

Ofqual: GCSE reform consultation

Response by the Wellcome Trust

August 2013

Key points

- Proposed changes to the GCSE curriculum and assessment process offer real potential to improve the quality and rigour of these qualifications.
- We welcome the recommendation that science GCSE qualifications should be tiered; this provides for the full range of student achievement.
- The current system of controlled practical assessment is deeply flawed: it consumes valuable teaching time and is vulnerable to widespread malpractice. We therefore agree with its removal and believe that it should be replaced with a different form of direct assessment¹. We are pleased that the Department for Education has included a mix of direct and indirect practical assessment in its reform proposals. The total contribution of direct and indirect assessment should remain at the current 25% weighting.
- Science teachers will need to participate in subject specific continuing professional development to help them prepare for changes across the biology, chemistry and physics GCSE curriculum and assessment process, and support them to undertake direct assessment of science practical work.

Introduction

1. The Wellcome Trust has a long-standing commitment to making inspirational, high-quality science education available to all young people. This will help nurture the next generation of scientists and ensure that all students have the skills and knowledge they need to live in an increasingly technological age.
2. We are pleased to have the opportunity to respond to Ofqual's GCSE reform consultation. The proposed changes to science qualifications promote progression to further study, better embed mathematics, put more emphasis on practical work and provide more challenge for the most able students. We also note Ofqual's commitment to improving assessment. We have included more information on the consultation questions relevant to the Wellcome Trust below.
3. We have also responded to the linked Department for Education consultation on reformed GCSE subject content and have enclosed a copy for information.

Consultation questions

Key design features – Tiering

4. We **warmly welcome Ofqual's proposal to tier GCSE science qualifications**. It would be extremely difficult to assess the necessary range of student achievement without the use of such examinations.

¹ 'Direct assessment' is based on the direct assessment of candidates while they carry out practical science activities; indirect assessment involves written questions designed to assess knowledge and understanding of practical science.

5. However, careful consideration must be given to the subject content of each tier and all must include mathematics. Science depends on good mathematical understanding and skills — from using probabilities in genetics to interpreting experimental data — and it should be taught and assessed across the science curriculum.

Subject-specific features of the reformed GCSEs: The sciences (biology, chemistry, physics and double award science)

Assessment of practical work

6. Practical work is a defining feature of scientific observation and inquiry, and must be an essential part of every young person's science education. Well planned and implemented practical work enhances learning and understanding of scientific concepts, explanations and processes. It engages and enthuses students², and further develops skills that are valued by both higher education institutions and employers³.
7. It is vital that practical work is assessed as part of all science qualifications. This must be **achieved through a mix of direct and indirect assessment**. Written exam questions can be used to test if students know and understand certain experimental and investigative methods, but some practical skills, such as the ability to work with accuracy and precision, can only be assessed directly.
8. We welcome the inclusion of both direct and indirect assessment of experimental skills in the Department for Education's proposed GCSE assessment objectives, particularly the 10% weighting of direct assessment. However, we recommend that the weighting of indirect assessment is increased from 10% to 15% as outlined in the Gatsby Foundation and Wellcome Trust paper on science practical work⁴. **In total, direct and indirect practical assessment should retain the current weighting and contribute 25% to GCSE science qualifications.**
9. We seek assurance that students will not be awarded a GCSE science qualification without demonstrating that they have developed practical scientific skills to the required level. Given that practical competence is an inherent part of science training, we propose that qualifications which do not provide such assurance are described as 'science theory'.
10. Section 5.2 of the Department for Education's consultation refers to the use of the current system of controlled practical assessment. We believe that this method is deeply flawed and leads teachers to focus on a narrow range of experiments. As outlined in the Addendum to the Gatsby Foundation and Wellcome Trust paper⁵, following focus groups with science teachers, we suggest direct assessments of practical skills using a simple practical examination involving a carousel of experiments administered by the school but externally invigilated and moderated using a school cluster model. The examinations

² Wellcome Trust Monitor Wave 2 (2013)

http://www.wellcome.ac.uk/stellent/groups/corporatesite/@msh_grants/documents/web_document/wtp053113.pdf

³ National Strategic Skills Audit for England, Skills for Jobs, Today and Tomorrow, UKCES (2010)

<http://www.ukces.org.uk/reports/skills-for-jobs-today-and-tomorrow-the-national-strategic-skills-audit-for-england-2010-volume-1-key-findings>

⁴ Gatsby Charitable Foundation and Wellcome Trust Paper: Assessment of Practical Work in Science (2013)

<http://www.gatsby.org.uk/~media/Files/Education/Practical%20Science%20Policy%20Note.ashx>

⁵ Addendum to Gatsby Charitable Foundation and Wellcome Trust Paper: Assessment of Practical Work in Science (2013)

<http://www.gatsby.org.uk/~media/Files/Education/Practical%20Science%20Policy%20Note%20Addendum.ashx>

would be monitored through sampling by the Awarding Organisations, with serious consequences if malpractice is discovered.

11. Furthermore, where written questions are used to assess practical science indirectly, care must be taken to minimise the chance of students scoring well without undertaking the necessary experiments. Work to improve the quality of such questions is needed, and new assessment techniques, perhaps electronic, should also be explored. We would welcome the opportunity to work in partnership with Ofqual and exam boards to refine these components of the practical assessment.

Continuing professional development

12. **Subject specific continuing professional development should be a regular part of good teaching practice.** This is particularly vital for increasing the quality of science education in schools; helping teachers to prepare for changes to subject content across biology, chemistry and physics GCSEs; and supporting them to undertake direct assessment of science practical work.

Qualification structure

13. The reformed GCSEs offer separate qualifications in biology, chemistry and physics, as well as a combined science double award, ensuring that an appropriate balance of all three sciences is studied at Key Stage 4. However, we would like clarity on what provisions will be made for those young people who would have previously studied for the single science GCSE because it was judged that they would struggle with the higher workload of two or three qualifications. These students must still be equipped with a basic understanding of science in order to live and work in an ever more technological age.

Regulating the reformed GCSEs

14. We are pleased to read of **Ofqual's intention to develop its approach to regulating for good assessment.** The consultation also notes that Ofqual intends to develop market and regulatory incentives over the coming years. We await further details on these plans with interest.
15. Significant problems arise from the current model of multiple exam boards for academic qualifications. Exam boards must better communicate with each other and work collaboratively to share best practice and develop innovative techniques. This could include the roll out of direct teacher assessment of science practical work and improvements to written questions which assess practical work. There must also be greater consistency in the overall process of awarding grades and much more openness about how it works.
16. The success of reformed GCSE assessments rests on their implementation. We note that Ofqual will be consulting on proposals for setting and maintaining standards in the reformed GCSEs in Autumn 2013. We look forward to responding to this in due course.
17. We would be happy to discuss any of these points in more detail if it would be helpful.

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