

Foreign support for US education

Richard Pearson

The increase in numbers of foreign students taking up postgraduate places in the United States is compensating for declining demand from US citizens.

UNTIL the mid 1970s the US higher education system had been experiencing continuous and rapid expansion, driven by the growing numbers of young people in the population, increasing participation by women in higher education and growing job opportunities for graduates, especially for those in science and engineering arising from the space programme. Between 1960 and 1974 the number of bachelors degrees awarded grew by 150% and the number of doctorates by over 200%. Although the numbers of bachelors degrees thereafter stabilized, the numbers of doctorates fell back by 10% in the 1970s before also stabilizing. The number of science degrees showed a broadly similar pattern, but the 1970s saw a significant 30% decline in the number of engineering doctorates awarded before they recovered in the mid 1980s.

This recovery, however, obscured a significant decline in the numbers of US citizens taking doctorates, a trend attributed to declining job prospects in academic life and the space and other federal programmes, this downturn being hidden by the rapid growth in overseas students. The output of US male doctorates fell by more than a half between 1970 and 1987, and although the number of US women studying grew rapidly, they still only accounted for one in four doctorates in 1986.

This decline in the numbers of US doctorates is causing great concern in the US, particularly if it continues in the future as it will then be exacerbated by the declining numbers of young people available to enter higher education over the next five years, and potentially even further by the current swing by students away from bachelors courses in technology and towards business studies (*Nature* 329, 90; 1987).

The problem has been obscured for some years by the massive compensating growth in the number of postgraduates coming from overseas. By the mid 1980s they were accounting for over half of all the doctorates awarded in engineering, including 65% of those in civil engineering and almost 60% in electronics engineering; representation was over 20% in the sciences with a high of around 40% in mathematics and computing but 14% in biological sciences (see table). At post-doctoral level their representation is even higher, 67% in engineering and 33% in the sciences, proportions that have also been growing.

Asia is the dominant area of origin accounting for over half of the foreign students, with China, India and Korea the leading countries, although the importance of the Middle East has declined in the 1980s. Although 80% are funded primarily by their home country or sources outside the US, many intend to, and do stay on in the US: 57% of engineers on temporary visas expect to stay, as do 46% of scientists, numbers that are well up on those of the early 1970s (31 and 28% respectively). A further one in four intend to continue with their studies in the US. They represent a major flow into the US high technology labour force: for example, by 1982 one in three engineering and computer science PhD entrants to the US labour market were foreign nationals. Many of these subsequently become

The percentage of foreign recipients of PhDs in 1985.

All science and engineering	28
Physical sciences	27
Mathematics	43
Computer science	37
Biological science	14
Chemical engineering	49
Civil engineering	67
Electronic engineering	58
Mechanical engineering	60

Source: *Foreign Citizens in US Science and Engineering*, NSF, 1987.

naturalized US citizens and their representation in the US workforce has grown dramatically; in 1982 they accounted for 13% of all scientists and engineers in the US workforce, 5% more than the previous decade. Over the same period the proportion on temporary visas was broadly static.

It has been argued that this high representation of foreign students has been depriving US citizens of postgraduate places and distorting the process and content of postgraduate education, but the evidence is to the contrary. In terms of student demand 86% of departments in engineering in a recent study (Boon or Bane, Institute for International Education, 1988) reported a shortage of US applicants, with few department heads expecting any improvement in the next few years. They report a continuing high demand from overseas students even though much of the available financial support is directed to US students. This demand from foreign nationals has been necessary to keep some of the programmes

open and it has only been in the more prestigious institutions that they have sought to, and been able to, restrict the number of foreign students. Although many faculty members reported that they spent more time advising and assisting foreign students, few said they adjusted the content and subject matter of the teaching to the needs of foreign students. On a qualitative level, many reported that they enhanced the quality of the student body and that the foreign students were more theoretically inclined than the US students; they were, however, less practical. Because of the shortfall of US postgraduates, foreign postgraduates play an essential role as teaching and research assistants although language and cultural differences could cause problems with US students. They were, however, often a positive factor when working with the large number of foreign postgraduates. On the negative side about 10% of departments said that their research activities were restricted in relation to defence contracts because only foreign and not US nationals were available.

At faculty level, shortages have been prevalent in many engineering and related subjects because of the earlier downturn in the throughput of postgraduate students. Here again foreign-born nationals play a key role, currently filling nearly one in three engineering faculty posts. They are on average younger than their US counterparts, probably reflecting their more recent recruitment, and they are also more research intensive in their activities. Although communication was once again a problem with the US students there were advantages when teaching the foreign students.

Overall the assessment on foreign participation is positive: in times of weak student demand they do not displace US students. Although there are some problems, they have a key role in propping up major areas of US postgraduate education both in research and as faculty, and will continue to be needed unless there is a massive and unexpected swing by US students in the next few years towards scientific and engineering subjects, a swing that must be large enough to counter the demographic downturn □

Richard Pearson is at the Institute of Manpower Studies, Mantell Building, University of Sussex, Brighton BN1 9RF, UK.