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A Matter of Ideology: a response to the Draft Primary Mathematics Programmes of Study

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ABSTRACT This article is the text from a talk given to the conference *The Primary Curriculum: English, mathematics and science in 2014* on 27 February 2013 at Canterbury Hall, London, organised by the National Association for Primary Education (NAPE). In it the author argues that the current consultation process is flawed as there is an ideological divide between Subject Association's views of effective learning and teaching and the beliefs of the current government. He argues that the Subject Associations base their arguments on research and years of experience whereas government policy often aims for easy political wins. This means that the current curriculum does not meet the needs of our learners. The article ends with a call for all who are engaged within the education system to work towards a curriculum which has the development of a participative democratic society at its heart rather than the economic needs of the government.

Introduction

This article is the text from a talk given to the conference *The Primary Curriculum: English, mathematics and science in 2014* on 27 February 2013 at Canterbury Hall, London, organised by the National Association for Primary Education (NAPE). The talk outlined the response made by the joint Association of Teachers of Mathematics (ATM) and Mathematics Association (MA) Primary Expert Group. The ATM/MA Primary Expert Group has over 50 members who work across the mathematics community, including primary and middle school teachers, university lecturers, freelance consultants and employees of national mathematics bodies. The group meets regularly and reports back to the parent organisations on all matters related to primary education.[1]

Before moving into the detail of the response I want to respond to my colleague from the Association of Science Education who suggested that they

have been able to influence the science proposals by having the 'right people' meeting with appropriate government officials. The ATM/MA group has met key civil servants and ministers throughout the process. Indeed, a prominent figure in mathematics education, Dylan Wiliam, was a member of the original expert group advising on the National Curriculum. Professor Wiliam was so disenchanted with the process that he resigned from this group and has said that he can see little of its advice in the current proposals. Members of the ATM/MA Primary Expert Group have been engaged in writing the current draft and often report frustration with changes that are made after they submit their drafts which do not take account of the advice they are giving.

I would suggest that mathematics and English are sites for government interference in a way that science is not. It is much easier to score political points by claiming a 'back to basics' approach in these areas than in science. This raises the question for the ATM, the MA and the National Association of the Teaching of English (NATE) as to how best to engage with government (of all colours).

The Fifty-sixth Minute

But first let me offer you a metaphor – I am a Bradford City fan and last Saturday I was at Wembley to watch Bradford in the Capital One Cup playing Swansea. This was Bradford's first visit to Wembley for 100 years and the first time a club from the second tier had reached a major cup final for over 50 years. By half time Bradford were trailing 2-0 and the hope of a giant killing act was fading fast. In the fifty-sixth minute the Bradford fans started a traditional round of applause in memory of the 56 fans killed in the fire at the Bradford City ground in 1985. Seen by many as one of football's forgotten disasters, this event is commemorated in this way whenever Bradford have an important game. While the applause continued Swansea were awarded a penalty, the Bradford goalkeeper was sent off and Swansea gained an unassailable 3-0 lead. All without any break in the deafening ovation from the Bradford community for their family, friends and fellow Bradfordians.

This applause continued for the rest of the game – after the game newspapers and TV reporters were amazed at the celebratory way in which defeat was taken. For me there was an important message. It became clear that the gods of football had turned their backs on Bradford, there was going to be no surprise, no happy ending, but this did not matter. As a community, the Bradford fans celebrated something much more important. By coming together as a community we were able to share the real meaning of football. That is about sharing common experience, celebrating our community and moving forward together as a caring and loving group of people with common interests and goals.

Perhaps we have reached the 56th minute in terms of Subject Associations' engagement with government in terms of trying to change and influence policy. I am not sure that anyone 'up there' is listening. I'm not sure

there will be a happy ending in which government and Subject Associations come to a shared curriculum which serves our learners needs appropriately. I'm not sure there will be victory on this occasion.

However, we can take the longer view. The Subject Associations predated this government and will outlive them and their civil servants. We must focus on the communities we are a part of and that we represent. We must continue to work with teachers to support them in working with their learners in becoming critical effective mathematicians whatever the curriculum. And we should celebrate this role.

A Matter of Ideology

A key reason why this government is unlikely to listen to advice offered by the Subject Associations is that there is an ideological difference between the ATM/MA and the current government in terms of beliefs about learning and teaching. This is perhaps best summarised by an example.

Let me ask you to carry out a task. Can you copy the multiplication square shown in Figure 1 and complete it?

	7	8	2	½	¼	4
6						
3						
10						
9						
5						
12						

Figure 1.

Whenever I am asked to describe the problem-solving approach to learning and teaching mathematics I use this example. I noticed that you all chose to complete the grid as an individual activity even though I did not request this. Most of you chose to start at the top left square, completing 7 x 6 = 42 and continued by filling in the rows or columns one by one. There were individuals, however, who 'chose' to start with the column with the '2' at the top. This is an easy column to start with and once this is complete the '4' and the '8' column can be completed by doubling. Similarly, we can complete the '10' row and then the '5' row by halving these answers.

This is an illustration of working on a mathematical problem starting from 'what we know' and solving a problem by using what we already know to work out what we don't yet know. Mathematics is not about simply remembering

something we have been told, it is about applying our knowledge in new situations, with confidence.

Can I compare this with an experience I recently had in a school I was visiting. The teacher had told me that 'We are doing rapid recall' and each child had a grid something like the one shown in Figure 2 (only much bigger!).

7 x 8	9 x 4	2 x 4	4 x 6
6 x 4	7 x 7	6 x 2	5 x 5
2 x 6	3 x 8	7 x 5	8 x 10
2 x 7	10 x 3	9 x 3	8 x 6

Figure 2.

I sat next to one girl who had not completed any answers after 5 minutes. I asked her if there were any she could do. She gave me a look which suggested I did not understand the point of the exercise and continued to stare blankly at the grid. I pointed to '2 x 4'and she filled in '8' next to it without any feeling of accomplishment, still focused on trying to remember '7 x 8'. I pointed to 10 x 3, again she inserted '30' and went back to the problem of remembering '7 x 8'. I pointed to '6 x 2' to no response. I wonder if she 'knew' her 2 times table but had not yet memorised her 6 times table. This offers an ideological contrast to the first example. Here, mathematics is about memorising and practising facts which we apply later when given problems to solve. I would suggest the first example offers a view of learning and teaching mathematics that I share. Indeed, the guiding principles of the ATM state:

> The power to learn rests with the learner. Teaching has a subordinate role. The teacher has a duty to seek out ways to engage the power of the learner. Any possibility of intimidating with mathematical expertise is to be avoided.[2]

This contrasts with the views of learning and teaching offered by Michael Gove who, when interviewed by the BBC about the aims for the new curriculum, was reported as saying, 'I'm not going to be coming up with any prescriptive lists, I just think there should be facts.'

So let us look in detail at the current proposals for the mathematics curriculum in our primary schools.

Aims of Curriculum

The proposed aims encapsulate some of what we would hope to see as priorities in a National Curriculum. However, we would argue that the order in which

these appear is significant as teachers and others are likely to see the first bullet point as the most important. The first bullet point currently reads:

> [All pupils should] become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils have conceptual understanding and are able to recall and apply their knowledge rapidly and accurately to problems.

The focus here is clear. The message is not hidden. Mathematics learning and teaching is about 'varied and frequent practice' so that at a later date pupils will 'apply their knowledge rapidly'.

We recommend changing both the order and the content of the aims. We would argue that more appropriate aims would be:

The National Curriculum for Mathematics aims to ensure that all pupils:

1. Can reason mathematically by following a line of enquiry and develop and present a justification, argument or proof using mathematical language;
2. Can solve problems by applying their mathematics to a variety of problems with increasing sophistication, including in unfamiliar contexts, and modelling real-life scenarios;
3. Develop conceptual understanding alongside fluency and efficiency in mathematical techniques and procedures, with mental methods as a first resort;
4. Enjoy and feel confident about mathematics, persevere with challenges and demonstrate resilience, flexibility, enthusiasm and curiosity when learning and using mathematics.

Calculators

The Education Minister, Elizabeth Truss, seems to have a strange aversion to calculators and the use of information technology which is not based on anything other than a few brief visits to classrooms. The current statement in the curriculum document states:

> Calculators should not be used as a substitute for good written and mental arithmetic. They should therefore only be introduced near the end of Key Stage 2 to support pupils' conceptual understanding and exploration of more complex number problems, if written and mental arithmetic are secure. In both primary and secondary schools, teachers should use their judgement about when ICT tools should be used.[3]

While we would support the opening statement that calculators should not be used as a substitute for good mental arithmetic, to follow this by saying that calculators should be banned from the majority of learners in primary schools does not follow. But this does seem to be a pet issue of Ms Truss. In a speech published on the DfE website she argued:

> Calculators can support the teaching of mathematics very effectively – it would be wrong to claim otherwise – but they are no substitute for calculations that can be carried out by a child with a pen and paper, or in their head. Particularly in a test that is designed to check whether a child has mastered the basics.[4]

As I stated earlier, this is an easy win for government, which can argue that the curriculum is more rigorous by appealing to simplistic arguments even when these fly in the face of research. The Ofsted report *Recent Research in Mathematics Education*, published by HMSO in 1995, stated categorically that '[having] open access to calculators does not lead to dependence on calculators and can improve pupils' numeracy'.[5]

Perhaps this is an example of not letting facts get in the way of a populist policy.

Expectations

The level of challenge is high, probably too high, in many aspects of this curriculum. There needs to be clarification as to whether the programme of study defines an entitlement for learners (as established in the 1988 curriculum) or whether it is an aspiration for the highest attainers. The recent Ofsted report on primary arithmetic (2011) makes it clear that a formal algorithm for division is beyond what can be expected for even high-attaining well-taught 11-year-olds. Roughly speaking, the expectations for the end of Year 4 are similar to the expectations for Year 6 currently, and many of the expectations for Upper Key Stage 2 include things which are best left to secondary, such as coordinates in four quadrants, the compound measure, speed and formal algebra. These topics are left until lower secondary school in the high-performing jurisdictions without exception as far as we can ascertain. Care also needs to be taken to ensure coherence with the programme of study for primary science.

In high-performing jurisdictions such as Singapore and Massachusetts, mathematical proficiency embraces not just skills, but also concepts, processes, metacognition and attitudes, with problem solving being central to mathematics learning. We recommend that a similar approach is taken in this document. It is also worth noting that formal schooling does not begin until the age of 6 or 7 in these high-performing jurisdictions and that their Year 6 curriculum is for 12-year-olds rather than 11-year-olds.

Inclusion and Assessment

While the statement on inclusion is welcomed, we have grave concerns about those learners who do not attain the programme of study expectations. It would be helpful to have clarity around expectations of experience, a notion of entitlement and a realism that not all students will learn everything that is

taught. The testing regime will have an impact on how the curriculum is delivered, and as such, it needs to be developed in conjunction with it.

Removal of Levels

One of the major changes which teachers are coming to terms with is the removal of levels from the curriculum document. We agree with the removal of levels and the argument that they have become complicated and difficult to understand, especially for parents, and we would also agree that too many teachers focus on a pupil's current level as a fixed descriptor, often referring to pupils by their level as defined by a test rather than focusing on what pupils understand across a range of mathematical skills. However, there needs to be clarity about what will replace them and how children's attainment is to be reported. The current statement on the DfE website reads:

> Schools will be able to introduce their own approaches to formative assessment, to support pupil attainment and progression. The assessment framework should be built into the school curriculum, so that schools can check what pupils have learned and whether they are on track to meet expectations at the end of the key stage, and so that they can report regularly to parents.

This is disingenuous, as many schools will simply carry on as they are.

Teacher Support

There is a danger that specific statements about pedagogy, including those about drill and practice and the use of calculators that I have discussed earlier, will hinder the development of a school's mathematics curriculum as they may be seen as prescriptive. However, we are concerned that if the National Curriculum lacks any guidance, then schools may resort to published schemes. Teachers should have sufficient information to allow them to make professional judgements about mathematics teaching. The expertise available in the mathematics community should be drawn on to ensure that the level of guidance within the programmes of study is appropriate.

In the highest-performing jurisdictions, textbooks and resources to support learning and teaching are produced by teams of teachers, curriculum developers and teacher educators/ researchers who have expertise in the area. This is funded by governments who would not consider leaving something so important to commercial interests.

The Purpose of (Mathematics) Education

Let me finish with a reflection on what may be another ideological divide between the current government and the ATM/MA on the purpose of education in general and mathematics education in particular. Let me first share

with you the view of mathematics that Elizabeth Truss used to open her speech which I quoted earlier:

> From our experience of online shopping to the financial performance of investments and pensions, we live in a world entirely framed by maths. Even in those professions not traditionally associated with mathematics, there's now a heavy reliance on algorithms and calculations: in journalism to spot the patterns in data; in architecture to use algebra and calculus with confidence; in marketing to make sense of the enormous array of statistics the world creates every day.[6]

That modern orientation towards deduction and logic, that appetite for maths, the appreciation of statistical analysis, technology and probability, these open up tremendous opportunities for young people in this country. But to take full advantage, we need to start exploiting mathematics as urgently as other countries might drill for oil.

Here mathematics is a tool with which individuals support the economy or which can be exploited in marketing or investments or other activities which will make individuals wealthier. This is not my view of the purpose of education. I became a teacher because I believe that education allows individuals to better understand the worlds in which they live in order to change them for the benefit of the communities that they live and work in. I believe that the letter from Haim Ginott, with which I close the talk, acts as a warning to the government and to Subject Associations who see education as purely about advancing the state:

> Dear Teachers:
>
> I am a survivor of a concentration camp. My eyes saw what no person should witness. Gas chambers built by learned engineers. Children poisoned by educated physicians. Infants killed by trained nurses. Women and babies shot and burned by high school and college graduates.
>
> So I am suspicious of education. My request is: help your students become more human. Your efforts must never produce learned monsters, skilled psychopaths, or educated Eichmanns. Reading, writing, and arithmetic are important only if they serve to make our children more human.

Notes

[1] A full copy of the response to the curriculum proposals can be found at http://www.atm.org.uk/policy/ATM-MA-Nat-Curr-Review-Response-2013-04-16.pdf

[2] ATM Guiding Principles. www.atm.org.uk

[3] National Curriculum in England: mathematics programmes of study – key stages 1 and 2 (p. 3). https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/239129/PRIMARY_national_curriculum_-_Mathematics.pdf

[4] Full text available at https://www.gov.uk/government/speeches/elizabeth-truss-calls-for-a-renaissance-in-maths

[5] M. Askew & D. Wiliam (1995) *Recent Research in Mathematics Education 5-16.* London: HMSO, p. 30.

[6] Full text available at https://www.gov.uk/government/speeches/elizabeth-truss- calls-for-a-renaissance-in-maths

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