

Reaching Out to Potential Scientists: Why should we care?

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“At least ten of the current best selling drugs on the market have Britons as their named inventors” [1]. Britain has long been amongst the world leaders in the twin fields of the chemical and pharmaceutical industries; however, if it is to keep its place, work must be done to target a key group of individuals: 16-17 year olds.

At this age, adolescents are in the process of making important decisions that will define their future careers, particularly A-level and potential degree course choices. Unfortunately, the current crop of GCSEs has been roundly criticised by several scientific organisations. In 2008, the Science Community Representing Education stated: “It is astonishing that there are questions in our science GCSEs that have no relation to science and that mathematics, the cornerstone of sound scientific understanding, is so woefully represented” [2].

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Indeed, despite the money being spent and the governmental drive to make sciences more accessible, interesting and relevant to today’s youth, examinations still appear to be a major source of contention. On the matter of Key Stage 3 examinations (for 14 year olds) Royal Society of Chemistry chief executive Richard Pike said: “This is not just a matter of having questions of varying difficulty to accommodate a wide range of ability within the student cohort... which has become a feature of modern examinations. Rather, even questions tailored for an ability range such as tiers 3-6 in Key Stage 3 are far less demanding than reflected in the content of text books written specifically for this range” [3].

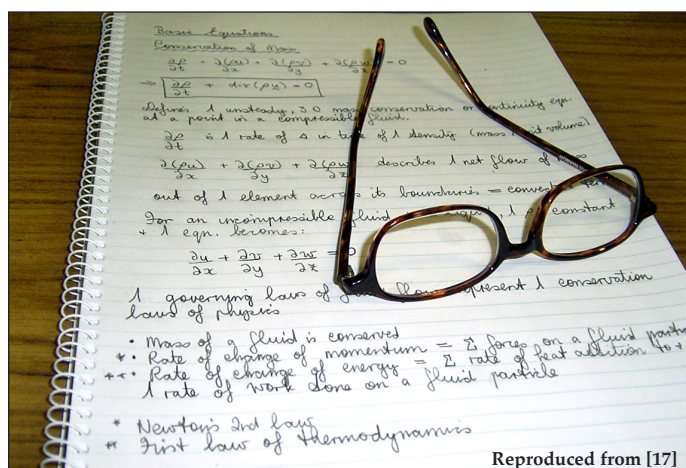


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This style of question from the National Curriculum Key Stage 3 exams, commonly known as SATs (from the 1991 name of Standard Assessment Tests for 14 year olds), appears to set the trend for all of the next three sets of major exams sat by students [4]. On the other hand, research done by Durham University, which analysed 250,000 A-level results showed that it is easier to achieve the highest grades in subjects such as Media Studies and Psychology than when sitting Maths, Physics and Chemistry [5]. Studies like these make it easy to see why several commentators suggest teachers push students away from the sciences in order to raise the school’s ranking in the league tables [6].

There have been several initiatives to increase the quality and scope of teaching for science and Maths in schools. In 2009, the Department for Children, Schools and Families claimed that “as a result of bursaries and golden hellos the number of trainee science teachers recruited last year reached more than 3,000, and applications were up so far this year by 42 per cent compared with last year” [7]. However, the number of applicants for a post-graduate certificate in education (PGCE) in Chemistry dropped from 595 in 2006 to 513 in 2008 [8].

There has been mixed success in increasing the overall



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numbers of students studying science at A-level and university. For example, since 1996, the number of students studying Chemistry has increased from 40,148 to 41,680, though as

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a percentage of the total number of A-level students there has been a fall from 5.5% to 5%. A similar trend is seen in the applications to UCAS for Chemistry degrees; in 2003 there were 2,434 applications (0.57% of all applicants), rising to 3,399 (0.66%) in 2008, representing a 10-year high. Unfortunately there has been a fall since 1996, when there were 3,612 applications representing 0.93% of all UCAS applications. These percentage falls reflect the fact that rising numbers of students are continuing their education to a higher level [8].

Schools and the exam system tend to shoulder the majority of the burden when it comes to inspiring the next generation of scientists. It may not be the role of exams to take up this challenge, but in recent years, teaching and exams have become inexorably linked. In 2008, a report by the schools inspectorate, Ofsted, found that “too much teaching concentrates on the acquisition of sets of disparate skills needed to pass examinations” [9]. This does not mean that schools should be the only group working to enthuse; there is more that can be done outside the classroom to reach out to teenagers. Institutions such as the University of Cambridge run Science Festivals, though these tend to be focused more on the very young, with flashes and explosions being a staple requirement. Elsewhere, the Manchester Museum of Science and Industry has created the Joshua Philips Award, which was founded for “innovation in science engagement” [10]. Last year it was presented to David Price, a man who tours schools in the North performing science shows and also takes to the streets in Manchester busking about science. It is probably true that in the vast majority of cases, shows, museums, or even television programmes like the BBC’s ‘Bang Goes the Theory’, will not be the deciding factor in influencing a 17-year-old’s decision to pursue

a future in science, but this does not mean that they should be neglected.

The need for scientists to showcase their talents and the cutting-edge nature of their work to students is very real and could be a deciding factor in overcoming the barrier erected by an undemanding examination system. This is where universities can step in, by running workshops or outreach days specifically aimed at GCSE / AS students. These courses are already quite common and allow access to higher-grade laboratory equipment. Often these open days include talks that aim to raise the students’ current knowledge to the next level by introducing more advanced science. One major scheme is The National Particle Physics Masterclass, which has been running since 1997. These classes are organised by the High Energy Particle Physics Group of the Institute of Physics. In 2010, nineteen institutions nationwide, ranging from the Rutherford Appleton Laboratory, Didcot, to the University of Glasgow, hosted events. The programmes differ at the various institutes, but they typically include “talks by particle physicists which convey some of the excitement of working in a rapidly-moving field [and] hands-on experience of the interactive graphical display programs that particle physicists use at the European Laboratory for Particle Physics, CERN” [11].

“ For Britain to continue to be a leading scientific nation, it must engage future generations ”

Why do we care, though? What need is there for us to



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both channelling our time and energy into stimulating the huge potential that is out there? Why should we be doing anything to arrest the decline in further scientific study?

Chemistry is a prime example of just why. In 2006, Sussex University announced the planned closure of its Chemistry Department [12]. Its closure was prevented owing to student and faculty protests, but the University now plans to axe some 30% of the faculty [13]. Amid the outcry at the time, few reasons were provided regarding why we need chemists

in the first place. Before the Credit Crunch, the chemical industry contributed a trade surplus of £5.6 billion; given that in the same year, 2005, the UK's trade deficit was about £4 billion, this figure puts into perspective just how important this industry is. Just two years later, the contribution was down to £4.5 billion; this decline is nothing new [14].

Ten years ago, back in the heady days of the late 90's, Britain had a 4.4% share of the chemicals export market, equating to around US\$73 billion, a substantial contribution to any country's GDP. However, in 2009, despite the value of our exports rising to US\$120.3 billion, our portion had fallen to 3.3% [15]. This is primarily due to the huge increase in production from India and China that has continued to reverberate around the world [16].

It is not just the pure chemical based companies that have been affected; the pharmaceutical sector has also started to take a hit. The UK and its companies have long been renowned in this area, providing a large employment sector for many skilled graduates to use their hard-earned degrees. However, big names like Merck, Roche and AstraZeneca have started to look towards the rising Eastern powerhouses, not only for production, but also for the research and development – the technical innovations that have helped to shape this country [14].

Where, then, do we stand? Clearly there are issues that urgently need to be addressed, but there is hope. Whilst the university-run outreach schemes are an important step in encouraging further study in sciences, the perception of science by school pupils must change. This requires a re-think of the education system, with greater input by scientific institutions to ensure that syllabuses remain stimulating, challenging and relevant. For Britain to continue to be a leading scientific nation, it must engage future generations and, in doing so, rebuild solid foundations for the next cohort of world leading scientists. If the economy is to thrive, Britain must reawaken to science. ■

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