

Academics See Benefits in Hong Kong's New Status

HONG KONG—Talk to Johnny Chan and Shi Jiu-en about the weather, and you may also learn a great deal about the future of science in Hong Kong. Chan, a meteorologist at City University of Hong Kong, and Shi, a research professor at Beijing Meteorological College, have jointly studied typhoons for the past 2 years and are putting the finishing touches on a model to predict the number and severity of storms that slam into the Asian coast each year. Chan and his department have benefited from Shi's knowledge of applying statistical methods to environmental and meteorological studies, while Shi brings back to Beijing the latest thinking on short-term climate variability. This kind of scientific cooperation has flourished in the past few years and, says Chan, "it's probably just going to get easier" now that Hong Kong is formally a part of China.

While the news coverage of this month's historic events involved speculations about changes that may be in store, most Hong Kong scientists and research administrators say that the future for academic science is likely to be more of the same. In particular, stronger links with the mainland are expected to increase the influx of well-trained graduate students, while providing Hong Kong researchers with greater access to large scientific facilities throughout China. "There is a complementarity between the mainland and Hong Kong" that the new relationship will foster, says H. K. Chang, president of City University of Hong Kong. Chen Jiaer, president of Peking University, sees benefits for both sides: "If Hong Kong can get better, China can get better."

One potential wild card is whether Hong Kong's new administration will adopt an industrial policy for a region that has traditionally avoided such government intervention in technology. Speaking at a meeting of university administrators from around the world (see sidebar), Tung Chee-hwa, the region's new chief executive, raised some eyebrows by suggesting that "more of the research funding should be devoted to applied research and commercialization."

Despite Tung's influence, audience members said that his voice is only one of many in what they expect to be an ongoing discussion about industrial policy and the role of universities. They also noted that education is part of the Basic Law, which enshrines the region's ability to set its own course in most internal matters while China controls foreign policy and defense. "Academic freedom and the autonomy of Hong Kong in educational affairs are part of the Basic Law," says Antony Leung, an adviser to the new government on education and a local banker who is chair of the University Grants Committee, which oversees the funding of Hong Kong's six universities.

For Hong Kong's academics, increased autonomy offers the chance to pick and choose among the legacies of colonialism. That could mean a move away from a 3-year undergraduate program, the capstone of a system with 6 years of primary school, 5 years of secondary, and 2 years of postsecondary. There is talk of emulating a system that mirrors mainland China and the United States, including 4 years of university training. "The university presidents are unanimously in favor of a 6-6-4 program," says Woo Chia-Wei, president of Hong Kong University of Science and Technology (HKUST), who says that 3 years is not long enough to educate responsible citizens. However, any change is likely to be gradual.

In other areas, programs begun under colonial rule may well be extended. One effort is attracting outside students, which overwhelmingly means from the mainland. The number of nonlocal graduate students had been capped at 20%, on the grounds that most of the slots, which are sup-

ported by local taxes, should be reserved for local students. Last December, the government agreed to raise the cap to 33.3%, although its full effect won't be seen for several years.

The change is expected to attract more students like Kong Yunfeng, who recently arrived at the Chinese University of Hong Kong

to pursue a Ph.D. in geography. The 30-year-old Kong chose Chinese University because of its program in geographic information sciences. "The resources [at Chinese University] may be better than anywhere in America," he says. Kong, who holds a master's degree in surveying and mapping from Tongji University in Shanghai, was also drawn by the cultural familiarity of Hong Kong.

Hong Kong university officials expect the influx of mainland students to improve graduate education. "Hong Kong has the resources, while the mainland has the students," says

Richard Ho, dean of the faculty of business at City University of Hong Kong. In addition to being the elite of a very large population, the mainland graduate students "are more mature and generally work harder than local students," says City University's Chan, and many have experience working in mainland research labs.

That's the case with Feng Ji, a 36-year-old City University doctoral candidate with a decade of

lab experience working on high-temperature superconductors at the Chinese Academy of Sciences' Institute of Physics in Beijing. Like many mainland grad students, Feng was partly drawn to City University because of a cooperative agreement between the university and his institute in Beijing, part of a grants program begun in 1982 by the Hong Kong government to encourage such links. Now "such cooperation between Hong Kong and mainland Chinese institutions has become an everyday occurrence," says Nigel French, secretary-general of the University Grants Committee, and the special grants, having served their purpose, will be phased out.

For Beijing's Shi and other mainland scientists, Hong Kong's major attraction is its relatively plush support for researchers who work there. But the funding equation works both ways: For many Hong Kong scientists, the mainland offers big-ticket facilities too costly for its small population of researchers. For example, HKUST scientists can use a synchrotron operated by China's University of Science and Technology in Hubei.

Often, the cooperation means assembling enough brain power to tackle complex problems. HKUST physicist Ge Weikun has been working with colleagues at the Institute of Semiconductors in Beijing on quantum phenomena in nanometer-scale semiconductor devices since coming to Hong Kong in 1993 from Dartmouth College. The collaborative research has yielded "a lot of results and a number of papers," says Ge, with the next step aimed at building a theoretical framework that would allow the simulation of the properties of quantum dots, nanometer-scale



From the top. Tung calls for more applied science at Hong Kong's universities.

ANAT GIVONAP PHOTO



Calm in the storm. Chan (left) and Shi say the handover doesn't affect their work on typhoons.

D. NORMILE

Schools Ponder New Global Landscape

HONG KONG—Around the world, new institutions are promising to deliver education to a student body many times larger than the enrollment of any current university—at a fraction of the cost and without sacrificing the quality of the instruction. Such megauniversities—which rely on remote teaching techniques such as televised courses, correspondence, and the Internet—are a response to society's increasing demand for a skilled work force. But will such upstarts force major research universities to change their ways?

Earlier this month, top officials from dozens of major research universities around the world wrestled with that and other questions during a 2-day conference here* that coincided with the hand over of Hong Kong to China. Their answers suggest that plotting the future of academic research may be as difficult as predicting the fate of the former British colony.

For some participants, change can't come soon enough. "I consider the American research university of the last 40 years to be a failure," famed management guru Peter Drucker told the audience in a teleconference address. "The great educational needs of tomorrow are not on the research side but the learning side." The bulk of that learning, he predicted, will occur not on traditional residential campuses but through some form of distance learning.

Distance learning offers students more choices and increases access to higher education, believes John Daniel, vice chancellor of the Open University of the United Kingdom, which pioneered the approach on a massive scale. It also provides cost advantages—anywhere from half to one-tenth the traditional price—over oncampus instruction, he says. The success of distance learning, he adds, can be seen in the rapid growth of megauniversities (see table).

Mass education does not have to mean low quality, however. Daniel noted that the U.K.'s Open University ranked 10th out of 77 universities in a national survey on the quality of the teaching. Several members of the Cambridge University faculty, a conference participant noted, earned their Ph.D.s at the Open University.

While university presidents at the meeting were impressed by such data, many wondered whether the distance learning and residential university experiences are really comparable. Ronald Oxburgh, rector of the University of London's Imperial College of Science, Technology, and Medicine, noted that the open universities often rely on the faculty of traditional universities to develop the course materials and provide other services. Part of the cost effectiveness of the open universities, he pointed out, stems from their being run "on the back of a mature and established system." Daniel said he preferred to view the traditional institutions as complementary, with the new megauniversities making use of their facilities for summer workshops, laboratory courses, and the like.

Joseph Bordogna, acting deputy director of the U.S. National Science Foundation, offered a spirited defense of research universities by noting the important contribution of academic research to economic growth. A new study by Francis Narin, of CHI Research in Haddon Heights, New Jersey, he noted, has found that 73% of recent U.S. patents cite research from public and nonprofit organizations, with half of those citations from academic research. What's more, the study showed that the links

between academe and innovation are becoming stronger, with the average number of scientific citations per patent jumping from just 0.4 in 1985 to 1.4 in 1995. "I don't think [the research university] is dead yet, but it's changing," Bordogna said.

Indeed, most participants were upbeat about the future, despite a consensus on the pressing need for change. They also suggested using history as a guide. "As long as we are able to provide incubators for alternative ways of doing things, then we can continue to evolve as we have been doing for the last 800 years," says Emil Javier, president of the University of the Philippines. —D.N.

MEGAUNIVERSITIES AROUND THE WORLD

Institution	Began	Students	Budget (US\$ millions)	Unit cost*
Anadolu University, Turkey	1982	578,000	30	10%
China TV University	1979	530,000	1	40%
Universitas Terbuka, Indonesia	1984	353,000	21	15%
Indira Gandhi National Open Univ.	1985	242,000	10	35%
Sukhothai Thammathirat Open University, Thailand	1978	217,000	46	30%
Korean National Open University	1982	211,000	79	5%*
National Center for Distance Learning, France	1939	185,000	56	50%
The Open University, Britain	1969	157,000	300	50%
University of South Africa	1873	130,000	128	50%
Payame Noor University, Iran	1987	117,000	13	25%
National Center for Distance Learning, Spain	1972	110,000	129	40%

*Cost per student as a percentage of average for other universities in that country.

SOURCE: JOHN DANIEL, MEGA-UNIVERSITIES AND KNOWLEDGE MEDIA

structures that trap electrons.

There are also schemes to extend the reach of Hong Kong's faculties. Henry Wong, a chemistry professor at Chinese University, says that one legacy of the Cultural Revolution is a shortage of midcareer scientists in China. So Chinese University is working up an agreement with the Shanghai Institute of Organic Chemistry "to train graduate students in research techniques," he says. At the same time, Pan Yunhe, president of Zhejiang University in Hangzhou, hopes that Hong Kong scientists "will serve as a bridge to the world" by sharing

their international contacts with his faculty.

To many Hong Kong academics, the running discussion on industrial policy and the role of universities is a sign that the region will retain its intellectual vibrancy. John Chan, associate professor of clinical oncology at Chinese University, said that Hong Kong needs an industrial policy to help it replace the manufacturing sector of the economy that is moving to lower wage sites in China and Southeast Asia. But Chinese University electrical engineer Charles Kao countered that "industrial policy has failed in every country that has tried it."

HKUST's Woo agrees with Tung that "Hong Kong does need applied research and technology transfer [to industry] badly." But he defends the current balance of applied and basic research being done by universities.

Only time will tell whether Hong Kong adopts some sort of industrial policy, and whether universities are asked to play a role in it. What seems clear, however, is that, so far, academic debate remains alive and well in the Hong Kong Special Administrative Region, just as it was supposed to be.

—Dennis Normile