

The Rise of Asia's Universities

Richard C. Levin
President, Yale University

Seventh Annual Lecture of the
Higher Education Policy Institute

Delivered at the
The Royal Society
London, England
February 1, 2010



Yale University

It is a great pleasure to be with you this evening, and an especially great honor to have been asked to deliver the Seventh Annual Lecture of the Higher Education Policy Institute.

I stand before you this evening as a representative of the third oldest university in the United States, little more than 50 miles from the two oldest universities in the English-speaking world. Today, the strongest British and American universities – such as Oxford, Cambridge and Yale, not to mention Harvard, Stanford, Berkeley, MIT, University College London and Imperial College London – call forth worldwide admiration and respect for their leadership in research and education. Sitting atop the global league tables, these institutions set the standard that others at home and abroad seek to emulate; they define the concept of “world-class university.” They excel in the advancement of human knowledge of nature and culture; they provide the finest training to the next generation of scholars; and they provide outstanding undergraduate and professional education for those who will emerge as leaders in all walks of life.

But, as we all know at this, the beginning of the 21st century, the East is rising. The rapid economic development of Asia since the Second World War – starting with Japan, South Korea, and Taiwan, extending to Hong Kong and Singapore, and finally taking hold powerfully in mainland China and India – has altered the

balance of power in the global economy and hence in geopolitics. The rising nations of the East all recognize the importance of an educated workforce as a means to economic growth and the impact of research in driving innovation and competitiveness. In the 1960s, 70s, and 80s, the higher education agenda in Asia's early developers – Japan, South Korea, and Taiwan – was first and foremost to increase the fraction of their populations provided with postsecondary education. Their initial focus was on expanding the number of institutions and their enrollments, and impressive results were achieved.

Today, the later and much larger developing nations of Asia – China and India – have an even more ambitious agenda. Both these emerging powers seek to expand the capacity of their systems of higher education, and China has done so dramatically since 1998. But they also aspire simultaneously to create a limited number of “world class” universities to take their places among the best. This is an audacious agenda, but China, in particular, has the will and resources that make it feasible. This aspiration is shared not only by other nations in Asia but also by certain resource-rich nations in the Middle East.

Consider the following recent developments:

- In the Gulf States, hundreds of millions of dollars are being spent to open branches of top U.S. and European universities such as Cornell in Qatar and the Sorbonne in Abu Dhabi.

- This past autumn, the new King Abdullah University of Science and Technology opened in Saudi Arabia. Its \$10 billion endowment exceeds that of all but five American universities.
- In Singapore, planning is underway to build a new public university of Technology and Design, and a new American-style liberal arts college affiliated with the National University.
- In China, the nine universities that receive the most supplemental government funding to enhance their global competitiveness recently self-identified as the C9 – China’s Ivy League.
- In India, the Education Ministry recently announced its intention to build 14 new comprehensive universities of “world-class” stature.

This evening I want to discuss the motivations for attempting to build world-class universities, the practical obstacles that must be overcome, and the potential consequences of success. Because the circumstances in the Middle East are very different, I will confine my attention to Asia.

There are other important trends that are changing the global landscape of higher education: the rapidly increasing flow of students across borders, the expanding number of satellite campuses being established by U.S. and European universities, the emergence of for-profit providers of both on-site and distance education, and the

urgent need to strengthen higher education in the world's poorest nations, most notably in sub-Saharan Africa. I lack the time this evening to cover this entire terrain, so I shall confine myself to analyzing the prospects for and the potential consequences of developing world-class universities in Asia. The broader topic – the globalization of higher education – is the subject of an excellent new book by Ben Wildavsky, entitled *The Great Brain Race*, to be published this spring by the Princeton University Press.

Asian Ambitions: Expanding Access to Higher Education

In the early stages of postwar Asian development, it was well understood that expanded access to higher education was a requisite for sustained economic growth. A literate, well-trained labor force was a key ingredient in transforming Japan and South Korea over the course of the past half century, first from agricultural to manufacturing economies and subsequently from low- to high-skill manufacturing. With substantial government investment, the capacity of the tertiary educational systems in both countries expanded rapidly. The gross enrollment rate, the ratio of students enrolled in tertiary education to the size of the age cohort, rose from 9 percent in Japan in 1960 to 42 percent by the mid-1990s. In South Korea, the increase was even more dramatic, from 5 percent in 1960 to just over 50 percent in the mid-1990s.¹

In this earlier period, China and India lagged far behind. By the mid-1990s only 5 percent of college-age

Chinese attended college, putting China on par with Bangladesh, Botswana, and Swaziland. In India, despite a postwar effort to create first a set of national comprehensive universities and later the elite and very small Indian Institutes of Technology, the gross enrollment rate stood at 7 percent in the 1990s.²

Speaking at the 100th anniversary celebration of Peking University in 1998, China's president, Jiang Zemin, publicly set his country's sights on greatly expanding its system of higher education, and his administration made it happen – faster than ever before in human history. By 2006, China was spending 1.5 percent of its GDP on higher education, nearly triple the share of GDP it was spending a decade earlier.³

The results of this investment have been staggering. Over the decade following Jiang Zemin's declaration, the number of institutions of higher education in China more than doubled, from 1,022 to 2,263.⁴ Meanwhile, the number of Chinese who enroll in college each year has quintupled – rising from 1 million students in 1997 to more than 5.5 million students in 2007.⁵

This expansion in capacity is without precedent. With more than 20 million students, China has built the largest higher education sector in the world in merely a decade's time.⁶ In fact, the increase in China's postsecondary enrollment since the turn of the millennium

exceeds the total postsecondary enrollment in the United States.⁷

China still has a long way to go to achieve its aspirations concerning access to higher education. Despite the enormous surge, China's gross enrollment rate for tertiary education stands at 23 percent, compared to 58 percent in Japan, 59 percent in the UK, and 82 percent in the United States.⁸ Expansion has slowed since 2006, owing to concerns that enrollments have outstripped the capacity of faculty to maintain quality in some institutions. The student-teacher ratio has roughly doubled over the past decade.⁹ But enrollment will continue to rise as more teachers are prepared, because the Chinese leaders are keenly aware of the importance of a well-educated labor force for economic development.

India's achievement to date has not been nearly so impressive, but its aspirations are no less ambitious. India is already the world's largest democracy. In two decades, it will be the most populated country in the planet, and by 2050, if growth can be sustained, it could become the second largest economy in the world. To sustain that growth, India's Education Minister, Kapil Sibal, aims to increase his country's gross enrollment ratio in postsecondary education from 12 to 30 percent by 2020. Sibal's goal translates to an increase of 40 million students in Indian universities over the next decade – perhaps more

than can feasibly be achieved, but even getting half way there would be a remarkable accomplishment.

Asian Ambitions: Building World-Class Universities

Having made tremendous progress in expanding access to higher education, the leading nations of Asia have now set their sights on an even more challenging goal: building universities that stand in competition with the finest in the world. This is a tall order. World-class universities achieve their status by assembling scholars and scientists who are global leaders in their fields. This takes time. It took centuries for Harvard and Yale to achieve parity with Oxford and Cambridge, and more than half a century for Stanford and the University of Chicago (both founded in 1892) to achieve world-class reputations. The only Asian university to rank in the top 25 in global league tables, the University of Tokyo, was founded in 1877.

Why do China, India, Singapore, and South Korea aspire so openly to elevating some of their universities to this exalted status? For two reasons, I would submit. First, these rapidly developing nations recognize the importance of university-based scientific research in driving economic growth, especially since the end of the Second World War. Second, world-class universities provide the ideal context for educating graduates for careers in science, industry, government, and civil society who have the intellectual breadth and critical-thinking skills to solve problems, to innovate, and to lead.

Let me expand on each of these points. Although China and India remain at a stage of development where they are able to compete effectively by deploying low cost labor in manufacturing, their surplus agricultural labor will eventually be absorbed in cities – as it was in Japan and South Korea – and wages will begin to rise. At this stage, it will become impossible to sustain rapid economic growth without innovation, without being early to market with new products and new services, many of them the fruits of applied research based on underlying scientific advance.

To oversimplify, consider the following puzzle: Japan grew much more rapidly than America from 1950 to 1990, as its surplus labor was absorbed into industry, and much more slowly than America thereafter. Now consider whether Japan would have grown so slowly if Microsoft, Netscape, Apple, and Google had been Japanese companies. I think not. It was innovation based on science that propelled the U.S. to more rapid growth than Japan during the two decades prior to the crash of 2008. It was Japan's failure to innovate that caused it to lag behind.

The emerging Asian nations recognize, very explicitly in their national policy documents and plans, the link between building indigenous research capacity and economic growth in a post-industrial knowledge economy. And they also recognize that university-based research is the most effective driver of scientific discovery and ultimately, both directly and indirectly, of economically

relevant new technologies. Hence derives their aspiration for research universities capable of working on the scientific and technological frontier – and not a moment too soon, in my opinion. At their current pace of urbanization, China will begin to lose its labor cost advantages in manufacturing in about two decades, and India will reach the same point a decade later. This gives both nations enough time to make significant progress in building the capacity to compete effectively on the frontier of innovation.

But it takes more than research capacity alone to develop a nation. It takes well-educated citizens of broad perspective and dynamic entrepreneurs capable of independent and original thinking. This is the second factor motivating Asia's ambition to build world-class universities. The leaders of China, Singapore, and South Korea, in particular, have been very explicit in recognizing that two elements are missing in their universities – multidisciplinary breadth and the cultivation of critical thinking. Asian higher education, like its European counterpart but unlike America, has been traditionally highly specialized. Students pick a discipline or a profession at age eighteen and study little else. And, unlike the norms in elite European and American universities, pedagogy in China and South Korea relies heavily on rote learning. Traditionally, students are passive listeners, and they rarely challenge each other or their professors in classes. Pedagogy focuses on the mastery of content, not on the development

of the capacity for independent and critical thinking. The traditional Asian approaches to curriculum and pedagogy may be highly functional for training line engineers and mid-level government officials, but they are perhaps less well suited to educating elites for leadership and innovation.

It is curious that while American and British politicians worry that Asia, and China in particular, is training more scientists and engineers than we are, the Chinese and others in Asia are worrying that their students lack the independence and creativity to drive the innovation that will be necessary to sustain economic growth in the long run. They fear that specialization makes their graduates narrow and traditional Asian pedagogy makes them unimaginative. Thus, they aspire to strengthen their top universities by revising both curriculum and pedagogy.

Requisites for World-Class Universities: Research

Having discussed what is motivating the Asian quest for world-class universities, let us turn next to what needs to be accomplished. So the first question is: what does it take to build universities capable of world-class status in research? First and foremost, it requires the capacity to attract scholars and scientists of the highest quality. In the sciences, this means first-class research facilities, adequate funding to support research, and competitive salaries and benefits. China is making substantial investments on all three fronts. Shanghai's top

universities – Fudan, Shanghai Jiaotong, and Tongji – have each developed whole new campuses within the past few years, with outstanding research facilities, located close to industrial partners. Research funding has grown in parallel with the expansion of enrollment, and Chinese universities now compete much more effectively for faculty talent. In the 1990s, only 10 percent of Chinese who received a Ph.D. in science and engineering in the United States returned home.¹⁰ That number is now rising, and, increasingly, China has been able to repatriate mid-career scholars and scientists from tenured positions in the United States and the United Kingdom, who are attracted by the greatly improved working conditions and the opportunities to participate in China's rise. India, too, is beginning to have more success in drawing on its diaspora, but it has yet to make the kind of investment that China has made in improving facilities, research funding, and extra compensation for faculty of distinction.

Beyond the material conditions required to attract faculty, building a national capacity for first-class research can be greatly facilitated by an efficient and effective system of allocating research funding. The underlying principles for creating such a system were brilliantly articulated in a 1946 report entitled *Science: The Endless Frontier*, by Vannevar Bush, the Science Adviser to President Truman. The report acknowledges that the discoveries in basic science are ultimately the basis for developments in industrial technology, but it notes that the economic gains

from advances in basic science often do not accrue for decades and often yield results in applications that were entirely unanticipated at the time of the scientific breakthrough. When the properties of coherent light were first identified in the late 1950s, no one imagined that lasers would become useful in eye surgery decades later. Because the full economic benefit of a breakthrough in pure science can rarely be captured by the original inventor, private enterprises will typically have insufficient incentive to make many socially productive investments. Government must take the lead.

Bush's 1946 report established the framework for a national system of support for scientific research founded in three principles, which still govern today. First, the federal government bears the primary responsibility for funding basic science. Second, universities – rather than government-run laboratories, non-teaching research institutions, or private industry – are the primary institutions responsible for carrying out this government-funded research. Third, although the government determines the total amount of funding available in different fields of science, specific projects and programs are not assessed on political or commercial grounds, but through an intensely competitive process of peer review in which independent scientific experts judge proposals on their scientific merit alone.

This system has been an extraordinary success, and for a number of reasons. It has the benefit of exposing postgraduate scientists-in-training – even those who do not end up pursuing academic careers in the long run – to the most cutting edge techniques and areas of research. It allows undergraduates to witness meaningful science first-hand, rather than merely reading about the last decade’s milestones in a textbook. And it means the best research gets funded – not the research proposed by the most senior members of a department’s faculty, or by those who are politically well-connected.

This has not been the typical scheme for facilitating research in the East. Historically, most scientific research in East Asia has taken place apart from universities – in research institutes and government laboratories. And in Japan, South Korea and China, funding has primarily been directed toward applied research and development, with a very small share of total R&D funding devoted to basic science. In China, for instance, only about 5 percent of R&D spending is aimed at basic research, compared to 10 to 30 percent in most OECD countries.¹¹ Expressed as a share of GDP, the U.S. spends seven times as much on basic research as China.¹² Moreover, the use of peer review for grant funding in East Asia is inconsistent at best, completely absent at worst. Japan has historically placed the bulk of its research resources in the hands of its most senior investigators. Despite acknowledging several years ago that a greater share of research funding should be subject to

peer review, only 14 percent of the government's spending on non-defense-related research in 2008 was subject to competitive review, compared to 73 percent in the United States.^{13, 14}

On the other hand, there is no doubt Asian governments have made increasing research and development a priority in recent years. R&D spending in China has increased rapidly over the last two decades, rising from 0.6 percent of the country's GDP in 1995 to 1.3 percent of GDP in 2005.¹⁵ That is still significantly below the advanced OECD countries, but it is likely to keep climbing. The Chinese government has set a goal of increasing R&D intensity to 2 percent of GDP by 2010 and 2.5 percent of GDP by 2020.¹⁶ And there is some evidence of the payoff from increased research funding. To give one benchmark, from 1995 to 2005, Chinese scholars more than quadrupled the number of articles they published in leading scientific and engineering journals. Only the U.S., the U.K., Germany and Japan account for more publications.¹⁷

Requisites for World-Class Universities: Education

Having described what it takes to build world-class capacity in research, let us now turn our attention to what is required to transform education. As I mentioned earlier, Asia's aspiration is to develop graduates of elite universities who have a broad, multidisciplinary perspective on the world and who have the capacity to innovate. This has led

officials in China, Singapore, and South Korea, in particular, to look closely at America's leading universities, which differ from Asian norms in both the structure of the curriculum and the practice of pedagogy.

Asian leaders are increasingly attracted to the American model of undergraduate curriculum, which typically provides students with two years to explore a variety of subjects before choosing a single subject on which to concentrate during their final two years. There are two principal rationales for this approach. First, significant exposure to multiple disciplines gives students alternative perspectives on the world, which both allows them to function more effectively in their chosen field and better prepares them to encounter new and unexpected problems. The second rationale is that students are in a better position to choose a specialization at age twenty than at age eighteen. I would not press these arguments too far in this forum, since it has not been my experience that the graduates of Oxford and Cambridge are too narrow by virtue of having specialized at age eighteen. But I have no doubt about the virtues of the American model. At its best, it produces strong results by effectively broadening the perspective of graduates.

That world-class universities must cultivate independent, critical thinking is a much less controversial point. In today's knowledge economy, no less than in the nineteenth century when the philosophy of liberal

education was articulated by Cardinal Newman, it is not subject-specific knowledge, but the ability to assimilate new information and solve problems is the most important characteristic of a well-educated person. The *Yale Report of 1828*, a document with enormous influence on American undergraduate education, distinguished between the “discipline” and the “furniture” of the mind. Mastering a specific body of knowledge – acquiring the “furniture” – is of little permanent value in a rapidly changing world. Students who aspire to be leaders in business, or medicine, or law, or government, or in the academy need the “discipline” of mind – the ability to adapt to constantly changing circumstances, confront new facts, and find creative ways to solve problems.

The cultivation of such habits requires a pedagogy that encourages students to be more than passive recipients of information; rather, they must learn to think for themselves, and learn to structure an argument and defend it, or modify it in the face of new information or valid criticism. The Oxford-Cambridge tutorial is perhaps the paradigm of such pedagogy. But the tutorial system is almost unthinkably labor-intensive in an Asian, let alone an American, context. The American substitute has been the interactive seminar, where students are encouraged to take and defend positions in small groups, and to challenge rather than blindly accept, the instructor’s point of view. Even where numbers dictate reliance on large lecture courses, small discussion sections serve as a complement to

the lectures. Examinations in top U.S. universities rarely call for a recitation of facts; they call upon students to solve problems they have not encountered before, or to analyze two sides of an argument and state their own position.

In Asia's quest to build world-class universities, there has already been dramatic movement in the direction of developing an American-style curriculum. Peking University introduced Yuanpei Honors College in 2001, a pilot program that immerses a select group of the most gifted Chinese students in a liberal arts environment. These students live together and sample a wide variety of subjects for two years before choosing a major field of study. Yonsei University in South Korea has opened a liberal arts college with a similar curriculum on its campus, and the National University of Singapore has created a University Scholars program in which students do extensive work outside their disciplinary or professional specialization.

For the past six years, the presidents, vice presidents, and party secretaries of China's top universities, those singled out for special support by the government, have met annually with Yale faculty and administrators in a weeklong workshop to learn about the practices of American institutions and share their own experiences with the reform of curriculum, faculty recruitment, and pedagogy. Although I do not claim a direct causal linkage, their progress toward curricular reform has been astonishing. At Fudan University, all students now take a

common, multidisciplinary curriculum during their first year before proceeding with the study of their chosen discipline or profession. At Nanjing University, students are no longer required to choose a subject when they apply for admission; they may instead choose among more than 60 general education courses in their first year before deciding on a specialization.

Changing pedagogy is much more difficult than changing curriculum. It takes increased resources to offer classes with smaller enrollments, but it also requires the faculty to adopt new methods. This is a huge challenge in China, Japan, and South Korea, where traditional Asian pedagogy prevails. It is much less of a concern in India and Singapore, where the legacy of British influence has created a professorate much more comfortable with engaging students interactively. The Chinese, in particular, are eager to tackle this challenge, but they recognize that the key to changing pedagogy is the growing representation in the professorate of those who have studied abroad and been exposed to methods of instruction that do not rely on rote learning. Increasing exchange opportunities, whereby Asian students study in the West and Western students spend time in Asian universities, will also help to accelerate the transformation.

Prospects for Success

As we can see, developing world-class universities in Asia will take more than money and determination. To

create world-class capacity in research, resources must not only be abundant, they must also be allocated on the basis of scholarly and scientific merit, rather than on the basis of seniority or political influence. To create world-class capacity in education, the curriculum must be broadened and pedagogy transformed. These are all problems that can be solved with sufficient leadership and political will.

Another requisite for success is focus. Not every university can or need be world-class. The experiences of the U.S., the U.K., and Germany are instructive. In the U.S. and U.K., the higher education is a differentiated system of many types of institutions, of which the comprehensive research university is merely one. And within the set of comprehensive universities, government support for research is allocated chiefly on the basis of merit, which allows some institutions to prosper while others lag. In the U.S., fundraising reinforces this tendency to differentiation. Success breeds success, and, for the most part, the strongest institutions attract the most philanthropy. In Germany, by contrast, government policy has deliberately constrained institutions from achieving distinction. By opening enrollment, allowing the student-faculty ratio to rise everywhere, isolating the most eminent researchers in separate institutes, but otherwise distributing resources on the basis of equity rather than merit, the German government has destroyed the worldwide distinction its best universities once held. Only recently has

Germany decided to focus resources on three universities in particular in order to make them more globally competitive.

Japan and South Korea have learned this lesson. Both have flagship national universities that are well supported: the University of Tokyo and Seoul National University. And in Japan at least two other public universities, Kyoto and Osaka, are not far behind Tokyo and well above the rest. China has this message, too. In 1998, it identified seven universities for disproportionate investment: Peking, Tsinghua, Fudan, Shanghai Jiaotong, Nanjing, Zhejiang, and Xi'an Jiaotong. And even within that set, the government has drawn distinctions, concentrating national resources on Peking and Tsinghua Universities in an effort to propel them into the worldwide top twenty. The Shanghai-based institutions – Fudan and Jiaotong – are making nearly comparable investments, thanks to generous supplemental funding from the Shanghai government.

India is the anomalous case. In the 1950s and 60s, it focused resources on establishing five Indian Institutes of Technology. These, and the ten more added in the past two decades, are outstanding institutions for educating engineers, but they have not been globally competitive in research. And India has made no systematic effort to raise the status of any of its fourteen comprehensive national universities, which are severely underfunded.

The current Minister of Education is determined to create world-class comprehensive universities. But the egalitarian forces that dominate India's robust democracy threaten to constrain the prospects for excellence, by spreading funding too thin and allowing considerations of social justice to trump meritocracy in selecting students and faculty. Two years ago, the government announced that it would create thirty new world-class universities, one for each of India's states, clearly an unrealistic ambition. The number was subsequently reduced to fourteen, one for each state that does not yet have a comprehensive university, but even this target seems excessive, compared with China's focus on seven, and special focus on two within the seven.

Given the extraordinary achievements of Indian scholars throughout the diaspora, the human resources for building world-class universities at home are surely present. But it remains to be seen whether India can tolerate the large discrepancies in faculty compensation that would be necessary to attract leading scholars from around the world. Consequently, an alternative and potentially more promising strategy being pursued by the government is to allow the establishment of foreign universities and to create conditions under which private universities – foreign or domestic – can flourish.

In one respect, however, India has a powerful advantage over China, at least for now. The freedom of faculty to pursue their intellectual interests wherever they

may lead, and the freedom of students and faculty alike to express and thus test their most heretical and unconventional thoughts – these freedoms are an indispensable feature of a truly world-class comprehensive university. It may be possible to achieve world-class stature in the sciences while constraining freedom of expression in politics, the social sciences, and the humanities. Some of the Soviet Academies achieved such stature in mathematics and physics during the Cold War. But no comprehensive university has done so in modern times.

There is one other potential obstacle to success in China, which is currently the subject of intense discussion: the unique way in which university leadership responsibilities are divided between each institution's President and its Communist Party Secretary, who serves as Chair of the University Council. Often the two leaders work together very effectively as a team. But there are concerns that the structure of decision-making limits a President's ability to achieve his or her academic goals, since the appointment of senior administrators – vice presidents and deans – is in the hands of the University Council, chaired by the Party Secretary, rather than the President. The issue of university governance is currently under review by China's Ministry of Education.

Conclusion: A Positive-Sum Game

The rise of Asia's universities is a natural manifestation of the more general phenomenon of

globalization. As barriers to the flow of people, goods, and information have come down, and as the economic development process proceeds, the nations of Asia have increasing access to the human, physical, and informational resources needed to create institutions at the highest level of excellence. If the emerging nations of Asia concentrate their growing resources on a handful of institutions, tap a worldwide pool of talent, and embrace freedom of expression and freedom of inquiry, they have every prospect of success in building world-class universities. It will not happen overnight; it will take decades. But it may happen faster than ever before.

How should we in the West regard this prospect – as a threat or as an opportunity? I would argue forcefully that competition in education, like the phenomenon of globalization itself, is a positive sum game.

Consider the following example. One of our most distinguished geneticists at Yale and members of his team now split their time between laboratories in New Haven and Fudan University in Shanghai. Another distinguished Yale professor, a plant biologist, has a similar arrangement at Peking University. In both cases, the Chinese provide abundant space and research staff to support the efforts of Yale scientists, while collaboration with the Yale scientists upgrades the skills of young Chinese professors and graduate students. Both sides benefit.

The same argument can be made about the flow of students and the exchange of ideas. As globalization has underscored the importance of cross-cultural experience, the frequency of student exchanges has multiplied. As Asia's universities improve, so do the experiences of students who participate in exchange programs. Everyone benefits from the exchange of ideas, just as everyone benefits from the exchange of goods and services.

Finally, increasing the quality of education around the world translates into better-informed and more productive citizens. The fate of the planet depends on our ability to collaborate across borders to solve society's most pressing problems – the persistence of poverty, the prevalence of disease, the proliferation of nuclear weapons, the shortage of water, and the danger of global warming. Having better educated citizens and leaders can only help.

Notes

¹ UNESCO, *1975 Statistical Yearbook* (Paris: UNESCO, 1976), p. 107; and World Bank EdStats, <<http://www.worldbank.org/education/edstats>>

² *Ibid.*

³ Tables 2-1 and 20-37, National Bureau of Statistics, *China Statistical Yearbook 2008*, and Tables 2-9 and 18-37, National Bureau of Statistics, *China Statistical Yearbook 1997*

⁴ Table 20-3, National Bureau of Statistics, *China Statistical Yearbook 2009*

⁵ Table 20-6, National Bureau of Statistics, *China Statistical Yearbook 1999*, and Table 20-2, *China Statistical Yearbook 2008*

⁶ Zhao Litao and Sheng Sixin, "China's 'Great Leap' in Higher Education," Background Brief No. 394, East Asian Institute, National University of Singapore, 24 July 2008, p. i

⁷ UNESCO Institute for Statistics, <<http://stats.uis.unesco.org>>

⁸ UNESCO, *2009 Global Education Digest*, p. 128-137

⁹ Wu Bin and Zheng Yongnian, "Expansion of Higher Education in China: Challenges and Implications," China Policy Institute, University of Nottingham, February 2008, p. 11

¹⁰ National Science Foundation, *Asia's Rising Science and Technology Strength: Comparative Indicators for Asia, the European Union, and the United States*, 2007, p. 7

¹¹ OECD, *Main Science and Technology Indicators*, 2009, p. 25, 29

¹² National Science Foundation, *Science and Engineering Indicators 2008*, p. 4-41

¹³ Ministry of Education, Culture, Sports, Science and Technology, *White Paper on Science and Technology 2009*, p. 116-117, 200; and National Science Foundation, *Science and Engineering Indicators 2010*, p. 4-22 to 4-27

¹⁴ For the purposes of this comparison, I consider federal research funding appropriated to the National Science Foundation, the Department of Energy and the National Institutes of Health as being subject to competitive review.

¹⁵ OECD, *Main Science and Technology Indicators*, 2009, p. 25

¹⁶ OECD, *Reviews of Innovation Policy: China*, 2008, p. 111

¹⁷ National Science Foundation, *Science and Engineering Indicators 2008*, p. 5-38

You are here. Home > Asia > The Rise of Asia's Young Universities. MENU. Join Now / Login. Asian universities fill four of the top five places in a new table of young universities extracted from the 2011/12 QS World University Rankings to demonstrate their growing power. The more recent figures included in the specialist Asian rankings published today suggest that they will make an even bigger mark this year. Hong Kong University of Science and Technology (HKUST), which is top in Asia for the second year in a row, is the youngest of all, having been founded only in 1991. The neighbouring Chinese University of Hong Kong, which finishes ahead of HKUST on the different criteria used in