SCIENCE COMMUNITY REPRESENTING EDUCATION

Draft National Curriculum for science

SCORE response to the Department for Education's revised draft science curriculum for key stages 1–3.

8 August 2013

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Introduction

1. SCORE is a partnership of organisations, which aims to improve science education in schools and colleges in England by supporting the development and implementation of effective education policy. The partnership is chaired by Professor Julia Buckingham and comprises the Association for Science Education, the Institute of Physics, the Royal Society, the Royal Society of Chemistry and the Society of Biology.
2. In April 2013 SCORE submitted a response to the consultation on the first drafts of the National Curriculum, and has since communicated with the Department of Education regarding drafts of the national curriculum on a number of occasions.
3. Many stakeholders responded to the consultation and in light of their comments the documents have been redrafted. It is likely that in trying to accommodate different comments from varied sources, new problems in consistency, sequencing and coherence have been introduced to the drafts.
4. SCORE offered to check the new drafts and raise matters of particular concern in June 2013. In this final submission, SCORE emphasises the comments made in that informal dialogue and submit these as the formal SCORE consultation response.
5. Content-specific responses to the drafts for each of the three sciences are attached; however there are a number of points that SCORE feels it is important to highlight more broadly.

The process of review

6. In the April 2013 consultation response overview[1] SCORE emphasised the importance of defining the content contained at each key stage by taking as its starting point the learning outcomes for pupils. SCORE is concerned that this process has not been put into practice and that as a result, the content is not always structured to demonstrate progression towards learning outcomes.
7. This structural issue may largely be due to the process used to develop the new curriculum. The statements of content that have been selected and included in each key stage by writers and editors do consist of important items to learn in science; however, the underlying rationale for why these statements have been chosen over others is not clear.
8. The timescales for the review have made it very hard for SCORE to input into the process in a way that would have made the most of the expertise that the SCORE organisations are able to draw on. That said, we have had good working relationships with many of the drafters.
9. SCORE has recommended on several occasions that the drafts be audited for the amount of content and how their content contributes to the development of ideas through the key stages. Although we are aware that drafters have been mindful of sequencing content, we are concerned that this has been implemented too late in the process to be able to inform meaningful change to the programmes of study.
10. SCORE reiterates concerns surrounding the way in which it is envisaged that a new curriculum will be implemented alongside reforms to GCSEs and A-levels, which are

[1] SCORE response to the National Curriculum consultation – Overview

occurring at the same time. It can be assumed that any changes to key stage 4 and 5 will have an impact on teaching and learning at lower key stages.

Consistency, coherence and sequencing

11. The final draft contains a statement of purposes of study and aims for the science national curriculum in the introduction (page 136). This statement includes an aim that pupils "are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future." SCORE wants to highlight that there are no content statements within the programme of study that relate to, or uphold this aim. Without content that encourages the development of scientific knowledge related to current and future scientific topics, this stated aim cannot be promoted. We are aware that there are elements of cutting edge science in the draft GCSE criteria, also currently being consulted on, which we are pleased to see.
12. We understand that a written introduction is to be included in the final key stage 3 National Curriculum. SCORE is pleased to hear that an introduction to key stage 3 will be included and asks that it contains the following: a statement of principle focus for key stage 3; an introduction to the need for teachers and schools to integrate practical work, mathematics and critical reasoning throughout the content; and an indication that the three sciences are not independent of each other and should be taught together as a basis of fundamental knowledge and skills. In addition, the introductory statement should identify the areas of scientific enquiry that pupils have been introduced to at primary. Without such an introduction at key stage 3, secondary teachers may assume that pupils entering the school have little or no experience of working scientifically. An introduction would also ensure that progression in scientific enquiry is clearly demarcated in both the primary and secondary programmes of study.
13. There is a lack of consistency in the way in which statements of content are presented between subject disciplines, and opportunities have not been taken to draw out the connections between subjects where appropriate. This is not the fault of the writers and editors, but a problem caused by the inconsistent approach taken in conducting the review. In particular, the clarity and level of detail across the three sciences at key stage 3 continues to vary and this is not helpful when interpreting the statements.
14. There is a concern that, at key stages 1 and 2, teachers who may not have a science background could have difficulties interpreting the notes and guidance and following the content. The inclusion of a glossary would mitigate difficulties in interpretation, ensure consistency and assist less confident teachers.
15. The way in which the expectations of pupil progression and level of appropriate subject knowledge at each key stage have been defined is unclear. SCORE emphasised in its previous consultation response that, in key stages 1 and 2, content should be included at an educationally appropriate point, rather than introduced in order to 'achieve an impression of balance' between the sciences at each key stage. SCORE reiterates this point.
16. SCORE welcomes the inclusion of mathematics in the science programme of study, but would like clarification of the process of audit by which the sequencing of mathematics across the sciences and key stages was decided, as well as an assurance that an attempt has been made to ensure coherence with the mathematics programmes of study at each key stage.

17. Certain aspects of the mathematics included in the Working Scientifically section appear to have been decided without considering appropriate contexts and applications for learning and teaching mathematics in science. There needs to be exemplification of the use of mathematics within the content statements of the programme of study.

18. It is unclear why certain activities have been chosen for inclusion in the notes and guidance. In particular, the biographies and activities contained in the key stage 1 and 2 notes and guidance are over-specific and therefore risk being too narrowly interpreted by teachers.

19. Given this opportunity to bring the national curriculum up to date with twenty-first century developments and contemporary contexts, SCORE recommends, as it has done previously in the SCORE consultation response, that biographies reflect a wider variety and span of scientific achievement and that the notes and guidance reflect the impact that science has on everyday lives. This would also provide greater flexibility for teachers to provide a range of experiences.

20. Referring to the point made in paragraph 11, SCORE recommends that throughout the programme of study for each key stage reference should be made to contemporary issues and challenges for science, such as food production, energy supply, controlling disease, climate change and providing drinking water.

Working Scientifically

21. SCORE welcomes the prominence that Working Scientifically has been given in the drafts. However, SCORE is concerned by a lack of coherence between the key stage 2 and key stage 3 guidance on Working Scientifically. The key stage 3 guidance on working scientifically needs to be edited for the correct use of language, consistent use of language between the key stages, progression from key stage 2 to key stage 3 and sufficient detail to enable teachers to interpret the meaning of statements.

22. This concern about cohesion in Working Scientifically across key stages applies also to the need for clarity on ways in which students should be progressing in scientific enquiry skills through from key stage 3 to 4.

23. In the non-statutory guidance there are a number of instances in which an experiment or hands-on activity requires equipment and consumables to which many schools and teachers may not have access (detailed in the subject-specific documents attached). SCORE has highlighted the problem of inadequately and inappropriately resourced practical science in schools in the *Resourcing School Science in primary and secondary* reports.[2]

24. In order to ensure that pupils are given the optimum practical science experience SCORE suggests that the Department for Education highlights the SCORE equipment and consumables benchmarks to primary and secondary schools. This will ensure that senior leadership and teachers have a reliable reference for resources used in practical science when planning and budgeting for practical work contained in the science programme of study. SCORE recommends that the Department for Education use the SCORE practical work benchmarks for primary and secondary schools[3], as a reference guide to setting standards in science resourcing in schools.

[2] The Resourcing School Science reports are available on the SCORE website.
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