

US universities are in flux, not crisis

[WASHINGTON] The past year closed to the sound of alarm bells alerting US policy-makers to the allegedly perilous state of higher education. But the research universities that occupy the pinnacle of the system say that they are strong enough — financially and intellectually — to weather the storm.

The Cassandras have certainly been out in force. Speaking last month at the National Science Foundation, Chang-Lin Tien, until recently chancellor of the University of California at Berkeley, argued that “time was running out” for the “very needy, very stressed” higher-education system to diversify its funding base, improve teaching and reform its tenure system.

And a report in the summer by the Council for Aid to Education, a subsidiary of the Rand Corporation, found that “the present course of higher education, in which costs and demand are rising much faster than funding, is unsustainable”.

The report, *Breaking the Social Contract: The Fiscal Crisis in Education*, called for “increased public funding of higher education and wide-ranging institutional reforms”, and for funds to be directed to the top-ranked research universities.

But a visitor to, for example, the vast oceanside campus of the University of California at San Diego, or the superb new Uni-



Boundless possibility: Research on the University of California's San Diego campus has blossomed.

versity of Arizona in downtown Tucson — two of the establishments that have evolved from near-obscurity to world-class status in the past 25 years — will not find an atmosphere of crisis. It is, instead, one of stunning, almost boundless possibility.

Reforms get a rough ride in Italy

[MUNICH] Italian universities — like those in Germany and Japan — suffer from a lack of internal competition for research funds, and are further disadvantaged by the fact that they have a smaller pot of public research money.

At the same time, full professors remain powerful, and have for many years successfully opposed the introduction of a more accountable system of allocating research funds, including compulsory peer review.

Until last year, national research grants were allocated by discipline-based committees whose members were elected by the academic community. Most appeared to be concerned primarily with avoiding conflict by ensuring that no scientist was left empty-handed.

The government wants to exercise greater control over

the allocation of public research funds, to ensure both that more ‘transparent’ systems are introduced and that these funds are concentrated on fewer projects, in areas of strategic importance. It would like to see a general improvement in the quality of research in universities.

To achieve this, it has introduced a law dissolving the committees and replacing them with a single grant committee composed of five ‘wise men’ appointed by the research minister, Luigi Berlinguer. The five have now completed their first round of applications.

Despite concern in the academic community that five individuals would lack the breadth of expertise to select referees for the thousands of applications received, results suggest that concentration of research funds has for the first time

been achieved.

The new grant system places more responsibility on individual universities, which have been slow to embrace the autonomy granted to them in the late 1980s. Now, only projects selected by the individual universities for internal funding are eligible for a top-up from national research funds.

So far, however, the government has failed to increase its control over university grant money distributed by the CNR, Italy's national research council. It wants eventually to remove CNR's role as a grant agency, and transfer the moneys to the general universities fund, over which it has more direct control.

Berlinguer has proposed a change in CNR's rules to allow this, but has so far been unable to overcome the inevitably strong resistance.

Alison Abbott

And among university administrators and senior government officials, the view that the system is in deep trouble remains a minority one. “I wouldn't call it a crisis,” says Joe Bordogna, deputy director of the National Science Foundation. “There are changes going on and the universities are all having trouble adjusting, some more than others.”

Cornelius Pings, president of the Association of American Universities, which represents 60 leading research universities in both the public and private sectors, is similarly relaxed. “I certainly don't sense any crisis, although I sense some increasing pressures and anxieties,” he says.

The financial pressure on universities involves distinct problems with each of the three main sources of funding — research funds from the federal government, general support from the 50 states, and earnings from teaching hospitals.

After four decades of substantial growth, for example, research funding from the Department of Defense (DOD) has stagnated since 1990, while support from the National Science Foundation has increased only very slowly.

But the budget of the National Institutes of Health, which pay for more university research than DOD and NSF combined, has continued to grow. And the threat of cuts of up to one-third in federal research support — very real two years ago — has also evaporated. “There were dire predictions that the research money would dry up,” says Pings. “It hasn't.”

On declining support from state governments, the Council for Aid to Education report says that if trends continue, tuition costs would double by 2015, and the universities would face “a catastrophic shortfall in funding”.

But public and private universities are acutely conscious of the need to compete for middle-class students whose parents are too well-off to qualify for needs-based scholarships, but not rich enough to pay six-figure sums for their children's education. Several, including Carnegie Mellon, New York University and the vast University of California system, have either frozen this year's fees or raised them by less than in previous years.

Robert Shelton, for example, vice provost for research at the University of California, points out that it has been able to pin its undergraduate fee at \$4,800 a year for in-state students for several years.

The third and most vigorous pressure faces medical centres, where health-insurance companies are increasingly reluctant to pay for people to occupy research hospitals' expensive beds. Mergers of important institutions, as well as closures of hospital beds,

have swept across the system. But Bordogna points out that no medical centre in the United States has been closed: indeed some, such as the University of California at San Francisco, plan significant expansions.

None of the financial pressures on the system appears strong enough to shake institutions that do good research and attract good students. And although administrators criticize academics for neglecting teaching, many institutions are making progress integrating teaching and research.

"There's a very different atmosphere from 15 years ago," says Bordogna. Senior staff, he says, give much more consideration to what younger members of departments think. It is hard to prove, but many long-

term observers of the system agree. "We are light-years ahead of where we were," says Paul Christiano, provost of Carnegie Mellon University in Pittsburgh, Pennsylvania.

At the same time, competition between institutions for both research funds and students continues unabated. "The diversity of institutions in this country has been a blessing and a source of strength," says Christiano.

A remarkable aspect of this competition is the success of public institutions. An extensive study of doctoral programmes by the National Research Council found the institution with the most departments ranked number one in their disciplines is the publicly funded University of California at Berkeley.

The complaint persists that too many smaller universities are trying to do too much. Bordogna says the United States can support only "50, or maybe 30" top research universities, and wishes the other hundred or so aspiring research universities would concentrate on teaching.

But there is no possibility of Washington selecting that élite. Even Pings, who represents most of the leading universities, recoils at the idea of closing the door on other schools. "There should be an open, dynamic, competitive system. If an institution can muscle in, it should be allowed to do so," he says. So long as that opportunity remains, the research university system in the United States is likely to remain the envy of the world. **Colin Macilwain**

Japan faces problem of science recruits

[TOKYO] Despite claims by Japan's ministry of education that the country has now caught up with the West in both the output and the quality of its research, its universities still face chronic problems of limited flexibility and conservative attitudes. Critics say that recent policy moves may only aggravate the situation.

A 'white paper' produced by the ministry last month highlights the fact that Japan was second only to the United States in terms of its total output of scientific papers in the 1996 index of the Institute for Scientific Information (ISI). It also claims that Japan ranks fourth in the 'quality' of its research as measured by the percentage of total citations accounted for by Japanese papers. However, an analysis last year by ISI based on citation impact, or average citations per paper, which is the more generally recognized method of measuring quality, placed Japan seventeenth and below the world average (see *Nature* 389, 113; 1997).

But even the ministry admits that the universities, where most of Japan's public research is carried out, face severe problems. A fall in the student population means that there are too many universities competing for fewer students. Faculty members are ageing — the number of university researchers in their twenties fell from 11.6 per cent in 1977 to 4.5 per cent in 1995 — and the ministry expects a severe shortage of young researchers in the near future if these trends continue.

Responding to this situation, the government last year unveiled a plan to double the number of postdoctoral fellows to 10,000 by the end of the decade as part of a five-year plan to boost science and technology. The education minister is also considering a plan to prioritize education in graduate schools, and to increase the number of postgraduate students from 170,000 to 300,000 by 2010.

But some university faculty members are concerned that they will have to lower their



A task for the future: how to attract and encourage able students into research.

standards to fill graduate student and postdoctoral positions, and that four years of university education may be insufficient to produce graduates of international standard.

Another problem is the fact that faculty positions at national universities are subject to government regulations aimed at restricting the number of civil servants. Recent reforms led by Prime Minister Ryutaro Hashimoto are intended to cut the number of civil servants even further, and so the number of faculty positions at national universities is likely to be reduced still more, says Yoshiki Hotta, director of the National Institute of Genetics in Mishima, south of Tokyo. "The plan will be meaningless unless the government increases the number of research posts at universities," he says.

Leading policy-makers such as Akito Arima, president of the Institute of Physical and Chemical Research and a driving force behind government science policy, believe that a recent proposal by the education ministry and the Ministry of International Trade and Industry to strengthen the links between universities and industry (see *Nature* 390, 105; 1997) will create a large demand for university researchers.

But some in industry are sceptical. "A

strict selection mechanism will obviously be at work when we recruit new researchers," says Susumu Nishimura, director of research at Banyu Pharmaceuticals in Tsukuba science city.

"We would be looking very closely at whether they had received high-quality teaching and carried out interesting and creative research."

Nishimura points out that "many post-graduate students and postdocs at Japanese universities spend most of their time doing menial jobs under more senior researchers". A priority for Japanese universities must be to create an environment in which creative and original minds will thrive, he adds.

The white paper recognizes the need for a routine, nationwide external review system. Although Japanese universities began self-assessment of their research activities in 1992, less than half have so far brought in external reviewers, and only about a quarter of these have made the reviewers' reports public.

Critics also point out that there is an urgent need to reform university management so that the results of external reviews can be used to bring about improvements. Most external reviews have so far had comparatively little impact, and key recommendations are often not implemented, particularly if they involve changing fundamental management practices.

A recent attempt by politicians to convert universities into 'agencies' that would have greater autonomy but also greater accountability was quickly killed by the universities themselves, and by leading proponents of reform, as potentially restricting their level of public support (see *Nature* 389, 897; 1997).

But many leading Japanese scientists recognize that unless Japan implements routine external research evaluation and new mechanisms for managing universities, it will be hard for universities to produce creative and innovative research. **Asako Saegusa**