

Higher education and research innovation in China

By Jane Qiu

China places a great emphasis on boosting its innovative capability, which it says is key to meeting the challenges in economic development and global competition. At the heart of the matter is how the country could produce its own agent of innovation—creative graduates and postgraduates.

In a forum chaired by *National Science Review's* executive associate editor Mu-ming Poo, five panelists from top universities discuss the problems and challenges of higher education in China and in what ways the system needs to be reformed.



Yuanfang Chen

Physician and Vice Chair of Peking Union Medical College's Expert Committee on Education in Beijing



Ke Gong

Electronic Engineer and President of Nankai University in Tianjin



Chia-Wei Woo

Physicist and Founding President of Hong Kong University of Science and Technology in Hong Kong



Song Gao

Chemist and Vice President of Peking University in Beijing



Yigong Shi

Biologist and Dean of Tsinghua University's School of Life Sciences in Beijing



Mu-ming Poo (Chair)

Neuroscientist and Director of Chinese Academy of Sciences' Institute of Neuroscience in Shanghai

ELITE UNIVERSITIES AND INNOVATION

Poo: Many of the challenges China faces in economic development and global competition are about innovation. We don't have much genuine innovation at the moment, often trailing behind developed countries. The purpose of this forum is to discuss China's higher education in this context—including both undergraduate and postgraduate education. What are the problems and challenges? And how could Chinese universities produce creative talents?

Shi: The concept of higher education is very broad. There are over 1000 universities in China, many of which tend to have a narrower focus on technical and professional training and should have quite different education missions and elements from elite universities. I think the top 30 to 40 research-oriented universities—the Ivey League in China—are most relevant

to the issue of innovation being discussed today.

Poo: I agree. I think we should focus our discussion on top universities; otherwise it would be too diffuse.

Shi: There is this pervasive culture of *ji gong jin li* (seeking quick success and short-term gains) in mainland China. The government regards universities as the engine of employment. Pressurized by their parents and the entire society, the vast majority of students in China's top universities are obsessed by finding a well-paid job. Under this kind of atmosphere, few people are really interested in innovation. In most universities, including Tsinghua, finance is the first choice of major for many students. And a talented graduate student quit his PhD study in my lab for a job in investment banking. It's simply unbelievable.

Gong: What's critical for innovation are not specific skills but culture. I agree:

there is too much of a culture of seeking short-term gains in China, which is not conducive to creativity. There is little trust between people, and collaboration is extremely limited, which also impedes innovation. Moreover, Chinese scientists tend to have a very narrow perspective and are only interested in their own specialties, but innovation these days often takes place in multidisciplinary research. All these reflect flaws in our higher-education system that need to be urgently changed.

Woo: Indeed. The seeds for a healthy research culture are sown in universities. But I'd like to point out there are different kinds of innovation. Opening a fast-food restaurant, for instance, also requires imagination and creativity. The basic principles of higher education are the same whether you are talking about elite universities and vocational colleges.

HIGHER EDUCATION AND JOB PROSPECT

Shi: The Chinese government often links higher education to employment—with the view that employment is the primary purpose of higher education. This is often amplified in the Chinese media, and gives universities, including Tsinghua and Peking University, tremendous pressure. I think an overemphasis on job prospects is missing the point of higher education. Sadly, there is no consensus in our society.

Gong: Indeed. There are 7 million university graduates in mainland China every year. The government puts a lot of pressure on universities to maximize the employment rates. For instance, we are required to file a monthly report since November on the percentage of students who are successful in signing a job contract.

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Shi: I engage freshmen every year in town hall-style meetings, which some of their parents often attend. Their concern for job prospects is overwhelming. You cannot imagine. I often tell the parents: your children do not come to Tsinghua just to get jobs afterwards—there is a much bigger picture in that—so please do not talk to your children in the following four years about which jobs are the most lucrative.

Woo: This is not unique to China. Universities in other countries, especially those that are publicly funded and therefore accountable for the masses, are also very much concerned with employment rates. After all, how many of the 7 million graduates in China are expected to be innovative in the end? The main reason for most students going to universities is to find good jobs. There is nothing wrong with that. The key is employment rates

shouldn't be the only criteria for evaluating a university's performance.

Gong: But this is exactly where the problem is. There is already a tendency in China to think that universities have done a good job as long as their graduates get employed. Universities, including the best ones, are busy meeting targets such as employment rates, the number of awards and publications, and impact factors, while neglecting the essence of higher education. They are simply *ben mo dao zhi* (putting the cart before the horse).

Shi: Of course, all universities should care about their students' job prospects. In China, however, this has become a driving force for universities—in ways that have no parallel in any other places in the world—with serious adverse effects on students, lecturers and the overall development of higher education. The goal of elite universities should be to train leaders of the society for the future, not just to have their students placed in high-paying jobs.

Gao: I agree. It's understandable that students going to universities hope to find good jobs afterwards. But the purpose of universities is not to boost employment rates, which are more related to a country's economic development and population growth.

Chen: The overemphasis on employment rates and similar targets is indicative that the Ministry of Education does not have a clear picture of what higher education is about or its role in shaping a country's future. Higher education has become merely a number's game. This is the crisis China is facing. We should look at the big picture and ask what key elements are missing in higher education in China.

PHILOSOPHY OF HIGHER EDUCATION

Poo: Peking Union Medical College (PUMC) is the premium medical school in China, with a history going back to 1917, and is highly influential. What's the situation there?

Chen: PUMC is a small, highly selective medical school. Before it was forced to close down after the Pearl Harbor event,

PUMC only had 310 graduates, about 16.3 a year on average. But those graduates were the pillars of modern medicine in China and had a massive impact in the fields of clinical practice, medical research, public health, nursing and medical education. Many of them later became famous medical leaders, and were elected as fellows or directors of various prestigious academies—including the Chinese Academy of Sciences, the Chinese Academy of Engineering, the Chinese Academy of Military Medical Sciences and the International Academy of Aviation and Space Sciences. PUMC has been struggling to reproduce its past glory since it reopened at the end of the Cultural Revolution.

Poo: You belong to the old generations of PUMC graduates, who graduated before the Cultural Revolution. Why could it be so successful in your view?

Chen: This is related to its vision and education philosophy. At the outset, PUMC was clear that its goal was to produce the *crème de la crème* in medicine, which determined every aspect of how it was run. For instance, it had a three-year pre-medical program designed to allow the students to build a solid and broad foundation in natural sciences, humanities and language skills; it placed more emphasis on the quality of mind than the quantity of knowledge, encouraging critical thinking and disciplined habits of reasoning; it instigated a tutorial system in which students had regular personal contact with professors and senior faculties, which is critical for the transmission of not only knowledge but also culture and values.

Woo: This kind of educational philosophy is also one of the reasons why some liberal-arts colleges in the USA are highly successful. They really focus on cultivating students' creative spirit, encourage them to think critically and independently, and teach them how to work with and learn from their fellow students. Such training must start with undergraduate education.

Chen: As Drew Gilpin Faust, president of Harvard University, stated in her 2007 inauguration speech: "The essence of a university is that it is uniquely accountable to the past and to the future—not

simply or even primarily to the present. A university is not about results in the next quarter; it is not even about who a student has become by graduation. It is about learning that molds a lifetime, learning that transmits the heritage of millennia, learning that shapes the future. A university looks both backwards and forwards in ways that must—that even ought to—conflict with a public's immediate concerns or demands. Universities make commitments to the timeless, and these investments have yields we cannot predict and often cannot measure. Universities are stewards of living tradition...' I think we should evaluate the situation of our higher education and reform from this vantage point.

Gao: Indeed. The most important thing in higher education is to produce wholesome people with independent judgment and critical thinking, who have a sound moral sense, citizen consciousness and the ability to appreciate different cultures. Hu Shi [a famous Chinese scholar and former president of Peking University during 1945–1948] said that education is to equip you with a pair of glasses with light, allowing you to see things you couldn't see before or other people cannot see.

Shi: Unfortunately, there is a utilitarian mentality towards higher education in China, which focuses on knowledge and skills with direct applied values. I think this is highly influenced by an ancient saying in China *xue yi zhi yong* (the purpose of learning is to be able to apply the knowledge). This *yong* (usefulness or application) normally refers to the usefulness in the narrow sense. For instance, many Chinese enterprises, including some big companies, are very unhappy with graduates from Tsinghua and Peking University because they can't latch into their assigned jobs right away without further training.

Woo: I don't think these two functions of education contradict each other. Cultivating students' critical thinking ability and creative spirit on one hand and teaching them knowledge and skills for direct application on the other are not contradictory. The key is how to strike a balance.

Gong: I agree. I don't think we should place *xue* (learning) and *yong* (useful-

ness) in opposing poles. There is no inherent contradiction between building a solid foundation and providing promising job prospects. I try to make parents see the kind of challenges their children will face all their lives—not just immediately after graduation. The world is changing rapidly. A broad and solid foundation and, more importantly, the ability to learn will determine how well the students can keep up with the rapid changes and make sound judgment and wise choices. It's a matter of whether this *yong* (usefulness) is for short-term or lifelong benefits. The ultimate goal of higher education is not about *xue hui* (learning specific knowledge) but *hui xue* (learning how to learn).

EARLY SPECIALIZATION IN CHINESE UNIVERSITIES

Chen: The Ministry of Education has tried to replicate the success of PUMC by allowing medical schools offer Doctorate of Medicine after eight-year courses. But some of them resemble PUMC only in forms rather than substance, and have little idea of what makes a world-class medical school. For instance, one of the most prestigious medical schools only has one-year pre-medical program, pays little attention to humanities education and requires students to take three years of highly specialized training in the last stage of their undergraduate education. The main motivation is that universities think early specialization would give the students more competitive edge in the job market. But such narrow training would not equip students with the necessary qualities or perspectives to be competent doctors, let alone competing in the world stage.

Shi: Some universities, especially specialized and professional colleges, are designed to maximize students' chances of employment after graduation. But this shouldn't be the case for elite universities.

Poo: This is a very important issue. Students are specialized very early on in China—almost from the moment they step into universities—and higher education is very narrow and focused. The Ministry of Education places a lot of re-

striction on students' choice of specialty and courses they must take. Universities shouldn't be reduced to professional education, but should prepare students for the rest of their lives, give them a broad perspective and the ability to take on any profession they choose. There should be a lot more freedom for students to discover themselves and their passion in universities.

Chen: Indeed. Two of my PUMC schoolmates were assigned to work in an aerospace institute immediately after graduation. Although they knew nothing about space medicine and computer science at the beginning, they both became highly accomplished later and were elected as fellows of the International Academy of Astronautics. This is because they were trained well at PUMC—which focused on quality, ability and potential rather than specific skills—and can be successful regardless of which field they get into.

Gong: This problem of early specialization has a deep-rooted history. In an attempt to boost industrialization, China copied the education system in the former Soviet Union in the early 1950s by splitting comprehensive universities into colleges specialized in areas such as mechanics, architecture, aviation, railway and ship building. This has a long-term impact on the philosophy of higher education in China even though the process was reversed 20 years ago. This is the biggest obstacle of higher education in China.

“Academic freedom, especially university autonomy, is the most pressing issue [in education reform].

—Ke Gong

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Chen: The situation needs to be changed urgently. Otherwise, we will get into a higher-education cul-de-sac, not just in medicine. The question is: What kind of people China really need? Yes, we need people with special skills. But it's far from enough. What we really need are leaders with vision, imagination and courage

in every single field—they are China's future.

Gao: I totally agree. The extent of specialization is overwhelming at every level—from the Ministry of Education to lecturers to students. If we don't change the situation, we won't be able to significantly boost our innovative capability, which increasingly demand a broad perspective. Many emerging research fields also tend to be multidisciplinary.

Shi: Many elite, research-oriented Chinese universities, under pressure from the society, parents and the government, have embarked on an overly pragmatic path by placing too much emphasis on employment and direct application. This problem may not be unique to mainland China, but is particularly acute here.

OBSTACLES AND CHALLENGES OF EDUCATION REFORM

Poo: The Ministry of Education talks a lot about education reform. We've touched upon several issues that need to be changed urgently—such as early specialization and an overemphasis on employment rates. What's happening in universities?

Gao: In the past few years, more and more people have become increasingly aware of the importance of building solid foundation, disciplinary crossover and students' own interest. At Peking University, we have tried to realize the ideal of higher education by combining specialization with broad liberal education. In 2013–2014, we developed over two dozens of massive open online courses (MOOCs)—in order to take advantage of blended learning for improvement of teaching and learning on campus. Meanwhile, the MOOCs will benefit the whole society.

Shi: One challenge is about the quality of faculty, which ultimately determines the quality of universities. Higher education in China has undergone a period of 'Great Leap Forward' in the past two decades, during which the total undergraduate student enrollment has increased from about 5 million in 1990s

to more than 20 million now. This has placed a great demand for university faculty. But where could we suddenly get so much more quality lecturers? Have we maintained the quality of education during this rapid expansion? I think we all know that we can't get so many quality lecturers out of nowhere and, consequently, the quality of education has been seriously compromised.

Woo: It takes many years, or perhaps even generations, to train quality university lecturers. But China has an urgent need for more university graduates now. So what's your solution?

Shi: I don't have a good answer. But we have a saying in China: *shui dao qu cheng* (a waterway is naturally formed where water flows). And we also have an ancient parable: *ba miao zhu zhang*, in which a farmer tries to help the shoots to grow by pulling them upward. This is what worries me. What I'm trying to say is that everything follows a course of its own, which can't be rushed.

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Gong: Higher education must shift from a focus on quantity to one on quality. The most important aspect of the reform is to identify the kind of quality we strive for and to improve relevant evaluation systems. This is crucial for causing a sea change in China's education quality and innovative capability alike.

Woo: Please note that most of our discussion today has focused on the top universities in China. But there are many types of higher education institutions, with varied goals and objectives. For any institution, the key is to first determine what it aims to achieve—that is, to clearly position itself—and

then decide how best to go about it. Once the institution's positioning is clearly set, its professors—who are, after all, the soul of the institution—should have the freedom to determine its academic plans and insure their implementation.

Gong: Indeed. Academic freedom, including university autonomy, is the most pressing issue in my view. Even though we talk about it all the time, it remains an ideal that is yet to be realized in this country.

Chen: The Ministry of Education is key to changing the situation fundamentally. We've been talking for years about reducing bureaucratic interference in universities—without which there would be very limited scope for innovation. But has it happened? The ministry is simply unwilling or lacks the drive to instigate such changes.

Shi: University autonomy is a very important issue. Having sufficient freedom is key to innovation in both education and science. The Ministry of Education takes too tight a control over how universities should be run. I guess it worries that some universities may not know what to do if they are given too much freedom. This may be true. But it's better to let them learn from their own mistakes than trying to control every university—because academic freedom is a prerequisite of 'letting one hundred flowers bloom' and key to education innovation. Universities should also give more freedom to departments with a proven track record and let them decide how to train their students.

Chen: Higher education in China has come to a crossroad, with equal measures of challenges and opportunities. Whether China could instigate substantial reforms in both education philosophy and institutions, and whether China could strike a balance between elite and general higher education, will determine not only the future and destiny of its higher education but also the nation's long-term strength and prosperity. The time to act is now.

Jane Qiu writes for NSR from Beijing.