THE FOUNDATION FOR SCIENCE AND TECHNOLOGY

DINNER/DISCUSSION SUMMARY

Strategic Subjects in Higher Education

Held at The Royal Society on Tuesday 23rd November, 2004

We are grateful to the following for support for this meeting:
Engineering and Physical Sciences Research Council (EPSRC),
Royal Society of Chemistry (RSC) and
South East England Development Agency (SEEDA)

Chair: **Dr Robert Hawley CBE DSc FRSE FREng**
Deputy Chairman, The Foundation for Science and Technology

Speakers: **Sir Howard Newby CBE**
Chief Executive, Higher Education Funding Council for England
Pam Alexander
Chief Executive, South East England Development Agency
Tom Swan OBE
Chairman, Thomas Swan & Co Ltd

SIR HOWARD NEWBY outlined the context within which the present problem arose – the Lambert Review, the Higher Education Act 2004, the 10-year Science and Innovation Investment Framework – and the role of HEFCE as a regulator and protector of the public interest in higher education. He emphasized both the limit on its powers – it set a framework of accountability and distributed a block grant but had no planning powers – and the priority it gave to requiring autonomous institutions to manage their own affairs. Where this approach had threatened the existence of certain subjects – notably exotic languages – with few students, but where it was important to maintain a national capacity, the minority subjects scheme had provided a lifeline.

But the problem now was the drastic decline in student numbers in scientific, technical, engineering and mathematical (STEM) subjects, area studies and modern languages, which was prompting universities to close departments. If this meant the closure of small weak departments, this was no bad thing, but if it meant that decisions by individual institutions led to such a reduction of capacity that national interest was threatened, the government and HEFCE could not stand idly by. High quality research departments needed students both for financial reasons and to continue research; Regional Development Agency (RDA) plans were posited on a good flow of well-qualified graduates and continuing research. The problem was not only national capacity, but also regional adequacy.

The government recognized that the core of the problem lay in the failure of the school system to bring on students with an interest in STEM subjects and were seeking to address this, but further work was needed to ensure continuity of access in local areas, as financial pressures and the need to work during study meant students must be able to study near their homes. He expected the Secretary of State would ask HEFCE to consider the problem.

PAM ALEXANDER stressed that principal objective of RDAs was to promote the sustainable economic growth of their regions. To accomplish this they needed to work in partnership with business and higher and further education institutions as "smart growth" required both innovation and investment. RDAs could offer business links, advisory services and enterprise links as well as the distribution of substantial funds to further their aims. The UK needed an internationally competitive workforce and high innovation rates. At present both were lacking. Underperforming regions and areas needed special efforts to get a better, which meant well qualified, workforce. – Medway, for example, had only 21% of under 21s going into higher education. Training and release for short courses, which gave credit and were designed with business purposes in mind, were crucial.

Science and Industry councils could advise on the transfer of skills; partnership with industry and education establishments had led to such projects as computer clubs for girls, an E-skills degree, and the significant contribution to urban regeneration provided by the Universities at Medway and University Centre at Hastings. If all stakeholders collaborated with RDAs for excellence, it would be possible to create, in otherwise underperforming areas, a critical mass of economic development.

MR. SWAN said that it should be recognized that we needed two quite different types of University – one, which concentrated on academic excellence, and another which was devoted to high quality vocational training. This was the German model. At present we were not getting either sufficiently high numbers of well trained technicians, and the excellence of academic disciplines was at risk The quality of science graduates had dropped compared with 30 years ago. A factor in

this was the mistaken view that industry wanted science graduates with other broader skills. It did not – it wanted excellence in the subject; if the graduate was any good, the industry concerned would ensure his/her business and other skills were developed. Of course, the problem was basically in the school system. Poor teaching and the indifference to science subjects which developed at age 11 – 15 must be addressed. This meant radically upgrading the status and pay of teachers, and the active involvement of universities in continuing the development of teachers and inspiring pupils. The primary level, where there was already in young children an interest in the world about them, must be fostered and encouraged. But exams must be rigorous and meaningful; they should show that the pupil understood the subject he/she was being examined in. He did not agree with Tomlinson's emphasis on coursework. Academic universities should not seek to offer all subjects; they should select and build on excellence and seek to find "stars"; it should then be made easier for industry to know where these centres of excellence in various subjects were. There were many successful outcomes of research collaboration between universities and industry; failures could be due to insufficiently close liaison during the project – industry must be prepared to devote time to such projects, and universities to be prepared to work with close involvement with the industrial sponsor.

Principal themes in the ensuing discussion were whether the current structure of teaching STEM subjects in Universities was in itself one of the causes of lack of enthusiasm for scientific subjects, and how the decline in numbers of students could be reversed thorough better teaching in schools. It was possible that the classification of scientific subjects into chemistry, physics etc. was too rigid and not only led to the existence of too many small departments, but hindered interdisciplinary learning, and the development of a more general interest in science as a whole. Pupils in schools might feel they were being forced into a particular discipline, rather than being encouraged to understand that no discipline stood on its own, but that the solving of exciting and difficult problems demanded work in various fields. This did not mean a general scattering of bits and pieces of knowledge, but a concentrated core knowledge which recognized that other areas were important and attempts made to understand their contribution to problem solving.

Much of the problem stemmed from the feeling amongst pupils that scientific subjects were not only difficult, but that they were boring. They were also being asked to make choices about subjects, and being allowed to drop subjects, at too early a stage. Few had any idea about what possible careers were open to scientists, and how exciting science could be. Career advisers did not generally have sufficient knowledge of the scientific and technological world. Teachers who could inspire enthusiasm were, inevitably, rare, but they could be encouraged and their numbers increased if universities saw it as part of their responsibilities to liase closely with teachers, help them develop, and bring their own presence into the classroom. Greater effort should also be given to stimulating pupils' interest by bringing them into universities, businesses and other institutions (such as hospitals) to see what scientists really did, and what were the problems they were involved in. Although the flight from science was worldwide, certain countries, notably Canada, had succeeded in reversing it, and we ought to look at their experience. In Canada's case it had been due to their success in getting girls to be interested in science; how had they done it? Schemes such as the Royal Society of Chemistry's pilot on promoting chemistry through mentoring, sponsoring children, and helping teachers showed every sign of being successful.

Some speakers were concerned that the suggestion that academic and vocational courses should be taught in different universities might lead to academics failing to understand the application of technology in real life, or, alternatively vocational students might not understand the need for high quality research and scientific teaching. But such concerns could be addressed, first, by not physically separating vocational and academic campuses, and second, by encouraging some overlap in teaching. Other speakers suggested that the introduction of fees might help more to enter subjects with demand problems (which were not only STEM subjects, but also modern languages and area studies), because fees could be reduced, or eliminated for those courses. While this might be difficult to do on the face of the prospectus, it would certainly be possible, through the use of bursaries or other devises, to increase the attractiveness of such courses. Much better marketing of courses and better information given to students (on, for example, employment rates and starting salaries) for different courses could also be important. A general complaint was that there were far too many organizations involved in further and higher education, regional and local economies, learning, training and skills, and promotion of scientific and technical development. Fewer organizations and quangos, and greater working partnerships were essential.

A speaker questioned whether the government's target of 50% in higher education was sensible; but other speakers emphasized the need for a developed knowledge and service based economy to have a large proportion of its workforce with experience of higher education. If the definition of higher education covered vocational training through foundation degrees, 50%, or even 60% was both realistic and desirable.

Sir Geoffrey Chipperfield KCB

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The Foundation for Science and Technology
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