



CAMBRIDGE ASSESSMENT

**Research summary – A study of stakeholders' views on
mathematics courses for 16 year olds
(Mathematics teachers, professional association representatives,
employers and vocational Further Education tutors)**

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March 2013

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1 Introduction

The Department for Education has announced its intention to reform GCSEs. New syllabuses will be introduced for first teaching in schools in September 2015. As part of Cambridge Assessment's wider programme of research relating to qualifications for 16 year olds, a questionnaire study was conducted. Views on a range of issues relating to qualifications in mathematics were sought from GCSE mathematics teachers, professional associations, employers and vocational FE tutors. The findings are summarised here.

2 Findings from the mathematics teachers' questionnaire

2.1 Characteristics of the responding teachers

179 teachers participated in the study. This was a response rate of 8.6%. All the school types were represented in the responses. The majority of teachers taught at comprehensive schools (44%), followed by independent schools (19%) and FE institutions (11%). The majority of responding teachers taught at schools and colleges offering GCSE mathematics (87%) and A Level mathematics (88%). Most also taught KS3 mathematics courses (68%).

2.2 Types of support

The types of support that teachers used varied depending on the area of content. However, for almost all areas the most popular types of support were colleagues and the internet.

2.3 Preparation for A Level

The GCSE/IGCSE courses were commonly thought to prepare students adequately for AS/A Level mathematics in a range of topic areas. However, teachers thought students were not well prepared in proofs (68%), unstructured problem solving (54%), algebraic fluency (44%) and familiarity with other technology (47%). Teachers felt that areas that would benefit from greater emphasis at KS4 were: algebraic fluency (61%); problem solving (18%); proofs (18%); functions and graphs (18%); co-ordinate geometry (12%); and surds (7%).

The majority of teachers (86%) offered extra lessons at the start of A Levels for some or all of their students. Most of these teachers focused the sessions on particular knowledge and skills, including algebra (80%), surds (26%), quadratics (17%), graphs and functions (15%) and indices (14%).

2.4 Increasing student engagement

When asked about how to increase student engagement with Key Stage 4 mathematics, most of the suggestions related to changing the content of the GCSE. Common suggestions included using mathematics in real-life situations (38%), increasing the amount of problem solving (17%), and changing the content of the curriculum (21%). In general it was suggested that mathematics had to be relevant for the lower ability students, whilst stretching the high-ability students.

2.5 Mathematics assessments

Most teachers thought that the maximum length of a mathematics assessment at Key Stage 4 should be one and a half hours (34%) or two hours (55%). Almost all teachers thought that assessments at Key Stage 4 should include short answer questions (93%) and questions with multiple steps where the steps aren't given (93%). The majority did not want these assessments to include multiple-choice questions (70%) or open-ended investigations (60%). Almost all teachers (93%) supported the use of either two or three tiers in mathematics assessments.

2.6 Distinction between pure mathematics and applications of mathematics

Opinions were divided as to whether pure mathematics and applications of mathematics should be assessed on the same paper (45%) or different papers (37%). Several teachers thought they should be assessed in different qualifications, possibly for different types of students. Others identified the problems that separating the two would cause when there was also a need for calculator and non-calculator papers.

2.7 Role of an additional qualification

Teachers narrowly favoured an additional mathematics qualification that contained some Key Stage 5 material (54%), over one that enhanced Key Stage 4 material (36%). Many provided reasons for their choice. Some linked their choice to the type of students taking the qualification, others to the content that they thought it was important to include. The majority of teachers (83%) would only enter students who obtained an A and higher, or a B and higher

3 Responses from professional associations

Four questionnaire responses were received from professional associations. For most of the questions, the responses were similar to those of the respondents to the teachers' questionnaire; however, they differed in some areas. The professional associations were unanimous in suggesting that students were poorly prepared on estimation, whereas a majority of respondents to the teachers' questionnaire thought they were adequately prepared in this area. They were also slightly more likely than the respondents to the teachers' questionnaire to suggest that students were inadequately prepared for appropriate use of calculator and solving problems within context. The professional associations were in favour of long assessments, selecting two and a half or three hours as the maximum appropriate length. They also thought an additional maths qualification should enhance the Key Stage 4 content.

4 Findings from the employers' questionnaire

4.1 Characteristics of respondents

Thirty five employers participated in the research. The majority of them (54%) came from businesses with more than 250 employees. These businesses were in a wide range of sectors.

4.2 Mathematics grades, knowledge and skills required

43% of employers felt that a grade B in mathematics provided good evidence that new employees had a sufficient level of mathematics to work confidently, efficiently and independently; 22% felt that a grade C was sufficient. The most useful mathematics skills were: use of ICT (97%); proficiency with quantity and number (97%); and using diagrams, charts and tables (91%). Few employers listed the skills that employees lacked, so it was not possible to draw firm conclusions about this. However, three areas were included by more than one respondent: mental arithmetic and basic skills; understanding the magnitude of numbers; and using mathematics in context.

4.3 Mathematics training

About half of respondents said that they provided some form of mathematics training for new employees. This was slightly less likely to be remedial training than job specific training or training which built on existing knowledge.