

Perspectives on science: A new AS level putting science in its human context

SUMMARY

A new AS level, Perspectives on Science, gives school students the chance to explore historical, philosophical and ethical aspects of science – by pursuing a 6000-word research project of their choosing. The course, which also aims to teach them critical thinking skills, has become one of the cornerstones of the new Extended Project, part of the ‘vocational’ diplomas rolling out nationally to 20 000 students in September 2008.



Background

Over dinner at a conference at the University of York in the summer of 1999, a group of teachers, academics and education experts found themselves chatting about approaches to teaching science. They all found themselves agreeing that sixth-form students would benefit from learning about the human context of science – about the scientists who made important discoveries and the society they were living in, and about the philosophical and ethical questions scientific advances raise today.

Such an approach would be valuable not only to science students – who would get a clearer sense of science as something progressive and open-ended, rather than a closed body of established ‘facts’ – but also to humanities students who, although they might opt out of science in the sixth form, often remain interested in debating the issues it raises. Research – and the teachers’ own experience – suggests students are particularly interested in issues around genetics, animal welfare and ethical issues associated with mental health.

As a result of this discussion, a project team led by Dr John Taylor, Head of Physics and Critical Skills at Rugby School (and now Chief Examiner for the Extended Project), started to develop a new sixth-form qualification: Perspectives on Science, an AS level focusing on the history, philosophy and ethics of science.

With grants from the Wellcome Trust, the Royal Society and the (former) Particle Physics and Astronomy Research Council, the team began to research and develop course materials for teachers and students. They also worked closely with Edexcel, the leading provider of internationally recognised qualifications, and the Qualifications and Curriculum Authority (QCA), to draw up a specification and assessment scheme. The AS level was piloted in 2004 and has rolled out nationally from September 2008 as part of the Extended Project.

Outcome

From the start, the project team wanted students to have the freedom to choose a research question that enthused them and to have the time and space to investigate it more deeply than is usually possible at AS level. They also wanted the new course to be a vehicle that would enable students to develop critical thinking skills that would not only prepare them for university, but would also foster an inquisitive, rational approach to life in general.

As a result, the course developed into a unique hybrid. The first half is devoted to teaching students how to state coherent points of view and defend them with logical reasons, how to identify and balance arguments and counterarguments, and how to research and assess the validity of source material. Discussion and debate, which lie at the heart of any philosophical or ethical (or even historical) argument, are integral to this part of the course, and students are encouraged to keep an open mind and be prepared to change their viewpoint in response to a reasoned argument.

During the second half of the course the students apply these skills to a research question of their choosing, and produce a written dissertation of 6000 to 7000 words, and a ten-minute oral presentation of their arguments to teachers and their peers.

How it’s making a difference

Perspectives on Science is the first qualification of its type within the GCE (A level) qualifications framework whose entire structure was based on what students produce, and whose focus is on teaching skills rather than content. It is also unusual in that there is no examination: it is assessed purely on the dissertation and oral presentation.

Although they get plenty of freedom in choosing their research question (helped by the teacher, who acts as a facilitator to help students choose a focused question that can be sustained throughout a 6000-word dissertation), the dissertation must be presented as an organised and academically rigorous piece of work. Meanwhile, the oral presentation, and the confidence-building activities to prepare them for it, help them learn to speak out confidently and passionately.

In feedback, students consistently mention the confidence they gained – in both carrying out an extended piece of academic work and presenting their findings to a large audience. The sense of ownership and pride they get as a result of choosing their own research question is also key.

Crucially, the thinking skills students learn during the first half of the course are highly transferable – so transferable, that Perspectives on Science has become one of the cornerstones of the new Extended Project, part of the new diplomas (“the biggest shake-up of the secondary school curriculum for years”, according to Ken Boston, Chief Executive of the QCA).