaphors, for example 'catch-up' and 'springboard' which construct attitudes to teaching and to learning. We now have a Year 9 'booster kit' which one head of department described as 'the ultimate quick fix; the twelve lessons which will transform your level 4s into 5s or 6s'. The very language of 'kit' raises images of the plastic aeroplane kit, with all the parts to make your exact scale model of reality – you too can own Concorde! And as for 'booster', are we planning to send them on a trip to Mars? Or perhaps we are boosting their immunity to disease (is that disease mathematics?)

BACKGROUND

The National Curriculum was introduced in 1985 and over the last 15 years has been altered and changed many times. Brown (1999) explores the government interventions and changes to the curriculum during this period claiming that the changes had an affect on the nature of teaching as a direct consequence of the national assessment. Concerns have been expressed at government level about low standards of numeracy, mainly as a consequence of unfavourable international comparisons (ibid). In 1996 primary numeracy and literacy projects were launched and the National Numeracy Strategy (NNS) developed during 1997–8. With a change of government there was no change in the push to raise standards. Education remained a place for politics to be seen to move things forward purposefully with a yard-stick to measure results. The NNS Framework for primary schools was introduced in 1999, and that for Key Stage 3 in September 2001. The Numeracy Task force claims that such recommendations are based in research evidence:

to find solutions to any problems with mathematics achievement and to make practical recommendations based on methods that have been shown to be effective in raising standards (DFEE, 1998, p. 7)

All of the documentation has stressed the need to find ways to improve standards. Much of the finance has been directed to produce materials for schools to use.

METHOD

The data source for this paper is the Y9 Booster document itself. Government or government agency documents provide an environment for the exercise of political power. May (1997, p. 164) notes "Documents are now viewed as media through which social power is addressed." More importantly they also create a particular environment.

They do not simply reflect, but also construct social reality and versions of events. (ibid)

The constant repetition of inadequacy and the need to improve and the provision of 'right' ways create a particular image of education in schools. This power has a way of creating the 'knowledge' which becomes acceptable.

Power produces knowledge, they imply one another: a site where power is exercised is also a place at which knowledge is produced. (Smart, 1989, p. 49)

Thus the glossy folder can pretend to reliability and validity. Its existence attests to its necessity, its appearance reinforces its importance. A brief content analysis shows that there are 5 sections, the introduction (2 pages/1 sheet) and contents (2 pages) plus 4 others. The first section "Focusing teaching to improve pupil performance" has 14 pages including 1 blank. The booster lessons section has 88 pages 43 of which are blank. The last two sections are both 2 pages consisting of a leaflet for pupils and one for parents and guardians. The folder is glossy, sections are given for single sheets, the paper is heavy and the existence of so many blank pages gives the impression of a far more important and weighty document than the actual content justifies.

the gloss put on the message can itself convey indirect information about, say, the ideals aimed at. (Sapsford & Jupp, 1996, p.143)

We next used a framework offered by Jupp and Norris (1993) to analyse the document:

1. Who writes these discourses and whom do they represent or purport to represent?
2. What is the intended audience of such writing?
3. What does critical reading of these documents tell us about
 - what is seen as problematic;
 - what explanation is offered for what is seen as problematic;
4. What alternative discourses exist? (adapted from p. 50)

Question 1: The kit claims that "The Key Stage 3 National Strategy has prepared ... (DfES, 2002, p. 7)" Authorship is attributed to the Strategy; no individuals are named. The power lies with the Strategy. But there is an element of 'street cred', an acknowledgement to work from some Local Education Authorities.

The Key Stage 3 Strategy (mathematics strand) acknowledges the contributions of Greenwich, Barking and Dagenham, Tower Hamlets and Birmingham LEAs in producing these resources. (DfES, 2002, p. 13)

These names conjure difficult inner-city schools, with the possible attribution of 'if they work here, they will work anywhere'. Certainly a major claim is made for the document, that it will strength the mathematical understanding of 'all' pupils.

The guidance reinforces approaches that teachers in schools are using in the mathematics strand of the Key Stage 3 National Strategy. It reflects existing good practice in many schools and will help all schools to strengthen all pupils' understanding of mathematics before the National Curriculum tests in May. (DfES, 2002, p. 7)

Question 2: The kit directs us to teachers who are "Helping pupils prepare for Key Stage 3 mathematics tests" (DfES, 2002, title, p 7). The advice is also very specific about how this audience will be aided.

The guidance is designed to help teachers enable pupils to maximise their achievements in mathematics at the end of Key Stage 3. (p 7)

Question 3: There is nothing in the document that recognises any problem, other than the need to raise standards and improve test results. This is an objective, its achievement is not seen as problematic, because the guidance offers the solution in the form of:

- a set of 12 booster lessons, tightly focused on the skills, knowledge and understanding required to achieve levels 5 and 6 in mathematics;
- a pupil leaflet that focuses on revision technique and test preparation;
- a leaflet for parents and guardians, designed to provide information on the Year 9 tests, and provide guidance on the support that they can offer in the run up to tests.

Question 4: One of the last questions in their framework for discourse analysis is: "What alternative discourses exist?" We would suggest that there are many and that by exploring one lesson in detail (see below) we offer an alternative discourse to that imposed by the booster kit with attention to what has been omitted.

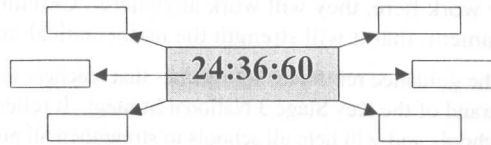
Many of our comments are not criticisms of the activities per se. Many are of the form we would use. The mutton may be very tasty and relevant to our pupils. Our difficulty lies with the combination of activities, their collection into a particular format, the template, and the imposed linearity (the lamb).

A CRITIQUE OF THE 5TH LESSON

Lesson 5 is on Ratio and Proportion (p.49). The kit reminds teachers of the demands on pupils of the ratio and proportion content. For pupils working to achieve level 5, teachers need to "develop pupils' ideas about ratio and proportion and use them to solve simple problems" (p. 11) and for level 6 help them to "understand proportional reasoning and use it to solve problems" (p. 13). The implication is that pupils who are likely to be level 4 in the tests will need to work on these aspects.

For the oral and mental starter the objectives (Y8) consist of reducing “a ratio to its simplest form” and dividing “a quantity into two or more parts in a given ratio”. The starter, timed at 15 minutes, is based on two spider diagrams and a discussion.

The first diagram offers a three-part ratio and the instruction is to ask pupils to give ratios equivalent to the one in the middle and then to decide which is the simplest with reasons.



This is a useful activity but it really only works in its current form if pupils can already do the task. What if the pupils do not know what to do? The lesson plan offers no indication of how to help learning at this stage – or any other.

... focus some time on developing oral and mental work. This is an excellent way of checking pupils’ understanding in order to inform your future planning. It also provides opportunities to keep past work fresh in pupils’ minds. (DfES, 2002, p. 10)

We are offered a reason for our oral starter, but significantly there is no mention of what you might do if pupils have difficulty with the mental activities. Well perhaps the whole lesson is for checking what can or cannot be done? And yet:

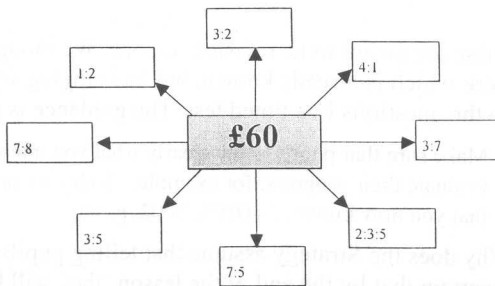
Having identified pupils’ weaknesses, select appropriate teaching objectives from the Framework as a basis for your planning and teaching. You should address these objectives explicitly and not just through a passing reference. (ibid)

If this topic reflects a potential weakness, there is no explicit planning for the objective, other than success or failure at a particular task. The diagram offers practice towards the objective of pupils simplifying ratios, especially for those where this activity is needed to stretch thinking or impose time pressure. For those who are yet to understand, a three-part ratio is inappropriate. For many, the multiplication knowledge to simplify 24:36 is sufficiently complex. The planning fails to exploit the connections to multiplication and factors that may help the pupils use more secure knowledge that can be adapted to this context.

The next stage in the starter adds complexity. The plan suggests a discussion about simplifying ratios including different units e.g. 5p to £1. Is converting units in this context suitable for the ‘booster’ pupil? Advice on suitability and discussion of possible misconceptions are omitted. What do you tell the pupil who cannot convert units and simplify? What new connections might be made? The only teaching strategy offered is working through an example (or more if you make them up). Is this the only pedagogical tool available? The inclusion of the word ‘discussion’ seems to imply that the planner expects some purposeful action. But without more detailed planning we would doubt that any real mathematical discussion takes place when simplifying 5p to £1. Whilst we recognise that teachers are well able to do this, the document gives a powerful message that such aspects are unnecessary

The starter concludes with work on the second spider diagram, using the “unitary method”.

Does the language of the unitary method imply that if pupils are unsuccessful should we offer them the algorithm? $3:5 \Rightarrow 3 + 5 = 8$, 8 equal shares $\Rightarrow 60 \div 8 = 7.5$, £7.50 per share.



What is it about this activity that is going to help learning? The assumption is surely that the pupils understand and know how to do these tasks.

Three items are to be ‘delivered’ in 15 minutes. Is this possible with level 4 pupils who need to understand the ideas not just practice them? The implication that this is unproblematic offers a diminished perspective of teaching and learning.

The main teaching sequence (30 mins) has objectives about dividing “a quantity into two or more parts in a given ratio (Y8)” and using “the unitary method to solve simple word problems involving ratio (Y8)”. The vocabulary is again “unitary method” – why? Children know the name ‘long multiplication’ but this does not help them to do the algorithm. Whilst language is essential in our thinking, and labels can be useful to aid learning and memory, the label has no hook on which to hang the mathematics. The label can come to be seen as more important than solving the problem. The method may be the most generalisable, but it is not always the best way of finding the answers. We used non-standard methods for most questions given.

The first overhead transparency for this part of the lesson has three questions. The first has ratio in the context of the angles of a triangle and pupils have to share 180° in the given $9:5:4$, a question to practise the first objective. We did not use the unitary method. As $9 = 5 + 4$, the first angle is 90° , thus 50° and 40° . The next question is about mixing paint, 2 parts blue with 5 parts yellow given 5 litres of yellow and 10 of blue. Well, you could use the unitary method. But we doubled, giving 4 litres of yellow to 10 blue, no more blue is available. The unitary method involves calculating with $1:2.5$ or $0.4:1$. The last question concerns fruit squash for 9 or 10 people given a recipe for 6 (is this intended to be a real life question?) The 9-person recipe uses half as much again, and in real life we would probably make it stretch to 10; add a little more water or put less in the glasses. By setting the question in context, the context itself acts against the unitary method as the method of choice.

There is a second set of examples. Question 1 asks if Rob’s ratio of $5:3$, successful to unsuccessful kicks shows that he is more successful than Dave with a ratio of $3:2$. The plan warns that, “although Rob has a better ratio you cannot tell who had the greater number of successful kicks”, so is this question related to the objectives?

These are meant to be revision lessons. We thought that revision was about revisiting work which is already known, but like singing scales, needs revisiting if pupils are to do the questions in a timed test. The guidance is given to:

Make sure that pupils know clearly what you intend them to learn and that you can evaluate their progress; for example, 'Today we are going to learn...' and 'Let's check that you now know...' (DfES, 2002, p. 10)

Why does the Strategy assume that telling pupils what they are going to learn makes it certain that by the end of the lesson 'they will know'? If it was that simple would we need booster classes?

CONCLUSION

The way in which such materials are produced and disseminated into schools is redolent of panic. There is no time for their usefulness to be evaluated, nor is research funded to accompany the implementation. Those external to the Strategy, have no way of influencing or offering balanced view to accompany the material because of the speed of development. The quick-fix of the 'kit' offers a view of learning and teaching that is unlikely to offer long term remedies for improving standards. The power invested in the document makes it difficult for schools whose results are average or below to resist the compulsion to particular action and specific lesson content and style. This has the potential for such schools to find their standards lowering, because teachers are constrained to work in a particular way.

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