ECARDA

A revised National Curriculum

Fewer Words: More Opportunity

This very short paper is an exhortation to the Secretary of State for Education, Mr. Gove, to redesign the National Curriculum for mathematics in a way that benefits rather than restricts teaching and learning. This article first appeared in issue 48 October 2011 of the *Learning and Teaching Update,* published by Optimus Education and subsequently reprinted in *Mathematics Teaching*, the journal of the Association of Teachers of Mathematics, issue 226.

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Emptying my loft in preparation for its conversion into an office forced me to undertake a significant de-cluttering exercise. I applied the principle of retaining only that which was useful or of high value. Now that the exercise is complete I believe my approach worked.

The Secretary of State has his own de-cluttering exercise on the National Curriculum. This is good news. Too many state-determined prescriptions de-value the skills and professionalism of teachers. Why invest in training a teacher if their job is no more than to 'deliver' a national strategy and assess pupils' progress using a state-sponsored algorithm? Moreover, why so fill the national curriculum that there is no room for teachers to select aspects of their subject that might be more interesting and relevant for their pupils?

The abolition of the National Strategies gives back to teachers what never should have been taken away in the first place. A minimalist approach to specifying a National Curriculum opens the opportunity for teachers to use their subject knowledge and teaching skills to ignite interest in their subject and guide pupils in its learning. This re-professionalising of teachers is welcome. It refocuses attention on the critical importance of initial and continuous in -service training which sharpens and maintains subject knowledge, whilst taking into full account research on how pupils learn and the consequent pedagogical considerations.

So, what should remain in the National Curriculum for mathematics? The key questions to ask are: what is it as a minimum, all pupils should know, understand and be able to do by the age of 11 and 16 (or perhaps 18)?

For this article, I will stick with age 11 years because getting this right underpins everything that follows.

Most will agree with the Secretary of State's intention to ensure children leave primary school secure in the basics of mathematics. Doing less mathematics in primary schools but being confident with it is preferable to doing more but lacking confidence to use it. Where politicians and mathematicians may differ is in their description of what constitutes these basics.

Listing all the bits which constitute the basics may mean that the new curriculum would use more words than the old. This drives me to consider articulating the essence of mathematics expected of and 11-year-old. Say, for the sake of argument, this new minimalist curriculum, which sets out the basics, is confined to no more than twelve statements. What would you write? Where do you start?

In designing a curriculum there is a logic to identify initially the scope and nature of the subject which underpins the design – a sort of design brief. However, there appear to be as many definitions of mathematics as there are authors of them. I believe that the original National Curriculum for mathematics in this country in 1988 intended a preface describing what mathematics was. Lack of agreement on this meant the idea was dropped. However, the formulation of the curriculum went ahead regardless!

To articulate this new revised slimmed-down national curriculum, it is even more important to have a working definition of mathematics. Because a curriculum sets out a territory for undertaking learning journeys I am proposing the description of mathematics that reflects human endeavour and achievement. Thus, my working definition is: "Mathematics is what mathematicians do." This has been often quoted and sometimes criticised for ducking the issue. I believe it reaches the heart of the matter. In behaving as a mathematician, I can make similar discoveries and acquire similar skills and knowledge to those who are described as mathematicians. The metaphor "standing on the shoulders of giants" captures an appealing curriculum principle.

Equipped with this working definition and motivated by this principle, it is possible to determine a strategy for formulating the "twelve-statement" curriculum. I believe that the scope of the curriculum should include three domains: Firstly, dispositions and attitudes (affects); secondly, mathematical processes; and thirdly, mathematical concepts. The first domain switches on and motivates learning; the second provides tools for acquiring skills and knowledge; and the third indicates key areas of skills and knowledge. This model was used as a basis for the Queensland State curriculum for mathematics in the mid-1980s. The third domain is only accessible through the first and second.

I now have definition, principle and strategy, so here goes:

By the age of 11 years, pupils should have developed:

Dispositions and attitudes towards mathematics which include:

1. Interest, enjoyment and confidence;
2. Initiative and creativity;
3. Co-operative effort and persistence;

Mathematical processes which include:

4. Classifying, organising, patterning and analysing;
5. Estimating and comparing;
6. Counting, measuring and calculating;
7. Representing, inferring, validating and explaining.

Mathematical concepts which includes an appreciation[1]:

8. That the number system is perfectly regular;
9. That mathematics is shot through with infinity;
10. That a lot can be gained from a little;
11. Of equivalence and inverse;
12. Of variance and invariance in transformation.

[1] Acknowledgement to Geoff Faux in the Association of Teachers of Mathematics' journal "Mathematics Teaching 163" June 1998