



## Education Select Committee: Primary assessment inquiry

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### Response by the Wellcome Trust

#### Key points

- Good assessment is fundamental to good teaching. Assessment can be made more robust through inter-school moderation and provision of subject-specific continuing professional development for teachers.
- Pupil performance in science should not be subject to high stakes accountability measures. School governors, trustees and Ofsted should instead regularly assess the delivery of science in primary schools.

#### Introduction

1. Wellcome exists to improve health for everyone by helping great ideas to thrive. Over the next five years, we plan to invest up to £5 billion on research to improve health. We also have a long standing commitment to making inspirational, high-quality science education available to all young people. This response therefore focuses on the assessment of science in primary schools in England.

#### Consultation questions

##### The purpose of primary assessment

2. In our view, the purpose of assessment in primary schools is:
  - o formative assessment of pupils' learning to inform teaching practice;
  - o summative assessment to characterise pupils' achievements, particularly at transition points, and their progress over time;
  - o and assessment to hold schools and the school system accountable.
3. The ability to assess pupils' understanding is fundamental to good teaching practice, and in science there are lots of ways to do this. Science inquiry and practical skills can be more challenging to assess but this process can be improved and made robust when teachers moderate assessments amongst themselves — the Nuffield Foundation's recommendations in this area are particularly helpful.<sup>1</sup> Ofsted has stated that it does not want to see unnecessary or extensive collections of marked pupils' work, nor does it have a preferred assessment system. This message needs to be fed through to schools to drive behaviour change.

##### The current assessment system

4. The Government's current focus is on the provision of mechanisms for accurate judgement of pupils' attainment (summative assessment) and for accountability measures. The new assessment frameworks for science provide teachers with a means for robust summative assessment at the end of a key stage and we are pleased

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<sup>1</sup> Nuffield Foundation, *Developing Principles and Practice in Primary School Assessment* (Nuffield, London, 2012) [http://www.nuffieldfoundation.org/sites/default/files/files/Developing\\_policy\\_principles\\_and\\_practice\\_in\\_primary\\_school\\_science\\_assessment\\_Nuffield\\_Foundation\\_v\\_FINAL.pdf](http://www.nuffieldfoundation.org/sites/default/files/files/Developing_policy_principles_and_practice_in_primary_school_science_assessment_Nuffield_Foundation_v_FINAL.pdf)

and encouraged to note that these place ‘working scientifically’ at the heart of science teaching and learning.

5. It is important that teachers understand how best to use these new frameworks for summative teacher assessment. There are published exemplification guidelines<sup>2,3</sup> from the Standards and Teaching Agency that should help teachers with the summative assessment of their pupils’ learning in science. Teachers should be advised not to simply replicate the examples in the guidance, but to use the examples to inform their practice and moderation internally and with other schools.

## The impact of recent reforms

6. The importance of effective communication with schools about the changes to assessment and the reasons for them cannot be overstated. Unfortunately, the interim guidance provided for teachers in their use of the science assessment framework for 2015/16 was published after Easter in 2016 leaving little time for teachers to prepare before summative assessments were expected to be submitted. The Department for Education (DfE) has now stated that schools can expect to use the same approach for 2016/17, but it is hard for teachers to commit to a system which is not certain to last beyond a single academic year.
7. Confounding assessments of pupil learning and progress with school accountability measures can produce misaligned incentives for schools which negatively affect pupils’ education (see next section). We are therefore content that science is not included in DfE’s floor measures. However, it is still vital that schools are held to account on their delivery of science education — this assessment should be made by school governors or trustees and Ofsted and go beyond pupil performance measures to take into account other elements of a rounded science education.<sup>4</sup> Requiring primary schools to publish their teacher assessment of science at Key Stages 1 and 2 on their websites would increase the visibility of science provision to parents, governors and Ofsted.
8. Ofsted has a key role to play in ensuring that primary schools are delivering science appropriately. We agreed with Her Majesty’s Chief Inspector’s observation that a strong emphasis on reading, writing and numeracy had pushed compulsory subjects such as science to the margins of the curriculum in many primary schools. He tasked inspectors with putting ‘as sharp a focus’ on science and modern foreign languages as they did on English and mathematics.<sup>5</sup>
9. Unfortunately, the Ofsted School Inspection Handbook, updated since then in August 2016, makes just three references to science (compared to 46 for mathematics). Furthermore, our own analyses of Ofsted inspections (see Appendix 1), reveals that just half of full inspections of primary schools mention the word science. Given the status of science as a core subject in primary schools, Ofsted inspectors should be assessing and be required to report upon the quality of science teaching in every school inspection report under the common inspection framework.
10. As Ofsted has itself pointed out, school governors have a crucial role in holding schools to account for their science delivery. We have worked with other organisations with an interest in science education and the National Governors Association to produce an online resource, Questions for Governors, which can help governors and

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<sup>2</sup> Standards & Testing Agency, 2016 *teacher exemplification: end of key stage 1* (TSA, 2016) <https://www.gov.uk/government/publications/2016-teacher-assessment-exemplification-ks1-science>

<sup>3</sup> Standards & Testing Agency, 2016 *teacher exemplification: end of key stage 2* (TSA, 2016) <https://www.gov.uk/government/publications/2016-teacher-assessment-exemplification-ks2-science>

<sup>4</sup> Sir John Holman, Wellcome Trust (2013) *Perspectives on Education: Effects from accountabilities*

<sup>5</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/524559/Foreign\\_languages\\_and\\_science\\_in\\_primary\\_schools.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/524559/Foreign_languages_and_science_in_primary_schools.pdf), May 2016

trustees to ask challenging questions about science in their schools, including its assessment, and interpret the answers they are given.<sup>6</sup>

11. With respect to monitoring performance and change over time at the national level, the new biennial national science sampling tests should be a useful tool (using only a small number of children in each school, these tests will not be used for school accountability or performance tables).<sup>7</sup> We welcome the clarity with which the Government has noted the limitations of a pencil and paper assessment of science in these tests, listing elements of the curriculum, particularly aspects of working scientifically, that cannot be assessed in this way. Publishing more information on the performance across different elements of the national tests, might allow teachers to compare areas of strength and weakness in their own classes with national trends, helping them to improve their teaching.
12. It is too early to comment on whether the current reforms are meeting their purpose or how they are affecting teaching and learning. We are optimistic that the new assessment framework for science holds promise for the assessment of pupil performance, however the late publication of guidance and exemplification for schools has led to stress and uncertainty.

### **The advantages and disadvantages of assessing pupils at primary school**

13. We welcomed the removal of SATs for science in 2009. Too many science lessons had been spent practising past papers and teaching to the test. When these formal tests ceased, schools had more freedom to develop science, particularly by extending practical enquiry. While some schools made the most of these opportunities, many teachers subsequently reported a decline in the status of science.
14. In 2013, Ofsted found that English and maths tended to take priority in primary schools' allocation of resources and curriculum delivery.<sup>8</sup> Ofsted warned that the leaders of about half the schools visited in their review "no longer saw science as a priority". We published research in the same year that found that science was rarely highly prioritised in school improvement planning or linked to other curriculum development areas.<sup>9</sup>
15. More recently, in a focus period looking at science and modern foreign languages in 234 primary schools early in 2016, Ofsted found that while the 'vast majority of primary schools inspected spent four or more hours on teaching English and mathematics', not one devoted a similar amount of time to science: two thirds of schools spent one to two hours on science teaching while a fifth spent, on average, less than an hour a week.<sup>10</sup> This is consistent with a survey we commissioned of a sample of science teachers in March 2016. Again, one fifth (19%) reported that they spent 30 minutes to one hour per week teaching science, while 48% taught between one and two hours.<sup>11</sup>
16. We do not wish pupil performance in science to be part of high stakes accountability measures. However, the educational oversight provided by school governors, trustees and Ofsted should regularly assess the delivery of high quality science in primary schools. To help deliver this, we estimate that primary schools should teach science for an average of at least two hours a week so that all pupils can experience a broad and engaging science curriculum.

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<sup>6</sup> Wellcome Trust *Questions for Governors*, (<http://www.questionsforgovernors.co.uk/>)

<sup>7</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/439614/2016\\_KS2\\_Sciencesampling\\_framework\\_PDFa.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/439614/2016_KS2_Sciencesampling_framework_PDFa.pdf)

<sup>8</sup> Ofsted, *Maintaining Curiosity: A survey into science education in schools* (Ofsted, Manchester, 2013) [ofsted.gov.uk/resources/maintaining-curiosity-survey-science-education-schools](http://ofsted.gov.uk/resources/maintaining-curiosity-survey-science-education-schools)

<sup>9</sup> Wellcome Trust, *The Deployment of Science and Maths Leaders in Primary Schools* (Wellcome, London, 2013) [wellcome.ac.uk/About-us/Publications/Reports/Education/WTP056230.htm](http://wellcome.ac.uk/About-us/Publications/Reports/Education/WTP056230.htm)

<sup>10</sup> Ofsted, *Foreign languages and science provision in primary schools* (Ofsted, Manchester, 2016)

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/524559/Foreign\\_languages\\_and\\_science\\_in\\_primary\\_schools.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/524559/Foreign_languages_and_science_in_primary_schools.pdf)

<sup>11</sup> Wellcome Trust, *Executive Summary of NFER Teaching Voice Omnibus Survey* (Wellcome, London, 2016)

<https://wellcome.ac.uk/sites/default/files/nfer-teacher-voice-omnibus-survey-data-apr16.pdf>

## **Logistics and delivery of the SATs**

17. There is a new assessment framework for English and maths alongside new SATs for Years 2 and 6. We are concerned that the new, more challenging SATs will further diminish the priority given to other subjects including science. We are initiating systematic research into how schools deliver their science and will be able to monitor change over the coming years.

## **Training and support needed for teachers and senior leaders to design and implement effective assessment systems**

18. Training and support is essential for teachers and senior leaders to design and implement effective assessment. Primary school teachers do not need to have studied science post-16 to be excellent teachers or leaders of science; however they do need to develop the necessary teaching skills and science subject knowledge during initial teacher training to support children's development of core concepts in science and assess them appropriately.
19. However, our research indicates that many teachers have low confidence in teaching science and often have relatively weak subject knowledge; their pupils are more likely to be watching investigations rather than learning through taking part themselves. These issues can be addressed through science-specific continuing professional development — much of which is freely available through the National STEM Learning Centre and, in a randomised control trial, has been shown to have a positive impact on the quality of teaching and pupil outcomes.<sup>12</sup> Teacher to teacher moderation of pupil assessment can also be a very useful form of professional development.<sup>13</sup>

## **Next steps following the most recent reforms to primary assessment**

20. There should be a review of primary assessment, with particular emphasis on:
  - o evaluating the impact of the new assessment framework for science — both as an assessment tool and for its impact on teaching
  - o ensuring the distinct separation of assessment and accountability, and that accountability systems extend beyond English and maths and do not produce perverse incentives
  - o quantifying the need amongst teachers for subject specific professional development in order to implement effective and robust assessments

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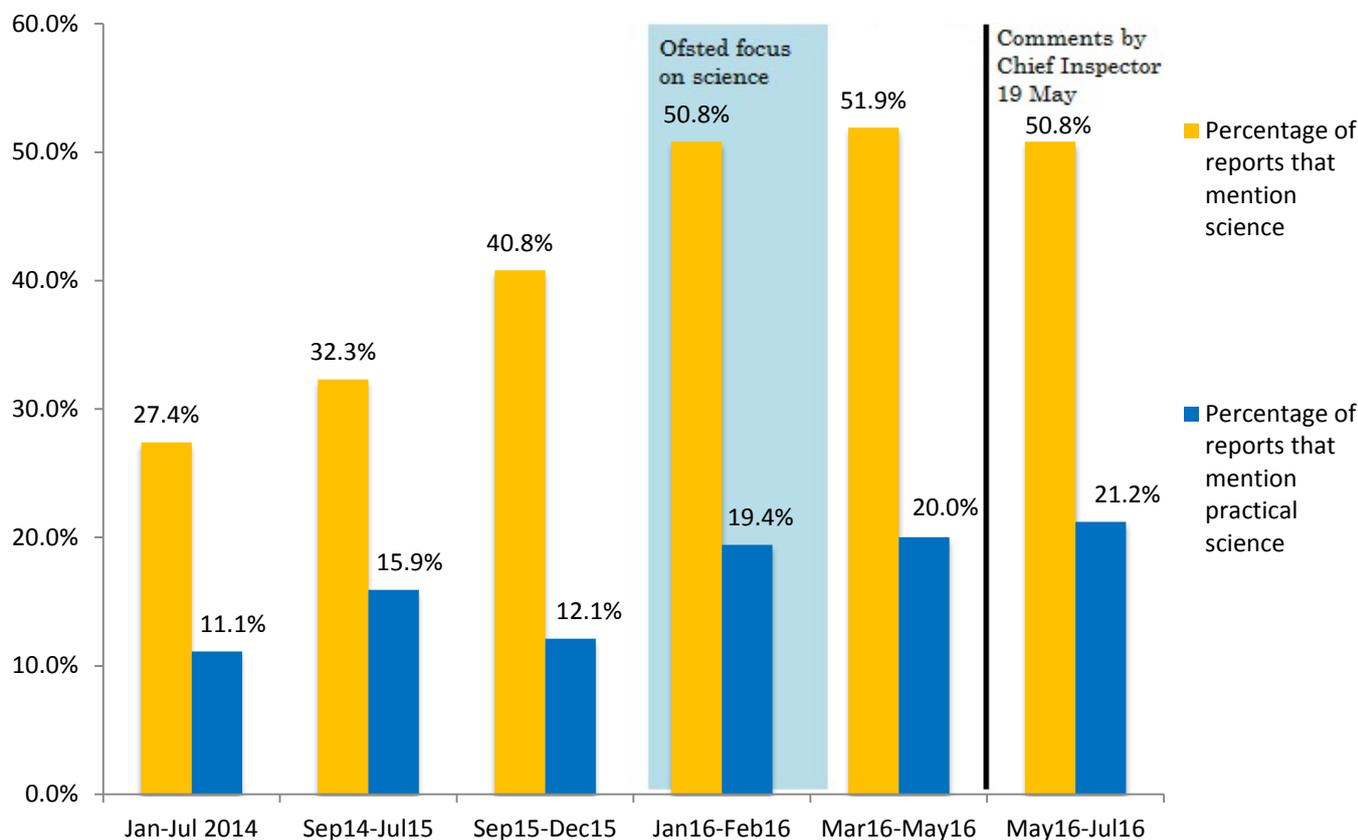
<sup>12</sup>University of York *Evaluation of the impact of a continuing professional development course on primary science specialists* . (York, 2015)  
<https://wellcome.ac.uk/sites/default/files/impact-of-cpd-for-primary-science-specialists.zip>

<sup>13</sup>Dan Davies, Christopher Collier, Sarah Earle, Alan Howe and Kendra McMahon *Approaches to Science Assessment in English Primary Schools* (Centre for Research in Early Scientific Learning (CRESL) (Bath Spa University, 2014)  
<http://www.bathspa.ac.uk/Media/Research%20in%20Education/TAPS/ASAEPS%20full%20FINAL.pdf>

## Appendix 1: Review of Ofsted inspections mentions of science

In September 2016, we compared all Ofsted inspection reports of primary schools from January 2014 onwards. We were interested in the extent to which they commented on science in general and practical activities or investigations.

**Figure 1: Percentage of Ofsted inspection reports of primary schools in England that mention science and practical science<sup>14</sup>**



As illustrated in Figure 1, there is an encouraging rise in the percentage of reports mentioning science and practical science over the period from January 2014, which stabilises at around 50% from January 2016 to July 2016. It is notable, that there has been no decline in the number of science mentions after Ofsted’s focus period.

However, science is a core subject at primary level and these percentages are far behind the 99% of reports that mention mathematics over the same period. Furthermore, a significant number of reports mention science only in relation to how it is used to reinforce writing skills, failing to mention important aspects of the subject. As the above charts indicate, less than half of reports that mention science refer to practical investigation. Practical science enthuses and inspires pupils and is a vital element of learning science, developing inquiry skills and gaining scientific knowledge.

<sup>14</sup>Methodology: We downloaded PDF versions of all Ofsted inspections reports for primary and secondary schools in England between 1 January 2014 and 31 July 2016. We then searched these reports for mentions of “science”, “practical”, “investigate”, “enquiry” and “experiment”. We then checked whether “practical” and “investigate” were used the context of discussing science education