



# **Consultation on proposed A-level Regulatory Requirements**

SCORE's response to the Ofqual consultation.

17 January 2014

SCORE is a partnership of organisations, which aims to improve science education in UK schools and colleges by supporting the development and implementation of effective education policy. The partnership is currently chaired by Professor Julia Buckingham and comprises the Association for Science Education, Institute of Physics, Royal Society, Royal Society of Chemistry and Society of Biology.

## 1. Introduction

In the SCORE response to the Department for Education consultation on proposed GCE AS- and A-level subject content for biology, chemistry, physics and psychology submitted on 20 December 2013,<sup>1</sup> we state that SCORE has offered expert support in the reform of A-levels since the initiation of the review process. However, we have raised serious concerns regarding the process of reform<sup>2</sup>.

The following response builds on the recommendations made in our response to the DfE consultation and the two should be read in conjunction. SCORE is concerned that discussion surrounding A-level reform has focused heavily on subject content, despite repeated calls from the science education community for assessment to be prioritised.<sup>3</sup> Assessment largely determines what students are taught, develops skills required in higher education and employment, and has an enormous influence on the style and emphasis of teaching and learning. Therefore, ensuring that assessment is developed coherently, alongside content, is paramount.

More time is needed to address the problems contained in current assessment procedures and the potential negative implications of proposals contained in the Ofqual consultation; SCORE cannot support a scheme in which the assessment of practical work is removed from the A-level grade.

SCORE strongly recommends that the introduction of new science A-levels is postponed for at least one year for the reasons set out below.

- Ways in which to assess practical work have not been given the appropriate development time or consideration. High quality assessment should be developed to allow practical work to contribute to a student's final grade, reflecting the importance of practical work to science. Solutions to the question of assessment methods must be based on research into best practice and robust consultation with a full range of stakeholders.
- It is essential that the skills required from A-level students by higher education institutions are identified and addressed coherently across content and assessment, particularly in practical and mathematical skills.
- A-levels must provide progression from GCSEs. It is our understanding that the new A-levels are intended to provide progression from the reformed GCSEs, which are still under development. It is only possible to ensure that A-levels achieve coherent progression by basing them on finalised GCSE criteria. This will not be possible with the current timetable.
- GCSEs in mathematics and the sciences are currently being reformed for introduction to schools in 2015 and 2016 respectively. Introducing reformed A-levels in 2015 will disadvantage the cohorts taking GCSEs in 2015 and 2016, who will not have the preparation from the new mathematics GCSE.

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<sup>1</sup> Response to the Department for Education consultation on A-level subject content in the sciences <http://score-education.org/news/consultation-responses>

<sup>2</sup> Letter to Professor Mark Smith, Reform of Biology, Chemistry and Physics A-Levels; June 2013 <http://score-education.org/media/13440/letter%20to%20mark%20smith%2024june13%20final.pdf>; Letter to Joint Council for Qualifications, Review of A-level subject content, September 2013 <http://score-education.org/media/12310/20130516%20score%20to%20aos%20re%20al%20reform.pdf>;

<sup>3</sup> For example, in July 2013, the Council for Science & Technology wrote to Michael Gove regarding the assessment of practical work in science; [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/230509/13-1131-stem-education.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/230509/13-1131-stem-education.pdf)

- Mathematics A-level is currently being reformed to a different timetable and via a different process, making cross-subject coherence impossible to achieve. A-level mathematics requirements for the three sciences must be thoughtfully mapped against the development of AS- and A-level content in mathematics. We recommend that the reform of science AS- and A-levels is brought in line with the reform of mathematics AS- and A-levels and that all of them are delayed until at least 2016 but preferably 2018 with a pilot in 2016 so that the 2016 cohort have not been the test case for both new GCSEs and new A-levels.

## 2. Assessment arrangements

SCORE is pleased to see that Ofqual has included a requirement for awarding organisations to ensure that assessment question types provide opportunities for students to construct reasoned arguments through extended writing. It is essential that science students are able to demonstrate an ability to coherently construct an argument in both practical investigation and theoretical knowledge.

In our response to the DfE consultation we raised concern over the drafting, ownership and future monitoring of the subject criteria – these concerns are explained below (see sections 6 and 7).

### a) Practical skills

Practical work in the science subjects is not an additional component of teaching and learning; it sits within thinking and working scientifically and is intrinsic to a full learning experience for students. Current proposals retain some direct assessment of practical skills for science A-levels; however, the marks from this assessment will be reported separately to a student's final A-level grade. SCORE cannot support such a system.

We understand that objections to the direct assessment of practical work are based on the assertion that it does not provide differentiation and on a perception of malpractice in schools. However, the evidence does not support the assertion - the data clearly show that there are schemes that elicit good discrimination of practical assessment marks<sup>4</sup> - and the proposed changes do not satisfactorily address the issue of malpractice. The logic is as follows:

- On the one hand, universities might ignore the result in practical assessment. If that were the case, the priority given to carrying out and resourcing practical work in schools would be reduced<sup>5</sup>. This would prevent malpractice by discouraging any practice at all. And that is not acceptable as it will leave students even more poorly equipped for progression to higher education and employment.
- On the other hand, universities might include the practical work grade in their offers. In which case, there will be greater pressure on teachers, they will still be compromised and the malpractice will continue.

Ofqual has deemed it appropriate to include fieldwork and practical work in grades in other contexts, for example GCSEs in the sciences and A-level geography, so SCORE would like to see the same approach applied to the A-level sciences.

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<sup>4</sup> Evidence can be publically accessed on the Ofqual website; *Request for statistics about grade distributions correspondence*, <http://ofqual.gov.uk/documents/request-for-statistics-about-grade-distributions-correspondence/all-versions/>

<sup>5</sup> For further information on SCORE research into the behaviours that drive science department resourcing, see SCORE: Resourcing Practical Science at secondary level, May 2013; <http://score-education.org/media/11805/score%20resourcing%20secondary.pdf>

It is essential that there is uniformity in the assessment schemes offered by different awarding organisations. Schools should not be able to choose a course based on the method of assessment and awarding organisations should not be able to compete on the cost or ease of implementation of their schemes for assessing practical work.

Finally, the consultation document does not provide information on a number of outstanding and essential questions in relation to the direct assessment of practical work. It is not clear from the proposals:

- how the direct assessment of practical skills will be derived, validated or regulated;
- how the assessment objectives outlined in the consultation document relate to appendix 5 ('working scientifically') of the subject criteria for the sciences;
- which, if any, of the proposed assessment objectives will be applied to the direct assessment of practical work.
- whether or how UCAS points would be associated with the written and practical components of the qualification.

SCORE recommendations:

- Practical work should be an integral part of the A-levels in the sciences, their assessment and grades awarded.
- Further research should be conducted to establish appropriate methods of assessing practical work effectively<sup>6</sup>. SCORE is happy to be involved in further discussions in this area. It is also important that any changes are piloted before introduction. However, we would propose that direct assessment of practical work could include the following elements:
  - a laboratory notebook, in which students record their activities (taken from a framework of skills and activities that should be covered)
  - an extended investigation
  - a test of students' technical and manipulative skills

Appropriate moderation procedures would also need to be in place to quality assure teacher assessment.

- Stakeholders that use science grades (including UCAS, employers, industry, higher and further education) should be consulted directly on the new grade structure. Ofqual must also undertake to communicate changes clearly.

## **b) Mathematical skills**

SCORE welcomes the increased emphasis on mathematical skills in the sciences, and in particular the inclusion of exemplification in the criteria, which go some way to illustrating how those skills should be embedded into each subject.

However, the amount of mathematical content should be determined on the basis of what is suitable for each subject. SCORE would like to see the evidence on which those judgments have been made, since we have concerns about some of the mathematical content given in the

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<sup>6</sup> For an in-depth discussion of the portfolio model see Black, P., Harrison, C., Hodgen, J., Marshall, B. and Serret, N.; *Can teachers' summative assessments produce dependable results and also enhance classroom learning?*; Assessment in Education: Principles, Policy & Practice, Volume 18, Issue 4, 2011, <http://www.tandfonline.com/doi/abs/10.1080/0969594X.2011.557020#tabModule>

criteria, particularly for biology (see SCORE's response to the Department for Education consultation for more information). It is essential that the requirements meet the needs of all users of the qualifications.

The mathematical skills must also be assessed appropriately; as recent SCORE research demonstrated<sup>7</sup>, these skills are currently not being comprehensively assessed, with insufficient extended and multi-step questions, and with the mathematical skills not appropriately embedded in a science context.

SCORE recommendations:

- Evidence is published for the percentages of mathematical requirements currently listed in the science subject criteria.
- A framework should be developed to regulate the way in which mathematical aspects of the subject are assessed within science A-levels.
- Awarding organisations should ensure that a broad spread of science-related mathematical requirements is assessed within relevant scientific contexts and is appropriately weighted across all theoretical and practical assessments.
- All mathematical requirements should be assessed over a 2-3 year cycle to ensure they are all taught. This should be monitored by Ofqual to ensure assessment across awarding organisations matches the requirements of the specifications.

### **3. Comparability of standards**

As we stated in a recent consultation response<sup>8</sup>, grades achieved in one A-level subject cannot always be compared reliably to grades achieved in another subject. This is particularly significant for the sciences and mathematics, in which students are demonstrably less likely to achieve high grades.<sup>9</sup> Candidates who take science subjects generally achieve lower grades in those subjects than comparable (or the same) candidates do in other subjects.<sup>10</sup>

SCORE believes that the current reform should include a review of grading and grading severity across A-level subjects in order to improve comparability in grading. Ofqual is responsible for reviewing standards in each subject across five-year periods; we are aware that this work may recently have been conducted in the science and mathematics, or be underway, and consider it imperative that the results of comparisons across subjects are integrated into current reform in order to resolve the issue outlined above. If changes are made to A-levels that impact comparability between subjects, students may be deterred (or prevented by their schools) from studying those subjects deemed most challenging, or severely graded – the sciences and mathematics. SCORE also notes that now that university entrance has been uncapped for ABB+, comparability between subjects will increase in importance in the university admissions process.

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<sup>7</sup> See SCORE, Mathematics within A-level science 2010 examinations, available on the SCORE website: <http://www.score-education.org/media/10033/score%20maths%20in%20science%20summary%20report.pdf>

<sup>8</sup> SCORE response to the Department for Education consultation on 16-19 Accountability (November 2013); <http://score-education.org/media/14027/2013%2016-19%20accountability%20score%20response.pdf>

<sup>9</sup> Relative difficulty of examinations in different subjects; Robert Coe, Jeff Searle, Patrick Barnby, Karen Jones and Steve Higgins; CEM Centre, Durham University, July 2008

<sup>10</sup> Grading severity In science assessment, Professor Robert Coe at the SCORE Annual Conference 2011

#### **4. AS- and A-level qualifications**

SCORE supports the continuation of the AS qualification, as it provides opportunities for students to broaden their programmes of study. However, we are concerned that the purpose of the AS-level has not been clearly stated, which makes it hard to ensure that they function effectively as discrete qualifications.

It is essential for AS- and A-levels to be co-teachable, both for practical considerations such as timetabling and to ensure that students can continue to use the AS-level as a means of retaining options for progression. The content, mathematical requirements and assessment for the AS-levels in the sciences must be such that students who choose only to take an AS-level still have an authentic experience of the subject. This means that some parts of the practical assessment that we describe in section 1 (for example, the lab notebook) must be included in the assessment for the AS-level.

SCORE recommendations:

- The purpose of AS-level should be clarified, and content, mathematical requirements and assessment reconsidered to ensure that they can function as discrete qualifications that are co-teachable with the full A-level.
- Both AS- and A-levels must include the direct assessment of practical skills.

#### **5. Curriculum Committees**

SCORE organisations are well-placed to provide subject-level advice on curriculum and qualifications. The Association for Science Education convenes a well-established 11-19 Curriculum Committee. And the professional bodies – Society of Biology, Institute of Physics and Royal Society of Chemistry – have established Curriculum Committees for developing a comprehensive view of an appropriate school science curriculum, from primary to university entrance, on behalf of each discipline. This will include, for each subject:

- developing content criteria;
- providing guidance on appropriate assessment models;
- defining the essential skills needed for successful progression to higher education.

The Curriculum Committees will comprise representatives from academia, schools and colleges, education research, curriculum developers and employers. However, given the very limited window available for the A-level reforms in science, their work will not be completed within the timeframe for this consultation. Instead, the Committees will undertake this work in parallel to the reforms, and some may publish early findings in the autumn term 2014. This could feed into the A-level review if it is delayed – as suggested in section 1.

SCORE recommendations:

- Curriculum Committees are involved in the reform process and the Committees' expertise taken into account in the development of new science A-levels, to the extended timescale recommended above.

#### **6. Awarding organisation requirements**

SCORE supports the principle that subject criteria should define a proportion of the content required for awarding organisation specifications, and is happy with the stipulated sixty per cent.

However, we would like to see some requirements about how awarding organisations can make use of the remaining forty per cent.

It is likely that awarding organisations will use this flexibility in order to differentiate their specifications from each other, which is a positive step if it provides schools and colleges with genuinely innovative approaches to learning the sciences. However, we would want to see the space within the specifications being used appropriately.

Given that the content in the remaining forty per cent will be developed by the awarding organisations, it is essential that suitably qualified subject experts from a range of backgrounds are involved in the accreditation of the specifications, to ensure accuracy and appropriateness of the content included. We note that Ofqual is currently recruiting for these roles.

Given that the Curriculum Committees (see section 5 above) will comprise the full range of expertise required in the accreditation process, the Committees should be considered as qualified experts in the accreditation of content and assessment specifications.

SCORE recommendations:

- Suitably qualified subject experts are involved in the accreditation of the specification and example assessment items; these could be the professional bodies' curriculum committees.
- The content requirements section is re-drafted to contain clear guidance on ways in which awarding organisations can use the forty per cent of unspecified subject content.

## **7. Drafting and ownership of subject criteria**

SCORE is concerned at the extensive involvement of awarding organisations in regulatory decisions concerning A-levels. The criteria will be used by Ofqual to judge whether awarding organisations' specifications meet appropriate Conditions of Recognition, so it is clearly a conflict of interest for those criteria to have been developed by awarding organisations themselves. Awarding organisations operate in a competitive market driven by commercial interests and the motive to attract school and college custom. In addition, there is no guarantee that awarding organisations are able to consult with a full range of stakeholders on content or that awarding organisation subject experts are entirely neutral in the approach to criteria drafting.

The heavy involvement by the Department for Education and awarding organisations in this process has highlighted a vacuum in subject-specific oversight of qualifications. All subjects will require review and renewal of content over time; without clear guidelines for ownership and a regulation strategy there is a risk that content will not be reviewed effectively.

SCORE recommendations:

- The question of subject content ownership must be clarified as soon as possible and the regulation strategy for monitoring content over time published.