Analysis of Responses to our Consultation on Conditions and Guidance for GCSE Science

July 2015

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Contents

Executive summary

Our consultation about the Conditions and guidance for GCSE science took place between 27th March 2015 and 4th May 2015.

The consultation questions were available to either complete online or to download. A copy of the consultation is available at www.gov.uk/government/consultations/gcse-reform-regulations-for-science.

There were 40 responses to the consultation – 27 from individuals and 13 from organisations. All responses were in a form that matched or broadly followed the layout of the online consultation.

Respondents broadly supported most of our proposals but did raise concerns about:

- minimum assessment times;
- minimum level of demand for mathematics;
- schools to provide annual statements confirming they have taken reasonable steps to secure that students carry out required practical work; and
- limiting marks that reward recall of knowledge.

Respondents also sought more detail in relation to our proposals for tiering, the 'practical science statements' (and the evidence needed to support them) and the monitoring of practical work.

1. Introduction

This report is a summary of the views expressed by those who responded to our consultation on the Conditions and guidance for GCSE science which took place between 27th March 2015 and 4th May 2015.

Background

Reformed GCSEs are being introduced in England. The primary purpose of the new qualifications will be to provide evidence of students' achievements against demanding and fulfilling content and a strong foundation for further academic and vocational study and employment. If required, the qualifications should be able to provide a basis for schools and colleges to be held accountable for the performance of all of their students.

Following earlier consultations, we have already taken decisions on:

- the general design of reformed GCSEs;
- our policy and technical arrangements relating to those subjects that will be taught from September 2015;[1]
- the design of the reformed GCSEs in science that are to be introduced for first teaching in 2016;[2] and
- arrangements for assessing practical skills in GCSE science.[3]

This consultation focused on more technical matters – that is, on the regulatory arrangements that we must put in place to make sure that exam boards design, deliver and award the new GCSEs in science in line with our policy decisions.

[1] Reformed GCSEs in English language, English literature and mathematics will be taught from September 2015.

[2] http://webarchive.nationalarchives.gov.uk/20141110161323/http://comment.ofqual.gov.uk/gcse-reform-june-2013

[3] www.gov.uk/government/consultations/assessing-practical-work-in-gcse-science

2. Who responded?

We received a total of 40 responses to our consultation.[4] Twenty-seven responses were from individuals and 13 were from organisations. All of the responses were from individuals or organisations based in England, Wales or the Channel Islands.

Table 1: Breakdown of consultation responses

Personal / Organisation response	Respondent type	Number
Personal	Teacher	22
Personal	Educational specialist	5
Organisation	Exam board	4
Organisation	Other representative or interest group	4
Organisation	School or college	2
Organisation	Local authority	1
Organisation	Private training provider	1
Organisation	Union	1

[4] Where responses were received in hard copy we entered them into the online platform.

3. Approach to analysis

We published the consultation on our website. Respondents could choose to respond using an online form, by email or by posting their answers to the consultation questions to us. The consultation included 22 questions.

This was a consultation on the views of those who wished to participate and while we tried to ensure that as many respondents as possible had the opportunity to reply, it cannot be considered as a representative sample of the general public or of any specific group.

Data presentation

We present the responses to the consultation questions in the order in which they were asked.

The consultation asked 22 questions and each had a different focus. We asked nine questions about our proposals for the three single sciences (biology, chemistry and physics), the same nine questions about our proposals for combined science, and four general questions.

Respondents typically provided the same answers to the equivalent questions about single and combined science (or cross-referred to their other answers). We have therefore chosen to present these linked questions together – indicating, where appropriate, when an answer referred solely to single or combined science.

Respondents could choose to answer all or just some of the questions.

During the analysis phase we reviewed every response to each question.

4. Views expressed – consultation response outcomes

In this section we report the views, in broad terms, of those who responded to the consultation document. We have structured this around the questions covered in the consultation document.

A consultation is not the same as a survey and the responses only reflect the views of those who chose to respond. Typically these will be those with strong views and/or particular experience or interest in a topic. What follows is a fair reflection of the views expressed by respondents to the consultation.

A list of the organisations that responded to the consultation is included in Appendix A.

Compliance with the subject content

Question 1 − Do you have any comments on our approach to securing awarding organisations' compliance with subject content for new biology, chemistry and physics GCSEs?

Question 10 − Do you have any comments on our approach to securing awarding organisations' compliance with subject content for new combined science GCSEs?

For both single and combined science, we proposed to introduce Conditions that would require exam boards to ensure that they comply with the Department for Education's subject content requirements, and with our published assessment objectives.

Thirty-six respondents (26 individuals, 10 organisations) did not comment on these proposals.

All the respondents who did comment (individual, three organisations) expressed support for our proposals.

Interpretation of subject content

Question 2 − Do you have any comments on our proposed requirements for interpreting the subject content for new biology, chemistry and physics GCSEs?

Question 11 − Do you have any comments on our proposed requirements for interpreting the subject content for new combined science GCSEs?

These questions referred to our draft rules which set out how exam boards should interpret the wording of some statements within the subject content documents, and how the subject content should be sampled over time.

Twenty-eight respondents (20 individuals, eight organisations) did not comment on these proposals.

Four (two individuals, two organisations) expressed support for our proposals.

Three (two individuals, one organisation) commented on the wording in relation to equations in physics.

Three (one individual, two organisations) commented that it was particularly important to ensure consistency across the different exam boards.

Two (both individuals) commented that requiring students to recall equations seemed unnecessary as it is the correct application of equations that is most important.

Tiering

Question 3 − Do you have any comments on our proposed Condition and requirements for tiering in new biology, chemistry and physics GCSEs?

Question 12 − Do you have any comments on our proposed Condition and requirements for tiering in new combined science GCSEs?

Twenty-five respondents (19 individuals, 6 organisations) did not comment on these proposals.

Seven (five individuals, two organisations) expressed support for our proposals.

Three (two individuals, one organisation) commented on the detailed design of tiering in GCSE science. One individual commented that making grade 5 accessible on the foundation tier could make assessments too difficult. One organisation suggested that the availability of grade 3 on the higher tier could encourage schools to enter candidates for higher tier when they are better suited to foundation tier. One individual commented that our approach to tiering might lead to better differentiation at foundation tier than at higher tier.

Three (all organisations) sought more detail on our proposals – specifically around how grade 3 will be awarded at the higher tier, what proportion of marks should be targeted at grades 4 and 5, and how questions targeting practical skills might be tiered.

One (an organisation) commented that a student narrowly missing the grade 4 boundary for the higher tier could get different results when taking combined science rather than two single science subjects.

Assessment requirements

Question 4 − Do you have any comments on our proposed Condition and requirements for assessments in new biology, chemistry and physics GCSEs?

Question 13 − Do you have any comments on our proposed Condition and requirements for assessments in new combined science GCSEs?

Twenty-one respondents (16 individuals, five organisations) did not comment on these proposals.

Seven (five individuals, two organisations) commented that the proposed minimum assessment times seemed too long, particularly for combined science. One further respondent (an organisation) supported our proposed minimum time. Another (an individual) suggested that we should also specify maximum assessment times.

Five (two individuals, three organisations) commented on our proposed requirements for assessing mathematical skills. Three commented that our proposed minimum level of demand was unclear – one suggesting that we should not set a minimum at all. One commented that our requirements seemed to allow significant scope for variations in difficulty between exam boards. One questioned whether a single task could count towards both the minimum percentage assessing mathematical skills and the minimum percentage assessing practical skills.

Three (one individual, two organisations) commented that it was not clear how much (and to what depth) exams should assess 'working scientifically' and noted that this could lead to inconsistencies across exam boards.

Practical work

Question 5 − Do you have any comments on our proposed Condition covering practical work in new biology, chemistry and physics GCSEs?

Question 14 − Do you have any comments on our proposed Condition covering practical work in new combined science GCSEs?

Following our earlier consultation,[5] we had already decided that science GCSEs will include set practical activities (eight for each single science subject, 16 for combined

[5] www.gov.uk/government/consultations/assessing-practical-work-in-gcse-science

science), and that schools will be required to confirm they have taken reasonable steps to secure that their students do the full range of practical work.

To implement these decisions, we proposed to introduce a new Condition that would require exam boards to ensure the following:

- Their specifications set out the practical activities that students are required to complete.
- Those practical activities provide opportunities for students to use all the apparatus and techniques specified in the subject content.
- They review and update their specified practical activities if the apparatus and techniques in the subject content changes.
- They require each school to provide an annual statement about the practical work done by that year's GCSE students.
- They treat as malpractice and/or maladministration any failure to provide that statement, and take appropriate action.

We asked separate questions about what the annual statement should include.

Fifteen respondents (11 individuals, four organisations) did not answer these questions. Most respondents who did answer focused on issues that are outside the scope of the consultation (see 'Other issues' below) or that related to the practical science statements (see questions 6 and 15 below).

Of the respondents who commented directly on our proposals:

- four (two individuals, two organisations) commented that it was important to ensure that combined science GCSEs had similar numbers of practical activities covering each of biology, chemistry and physics;
- one (an organisation) suggested that, to avoid unnecessary burden on schools, the set practical activities should not change over the lifetime of the qualification;
- one (an organisation) noted that it was not clear how practical activities should be tailored to foundation and higher tier candidates; and
- one (an organisation) commented that the set practical activities needed to be published early so that schools could plan for them, and that it was important to monitor the impact of these changes on practical work taught in schools.

Practical science statements

Question 6 − Do you have any comments on what we propose must be covered by the 'practical science statement' to be made by schools in new biology, chemistry and physics GCSEs?

Question 15 − Do you have any comments on what we propose must be covered by the 'practical science statement' to be made by schools in new combined science GCSEs?

This question referred to our proposal that the practical science statement made by schools should confirm that the school has:

> taken reasonable steps to secure that each student they have entered for a GCSE in biology, chemistry or physics has:
>
> - completed the practical activities set by the exam board; and
> - made a contemporaneous record of both the work the student has undertaken during the practical activities, and what the student has learned from them

Sixteen respondents (12 individuals, 4 organisations) did not comment on this question.

Four (three individuals, one organisation) supported our proposals.

Eleven (eight individuals, three organisations) commented that it was not clear what 'reasonable steps' schools should be expected to take to ensure that students complete practical work, or what evidence they would need to provide to demonstrate this.

Three (one individual, two organisations) commented that it was not clear how statements would be monitored, when exam boards should intervene and request evidence to support the annual statement, or what penalties schools would face if they failed to offer practical work.

One (an individual) suggested that allowances should be made for schools that cannot – because of budgetary and resource constraints – provide all the specified practical activities.

Targeting assessment objectives

Question 7 − Do you have any comments on our proposed approach to targeting assessment objectives in new biology, chemistry and physics GCSEs?

Question 16 − Do you have any comments on our proposed approach to targeting assessment objectives in new combined science GCSEs?

This question referred to our proposal that exam boards should have limited flexibility to deviate from the set assessment objective weightings.

Thirty-four respondents (25 individuals, 9 organisations) did not comment on our proposals.

Four (three organisations, one individual) supported giving exam boards some flexibility to vary assessment objective weightings, noting that this should help with the design of assessments.

Three (one individual, two organisations) expressed concerns that the requirement to exactly match assessment objective weightings over a four-year period would unnecessarily constrain assessment and could encourage examiners to "fiddle the figures".

Two (both organisations) questioned whether our proposals would allow too much variation between different exam boards, or from one year to the next.

Guidance on assessment objectives

Question 8 − Do you have any comments on the draft guidance on assessment objectives for new biology, chemistry and physics GCSEs?

Question 17 − Do you have any comments on the draft guidance on assessment objectives for new combined science GCSEs?

Thirty-four respondents (25 individuals, 9 organisations) did not comment on our proposals.

All the respondents who did comment (two individuals, five organisations) commented that dividing AO3 into six elements was overly complex and could make setting valid assessments too difficult. One respondent (an individual) also commented that some of the elements of AO3 would be inaccessible to foundation tier candidates.

Rewarding recall

Question 9 − Do you have any comments on our proposed approach to limiting the amount of recall rewarded by new biology, chemistry and physics GCSEs, including the proposed limit of 15 per cent of the marks?

Question 18 − Do you have any comments on our proposed approach to limiting the amount of recall rewarded by new combined science GCSEs, including the proposed limit of 15 per cent of the marks?

Sixteen respondents (11 individuals, 4 organisations) did not comment on our proposals.

Seven (five individuals, two organisations) expressed support for our proposals.

A further six (four individuals, two organisations) supported the idea of a limit on recall but were concerned that the proposed 15 per cent limit was too low, particularly for foundation tier candidates.

Six (three individuals, three organisations) expressed concern that it was not clear what type of questions or marks would 'count' towards the proposed limit, or what the remaining marks for AO1 should reward.

Four (all individuals) commented that our proposals could restrict students' ability to access other (non-recall) marks on exams.

One (an individual) commented that different percentages might be appropriate for biology, chemistry and physics.

Impact of our proposals

Question 19 − We have not identified any ways in which the proposed requirements for new single and combined science GCSEs would impact (positively or negatively) on persons who share a protected characteristic.[6] Are there any potential impacts we have not identified?

Twenty-six respondents (15 individuals, 11 organisations) did not comment on this question.

[6] 'Protected characteristic' is defined in the Equality Act 2010. Here, it means disability, racial group, age, religion or belief, pregnancy or maternity, sex, sexual orientation and gender reassignment.

Three (all individuals) commented that the absence of a direct replacement for the current single-award 'core science' GCSE could disadvantage students with learning disabilities or mental health conditions.

Three (two individuals, one organisation) commented that practical activities might not be accessible to disabled students, and that schools needed guidance on how activities might be adapted.

Three (two individuals, one organisation) commented that the overall length of assessment could disadvantage students with certain disabilities, particularly those who normally have extra time for exams.

Two (both individuals) commented on the impact of changes to practical arrangements on students outside of mainstream schools. One felt that moving away from direct assessment of practical work could improve accessibility for those students, while the other was concerned that prescribed practical activities might be difficult to deliver outside a mainstream school setting.

One (an individual) commented that the move to linear exams could favour candidates of a particular gender. [7]

One (an individual) commented that overly complex exams could disadvantage students with learning disabilities.

Two respondents (both individuals) also commented that the double-award combined science GCSE might be too demanding for a significant minority of students.

Question 20 − Are there any additional steps we could take to mitigate any negative impact resulting from these proposals on persons who share a protected characteristic?

Twenty-eight respondents (16 individuals, 12 organisations) did not respond to this question.

Four (all individuals) commented on ways that practical activities could be made more accessible. Suggestions included better consideration of accessibility issues at the design stage, more guidance for schools on how to adapt activities, minimising the need for expensive equipment, and a 'virtual lab'.

[7] For clarity, we have already considered this issue when taking decisions on the overall design of reformed GCSEs. While some studies have suggested such a link, the overall body of research does not support the assertion that there is a link between gender and performance in exams.

Three (all individuals) commented that a single-award 'core science' GCSE should be introduced.

Three (two individuals, one organisation) commented that overall assessment time should be reduced.

One (an individual) suggested introducing a third tier of assessment targeted at grades 1–3.

Question 21 − Have you any other comments on the impacts of the proposals on persons who share a protected characteristic?

Thirty-six respondents (23 individuals, all 13 organisations) did not comment on this question.

One (an individual) commented that the overall changes to GCSE science (including changes to the subject content and the longer overall assessment time) could disadvantage students with learning disabilities.

One (an individual) commented that breaking down the overall assessment into shorter papers could help students with disabilities such as chronic fatigue syndrome and anxiety disorders.

One (an individual) commented that recall of formulae favours particular individuals.

One (an individual) commented that the workload of a double-award GCSE could negatively impact on students with mental illnesses.

Question 22 − Do you have any comments on the impacts of our proposals on schools and/or awarding organisations?

Twenty-eight respondents (18 individuals, 10 organisations) did not comment on this question.

Eight (seven individuals, one organisation) were concerned that the introduction of set practical exercises and the practical science statement could increase costs for, and administrative burdens on, schools. Respondents were particularly concerned that set practical activities could require costly new equipment, or that collating evidence to support the statement would be onerous.

Three (all individuals) commented that changes to the curriculum necessarily created additional workload for teachers, and that it was desirable for teachers to have all the information they needed to begin teaching new courses in 2015.

Two (both individuals) commented that the increase in overall assessment time could lead to more exams, which would impose further administrative costs on schools.

Other issues

Respondents also commented on a number of issues that were outside the scope of the consultation, including:

- the subject content, and the extent to which it specifies apparatus and techniques for practical activities;
- the future availability of a single-award GCSE in combined science, or some other equivalent to the current 'core science' GCSE;
- our earlier decision that there will be no direct assessment of practical skills in GCSE science (but rather that students will need to complete set practical activities and answer questions on practical skills in the exam);
- our earlier decision to prohibit mixed-tier entry in both each single science subject and in combined science;
- the wording and weighting of assessment objectives;
- the weighting of mathematical skills in the different science subjects; and
- the use of a 17-point grading scale in combined science.

Issues relating to the subject content are a matter for the Department for Education, which carried out its own consultation on the proposed subject content,[8] and has recently published revised versions of the subject content for single science[9] and combined science.[10]

The future availability of a single-award GCSE in combined science is a curriculum decision for the Department for Education.

Comments on our approach to assessing practical skills, tiering, assessment objectives and the weighting of mathematical skills did not raise any new issues that would cause us to revisit the decisions we have made following our earlier consultations.

We understand the concerns raised by respondents about the possible complexity of a 17-point grading scale in combined science. At the same time, we think it is important that the grades for combined science reflect the fact that it is a double-

[8] www.gov.uk/government/consultations/gcse-subject-content-and-assessment-objectives

[9] www.gov.uk/government/publications/gcse-single-science

[10] www.gov.uk/government/publications/gcse-combined-science

award GCSE. The other option is a nine-grade system, where students get two grade 1's, two grade 2's and so on, up to two grade 9's. The disadvantage of this alternative approach is that students gain (or lose) two whole grades at each grade boundary. We think a system that changes only one grade at each grade boundary is fairer and can better reflect students' overall attainment.

We will be consulting at a later date on the detailed arrangements for the awarding of the new GCSE grades (including in combined science).

Appendix A: List of organisational consultation respondents

When completing the questionnaire, respondents were asked to indicate whether they were responding as an individual or on behalf of an organisation.

Below we list those organisations that submitted a response to the consultation. We have not included a list of those responding as an individual. However, all responses were given equal status in the analysis.

AQA

ASCL

Buckinghamshire Local Authority

English Martyrs' School and Sixth Form College, Hartlepool

Field Studies Council

Gatsby Charitable Foundation, Nuffield Foundation, Wellcome Trust (joint response)

Myscience – National Science Learning Network

OCR

Pearson

Rodillian Academy, Rothwell

SCORE

University of York Science Education Group

WJEC-CBAC

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