

Another Look At Engineering Education In China - Fuzhou University Revisited -

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Abstract

In 1983 I took a sabbatical leave from the United States Naval Academy and accepted an invitation to go to China to teach for two semesters at Fuzhou University in the People's Republic of China. Fuzhou University, located in Fuzhou city, capital of Fujian province, is representative of engineering colleges in China. When I arrived in Fuzhou in the autumn of 1983, college admission rate in China was a mere 20%. There were 5,000 students and 1,500 faculty members in Fuzhou University. Tuition and student housing were free. Classes ran from Monday to Saturday. There were 43 weeks in an academic year. An average instructor taught four to six hours per week. When I revisited Fuzhou University in the autumn of 1997, many changes have occurred and many improvements have been made. College admission rate in China has risen to 50%. The student enrollment in Fuzhou University has doubled to 10,000. The number of full time faculty has also doubled to 3,000. Many new programs have been added.

Background

China is a large country with a long history and civilization. It is still a developing country, being backward economically and technologically. Hoping to catch up with western countries, China launched an ambitious program of "four modernizations": modernization of agriculture, industry, national defense, and science and technology. Of the four modernizations, the modernization of science and technology is the most important link in the readjustment of the national economy. The success and failure of this endeavor depends on the quality of engineering education at the Chinese universities. After the chaos of the Cultural Revolution, and the collapse of the Gang of Four in 1976, the Chinese government completely reorganized higher education. Engineering education is now given special emphasis.

In 1949, when the Communists took over China, there were 205 higher educational institutions in China, with a total enrollment of 116,500 students. By the end of 1983, the number of universities and colleges reached 805 with a total enrollment of 1,207,000 of which 35 percent, or 423,000, were undergraduate engineering students. Tuition, lodging, and medical care were free. Students paid for their food and textbooks. The cost of food was about \$15 a month at Fuzhou University in 1983.

When I revisited Fuzhou University in 1997, the student enrollment has doubled, from 5,000 full-time students in 1983 to 10,000 in 1997. The number of full-time faculty has also doubled, from 1,500 in 1983 to 3,000 in 1997. An average instructor teaches six to eight hours a week. The monthly salary of a professor is about \$250. The cost of food for a student has increased

from \$15 a month to \$40 a month. Tuition and lodging were no longer free. The tuition is now \$250 per year per student. The cost of student housing is about \$25 per year per student.

Engineering College Admission

Admission to engineering college in China is highly selective. Nationwide college entrance examinations are given once a year. The test score determines whether or not one goes to a prestigious college or if one goes to college at all. During the period of the Cultural Revolution, from 1966-1976, the Chinese system of national joint entrance examination was abolished and replaced by political “recommendations”. Under that system, students were selected from among “outstanding” workers and peasants by the political unit and “recommended” to the university, which has no authority to reject any such recommendations. The academic qualifications of these selectees were irrelevant because college professors as well as all other intellectuals were down-graded and persecuted. University was no longer a place to pursue knowledge. It was a place to reward factory workers and peasants who were loyal supporters of the party. They entered the university not to study or to learn but to “teach”, to “reform”, and to “run” the university. In effect, there was no college education to speak of during those ten turbulent years. It was a tragic loss for China. Thousands of qualified young men and women were deprived of the opportunity for a college education.

The national joint entrance examination was reinstated in 1977. The examination now takes place once a year. It is given in July, shortly after high school graduation, and it lasts three days. During these three days, applicants to engineering school are examined in seven subjects. These subjects are English, Chinese, mathematics (geometry, trigonometry, algebra, and analytic geometry), physics, chemistry, politics, and biology. The highest possible score is 650 points with biology counting 50 points and all other subjects counting 100 points each. 600 points or higher is usually needed to get admitted to one of the prestigious universities.

There are many more applicants for admission to engineering school than there are openings. Percentage of admission varies from year to year. When the entrance examination was first reinstated in 1977, less than one percent of the applicants were admitted. In 1979, 4,700,000 took the entrance examination and 280,000 (about 6 percent) were admitted, of which 162,000 chose to study engineering and science. During the last decade, many engineering schools have expanded their capacity and are capable of accepting more students than ever before. In 1997, about half of applicants to engineering schools received admission.

Engineering Faculty

Faculty members are divided into four ranks: professors, associate professors, lecturers, and teaching assistants. These are comparable to professors, associate professors, assistant professors, and instructors in the United States. College teachers are recruited mostly from graduates with little or no experience in post-graduate education. They start as teaching assistants and move up the ladder. Most of the college professors in China today started out this way. In recent years, post-graduate education has become more popular. Now it is possible to hire a limited number of teaching assistants with master's degree.

With a four to one student teacher ratio, a typical college teacher teaches six to eight hours per week. They have plenty of time, supposedly, to read journals and to carry on research and some of them do. Sometimes there is bias against the faculty by the less educated party leaders. In China, a university, like all other work units of the government, takes care of employees' housing, transportation, food supply, medical care, child care, etc. The people in charge of these are party leaders who may have very limited education, and achieved their position in years when promotion came more likely as a result of "redness" than of "expertness". Some of these people do not care to make life easy for intellectuals such as college professors.

Emphasis On Practical Training

Engineering education in China puts a heavy emphasis on practical training. Many engineering schools in China have co-op programs with local industry. At Fuzhou University, students are required to have industrial experience. Some students spend one summer in a factory working on project related to his specialty under the joint supervision of a faculty member and a plant manager. This provides valuable experience for students. Moreover, it serves to strengthen ties between industry and engineering schools.

Since 1981, with the approval of Fujian Provincial Government, Fuzhou University has taken the initiative in running the school jointly with the Ministry of Electrical Power and cooperatively with the Ministry of Coal-Mining on a long-term basis, which enables the school to become the only provincial university that enrolls students from all parts of the country.

Changes at Fuzhou University

Founded in 1958, Fuzhou University is situated in the western suburbs of Fuzhou, near the picturesque Minjiang River, adjoining the famous ancient Xichan Buddhist Temple. The campus, standing in quiet and beautiful surroundings, is a spectacular example of southern scenery. The weather is agreeably mild all the year around. The school occupies an area of about 125 acres, with a developed area of some 3,000,000 square feet. The planned campus area will reach 180 acres, with buildings covering 4,500,000 square feet.

Fuzhou University has now developed into a comprehensive university of engineering, science, liberal arts, and finance and economics, concentrating mostly on engineering subjects. It is the important base for cultivating high level specialized personnel for the modernization of Fujian Province. The University offers master's degrees in 16 specialities, doctoral programs in 2 branches of learning and trains students studying for Ph.D degrees in 5 specialities in cooperation with other universities. Holding fast to the policy of combining teaching and learning with scientific research, the University has taken the initiative in scientific research. Now, it has 20 research institutes, 9 research sections and 2 multi-disciplinary research centers. Over the past 19 years, the University has made great achievements in more than 1,170 research projects, of which 282 won various prizes.

The University now has 70 laboratories, 7 school-run factories and more than 22,000 pieces of instruments and equipment. All these facilities have created a favorable environment at the

University to promote its mission of teaching and research and to provide students the opportunity to acquire practical skills, and scientific knowledge.

The great progress made at Fuzhou University during the last decade is by no means unique. Similar changes have taken place in many other engineering schools all over China.

Summary

Chinese engineering education is still flourishing and expanding. Engineering colleges are attracting the best minds. Greater number of engineering colleges has begun to combine teaching and learning with scientific research. They are more capable than ever before to provide the engineering students the opportunity to acquire not only the scientific theory but also practical skills to meet the needs and challenge of an increasingly more vibrant society.

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