

# Summary: Exploring young people's views on science education

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# Engaging, enthusing, exciting: the challenges and possibilities of science education

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**Most young people find science at school stimulating, with a quarter of them professing intense interest. But how do science teachers build on this positive finding and improve the learning experience for those already taken with the subject while seizing the attention of pupils who are currently less engaged?**

**These are some of the issues considered and provoked by new research<sup>1</sup> for the Wellcome Trust, which looked at young people's experiences of science education and how they could be enhanced.**

Much of the focus of this commentary will be on how teachers and schools can further raise the quality of what they offer to pupils. But it is important to note that, as things stand, the research suggests that **science teaching is already managing to capture the attention of most young people**: "The majority of pupils...demonstrated considerable degrees of enjoyment of, and interest in, learning science at school," found the research<sup>1</sup>, which included interviews and focus groups with 240 pupils studying at secondary schools and colleges, detailed consultation with a further 20 recent school leavers and discussions with teachers.

## Interest in science

Just under two-thirds of the focus group participants said they found science lessons "fairly" or "very" interesting, with a quarter of the sample professing intense interest.

These findings were more positive than the same pupils' responses when asked how much they enjoy studying at school in general, to which only one in six said they "really" enjoyed it. This suggests science may be in a relatively strong position, compared with those of other subjects.

These findings accord with previous research, conducted for the Wellcome Trust in 2009,<sup>2</sup> which found that more than half of the 14-to-18-year-olds interviewed thought science was more interesting than English and maths, while **a clear majority found science interesting**.

The latest research for the Wellcome Trust also revealed overwhelming support for science remaining a compulsory subject to the age of 16, with 59 per cent saying this was "very" important, and a further 31 per cent saying it was "fairly" important.

"There is a strong view that science should continue to be taught up to compulsory school-leaving age to empower young people and increase their general knowledge and understanding," concluded the report.

However, the 2009 study also found that around 40 per cent of young people were put off learning science because they found the subject difficult or boring. The latest research for the Wellcome Trust found that one in seven pupils reported viewing science lessons as "not very interesting" or "not at all interesting", while a further 20 per cent said their interest varied between science subjects.

**So if science teaching is still not capturing the imagination of at least a minority of pupils, where is there room for improvement?**

<sup>1</sup> National Foundation for Educational Research for the Wellcome Trust. 2011. Exploring Young People's Views Around the Personal and Societal Value of Formal and Informal Science Education. [www.wellcome.ac.uk/About-us/Publications/Reports/Education](http://www.wellcome.ac.uk/About-us/Publications/Reports/Education).

<sup>2</sup> National Centre for Social Research for the Wellcome Trust. 2009. Wellcome Trust Monitor 1: Tracking public views on medical research. [www.wellcome.ac.uk/monitor](http://www.wellcome.ac.uk/monitor) [accessed 26 August 2011].

### Links to the real world

This new research is clear: many young people want science teaching to **make more links to the 'real world'**. They worry about the subject being too exams-oriented. They want more practical work, and for out-of-school science learning to be more directly tied to what they are taught in the classroom. They would also like better careers advice.

To take these points in turn, the research found that “pupils, whilst agreeing that science education is important, have difficulties in making direct links and associations between what they learn at school, and how they apply this to everyday situations”.

Asked directly whether they agreed with the statement “In day-to-day life I rarely use the science learnt at school”, 12 per cent of the pupils interviewed in focus groups strongly agreed, with a further 26 per cent saying they agreed. The numbers disagreeing or strongly disagreeing were smaller, at a combined 29 per cent.

Part of the problem, some pupils felt, was that science teaching was too exams-oriented. As the researchers put it, there was a need to reinforce connections between science and the real world to be found both outside of school and beyond the confines of examination syllabi. However, “young people sometimes felt that they were accumulating knowledge solely to pass an examination because this connection [with the 'real' world] had not been made explicit”, found the study.

One Year 10 pupil pointed out that she faced 21 exams in total for physics, biology and chemistry GCSE, which, she felt, was too many. And there was a general feeling that schools needed to put more emphasis on assessment for learning – including emphasising the provision of verbal and written feedback to pupils on what they needed to do to improve, and pupils setting their own learning goals – as well as assessment of learning through formal external exams.

### Active participants in learning

The research also echoed previous studies in finding support among many pupils for the idea of placing **greater emphasis on practical, experimental work**: “There was a strong feeling that there was too much written work involved in studying science, which was discouraging for many”.

Not only did many pupils want to be involved with practical work, they wanted to take part actively: activities where the teacher demonstrated an experiment but the pupils were passive observers were criticised.

The study also prompted other suggestions for providing more variety in lessons, including more opportunities to work in groups and activities outside the classroom such as interschool competitions with a scientific theme – the pupils mentioned contests to design and build go-karts, or devise prototype solar energy systems for the school. However, both pupils and teachers put forward some potential obstacles if these ideals, which will be very familiar to many teachers and to readers of previous studies, are to be more fully realised.

Teachers pointed out that time could be a problem: **the National Curriculum was felt to be too packed**, and they needed the space in the day to devise and prepare meaningful and useful practical activities. However, with the government currently conducting a review of both the primary and secondary curricula, science organisations<sup>3</sup> hope that teachers will soon have more freedom to tailor teaching around a carefully designed science curriculum core.

Pupils also argued that practicals and out-of-class work might not be useful if their links with the science curriculum as a whole were not clear. Practical work should not be seen simply as an excuse to get some ‘fun’ into lessons, but should have a clear connection to theoretical learning.

The research found: “Some young people were less engaged in, and enthused by, practical activities, suggesting that no additional knowledge is gained above that derived from reading textbooks or computer-based research. This was especially the case when there was a perceived lack of clarity about the purpose of the activities and how they related to the rest of the science curriculum.”

<sup>3</sup> See 'Evidence to the DfE review of the National Curriculum (April 2011)' by Science Community Representing Education ([www.score-education.org/news/consultation-responses](http://www.score-education.org/news/consultation-responses) [accessed 26 August 2011]) and 'National Curriculum Review – Call for Evidence' (2011) by the Wellcome Trust ([www.wellcome.ac.uk/About-us/Policy/Consultation-responses/index.htm](http://www.wellcome.ac.uk/About-us/Policy/Consultation-responses/index.htm) [accessed 26 August 2011]).

“You just do [the practical] and learn nothing. If you did the theory first and then did a practical on that it would help,” as one Year 10 interviewee put it.

Teachers agreed with the need to **integrate all aspects of science learning with theoretical concepts and knowledge** taught within the curriculum, and said practicals could simply be a “distraction” for pupils if poorly designed and implemented.

This chimes with recent evidence from an Ofsted review of science teaching in primary and secondary schools<sup>4</sup>. It found: “The highest standards seen were in the schools where the scheme of work included well-integrated experiences of scientific enquiry and access to experiences that covered all aspects of ‘how science works’. In these schools, students were involved in planning and carrying out regular science investigations, so that they understood the processes involved. It was this combination of procedural and conceptual knowledge that promoted the most effective learning in science.”

It added: “Good-quality practical work was a key feature of good teaching in science. However, it was effective only when it was well-planned and managed. Simply exposing pupils to practical work did not, in itself, promote learning.”

While accepting some pupils’ points about the **over-emphasis on exams**, like it or not, there was a widespread feeling among the teachers in the study that formal testing through examination would remain the main means of assessment and that science teaching had to stay focused on this.

Finally, the research found that the **benefits of a science career** were not always made clear to young people. Those who were less successful at the subject were most unlikely to think about the career opportunities that could open up through science, while even higher achievers were unaware of the full range of possibilities.

## Overcoming the challenges

If the research presents both a positive picture but also some challenge in terms of the state of young people’s engagement with science learning, there are plenty of resources that teachers can take advantage of in the spirit of enlivening lessons.

The Science Learning Centres, overseen jointly by the Department for Education and the Wellcome Trust, offer copious professional development opportunities, aiming to enrich the teaching of all who take part.

This includes Project ENTHUSE – a fund that enables teachers to attend residential professional development courses at no cost to their school, including courses that support experimental and investigative work in the classroom, alongside using computer technology to promote effective learning. In a recent evaluation of Project ENTHUSE, 99 per cent<sup>5</sup> of participants said they would recommend courses to others.

Ofsted’s report on successful science teaching described the work of the centres as of “high quality”, and included powerful testimony from professionals reporting how they had benefited from attending one of the centres’ courses.

The Wellcome Trust – whose mission in this field is summed up in its new catchline “the future of science depends on the quality of science education today” – has also invested more than £50 million over the past decade in initiatives designed to promote science learning outside the classroom. Most of the investment has been through support for museums and science discovery centres, but a range of other projects – from a computer game allowing players to play the role of a virus spreading by sneezes to the chance for pupils to attend a touring exhibition covering genomics – are also funded<sup>6</sup>.

The potential enthusiasm existing within schools for materials supporting innovation in science teaching was illustrated in 2009–10, when the Wellcome Trust sent out a ‘Darwin box’ to schools across the UK in celebration of the 200th anniversary of Charles Darwin’s birth.

<sup>4</sup> Ofsted. 2004. Successful Science: An evaluation of science education in England 2007–2010. [www.ofsted.gov.uk/Ofsted-home/Publications-and-research/Browse-all-by/Documents-by-type/Thematic-reports/Successful-science](http://www.ofsted.gov.uk/Ofsted-home/Publications-and-research/Browse-all-by/Documents-by-type/Thematic-reports/Successful-science) [accessed 26 August 2011].

<sup>5</sup> National Science Learning Centre. 2010. Project Enthuse: Report on impact 2009–10. [www.sciencelearningcentres.org.uk/research-and-impact/enthuseimpactreport.pdf](http://www.sciencelearningcentres.org.uk/research-and-impact/enthuseimpactreport.pdf) [accessed 26 August 2011].

<sup>6</sup> These activities are summed up in a leaflet, ‘Learning Outside the Classroom’ (2011). See [www.wellcome.ac.uk/About-us/Publications/Reports/Education](http://www.wellcome.ac.uk/About-us/Publications/Reports/Education).

The resources gave primary schools the chance to take part in the Great Plant Hunt (where the Wellcome Trust teamed up with the Royal Botanic Gardens, Kew), while secondary schools were given support for conducting three types of experiment, including one using brine shrimp to investigate sexual selection and another using antibiotic resistance in bacteria to probe horizontal gene transfer. An evaluation found that at least 60 per cent of primary schools took part in the Great Plant Hunt, while two-thirds of all secondaries ordered at least one of the experiment packs.

In early 2012, to coincide with the enthusiasm around the Olympics, the Wellcome Trust will be sending a free educational kit to every UK school to help young people explore the physiology and psychology underlying exercise, movement, performance and rest.

The In The Zone kits will contain experimental equipment, teaching materials and resources to help bring the extraordinary feats of the human body to life within classrooms. Each activity will be tailored to meet curriculum requirements for science and PE for pupils aged four to 19.

**There is, then, clearly an appetite among many schools to find new ways of building young people's enthusiasm for science. The new curriculum may also, in time, provide more opportunities. Linking schools with exciting resources, allied to expert teaching, may be the key.**

The full 2011 research report, *Exploring Young People's Views on Science Education*, conducted for the Wellcome Trust by the National Foundation for Educational Research (2011), can be viewed at: [www.wellcome.ac.uk/About-us/Publications/Reports/Education](http://www.wellcome.ac.uk/About-us/Publications/Reports/Education).

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