

Debate:

Research to excellence

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What Peter Drucker described as the “knowledge economy” in 1969 is now a competitive global market, with higher education at its centre. While Australian universities have competed for full fee-paying international students since 1985 and enrolments have grown spectacularly since 1996, the real global competition is in research – for the best researchers, students, facilities, journals and the most money. It is research, rather than teaching quality or student numbers, that is the mark of prestige, the surrogate for quality and the key to national economic prosperity.

Vast amounts of money are now being spent on research and higher education in pursuit of the prestige and economic growth that is expected to follow. Countries in Asia, northern Europe and North America are at the forefront of this investment surge. In 1993, the Chinese Government promulgated the “Outline for reform and development of education in China” which led to the establishment of Project 211 – often literally interpreted as the establishment of 100 “world-famous” universities by the 21st century. The Chinese ministry of education spent nearly 18.3 billion yuan renminbi on Project 211 in the seven years from 1996 to 2002, some \$420 million each year. The focus is on research that will drive the Chinese economy in the future, that will keep the best Chinese students at home and attract the best from around the globe, and on the development of prestigious institutions to rival the greatest United States and British universities.

On May 4, 1998, the then president of the People’s Republic of China, Jiang Zemin, delivered a speech to mark the centenary of Peking University in which he argued for China to establish some first-rank, world-class universities. The policy, which became known as Project 985 because it was presaged by the former president in May 1998, has resulted in China investing \$4.5 billion in 34 universities to make them “world-class”.

But what is a “world-famous” or “world-class” university? Until recently, no one knew. There was probably a general consensus that Oxford, Cambridge, Stanford, Berkeley and MIT were world leaders, and that Harvard outstripped them all. Jiang Zemin’s *alma mater*, Shanghai Jiao Tong University, decided to find out. Its Institute of Higher Education, led by Professor Nian Cai Liu, first published an academic ranking of

the top 500 world universities in June 2003. Shanghai Jiao Tong University allocates 30 per cent of its ranking according to the number of each institution's graduates and staff who have won Nobel prizes for science or Field medals for mathematics and the rest to research publications and citations that are heavily weighted to scientific research. Nonetheless, Shanghai Jiao Tong's ranking has reasonable face validity as a ranking of universities' research performance and is the most authoritative and, in my view, the only credible international ranking of universities. Its 2005 rank places Harvard on top, as expected, with a score set at 100. Cambridge is ranked second, but with a score of only 73.6. The rest of the top 20 is dominated by US universities, with Oxford making tenth place with a score of 59.7 and Tokyo University ranked 20 with a score of 46.7.

Liu decided that a world-famous university was one ranked in the top 200, while a world-class university was one ranked in the top 100. On this measure, Australia does quite well, with the Australian National University and the University of Melbourne considered world-class and the universities of Sydney, Queensland, New South Wales and Western Australia considered world-famous.

Overt and intense global competition among universities is relatively recent. It has quickly become a proxy for the future economic success of nations. It is only loosely related to the education of most of the population. While national rankings of universities have been published at least since the magazine *US News & World Report* began its annual rankings of US colleges and universities in 1983, and in Australia in 1995, when the *Good Universities Guide* was first published, world rankings of universities didn't emerge until the turn of the millennium. The magazine *Asiaweek* published its report on "Asia's best universities" from 1997 to 2000, as the Asian tiger economies flexed their muscles. The first important international ranking of universities was not published until 2002 when the Swiss Federal Government's Zentrum für Wissenschafts - und Technologiestudien (Centre for Science and Technology Studies) published its "champions league" of research institutions which ranked universities and other research institutions by the number and impact of research journals.

For most of the past half-century, higher education has been dominated by two issues: more students and how to pay for them, with research considered by governments to be an expensive distraction from more pressing issues. The focus has been on getting more people into higher education to respond to social demand and develop a highly skilled workforce. The distinguished Berkeley higher education analyst Martin Trow first described in 1974 the transition from elite to mass higher education: from providing higher education to a small elite – typically around 5 per cent of school leavers – to making it available to more than 15 per cent of school leavers.

The US achieved this transition first, soon after World War II. Many European countries provided higher education to more than 15 per cent of high school graduates by the 1980s, Singapore by 1990 and Australia by the late 1990s. Other more advanced developing nations are now making the transition to mass higher education, while Australia, Canada, New Zealand, northern Europe, Singapore, the United Kingdom, the US and other developed countries have achieved universal higher education, which Trow defined as participation by more than 35 per cent of the relevant age group.

This expansion of higher education significantly increased costs. Some countries, typically those in northern Europe, have tried to handle this by increasing public funding of higher education to keep up with its expansion. Others, such as Australia, Canada, New Zealand and now England, have followed the US, transferring much of the extra cost to students and their parents with a combination of loans and grants.

One of the risks of this strategy is that it may restrict access overall, especially to members of disadvantaged groups, who may have the intellect but not the means to access higher education. Despite recurrent disquiet, this does not seem to be the case. Indeed, universal higher education is continuing to grow in most of the high-fee, high-loans countries as has been found in a recent study by the Education Policy Institute, based in the United States, Canada and Australia.

The institute ranks, by accessibility and affordability, higher education in sixteen countries: Australia, Canada, Japan, New Zealand, the UK, the US and ten western European countries. The Netherlands and Finland have both the most affordable and the most accessible higher education systems of the countries examined.

However, the rest of the Institute's accessibility table is almost the inverse of its affordability table. There is a clear trade-off between the availability of places and who bears the cost of expanding higher education: it is more accessible in those countries that have transferred most of the costs to students than in those countries where increased public funding has kept higher education relatively affordable, but limited the number of places available.

In the trade-off between afford-ability and accessibility, the strategy that transfers some of the costs to students seems to be more successful than one that favours high public funding and lower student costs. Despite this, the Anglo countries do not perform poorly on the Educational Policy Institute's educational equity index. The institute measured the extent to which students whose fathers had degrees were over-represented in higher education. Australia is in the middle of this table: it is not as equitable as the UK and Canada, but slightly more equitable than the US and more equitable than Germany and other continental European countries.

But it is research performance, not access or equity, that determines the ranking of a “world-class” university, and US dominance has provoked unexpected responses. In the UK, the Blair Labour Government is concentrating funding in research units assessed at the top two grades on a seven-point scale. The Blair Government is also introducing variable “top-up fees” of up to £3,000 (\$7,200) per full-time year in 2006. (Australia’s Higher Education Contribution Scheme {HECS}, on which the British model is based, ranges from \$3,847 per full-time year for education and nursing programs to \$8,018 for law, dentistry, medicine and veterinary science.) While the British fees are supported by income-contingent loans like Australia’s HECS, they have been highly controversial. Not only has it seemed incongruous for a Labour government to introduce sizeable tuition fees, but the UK is introducing, in one step, a fee regime that Australia established in three steps over seventeen years: flat HECS in 1989, differential HECS of a fixed amount for each program in 1997, and variable HECS up to caps set for each program in 2005.

Germany’s former centre-left federal government led by Chancellor Gerhard Schröder sought to chase global research prestige by developing elite universities with the expenditure of an extra p1.9 billion over five years, or \$604 million a year from 2005. The Singapore government has decided on a major national investment of some \$9.6 billion in research and development over the next five years, or \$1.9 billion annually. If it succeeds, Singapore believes it will gain a competitive advantage for the next two decades. Singapore has identified biomedical science as a key sector, in which it has made significant investments over the past few years. The cornerstone is Biopolis, a \$409 million skyscraper housing public research institutes, private companies and over 1,500 scientists and researchers. Within a kilometre the government is building the Fusionpolis, 26-storey twin towers for the communication, information and media technologies. Perhaps more surprisingly, in 1999 South Korea established its Brain Korea 21 (BK21) project to invest 1.4 trillion won over seven years, or \$233 million annually, to develop world-class research universities, foster the creation of human resources through graduate schools, nurture quality regional universities and reform higher education. At the same time, China, Malaysia and Singapore are seeking to retain more of their own students and attract international students by improving the quality of their universities, often in association with leading universities from the US, the UK and Australia.

Expenditure in the Asian challenge still has a way to go to match Australia’s universities, but it is likely to throw up unexpected challenges if it continues to grow. The OECD’s *Education at a Glance 2004* reported that, in 2001, Australia spent \$17,700 per student on universities, including research expenditure (a total of just over \$10 billion), while Japan spent \$14,900, Malaysia \$14,800, South Korea \$10,700 and Thailand \$2,300 per student. Rather than increasing expenditure per student, China and Korea are seeking to develop a group of elite universities to join the university world super league.

Many countries have handled the transition to mass higher education over the past 50 years by establishing sectors of higher education. Some countries have sought to accommodate a mass expansion of higher education in institutions that are sharply differentiated from universities in the type of programs they offer, the students they recruit and their teaching methods. These are the “tracked” systems of continental Europe, so called because students are placed on separate educational tracks from upper secondary school, usually in different schools and school systems. This is most pronounced in Germany, Austria and Switzerland, where secondary schooling determines the higher education options that will become available – in universities, technical colleges or vocational centres.

Other countries have accommodated student growth by creating institutions that are similar to universities and offer a broad range of programs, including in the liberal arts and sciences, but without a formal research role, and which are more vocationally oriented than universities (eg the community or two-year colleges of Canada and United States and New Zealand’s polytechnics). Britain also had polytechnics until 1992, similar to Australia’s colleges of advanced education that operated from 1967 to 1988.

The great expansion of universities in the latter half of the 20th century has led to their being divided formally or informally into segments, sectors or tiers. California has long segmented its universities into the campuses of the University of California with a formal research role, offering doctorates in a wide range of disciplines but restricted to the top 12.5 per cent of high-school graduates, and the state university system, which does not have a formal research role (although research is undertaken), does not offer doctorates and is restricted to admitting the top third of high-school graduates. The other half of high-school graduates attend the open access California Community College system to undertake a vocational program or a two-year associate degree, which allows them to transfer to a university four-year bachelor degree.

Elsewhere, informal segmentation has evolved. In the UK, a self-selected group of the older research-intensive universities created the Russell Group in 1994. In 1999, the Australian universities with the biggest research budgets, which are generally the oldest, followed this example to become the “group of eight”. There are now also groupings of Australian universities that were formerly institutes of technology, and the post-1960s institutions that call themselves the innovative research universities.

There is a broad international pattern in organising tertiary education into three tiers. The top tier comprises the elite universities that have major research roles. The second tier comprises universities and other higher-education institutions which are less selective and which have more limited research roles. The third tier includes institutions that offer

shorter, often vocational, programs of up to two years' duration. Some lead directly into bachelor programs.

The countries seeking to enter the university world super league, such as China and Korea, are doing so by establishing a small number of extremely well-funded research-intensive universities, supplemented by a second tier of moderately funded universities that have a minor role in research, which in turn is fed by a third tier of institutions offering "short-cycle higher education". These countries are emulating California's long-established master plan for higher education.

Australia has its advocates of such tiering. It is hard to see the benefit of this approach if the main consideration is economic growth from research and innovation. Governments invest more heavily in scientific research than in the creative arts or humanities, not for its intrinsic worth or to win esteem or indulge researchers' curiosity, but because of its potential contribution to economic development. To generate economic benefit and thus to warrant its extensive support by governments, research has to be incorporated into the productive process.

Knowledge and information abound; it is the capacity to use them productively that is in scarce supply. As distinguished science policy expert Michael Gibbons argues, much innovation – and hence economic development – depends less on original discoveries and more on the timely take-up, modification and marketing of knowledge solutions that already exist but need to be adapted to local environments. This is no more likely to emerge from the elite research institutions than from any others. This is a radically different orientation to cultivating research esteem that is more often judged by the interests and values of other researchers, not those who may use it. Japan is the great exemplar. Its powerful manufacturing sector is supported by a very vigorous national innovation system, but it has a relatively low number of world-class universities, as Professor Simon Marginson of Monash University has pointed out, and relatively few Nobel laureates.

Nobel laureates who may thrive in the hothouse of an elite research university are as successful at stimulating national innovation and economic benefits as Olympic gold medallists are at improving a nation's fitness or prima donnas in improving a nation's singing. The intellectual arms race may have absorbed billions of dollars, yet missed the wellspring of productive innovation in the knowledge economy. It may actually come from devoting more public and private resources to institutions and processes that mediate between the creators of new knowledge and its users than funnelling vast amounts of public money to benefit the relative handful of individuals who populate the world-class universities. ■