ACME Advisory Committee on Mathematics Education

National Centre for Excellence in the Teaching of Mathematics

Mr Nick Gibb MP
Minister of State for Schools
Department for Education
Sanctuary Buildings
Great Smith Street
London SW1P 3BT

3 November 2010

Dear Minister,

Thank you for meeting with us earlier this month to discuss issues in mathematics education. ACME and the NCETM greatly value your interest in this area, and we would like to summarise a few of the key points we considered for your reference.

Primary school arithmetic

We appreciate your concerns regarding the teaching of multiplication and division in primary schools and your interest in the associated algorithms being taught. There is an opportunity here to clarify, for teachers and parents alike, the importance of developing understanding alongside fluency in calculation, and the different ways that understanding and fluency can be reached.

An example of this is the 'chunking' method which we noted is taught in many schools. It is a useful step in the understanding of long division, alongside other models. For some children it can also be the most fluent and understandable method of achieving a sensible answer and their confidence and engagement grows when they feel comfortable with a method they understand, provided of course it is a correct method. All that we would add to our conversation is that just as 'fluency' in the context of languages requires an ability to express the same thought in a number of different ways according to the situation, so arithmetic fluency similarly requires an ability to choose the right approach at the right time. This diversity actually consolidates understanding and learning.

Teachers' subject knowledge

We agreed that it was important that teachers were given the freedom to teach in the way that they feel is most appropriate and that respects the rigour and progression of the subject. The National Centre was set up specifically to support teacher subject-specific knowledge and subject-specific pedagogy – what, for example, a fraction is and the different ways it can be taught and learned. Both ACME and the NCETM are convinced that teacher subject knowledge is a significant issue at all stages of mathematics education. At one extreme the NCETM is a partner in the successful Further Mathematics Support Programme in its work supporting teachers in teaching this advanced subject. We were also pleased to refer in our discussion to the crucial importance of ongoing support for the Mathematics Specialist Teacher (MaST) programme. We believe this will make a positive contribution to improving teacher subject knowledge in primary schools, and that this will have long lasting benefit across the sector.

Competition between awarding bodies

It was very encouraging that the negative effect on standards of commercial forces between awarding bodies was well understood by everyone present. There is a public perception that exam boards are in a downward auction and that, whether this is true or not, it is damaging public confidence in the examination system. We would urge you to review the current system, drawing in expertise from across the education community, in order to create a system which best serves the needs of learners and does not lead to a fall in standards.

This issue links with our concerns regarding textbooks. The high-stakes nature of the assessment system can have the perverse incentive for schools to purchase textbooks that are endorsed by the relevant chief examiner, irrespective of their quality. We believe that the relationship between exam boards and publishers needs scrutiny by the regulator in order to reinstate a true quality-based market and encourage the production of text books which support a rich mathematical experience.

Post-16 Mathematics

Our position is that, in the long-term, all students should be studying some form of mathematics post-16. The CBI's recent report *Making it all add up: Business priorities for numeracy and maths* also makes this recommendation, and a forthcoming research report from the Nuffield Foundation is expected to highlight how far out of step England is in relation to other developed nations. Other countries are producing young people who are more mathematically trained for longer, despite the extra teaching resource required – ultimately to the benefit of their economies. In this context, ACME continues to support the development of a richer set of pathways and qualifications that will support students in studying for a range of subjects within and beyond STEM post-16. We are pleased that the forthcoming Wolf Review will address the vocational aspect of this issue in more detail, and both ACME and NCETM have submitted evidence. At the same time we look forward to contributing to the review of A-level Mathematics and Further Mathematics, qualifications which are central to developing the mathematicians of the future and for preparing students for many degree courses.

Pathways problems still need to be addressed (including addressing the quality of the sample assessments produced by the awarding bodies for the 'Use of Mathematics' qualification and the regulatory restrictions that have contributed to them) but neither these nor the limitations of the current qualifications offer should be allowed to prevent the obvious need for the construction of well-targeted qualifications.

GCSE Mathematics

We discussed the linked pair of GCSEs and noted criticism of the specimen questions. Again, criticisms of the linked pair of GCSEs currently being piloted are based on some of the specimen questions prepared by the exam boards, reflecting their own interpretation of the philosophy of the qualifications and not the concept itself. ACME has convened a series of meetings with the exam boards and others to ensure that the philosophy is properly understood; the next meeting, planned for December, will bring those in the different boards who are setting the papers together with each other and relevant experts. This links to the risk of unhealthy pressures from the regulatory system on exam boards to produce questions with which teachers are most comfortable.

The vision for two GCSEs in mathematics has its origins in Adrian Smith's 2004 report *Making Mathematics Count* – a report which is still highly relevant today. ACME has worked hard to ensure that the pilot continues, given the community's investment in the linked pair, and was very pleased to see confirmation earlier this year that the pilot will continue. ACME will continue to strive to ensure that the pilot is successful and delivers a high quality mathematics experience to participating students and institutions. We noted at the meeting that ongoing management of the pilot will need attention as QCDA begins to wind down.

We were very grateful for your support for our concerns about early entry to GCSE mathematics and the effect on deep understanding and progression post-16. ACME is developing a position paper on this issue which we will forward to you when complete. We look forward to continuing to engage with your officials on how this worrying trend might be addressed.

Curriculum review

We referred briefly to models for curriculum development. ACME and the NCETM would be pleased to play some role in the curriculum development process as appropriate to our aims and objectives perhaps acting as a conduit to a highly diverse mathematics community.

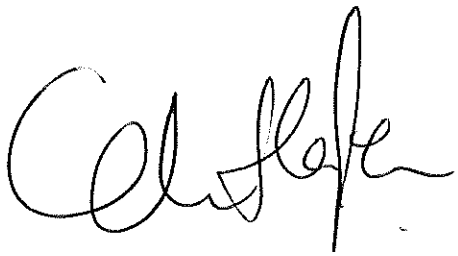
Curriculum development is a complex process requiring input from many interested parties. We discussed the involvement of mathematicians from Higher Education (HE) in any future curriculum review. Since its inception ACME has recognised the importance of HE mathematics to its 5-19 remit, with one of its seven members coming from a research-intensive mathematics department. ACME would welcome greater engagement of mathematicians from HE, and hopes that mechanisms can be found for them to have the time to bring their intellectual understanding of the subject to school mathematics in a constructive way. However, it is important that such mathematicians also recognise innovation, scholarship, wisdom and experience in those who work in schools and pedagogical research. It is also important that there is recognition that mathematics education for some post-16 will need to take into account the unique enabling role that mathematics plays in so many other subjects in STEM and beyond, and to employers.

ACME Conference 2011

We would like to conclude by reiterating our invitation for you to give the keynote speech at the ACME annual conference on **15 March 2011**. Michael Gove spoke at the ACME conference earlier this year and we believe welcomed the opportunity to set out his plans for school education reforms. The event will bring together teachers, academics, researchers and others with an interest in mathematics education and would provide a timely opportunity to engage with this community.

Thank you again for taking the time to meet with us.

Yours sincerely,



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