

## Summaries from Concurrent Sessions: Track D

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TRACK D had three distinct themes BRAIN DRAIN, COLLABORATION for universities, research institutes, industry, and SCIENTIFIC LITERACY.

Of these the easiest to report is BRAIN DRAIN where there was a considerable mood of optimism even from those countries which might seem to have most to lose. In fact there was universal support for the principle that individuals should be free to move their own human capital. Allied with this was a preference to speak of BRAIN CIRCULATION rather than BRAIN DRAIN.

There were several vivid examples of outflow being balanced by inflow with a resulting cross-cultural stimulation. There was some underlying sense that a nation state receives or retains the scientists and technologists that it needs. Certainly several governments have introduced incentive schemes to encourage the return of expatriates or the recruitment of foreign-trained personnel. Often, especially in the case of returning expatriates, there is a willingness to accept lower compensation in return for life-style, a lower cost of living, a spirit of loyal homecoming or the satisfaction of social contribution.

It was recognised that there are many examples where economies have developed to the point where all of this could work well and that many others were moving quickly towards such a state. Such optimism was balanced by the observation that it is difficult to kick-start economic growth in this way and hard to arrest an economic decline.

Because of the political overtones of international obligations, it seemed useful to consider brain circulation or brain drain within a given country. There was no appetite to spread higher educational resources evenly but rather a commitment to encourage mobility to allow access to first class facilities. There was a hint of a different strategy being appropriate for earlier stages of educational opportunity.

Finally there was further optimism over improved communication capacity so that human networks could transcend the tyranny of distance without the need for physical migration, and it was also noted that enlightened aid schemes can benefit both parties.

Perhaps I may be permitted a moment of Australian and, indeed, Asian sensitivity. When 'brain drain' was, in fact, spoken it was codified as South to North. North, in turn, was defined as North America, the UK and Continental Europe. Let me observe that, in the 2006 Times Higher Education Supplement-QS world university rankings for the 5 major disciplines, only 16 universities ranked in the first 35 for every discipline. Seven of these would be classified as 'South' by the previous definition.

The discussion of COLLABORATION was more complex. Relatively little time was spent on relations between research institutes and universities, save to say that the wider diversity of research within universities gives greater flexibility and also a measure of protection to basic research.

Of the university-industry interface it was emphasised that this should be a two-way bridge with the universities learning and modifying their behaviour. From one view this is a necessary antidote to ivory tower tendencies and from another a threat of imposing a structured machine on a fragile ecosystem. Indeed this relationship was variously described as varying from country to country, from industry sector to industry sector – even from company culture to company culture.

We were given examples of how government policy in both Japan and the UK has moved to encourage university/business cooperations. In Japan the number of patents arising from such activity rose from 789 in 1999 to 7,569 in 2006.

Many times the research training capacity of universities was emphasised. This supply of human resource to industry could be our greatest contribution. For this to be effective and for the universities to be sustainable, it was argued that they must give due weight to basic research and that this, in turn, requires access to government support whether or not we are considering public or private universities.

There was a desire to learn from the US experience and some diffidence in the response, with even a suggestion that the golden age had ended as the new century began. Good examples seemed to come more easily from relations with very large companies and it was agreed that universities needed to become more clever in dealing with SMEs. They need also to showcase their wares more effectively and it was suggested that appropriate intermediaries could be crucial to brokering joint projects.

We were reminded that university/industry links are by no means confined to the research arena and that the design of the undergraduate experience is important. There was a cautionary note that industry does not always understand its own needs, thus emphasising yet again the need for careful two-way dialogue with both parties learning the art of listening.

This brings me to SCIENCE LITERACY where there was a lively but confused debate. Sometimes it seemed that everyone present had a personal definition of the term and strong convictions about it. What was clearly agreed is the existence of a frightening trend away from the hard sciences and a common desire to encourage more students to undertake maths, physics, chemistry, engineering and IT.

There was also, of course, a desire to reach out to society more widely, to develop an appreciation of the benefits of science and technology while encouraging an informed debate about the light and the shade.

We worried about teaching basic maths and science in poor countries ravaged by war and we heard evidence that girls perform better in single sex classrooms.

At its highest level SCIENCE LITERACY is an appreciation of the extraordinary explanatory and predictive power of an effective theory. One must acknowledge that prediction is not perfect and must acknowledge, too, that this level of scientific understanding requires both aptitude and seriously hard work.

Accordingly, it was argued that we should aim much lower and target the knowledge society's version of the honest tradesman with a view to encouraging the average achiever to consider a career in science or engineering, in a support rather than leadership role.

It was argued also that early science teaching should be storytelling, preferably taken from nature around us, and that stories weaving together romance and applications are the true foundations of scientific literacy.

At least we agreed that the fundamental key is the quality of the teacher. But who teaches the teacher, and, in the case of the mature citizen who *is* the teacher? We ran out of time.