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## Science and Education

This year's CaSE Distinguished Lecture was given by David Willetts, the Conservative MP for Havant and shadow Secretary of State for Innovation, University and Skills.

Science for success, science for innovation, science for the economy - these are messages we are used to hearing. But in the CaSE annual Distinguished Lecture, co-hosted this year by the Wellcome Trust, David Willetts reminded his audience that science is far more than that; it is the cornerstone of our culture. Science has been inherent in our thought processes since the enlightenment. It pervades not only industry and academia but also philosophy, ethics and art. His lecture, in part a celebration of science and in part a practical call for action, looked at the education children and young people receive in science and maths and how this shapes their basic concepts, aspirations and futures.

Mr Willetts began by describing the value of science and its integral place in British society. He quoted a personal hero, the empiricist David Hume, who said 'The same age which produces great philosophers and politicians, renowned generals and poets, usually abounds with skilful weavers and ship-carpenters. We cannot reasonably expect that a piece of woollen cloth will be brought to perfection in a nation which is ignorant of astronomy, or where ethics are neglected.'

Science, Mr Willetts argued, is neither merely a money-making exercise nor a purely academic discipline. It is relevant to all areas of society, as a basis for rational thought. A scientific education should be valued in its own right, whether or not it leads on to a scientific career. There is now a shortage of science students, and this affects both academia and business. University admissions for the core physical sciences and even biology have dropped, departments have closed, and science in schools is suffering.

Mr Willetts pointed out that we must increase not only the demand for students to take up sciences but also their ability to do so. He described visiting a summer school at Cambridge University at which A-level students were enthused by the possibility of studying engineering. When he talked to individual students, however, he too often found that their A-level choices could well make their new aspirations impossible.

Central to increasing children's ability to study science at higher level is improving their basic mathematical skills from an early age, as well as giving them a good grounding in individual sciences at GCSE. Currently 8 per cent of maths teachers have no post-16 maths qualification and a shocking 42 per cent of designated 'science specialist' schools do not offer separate science GCSEs.

Mr Willetts then outlined some specific suggestions for consideration. First, he observed that the eccentric mixes of A-level subjects preventing the young would-be engineers from studying at Cambridge shows a dearth of proper careers advice. The current focus on league tables encourages schools to push easier subjects onto their students to improve results. The country

needs a comprehensive careers service that can inform students of the doors opened by science qualifications, as well as the financial benefits of possessing a science degree.

A second idea was to provide financial incentives for science students. Though refusing to comment on the relative difficulty of science and arts degrees, Mr Willetts pointed out that science courses were generally more time intensive, giving students less freedom to take on part-time work. Offering bonuses to science students could be looked on as levelling the playing field. Another of Mr Willetts' proposed measures was to increase links between schools and universities, as in Newcastle where local schools can use university laboratories for practical classes. This offers students not just better facilities but also an increased awareness of the possibilities of university science. And because science is a fast changing subject, subject-oriented continuing professional development for teachers is especially important.

Mr Willetts also felt that the culture in schools discouraged the use of existing rewards for teachers. Few schools feel comfortable awarding performance-based pay or increasing salaries for shortage subjects. This contributes to the shortage of high-quality teachers. The 'Teach First' project encourages recent graduates to spend a few years teaching before moving on to other things; Mr Willetts suggested an additional scheme, jokingly entitled 'Teach Next', that would allow people further on in their careers to take time out to teach.

As his final suggestion, Mr Willetts restated one of CaSE's own goals: that all students should have the opportunity to take separate science GCSEs.

However, Mr Willetts said, to truly address the state of the nation's young scientists we must look even further back. He pointed to the research of Michael Shayer at Kings College London, who recently discovered a drop in the basic conceptual skills of 11- year-olds over the past 15 years. Why this has happened is not yet clear, but Shayer places the blame for it on our current screen-based culture.

Children learn through experiencing the real world – there are mathematical and scientific concepts inherent in kicking a ball, building a model or playing with sand or water. Children are no longer able to roam freely and discover the world for themselves. Middle class families might organise their children's time with tennis and music lessons, extra classes and clubs, but for working class children there is often little option but to spend their free time in front of the television.

Science, Mr Willetts concluded, is fundamentally tied up with our well being, not just as adults but as children.

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