

Universities in the Future

Ding Gang

Harbin Institute of Technology, P.R. China

Email: dinggang@hit.edu.cn

Abstract—A new round comprehensive reform has been launched in China. In education, the core of this reform is to promote equal access to education. As information technology is developing rapidly, and information technology is integrating with education deeply, prerequisites to promote educational equity are ready. It is possible to build network universities and the alliance. Network universities as the main form of future universities will provide a key to promote educational equity and increase educational quality. The objective of future universities is to change the system of examination-oriented, adopting the principal of “easy entry, stringent exit”. The article provides reference to launch educational reforms for the government, and reference to make investments for businesses or individuals.⁷

Index Terms—Online education, education equity, network universities

I. FUNDAMENTAL CONTRADICTION OF CHINA'S EDUCATION

On the morning of November 10th, 2015, a student in Class 12, Grade 9 of No. 13 Senior School in the city of Nanyang, China suddenly collapsed because of a heart attack during his study period. The boy later died despite all rescue measures, which proved ineffectual. The previous evening, he had studied until midnight, and he woke at 6:20 am the following morning. He had slept for no more than 6 hours. This student usually did homework until midnight [1]. There are still many such students. How can we ease their burden? What can we do to transform exam-oriented education into quality-oriented education? What types of colleges should we provide for children in the future? These problems should receive more attention and consideration by all types of educators and all of society.

The current fundamental contradiction in China's educational system is the lack of high-quality, balanced educational resources despite increased demand. These deficiencies trigger various social problems, such as exam-oriented education, and a lack of innovation and of students' sense of happiness. Education has been denounced as one of the new Three Big Mountains. In addition, these social problems hamper smooth implementation of national strategies and national long-term stability.

II. FUNDAMENTAL CONTRADICTIONS THAT TRADITIONAL REFORM CANNOT OVERCOME

Current reform measures cannot overcome the fundamental contradictions in China higher education [2]. More than 9.42 million students participated in the National Entrance Examination for Colleges and Universities in 2015. Theoretically, most senior high school students dream of entering the best university in China. However, enrollment at Tsinghua University in 2015 was 3,372, or 0.358% of applicants. The enrollment at Peking University in 2015 was 3,665, or 0.389% of applicants. These numbers indicate that the universities selected one student per million. Students from the Beijing area accounted for approximately 30% of the student population, indicating that students from other provinces were less likely to be accepted by these two elite universities. In 2015, approximately 680,000 students registered for the National Entrance Examination for Colleges and Universities in Beijing. The percentage of students from the Beijing area enrolled at Tsinghua University was 15%. The percentage of students enrolled at Peking University from the Beijing area was 16%. The fraction of students admitted from provinces other than Beijing by Tsinghua University was 0.25%. For Peking University, the fraction was 0.27% [3], [4]. These figures indicate the great challenge that remains before educational equity can be achieved.

The educational resources at Tsinghua University and Peking University are limited, thus rendering it difficult to accommodate more students. A forced increase in enrollment would probably lead to a decline in the quality of education. Neither the two universities nor the Chinese government desires that result.

From a traditional perspective, we want to establish a system of higher education closely linked to educational resources such as courses, environment, hardware, time and teachers. With limited time and space, faculty resources cannot be fully utilized, and it is difficult for superior educational resources to benefit additional students. Experience indicates that this fundamental contradiction cannot be overcome by previous or current reforms.

III. FEASIBLE METHODS OF OVERCOMING FUNDAMENTAL CONTRADICTIONS

From the perspective of promoting circulation and sharing of resources, a new path may help to eliminate

the fundamental contradictions in China's educational development. The most desirable approach would be to consider comprehensive integration of the Internet and information technology into education. Through the Internet, high-quality educational resources can quickly be disseminated. High-quality educational resources should be expanded as much as possible and should be more evenly distributed geographically. A high-quality education would then no longer be beyond the reach of ordinary people.

A feasible means to realize such an approach is to establish a university network. The university network would strictly adhere to the following principles: 1. The entrance requirements would be completely eliminated, truly realizing the concept of "easy entry, stringent exit". 2. It would guarantee educational quality to ensure that the various educational demands can be met according to national strategies. The following design work is necessary:

A. Establishing and Sharing Resources

Network universities must assemble the best teaching resources from all over China and abroad. We must merge the strongest disciplines and majors of China's best universities, thereby building an online university network in the form of an alliance. The universities in this alliance could also incorporate leading businesses and research institutes. Multiple network university alliances would integrate the characteristics, advantages, history, regions, levels and objectives of all alliance members. A university, enterprise or a research institute would be able to join multiple university networks.

University network members would primarily be responsible for identification of educational objectives, construction of the educational system, and development and improvement of curricular resources. In addition, the university network would provide examination centers, practical learning centers, and laboratories to guarantee the financial support, management and service staff for the university's normal operation.

High-quality educational and instructional resources would primarily depend on the Internet and smart mobile terminals for demonstration and circulation.

B. Operation and Services of Teaching

Students would be admitted to network universities without an examination. Students would be able to choose whether to study for a degree.

Students who choose to obtain a degree would have to earn all of the course credits that their disciplines require for graduation within 8 to 10 years of enrollment (or without time limitation). A student would thus obtain a graduate certificate and diploma certificate granted by the local government. We could also incorporate elements of the German educational system, in which business and industry participate in the construction and development of higher education to strengthen students' practical abilities and guide students in terms of employment and future development. Theoretical courses would primarily be offered online, whereas practical

courses would be taught by combining online virtual simulation with offline manual practice.

C. Personnel Evaluation and Assessment

The universities should develop at least one examination per theoretical course per semester. Students would select an examination time according to their own schedules. Learners would also select the most convenient location to take the examination according to the locations of the test centers offered by university network members. Such flexibility would save students time and money.

The examinations for practical courses would use the examination methods of theoretical courses as a reference. However, in addition to theoretical knowledge, hands-on skills must also be tested. Students would be able to make an appointment with the relevant practical learning center established by university network alliance members. In this manner, students could access the practical courses and examinations at their convenience.

Whether courses are theoretical or practical, the assessment criteria should reflect those of top universities in China and worldwide. High assessment standards must be maintained to achieve the target of "easy entry, stringent exit."

Network university members would organize an examination committee to oversee testing to guarantee that students are tested in multiple dimensions. The examination committee would be legally responsible for maintaining the secrecy of the test questions. The examination committee would also be responsible for assembling appropriate instructors to review test papers and register test results, which would ensure the double-checking of test results.

D. The remodeling and Development of Individual Universities

What would be performed with brick-and-mortar universities during the development of network universities? Parts of ineffectual universities would be eliminated during this process and become the examination and practical learning centers of the university network. The brick-and-mortar universities that could compete would become considerably stronger, and the levels and objectives of their offerings would be enhanced and clarified. For example, such institutions could develop into research-oriented universities that focus on the cultivation of specific academic talents and basic scientific research. These institutions could also become application-oriented universities that focus on the cultivation of technical talents and solutions to engineering problems, or they could become career-oriented universities that focus on skills training.

Although all three types of brick-and-mortar colleges can offer traditional education, the colleges must institute significant reforms when recruiting students. Scores on college entrance examinations will no longer be the only admission criteria. Input, attitudes and output during the basic education process will be considered. However, creating network universities will require great effort; thus, the enrollment of these stand-alone universities will

be smaller. A small scale and superior educational quality will be the hallmarks of brick-and-mortar universities. The assessment criteria for these stand-alone universities will be stricter during the talent-cultivation process. Students who do not put sufficient effort into studying and cannot show satisfactory results would be dismissed from individual universities. Students who are dismissed from individual universities could enter network universities to continue their educations. The credits accumulated in the stand-alone university would be accepted by the network universities. Students with an excess of energy and time could enroll in network universities and stand-alone universities simultaneously.

E. Establishment and Implementation of Regulations

To maintain favorable operation and sustainable achievement, network universities must design and implement a series of rigorous regulations from the perspective of systems engineering, such as the following:

1) For students seeking a degree, the regulations must define their eligibility on the basis of virtue, integrity, credits, and so forth. During their enrollment, students must comply with state law and the various regulations of the university network. Students seeking a degree who violate the regulations or cheat on a test would be disqualified from studying in any network or stand-alone university. Their behavior would be recorded in individual integrity files. When a student violates the law, that student would be punished according to the law.

2) Currently, students must pay tuition fees according to the number of course credits taken. Students must also pay an examination fee to take examinations. The current expenses are appraised and decided by the relevant national sections. To popularize higher education and encourage civic learning, we advise that a portion of the fees be subsidized by the state and a portion of the fees be sponsored by businesses and communities. Thus, learners would pay little or no tuition.

3) Development, circulation, sharing and operation of educational resources must be established. Theoretical course resources, most portions of practical course resources and teaching progress should be readily available on the Internet. Data analysis could be performed to examine the students' learning behavior, thus continuously improving the teaching in network universities. For each course, several support groups would be necessary to solve the problems posed by students on the Internet in a timely fashion.

4) Mechanisms to ensure quality education by strengthening the supervision and examination of educational and instructional quality in network universities must be established. Courses that receive numerous complaints may either be suspended to be redesigned or improved with new resources.

5) Students must be the center of the service mechanism. We must not only coordinate the relations among network university members but also establish advisory and service centers for learners. Relying on

examination centers and practical learning centers, we can further strengthen academic support and services for students.

6) Network universities must not only strengthen research on educational philosophy, the development of educational and teaching resources, and the service for teaching operations but also enhance security to guarantee the advancement and reliability of the Internet facilities and information technology on which network universities will rely.

7) Teachers must constantly upgrade their teaching. In both physical and network universities, teachers must work hard to achieve teaching certification. Teachers can be certified only by experiencing keen competition. These teachers will be the directors of relevant courses, responsible for course organization and development. Teachers who fail in the competition will be assigned to be a teaching assistant, direct scientific research, or serve as a full-time administrator. A course director will not enjoy tenure and will face challenges and competition many times during his or her career.

8) A system of international communication and competition must be established to strengthen the communicative cooperation and competition with various countries, particularly countries with strong educational programs around the world. We must ensure our educational sovereignty and send China's education and culture out to the world.

9) We must focus strongly on social propaganda and fundamental educational reform to ensure that all citizens are familiar with the new policies and measures. Citizens must recognize and accept network universities. In addition, business enterprises, social institutions, and even individuals must provide intelligent and conditional support for practical teaching, entrepreneurship and innovative education, and private enterprises must be encouraged and guided to invest private capital in the construction of university networks.

10) To create a new pattern of education in China, we must focus on the role that high education reforms plays in elementary educational reforms.

IV. OVERCOMING THE FUNDAMENTAL CONTRADICTIONS

The above ideas of reform is one of the feasible ways to overcome the fundamental contradiction of China's education. Network universities as the main form of future universities are able to achieve the following goals:

A. Meeting People'S Demand for High-quality Education

We should promote fundamental educational reform so that more people can benefit from low-cost, high-quality education. Education must no longer be one of the "Three Big Mountains." Education improves people's well-being, enhances citizens' overall quality of life and ensures the lasting political stability of our country.

B. Meeting the National Demand for Personnel

Fundamental educational reform can eliminate the disadvantages of the current exam-oriented system and the shortage of innovation in different stages and various types of education in China. In the future, education will focus primarily on improving learners' abilities, quality, innovation and entrepreneurship. Fundamental reforms will enhance learners' autonomy and creativity to meet the "mass entrepreneurship and innovation" and other strategic national needs of top-notch innovative talents.

C. Meeting the Requirement for Defending the Sovereignty of National Education

Worldwide education powers have begun research on, reform of and implementation of online credit identification and degree-granting. For example, the Georgia Institute of Technology announced in May 2013 that students could earn diploma certification by participating in massive open online courses (MOOCs) provided by the computer science (CS) master's program of the college if the students pass the examinations and pay tuition of \$6,600 [5], [6]. In April 2015, Arizona State University (ASU) and edX (edX was the large-scale opening of an online course platform established by the Massachusetts Institute of Technology – MIT – and Harvard in April 2014) cooperatively established the "Global Freshman Academy." The academy stipulates that credits acquired through MOOCs completed before entering universities or colleges can be certified. Tuition for MOOC certification is \$45[7]. MIT is also conducting education and teaching reforms based on awarding a degree through MOOCs. Educational reforms abroad have influenced China, first by accelerating the flow of excellent Chinese students abroad, and second, by foreign universities importing their values to China more easily via online courses, which challenge China's educational sovereignty. If we want China's educational sovereignty to continue in this new landscape, we must fundamentally reform Chinese education.

D. Promoting the Long-term Development of the Nation and Society

Education must serve nation modernization, which must rely on education. Education has been the basis of a century of development of vital and lasting importance and the foundation of national revitalization and social progress. The realization of the "Two-Century Goals," rejuvenation and the great Chinese dream must rely on talent and education. From the perspectives of current global development and history, the education model is not inviolable. Only those reformers who dare to make fundamental changes to the education model and achieve success can reach greatness.

"Working hard to provide education that can satisfy people" is an essential part of the "Chinese Dream." We

encourage the government to endorse fundamental education reforms and conduct pilot programs as soon as possible; because practice is the sole criterion for testing truth.

ACKNOWLEDGMENT

This paper is supported by Key research projects of higher education reform in Heilongjiang (Research and practice of credit transfer mechanism oriented to the dissemination and sharing of high-quality educational resources, item No.: SJGZ20170068), General research projects on teaching reform of higher education in Heilongjiang (Problem analysis and countermeasure research on MOOC selection, item No.: SJGY20170663), Key projects of the online education research center of China's Ministry of Education (Research on the theory and practice of educational resource construction and gain propagation based on MOOC).

REFERENCES

- [1] Xinhuanet. (2015). A 15-year student died in class after staying up late. [Online]. Available: http://news.xinhuanet.com/yuqing/2015-11/16/c_128434092.htm
- [2] D. R. Bie and B. G. Ye, "Analysis of undergraduate enrollment quality of 'project 985' universities based on 2011-2012 statistics," *Tsinghua Journal of Education*, vol. 36, no. 3, pp. 27-38, 2015.
- [3] Peking University. (2015). The enrollment plan of college entrance examination for Peking University. [Online]. Available: <http://www.gotopku.cn/programa/enrolstu/6/2015/1/0.html>
- [4] L. Xu and H. D. Cheng, "On problems of regional education under background of coordinated development of Beijing-Tianjin-Hebei: based on considerations and suggestions about college entrance exam enrollment," *Journal of Tianjin Radio & TV University*, vol. 19, no. 3, pp. 12-18, 2015.
- [5] Z. Gail, "Exploring a new mode of Higher Education: Georgia Tech Masters of computer science MOOC as an example," *Journal of Beijing Open University*, no. 6, pp. 19-23, 2014.
- [6] S. Wallace, "Georgia Tech Masters of computer science MOOC as a model for public administration online programs," in *Proc. International Conference on Public Administration (10th)*, 2014, pp. 468-471.
- [7] Massachusetts Institute of Technology. (2012). An organization established by MIT and Harvard University that will develop an open-source technology platform to deliver online courses. [Online]. Available: <http://news.mit.edu/2012/edx-faq-050212>.



Ding Gang, Ph.D., Associate Professor and supervisor of postgraduates in School of Mechatronics Engineering, Harbin Institute of Technology (HIT). He was born in August 15 1976 in Qingdao city, Shangdong Province, China. Now he serves in HIT as the deputy director of Academic Affairs. He serves as the committee member of Mechanical Design, Manufacture and its Automation Discipline in the 3rd China Education Association of Machinery Industry. He also works as the number of editorial board of the *International Journal of Aerospace Engineering*.