Research summary – Focus group findings on stakeholders' views on the new science GCSEs

Dr Simon Child and Dr Sanjana Mehta

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Research Division
Assessment Research and Development
Cambridge Assessment
1 Regent Street, Cambridge, CB2 1GG

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1 The study

The Research Division at Cambridge Assessment conducted a series of focus groups with the aim of investigating teachers' and employers' views on the development of new qualifications for 16 year olds. Two of the focus groups had stakeholders present who were interested in the new science GCSE qualifications. One focus group comprised 13 science teachers and included all three disciplines (five chemistry teachers, four biology teachers and four physics teachers). There was representation from independent, comprehensive and grammar schools. The second focus group had seven employers present and included: a member of a sector skills council; employers involved in the pharmaceutical, catering and green energy industries; an independent retailer; and a representative for small businesses. The study investigated teachers' and employers' views in relation to the following themes:

A. The important science skills that 16 year olds require for later education and employment
B. The important knowledge areas in science that 16 year olds require when moving into further education or employment
C. The perceptions of the grade C in GCSE science subjects
D. The assessment structure of new qualifications in science
E. Tiering in the new science qualifications
F. Grading of the new science qualifications
G. The use of examination aids in science qualifications
H. Selection of 16 year olds for employment
I. Training of 16 year olds once in employment.

2 Main findings

A. The participants were of the view that the practical application of scientific knowledge was the most important skill that 16 year olds require for later education and employment. This skill was demonstrated through following procedures, problem solving and data analysis. Participants suggested that students are scientifically literate if they are able to use previous scientific knowledge to address a new problem, can understand and analyse new data and can run scientific practicals.

B. In the teachers' focus group, core content areas were identified for chemistry, biology and physics (see Table 1). Employers were generally of the view that scientific content should be applied to real-world contexts (e.g. the food industry).

Table 1**:** Core content areas identified by teachers for the three sciences

Subject	**Content areas**
Chemistry	Structure and bonding
	Organic chemistry
	Energetics and rates
	Quantitative chemistry
	Trends and patterns
Biology	Man and the environment
	Molecular biochemistry
	Co-ordination and control of body systems and plants
	Evolution
	Variation, genetics and gene technology
Physics	Mechanics
	Electricity
	Electromagnetism
	Waves
	Atomic / nuclear
	Thermal physics
	Astronomy / cosmology

C. Among employers there were a range of views as to the importance of achieving a grade C in science. Some perceived students with a grade C as being competent in following procedures, but those with higher grades should also have the ability to think critically. A number of employers were of the view that a grade C is not an effective indicator of future performance.

D. The science teachers wanted all three sciences to be included in the new qualification structure, as either part of a combined science qualification or through compulsory qualifications in the three science subjects. They suggested that the option to select two out of three sciences would potentially reduce the uptake of physics and close off career options for students. Employers saw a double award in science as a weaker qualification, although some teachers advocated that double and combined sciences could be more attainable for less able students. Teachers also emphasised the importance of practical teaching at Key Stage 4.

E. The majority of science teachers wanted tiering to be retained. They suggested that while the removal of tiering was in some ways preferred, in practice it would be unreasonable to achieve. They added that a single paper catering for the full ability range means that students' grades would be determined by their performance on one or two questions.

F. Science teachers were mainly in favour of retaining the current grading system at GCSE. This was due to the perception of an in-built tolerance of grades over percentage marks, and the expectation that employers would 'convert' any new grading system into a GCSE equivalent.

G. Science teachers were generally in favour of retaining examination aids. They argued that rote learning of formulae or the periodic table had little relevance to the real world, and that it would result in reduced teaching time for other content areas.

H. The employers had a range of entry requirements depending on the demands of the job role. In addition to examining the grade profile of potential employees, some employers noted that they have also introduced numeracy and literacy testing as part of their recruitment process.

I. A number of employers stated that they offer remedial literacy and numeracy training to new employees due to their difficulties with written instruction. Some employers offered training that focused on the writing of scientific reports and health and safety.