ACME Advisory Committee on Mathematics Education

Ofqual consultation: Developing new GCSE, A level and AS qualifications for first teaching in 2016

September 2014

1. About ACME

The Advisory Committee on Mathematics Education (ACME) is an independent committee that aims to influence mathematics education strategy and policies with a view to improving the outcomes of mathematics teaching and learning in England and so secure a mathematically enabled population.

2. This response

ACME's response to this consultation has been informed by discussions with the mathematics community and ACME's Outer Circle of advisors. ACME has also submitted a range of consultation responses and documentation on A level in recent months, which set out many of the arguments below in more detail.[1] In addition, in August 2014 ACME convened a meeting, bringing together learned societies, subject associations and other organisations interested and involved in the development and implementation of GCE Mathematics and Further Mathematics. During this meeting many of the issues set out below were discussed. ACME has also written a response to the Department for Education (DfE) consultation.[2]

3. Assessing GCE Mathematics

Linking content and assessment

3.1 The A level Content Advisory Board (ALCAB) had a remit to look at content of mathematics qualifications, but acknowledged the intrinsic links between content and assessment. They noted the criticism that current examinations test speed and accuracy rather than mathematical ability, are too short to allow for in-depth and searching questions and questions can be highly scaffolded.[3] To address some of these concerns, they emphasised a shift towards problem solving, interpretation and testing understanding. They argue that this shift requires assessment with less-structured questions that test understanding and help to develop strategies for solving problems either in a purely mathematical or in an applications context.

3.2 Ofqual and the Department for Education must work closely together with awarding organisations to ensure that assessments that are developed reflect the spirit of the specifications and fulfil the aims and objectives of those qualifications.[4] Assessment, rather than the specification, frames the way in which students are taught in the classroom. In addition, a sufficient range of assessment instruments is required to ensure validity of the assessment.

Assessment objectives

3.3 The current assessment objectives were laudable in their intent, but poorly implemented by awarding organisations. In part this may have resulted from lack of clarity of purpose in the very brief assessment objectives themselves. There is therefore a case for developing guidance for awarding organisations on

[1] http://www.acme-uk.org/policy-advice/current-areas-of-focus-for-acme/a-level.
[2] https://www.gov.uk/government/consultations/gcse-and-a-level-reform .
[3] https://alevelcontent.files.wordpress.com/2014/07/alcab-report-on-mathematics-and-further-mathematics-july-2014.pdf.
[4] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/330241/Mathematics_GCE_-_subject__content_-_final.pdf; https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/330359/Further_mathematics_GCE_-_subject_content_-_final.pdf.

the use of the new assessment objectives in order to ensure that they are used appropriately and consistently in examinations.

3.4 Ofqual (Paragraph 3.42, p. 32) writes that 'the proposed wording specifies more clearly than the current wording the core abilities for the subject. This is partly achieved by reducing the number of assessment objectives (AO) from five currently to three', namely application of standard techniques (AO1); reasoning, interpreting and communicating mathematically (AO2) and solving problems (AO3). It argues that these three assessment objectives (AOs) emphasise 'the clarity needed where tasks address these assessment objectives in combination'. This objective may not have been achieved. There remain serious concerns that:

- two key aspects of the current assessment objectives, reading and comprehending mathematics, and using technology, though identified as 'Aims and Objectives' in the DfE consultation, are not mentioned in the proposed new assessment objectives
- the use of bullets in the draft explanatory text may lead to a wholly inappropriate atomisation of the assessment
- the italic text within the proposed AOs 2 and 3 may make the examinations harder; the intentions of this text need to be clarified and the proportions of marks for each assessment objective should be reviewed.

Non-examination assessment

3.5 The changes proposed in the DfE consultation would involve a shift in emphasis towards problem solving, interpretation and understanding. To realise these aims fully will require some non-examination assessment as timed written exams cannot assess many of these skills in the depth that is suggested in the DfE proposals.

3.6 However, Ofqual noted that it had 'reviewed the mathematics content against our non-exam assessment principles and do not believe there are any essential skills which cannot be assessed by examinations alone' (Paragraph 3.41, p. 32). The Ofqual review should be published so that a debate may be held on the evidence that all the essential skills in mathematics can be validly assessed by examination alone. The current modest use of coursework in present mathematics specifications is not an argument against its validity.

3.7 Awarding organisations will have the space to develop content in AS/A level Further Mathematics. They therefore have the opportunity to develop innovative content that offers students stimulating and varied courses. In developing this content, it may become clear that non-examination assessment is necessary for assessing this new content.

Participation in GCE Mathematics

3.8 The Government's policy goal is to continue to see an increase in numbers of students taking mathematics post-16, and to ensure that the numbers taking AS and A level Mathematics and Further Mathematics increase. In recent years AS/A level Mathematics and Further Mathematics have been growth subjects.[5] ACME wishes to highlight its concerns about the potential detrimental effects of these

[5] In 2014, 89,497 students took A level Mathematics and 14,484 students took A level Further Mathematics, a rise of 0.4% and 2.6% respectively from 2013 entries. AS Mathematics and Further Mathematics had entries of 16,200 and 24,402, rises of 7.1% and 9.3% on the previous year. As has been well documented, mathematics uptake can be vulnerable to changes in the system, with an enormous decline in update in 2002 and 2003 following the Curriculum 2000 reforms. In 2012, about 9.95% of all A level entries were for mathematics (85, 741 candidates). AS Mathematics had 11% (148, 550 candidates),

proposals on the uptake of AS/ A level Mathematics and Further Mathematics. These concerns relate to two key aspects of the new arrangements:

- the risk that the examinations are harder in view of the proposed assessment objectives will mean the subject is considered difficult by students who will then be less likely to choose it
- the possibility that the loss of flexibility introduced through the new linear approach will act as a disincentive to students to extend their studies after early success, and, in some cases it may act as a disincentive to start the subject at all

http://www.jcq.org.uk/media-centre/news-releases/entry-trends-2012-a-as-aea-tables. See more detail on developments since Curriculum 2000 in a previous ACME response: http://www.acme-uk.org/media/11319/positionstatementalevelmay2013.pdf.