PHYSICS EDUCATION

The teaching of physics in schools owes much to its provenance as an academic discipline, but as Morris (2000) and others have noted, despite popularising books and television programmes, it continues to decline in popularity. Since developed economies are increasingly reliant on science for their success, this poses a tension for schools: to maintain challenging levels of instruction for those who aspire to scientific careers while simultaneously delivering a general science education to all.

Physics as a discipline was born of the need to supply the industrial revolution with engineering solutions. At that time, in the UK and elsewhere, secondary school examinations were administered by universities, so there was an explicit relationship between the development of the subject and what was studied in schools. This remained the case throughout the Victorian era, up to the end of the Second World War, after which time the concatenation of research and teaching was broken.

In the 1980s, following the Secondary Science Curriculum Review, the fashion was for an ‘entitlement’ to science for everyone, such that today all students in the UK study a range of sciences from age five to age sixteen. However, eleven years of compulsory science has not whetted their appetites: only 5% of the cohort study physics in the last two (senior) years of school, and none of the curriculum initiatives over the last forty years has had much positive impact on that figure (Hunt, 2000). On the contrary, some initiatives, like those providing greater opportunity for students to ‘mix and match’ science and non-science subjects at senior level, can have a negative effect: some students now drop physics after one senior year who might otherwise have continued it for two (Hollins, 2000).

Research suggests that students find the transition to senior physics difficult (SCAA, 1996). It is seen as dull and impenetrable (Evans & Evans, 1994), too mathematical and not relevant to everyday life (Black, 2000). Initiatives such as the Institute of Physics / Schlumberger '*Lab in a Lorry*', developed by Jenkins, Kelly and others in 2001, is one attempt to counter such negative perceptions. Staffed by practising physicists rather than teachers, it provides young people with the opportunity to do off-curriculum experimental physics intuitively. As an approach, it appears to offer a more promising prospect than, say, initiatives seeking to reduce the emphasis on the recollection of formulae (as recommended by the Physical Science Study Committee in the US and the Science and Technology in Society project in the UK) or the amount of mathematics involved, not least because those who study physics know that they 'obviously' benefit from studying mathematics concurrently.

Early specialisation, a characteristic of education only in England and Wales (and in countries with an historic link to Britain), is lately thought to be a major culprit in the decline of physics, but comparisons between systems are difficult to make and inconclusive because the time spent doing physics and methods of assessment vary so much (Black, 2000): physics might be one of ten subjects studied (as in Finland), one of seven (as in the Netherlands and Ireland) or one of three (as in the UK). Some use structured curriculum-based questions in their assessment, as in the French Baccalaureat; others rely on multiple choice questions and aptitude tests, as in the United States; still more use a mixture of the two, as in Japan (Black, 2000). It is difficult to draw conclusions from this diversity, to find a causal link between mode of delivery and decline, but experience suggests that the road to recovery for physics is likely to be paved with partnerships between policy-makers, researchers and

teachers in a way that allows practitioners to share ownership of new ideas. It is also likely that as part of the recovery, schools will increasingly use ‘out-of-school’ initiatives to rekindle interest - to put the ‘fizz’ back into physics - as it rediscovers its links with cutting-edge research in the universities. From a policy-making viewpoint, the fact that excellence is promoted and celebrated in Specialist schools in subjects like sport and music, but not in traditional academic disciplines like mathematics and physics, must also be addressed.

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