A study of stakeholders' views on science courses for 16 year olds

(Science teachers, professional association representatives, employers and vocational Further Education tutors)

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Contents

1 Introduction

This study aimed to survey science teachers' and employers' views on issues surrounding the development of science qualifications for 16 year olds. Two questionnaires were developed: one for teachers and professional associations, and one for employers and vocational FE teachers. Participants were invited to participate by email or the OCR website.

2 Findings from the science teachers' questionnaire

Three hundred and sixty science teachers responded to the questionnaire. Nearly 50% of respondents taught in comprehensive schools, approximately 20% taught in independent schools, and approximately 10% taught in secondary selective or sixth-form colleges.

2.1 Tiering

Over 60% of respondents thought that tiering should be retained in science qualifications for 16 year olds.

2.2 Combined and separate sciences

Approximately 70% of respondents thought that all or most students should study all three sciences until age 16. If students studied two sciences only, the combination of biology and chemistry was anticipated to be the most popular option by 83.6% of respondents.

Approximately 70% of respondents thought that there should be both a double and a single combined science award. Only 10% of respondents thought that there should be no combined science option. Of those respondents who thought that there should be a combined science option, over 60% thought that A Level sciences, A Levels in non-science subjects or vocational science qualifications would be the expected progression route from combined science.

Approximately 70% of respondents thought that 10% of curriculum time would be appropriate for a separate science qualification, while over 80% of respondents thought that 20% of curriculum time would be appropriate for a double award combined science option.

40% of respondents stated that they started teaching combined science GCSE courses in Year 9, compared with about 30% in Year 10. Over 50% of respondents stated that they started teaching separate science GCSE courses in Year 9, compared with about 25% in Year 10.

2.3 Practicals

Respondents reported spending a lower percentage of curriculum time on biology practicals compared to chemistry or physics practicals (modal values: 10–20% for biology, 30–40% for chemistry and 20–30% of time for physics). About 45% of respondents reported spending 20% or less of time spent on practicals on assessed practicals.

2.4 Progression

Nearly 60% of respondents thought that a B in a separate science GCSE was evidence that students had good knowledge and skills for progression, while only about 35% of respondents thought that a B in combined science was suitable for progression.

- The most important skills identified for progression from GCSE science to science A Levels were:Mathematical and numerical skills (approx 70%)
- Critical thinking and problem-solving skills (approx 60%)
- Self-directed study skills (approx 55%)
- Depth of subject knowledge (approx 55%).

2.5 Purpose

Respondents identified developing skills and understanding for further study (41.7%) and producing scientifically literate citizens (45.0%) as the most important purpose for the new science qualification for 16 year olds.

2.6 Reporting of student achievement

Respondents were asked how useful different measures of student achievement would be (eg an overall grade, performance relative to other candidates, a measure of achievement for different skills). All of the options provided were considered to be useful or very useful by at least 50% of respondents. However, a list of skills with a measure of achievement for each skill was considered useful or very useful by more respondents (82.3%) than other measures.

2.7 Assessment aids and format

The majority of respondents thought that calculators (73.3%), periodic tables (83.6%) and data sheets (65.0%) should be always available to students in examinations. There was less consensus for formulae, however nearly 50% of respondents thought they should sometimes be available.

Over 90% of respondents thought that short-answer questions, and calculations, should be used in Key Stage 4 examinations. About 80% of respondents thought that questions requiring candidates to draw and label diagrams, and extended writing questions, should be used in Key Stage 4 examinations. Less than 50% of respondents thought that multiple-choice questions should be included.

2.8 General comments: main themes

2.8.1 Assessment

- Coursework / controlled assessment at GCSE was seen as a problem because it reduces the amount of time for practical work, and encourages cheating.
- There was concern about the level of literacy and language skills needed in GCSE science assessments.

2.8.2 Content

Many respondents thought that there is too much content to cover. Additionally, many respondents thought that some content topics were uninspiring and a waste of time.

3 Professional associations

Four professional associations (PA) responded to a modified version of the questionnaire that was sent to teachers. These professional associations were all related to biological sciences. Overall the patterns of responses were very similar to the responses given by the teachers. However, the PA respondents valued practical skills more highly than the teachers did, and felt that synoptic questions should be included in assessment.

4 Findings from the employers' questionnaire

Thirty five employers responded to the questionnaire. The majority of these (54%) came from businesses with more than 250 employees. Respondents came from a wide range of sectors.

4.1 Grade needed for sufficient knowledge and skills in each subject

Across all three subjects, a grade B was the most popular choice of grade considered to show sufficient skills and knowlege (English, 34.3%; mathematics, 42.9%; science, 37.1%), followed by a grade C (English, 25.7%; mathematics, 22.9%; science, 28.6%).

4.2 Reporting

Respondents were asked how useful different measures of student achievement would be (eg an overall grade, performance relative to other candidates, a measure of achievement for different skills). No one method for reporting student achievement was favoured by employers.

5 Vocational FE respondents

Representatives from FE institutions who provided vocational qualifications were invited to respond to a modified version of the questionnaire sent to employers. Only five people responded to the vocational FE questionnaire; their responses were largely similar to those given by employers.