

Ofsted consultation: Generic grade descriptors and draft supplementary subject specific guidance for inspectors for science

A response from the Society of Biology to Ofsted

2nd August 2010

Introduction

The Society of Biology is a single unified voice for biology: advising Government and influencing policy; advancing education and professional development; supporting our members, and engaging and encouraging public interest in the life sciences.

The Society of Biology welcomes the opportunity to respond to the above consultation and supports the use of subject-specific descriptors to provide additional guidance for Ofsted inspectors on making judgements during subject survey visits to schools. It is important that these descriptors accurately reflect excellent science education and set a standard for schools to aspire to achieve. The Society of Biology has commented on three main areas: practical work in science, progression routes post-16 and specialist teachers.

Achievement in science

We welcome the strong emphasis on the learning and progress of the students in the guidance documents for achievement in science. The document should emphasise that outstanding achievement in science cannot be captured by attainment alone: pupils must also show enjoyment of the subject and an enthusiasm to develop their scientific knowledge and understanding and demonstrate capacity for independent thinking. Science is a core subject in the national curriculum and it is important that all pupils, regardless of future destinations, gain an appreciation of the subject in order to become informed citizens of the future.

We recommend that the guidance for achievement in science should also refer to science progression. Outstanding achievement should be reflected by the proportion of students opting to study science beyond compulsory education. Depending on the type of school, this should include a proportion of pupils opting to study triple science at key stage 3, opting to study one or more of the science subjects offered at A-level (As and A2) and opting to study science at higher and further education. This is a clear indication that pupils are aware of the wide range of opportunities available through studying science as well as demonstrating pupils have enjoyed the subject significantly to pursue it further.

Outstanding achievement in science can also be demonstrated through attitude to practical work. We welcome the guidance on pupils' attitude and ability to carry out practical activity. Practical work is essential to the biological sciences and the guidance should specify that pupils are able to demonstrate a high attainment in the intended learning outcomes of each practical activity.

Quality of teaching in science

The document acknowledges the importance of subject specialism. A specialist teacher must have sufficient subject knowledge (i.e. beyond the level they are teaching and to at least degree level in secondary education) and demonstrate a good level of pedagogical knowledge in order to communicate scientific ideas confidently and to challenge pupils on their scientific understanding at a particular level. SCORE¹ is currently reviewing the definition of a specialist teacher in the sciences and is considering whether the qualification history of a teacher can be correlated with the quality of their teaching. While pedagogical knowledge and pedagogical content knowledge influences the quality of teaching, a teacher who is a science graduate or who has worked in the science industry is likely to demonstrate: 1) a sufficient level of enjoyment for the subject to pursue science post-compulsory education; 2) high level of subject knowledge; 3) first-hand experience of progression routes post-16. These qualities are likely to impact on their pupils' overall enthusiasm and understanding of the subject.

Effective teaching must also inspire a proportion of pupils to continue science education post-16 and into higher education and/or industry. The guidance should therefore specify that teaching should incorporate aspects of science careers and that teachers should have adequate knowledge on possible progression routes from the sciences. A teacher must be able to portray enthusiasm for the subject in order to inspire pupils and must also maintain up-to date knowledge on current developments in their subject.

We recommend that the guidance on the quality of teaching in science references practical work. SCORE published a report in 2008 that found that poor quality practical work in schools and colleges can have a limited effect on a young person's engagement in and learning about the sciences. Teachers should feel confident in the learning objectives of each practical activity and be confident in undertaking these activities with their pupils. It is important a teacher is able to demonstrate sound understanding of the three main purposes of practical work, namely to develop scientific knowledge and understanding, practical skills and understanding of scientific enquiry.

In the biological sciences teachers should additionally appreciate the value of fieldwork, confidently draw on other disciplines to explain and develop their subject (e.g. chemistry, physics and mathematical principles) and effectively convey the applications of biology including but not exclusively in human health and natural resources.

The curriculum in science

The science curriculum should be coherent throughout a pupil's education at school and should build on a pupil's prior knowledge and scientific understanding. We strongly support the need for a relevant curriculum which provides real-life context of science and reflects current developments in the subject. However, the curriculum must also acknowledge the cross-disciplinary nature of the science subjects and highlight the areas of overlap. It is important that concepts covered in two or more of Mathematics, Chemistry, Physics and Biology complement each other and do not hinder a pupil's understanding of that concept.

¹ Science Community Representing Education (SCORE) is a partnership of six organisations and provides a coherent voice for the science community on issues in science education. The members of SCORE are the Association for Science Education, the Institute of Physics, the Royal Society, the Royal Society of Chemistry, the Science Council and the Society of Biology.

Practical work should be intrinsic to the curriculum and used to develop both understanding of scientific enquiry and practical skills and also to deepen scientific knowledge and understanding. The learning objectives of practical activity must be clear to the teacher and the learning outcomes must be clear to the pupil.

We support the guidance that a school demonstrates excellent links with the wider science community and incorporates enhancement and enrichment (E&E) activities into the science curriculum. However, we recommend that E&E activity is coupled with excellent practice in the classroom. The Ofsted report *Guidance for students studying science* highlights an example of a school which, despite engaging with numerous science E&E activities, has a low uptake of science post-16 because the activities were not supported by an engaging and interesting experience in the classroom. We therefore recommend that the curriculum provides guidance on progression routes in science and that this is accountable by the number of pupils opting to study science post-compulsory education.

We would like the guidance on curriculum to also include a requirement that E&E activities embraced by the school demonstrate a clear purpose in enriching pupils' experience of science education. Career awareness and advice and guidance on science progression should also be the purpose of some of these activities.

We strongly suggest that the guidance on the curriculum has a greater emphasis on opportunities for learning outside the classroom. One of the recommendations from a report published by the Select Committee for Children, Schools and Families in 2010 was for outside learning to become an entitlement within the national curriculum. Outside learning is also reflected in the new science GCSE specifications and should therefore be captured in the Ofsted inspection guidance documents. Outside learning offers significant benefits, particularly in illustrating the context of a subject. Furthermore the science subjects, like geography, offer a vast range of opportunity for outside learning and the curriculum should incorporate field work, observational work and visits to sites where science is at the heart of activities. The guidance document for curriculum in geography highlights that 'Pupils experience fieldwork on a regular basis, and activities offer clear progression rather than repetition' and we strongly recommend that a similar emphasis is captured in the science guidance document.

Effectiveness of leadership and management in science

The Society of Biology supports the guidance that effective leadership and management in science will result in high quality teaching and good attainment levels. We recommend that the term leadership refers to the Head Teacher and Governors of a school as well as the Head of Science. Science is a core subject and it is vital that the senior management, who may not have a background in science, appreciate the science requirements of their school. Under the new coalition Government, schools are becoming more autonomous, which means that it is even more important for senior school management to acknowledge the costs involved in science education. For example, there should be a strong commitment to ensure laboratories are fit for purpose and adequately equipped. Practical work is a key component of science education and pupils must have the opportunity to experience practical activity in properly furnished laboratory environments. Indeed earlier this month the Society replied to HEFCE on their teaching funding method consultation and we stressed the importance of adequate provision for lab and field work in terms of staff time and resources, highlighting the importance of these activities to the formation of skilled biologists.² SCORE has recently embarked on a benchmarking exercise of the current state of practical work in schools and colleges. This research will provide a baseline for all science departments to review

² <http://www.societyofbiology.org/policy/consultations/view/34>

and evaluate their practical work and, where necessary, to make a case for improvement. SCORE expects the report to be published in autumn 2010 and will inform Ofsted of the findings.

Further examples of areas where the senior management should ring fence funding for science education include activities incorporating learning outside the classroom; enrichment and enhancement activities that support the curriculum and information; advice and guidance on science progression.

The guidance recognises the importance of continuing professional development for teachers. We would like this to include all teaching staff in the sciences including teaching assistants and technicians. There should also be an emphasis on subject specific CPD so that science teachers have the opportunity to grow and develop in their specialism and are encouraged to remain engaged with their subject and funding should be ring fenced to support this. We support the guidance statement on sharing good practice among members of the science department. Resources and learning outcomes from external CPD courses should be shared to encourage the embedding of new initiatives within a department. There should be good mechanisms of support for non-specialist and less experienced science teachers. For example, non-specialist science teachers should be encouraged to develop their knowledge through courses such as the Science Additional Specialism Programme and/or are advised on teaching the subject by specialist teachers. Finally good leadership and management involves collaboration further afield, for example with other local schools, local university departments and with major scientific societies such as the Society of Biology and the Association for Science Education, this should be fostered and supported through CPD opportunities.

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The Society of Biology is pleased for this response to be publicly available and will shortly place a version on www.societyofbiology.org. For any queries, please contact Ms Rachel Forsyth, Society of Biology, 9 Red Lion Court, London, EC4A 3EF. Email: rachelforsyth@societyofbiology.org

About the Society of Biology

The Society of Biology is a charity, created by the unification of the Biosciences Federation and the Institute of Biology, and is building on the heritage and reputation of these two organisations to champion the study and development of biology, and provide expert guidance and opinion. The Society represents a diverse membership of over 80,000 - including, students, practising scientists and interested non-professionals - as individuals, or through learned societies and other organisations. We are committed to promoting biology as a subject of choice to students in schools, colleges and universities. We support and recognise excellence in biology teaching; champion a biology curriculum that challenges students and encourages their passion for biology; support young scientists through higher education, and provide career guidance at all levels.

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Association of Applied Biologists
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British Andrology Society
British Association for Lung Research
British Association for Psychopharmacology
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