A Mission for Innovation – Fostering science enquiry learning across the UK

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Thankfully, Sussex University's chemistry department has now been saved from closure, but this long-running saga saw a number of rationales put forward for its potential demise: a lack of funding from central government; a lack of will from the university itself; and, most notably, a lack of students. Despite figures suggesting that chemistry applications to the university had actually risen over the previous two years, there is little doubt that the problem was informed by the more general lack of interest our school leavers have in taking degrees in this subject. Indeed, the parliamentary committee which looked into the Sussex affair made one particularly apposite point in amongst its conclusions, namely that the declining interest in chemistry amongst the young was "without doubt a national concern". In an international economy, where a nation's capacity for innovation, science and technology is increasingly key to its ability to compete, we should all be concerned that school pupils no longer wish to study chemistry at undergraduate level.

This disinterest is, sadly, not merely applicable to chemistry, but found across all the sciences, and it is a worrying trend. Our scientific research base and public scientific literacy depend on a strong foundation at school level, yet increasingly this foundation appears to be slipping. We have already seen our manufacturing base usurped by the economies of India and China, and, as a nation, we must guard against the very real possibility that our science and technology-based markets could soon suffer the same fate. There is no shortage of motivated, dynamic young undergraduates pouring into Indian and Chinese universities and then emerging to transform the innovation capabilities of those countries. Yet here in the UK, where our innovation potential is vast yet still relatively untapped, the numbers appear to be drying up.

At Nesta, the National Endowment for Science, Technology and the Arts, our aim is to transform the UK's capacity for innovation in the firm belief that this leads to long term social and economic benefits. With endowed finance of £300m, we are the largest single source of pre-revenue investment in the UK. We also invest in projects across the entire innovation landscape to improve entrepreneurship and creativity, and undertake research aimed at influencing key policy-makers. It was under this policy and research remit that we recently produced a wide-ranging study focusing on how the manner in which children are taught science affects their learning. It concluded that pupils are losing interest in science because too often the subject is being taught as just facts on a board, rather than being shown as both relevant to daily life and a glorious exploration of the unknown through practical experimentation. Conducting practical science experiments, which may be termed as science enquiry learning, is an engaging manner of education which involves and motivates learners, and, most importantly, encourages school children to consider taking this interest on to undergraduate level. Regretfully, however, it is no longer the norm in our schools because of the constraints faced by teachers. Put another way, lessons are now too much based around books and not enough around Bunsen burners.

So why, specifically, is it that a reliance on the more "traditional"

forms of science teaching still seem to prevail? Alongside the research, a Nesta-commissioned ICM poll found that science teachers had little doubt about the value of science enquiry learning, but that many still had misgivings about allowing pupils the chance to undertake practical experiments. The poll, answered by 500 secondary school teachers across the UK, found that 84% considered science enquiry learning to be very important – with 87% agreeing that it can have a significant impact on pupils' performance – but that 64% found themselves curtailed by a lack of time and resources. An astonishing 87% also said that they had at least once prevented their students from undertaking practical work because they believed current health and safety regulations prohibit them from doing so. A recent survey commissioned by the Royal Society of Chemistry has echoed these findings.

So how can this apathy towards the sciences be dealt with before the economic consequences impact on the UK in ten or twenty years' time? At national policy level there needs to be greater recognition of the consequences outlined above: that if today's children lose out on the opportunity to engage with science in an illuminating manner, then tomorrow's society will suffer as a result of the UK's stuttering scientific public literacy and stunted capacity for research. The current National Curriculum is not so inflexible that there exists no opportunity for science enquiry learning within it, and, at government level, more must be done to encourage schools and teachers to exercise this leeway to provide innovative methods of teaching. Scientific literacy needs to take its place alongside general literacy and numeracy as a major part of the agenda to raise standards in our schools.

Yet, as noted above, it is unfair to suggest that it is teachers themselves who are unaware of the importance of science enquiry, but rather that they believe that the curriculum and, more presciently, health and safety legislation, inhibits them from allowing children to undertake practical learning. Again, it must be the remit of those in government to assuage the anxiety of teachers and quash the unfounded fears of litigation attached to science enquiry learning. Teachers themselves, where successful outcomes are derived from particular models, must attempt to form knowledge-sharing networks with other schools and professional bodies. They must further seek to install the key elements of effective practice in science enquiry learning, such as dedicated project managers, making links to topics beyond the traditional science curriculum and securing the commitment of senior management within schools. This can, of course, only be achieved through the assistance of funding and support organisations, such as Nesta, who must seek to enhance this transfer of professional knowledge of innovations in science education, and ensure that such schemes have their outcomes and impacts properly evaluated. Inevitably, the sustainability of innovative projects must be insured through improved funding. So far, Nesta's investment has been significant: over £1.6 million for projects promoting science in schools in addition to £3.5 million for schemes supporting the public appreciation of science.

While it is imperative that science enquiry learning is given far greater prominence in our classrooms and school laboratories, there is, of course, much still to be done at the other end of the university spectrum. As chief executive of Nesta, I will continue to champion the case for business learning and the creation of networks between companies, students and universities, however sterile this debate may have become over recent months. We still lag considerably behind the Scandinavian countries and the US in terms of the exposure to business culture we offer our aspiring undergraduate scientists and technicians. During a recent trip to both these regions, I was able to see at first hand how business and academia are integrated to a far greater degree than is found in the UK. Nokia's acceptance of science students into its company for large periods of their degrees incubates business acumen within them. Similarly, the establishment of new science degree masters courses incorporating elements of business learning in over 50 US universities is similarly typical of the American acceptance that scientific and business creativity are not diametrically opposed opposites. Too often in the UK the misconception prevails that science and business leaders do not share the same characteristics. Yet a zeal for creativity and the capacity for subversive thought when confronted with seemingly implacable norms are attributes shared by those who prosper in both these fields.

It is time for politicians of all parties to recognise that the UK simply cannot afford to maintain a culture of apathy towards science and technology. The present government has improved the UK's focus in this area as well as boosting public funding; similarly I was pleased to note the recent establishment of the Conservatives' Science, Technology, Engineering and Mathematics Taskforce. The landscape for innovation in the UK, however, will only be revamped if a more general consensus can be formed across the entire political spectrum. All political parties must work towards a national mission for science to ensure creative innovation is stimulated instead of stifled. If they do not, the result will be not just the closure of university science departments across the country, but the strangulation of the UK economy for decades to come.