

The Potential for Technology Education in People's Republic of China

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With the rapid development of society and economics in the People's Republic of China, the importance of technology education has been gradually recognized by both the government and people of China. China has benefited in many areas, including science and technology, since China opened her nation's gates to the industrialized western countries. China and the United States signed a memorandum of agreement to launch three satellites (Chen, 1990). The U. S. government has recently issued a license for shipment of these three satellites to China. The successful launching of AsiaSat-1, a satellite manufactured by the Hughes Aircraft Company for the Asia Satellite Telecommunication Corporation, marked the beginning of China's entry into the international satellite telecommunication market. Technologies in other areas, such as nuclear energy, superconductors, high-energy accelerators, advanced new computers, and robots to serve mankind, have also represented significant breakthroughs in Chinese science and technology.

With the increased pace of scientific and technological development, technology education in the mainland of China has new potential. For example, the Odyssey of the Mind program (OM, called Olympics of the Mind in China), created by Dr. C. Samuel Micklus of New Jersey of the United States in 1978, has been adopted by the Chinese educational system. The first OM competition at the secondary school level in China was held in Beijing in March, 1990 (Kong, 1990). It was organized by the Chinese magazine, "Secondary School Students."

Almost all schools are public schools in the socialist China. According to 1987 statistics, there were 807,400 elementary schools with 128,358,000 pupils in the mainland of China. Although 69.04% of the elementary school graduates were admitted to junior high school, only 31.14 of junior high grad-

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uates were admitted to high school. In the same year, the percentage of high school graduates granted admission to colleges and universities was 26.60 (SECOPRC, 1989).

These recent events raise a host of questions: What is the history, current status, and future of technology education in China? Is it possible to establish technology education systems in China? How can younger generations and Chinese society benefit from technology education? What are the implications of technology education for China?

Brief History and Status of Technology Education in China

China has a long history of technological inventions. Some greatest inventions in the world originated in the ancient China. Four of these inventions are paper manufacturing, gun powder, the compass, and printing technology. China is one of the oldest countries with an education system. Vocational education first appeared in China in isolated schools around 1870. A national system of vocational education was not set up until the Qing Government promulgated the "Imperial Ordinance on Schools" in 1902 (UNESACO, 1985). From then until 1949, when the People's Republic of China was established, the foundation of technical and vocational education was very weak. Ever since 1949, technical and vocational education in China has gone through a continuous process of reforms, readjustment and improvement. "Technology are the productive forces" is a well-known slogan in China that has been frequently recognized. The Central Committee of the Communist Party of China declared: "A vital factor for the success of our cause lies in the availability of skilled people, which requires the vigorous development of education as economic growth allows." (ROCES, 1985, p.1)

Technology education, which involves a study of communication, transportation, construction and manufacturing systems as currently implemented in the United States and some other advanced countries, has not yet been established in mainland of China. Technology education is different from vocational and technical education although they have certain relationships. Technology education deals with applying technology to understand, use and evaluate technology while vocational and technical education deals with developing employment skills. A technology teacher education major does not exist at the university level within China. Technology education in China exists solely in the forms of science and engineering education in the universities. In some elementary and secondary schools, technology education is currently included in vocational and technical education or integrated with general science education. The National Education Commission (SECOPRC, 1989) cited the following examples of the current status of technology education in Chinese schools:

1. The fourth and fifth grades in Beijing Yumin elementary school have learned computers.
2. The Qinghua middle school in Guiyang City of Guizhou Province has had a computer course since 1983.

3. An after-class group in physics at the Quinghua Middle school in Guiyang City experimentally on and demonstrated “heat transmission.” The group recently won the national youngsters' science and technology invention award.
4. Many schools have developed some courses relative to technology education.

Chinese elementary school students are required to have two hours of science, technical and entertainment (i.e., Art, Music, and so on) instruction per week in the Five-year Full Time Elementary School of China. This amount is minimal. The official view is that “in matters of educational structure, our elementary education is inadequate, there are not enough good-quality schools and there is a serious shortage of qualified teachers and basic facilities. Besides, vocational and technical education, which is almost urgently needed for economic development, has not expanded as expected, while there is a lop-sided arrangement of various disciplines and levels of higher education.” (ROCES, 1985, p.4)

Education in China is divorced, to varying degrees, from the needs of economic and social growth and lags behind the scientific and cultural development of the present-day world. It is necessary for the Chinese educational system to start with systemic reforms of the educational structure. Through a series of planned reforms, elementary education will be substantially strengthened, vocational and technical education will be greatly expanded, colleges and universities will be able to exploit their potential and exercise greater initiative, and education of all kinds and at all levels will actively address the multiple needs of economic and social development (ROCES, 1985).

Both the Communist Party and the government of China have recognized that in developing vocational and technical education, China should focus on secondary vocational and technical education and emphasize the central role of specialized secondary schools. At the same time, China should make an effort to develop advanced vocational and technical institutions. These institutions will enroll students who graduated from secondary vocational or technical schools with the required specialized training as well as employed workers in technical fields who have passed the entrance examinations. A system of vocational and technical education with a rational structure, ranging from elementary to advanced levels, embracing all trades and other areas in China societal structure, and linked regular education will be gradually established in China (ROCES,1985).

Establishment of a technology education system in China is just a matter of time. With the further development of science, technology, economics, and associated societal changes, Chinese educational systems will eventually shift from only vocational and technical education to both technology education and vocational and technical education. Technology education will ultimately be considered an integral part of general education.

Rationale to Establish Technology Education in China

Today, technology shifts rapidly. It is evident that what was purchased today will be obsolete tomorrow. "A current estimate is that our advanced technology enables knowledge to double about every five years." (TEAP, 1988, p.1)

China, which has the largest population in the world, is now moving forward in technology at the fastest rate in her history. The motivations for this increased pace are many. One can say that the economic foundation of China was weak before 1949 and is much stronger now. Education, including technology education, is the foundation of a nation's development. "Every nation now perceives its national security and economic health to be vitally dependent on its strength in technology. This is creating international contests for technological superiority, a world technology Olympics." (Ramo, 1988, p.44)

People in China often say that technologies are productive forces. The prosperity and development of a nation are based upon its technology. A nation will be "beaten" if its technologies fall behind those of more advanced nations. The importance of technology education can never be overemphasized. Making Chinese youngsters technologically literate is important. It promotes China's national development, prosperity, and safety as well as world peace. If Chinese youngsters fail today, China will fail in the twenty-first century.

Potential Development of Technology Education in China

The development of technology education in China has internal and external motivations. China is a developing socialist country. The socialist modernization of China not only requires senior scientific and technical experts but also urgently requires millions of intermediate and junior engineers, managerial personnel and technicians who have received adequate vocational and technical education as well as rural workers who are well-trained vocationally. Without these educated people, advanced sciences, technologies and sophisticated equipment cannot be translated into productive forces (ROCES, 1985). Furthermore, the need for economic, scientific and technological development and increasingly higher qualifications for employees are motivation to develop technology education in China. Although the Chinese education system has not implemented technology education, vocational and technical education are emphasized. Both the communist party and government of China have the confidence and determination to develop the nation's technology education. It is time for China to stand among the leaders in an increasingly technological world.

Good technology education programs in industrialized nations have a very strong influence and positive impact on technology education in China. For example, how would one build a declined tower with dozens of chopsticks without any adhesives or nails? This tower should support a weight until it is released by a control system assembled on the top of the tower. How would one make a bed on which loads could be supported with kraft paper and two wooden bars? These two activities were from OM activities showed in a series of sixteen television programs named "Olympics of the Mind of Secondary

School Students of China” from the first OM competition for secondary students in China. Beginning March 18, 1990, these sixteen television programs were broadcast throughout China via the National CCTV (i.e. Chinese Central Television Station) owned by the Chinese government. It is easy to image that the OM program has had an impact on technology education in China, and has developed positive attitudes about technology education. Students are very interested in the OM program, the goals of which are to educate, foster, and observe the students' abilities to actively and agilely solve problems. Besides the OM program, Chinese educational systems often hold technology program competitions at the elementary, high school and university educational levels. These include activities such as model airplane competitions, technology camps, computer application competitions, that stimulate students to love and pursue science and technology.

Chinese students studying technology education overseas can also affect the potential development of their motherland's technology education through communication with their universities, communities, or via suggestions to their educational systems and government.

According to the official plan for social and economic development in China, it is important to establish technology education systems. From the viewpoint of the internal and external motivations, it is possible and feasible to build good technology education systems in China.

The Implication of Technology Education in China

Only 5.72 students out of 100 enrolled elementary school students (according to 1987 statistics) were admitted to colleges and universities for higher education in China. Those not admitted will go to industry, the military, business, and other selected areas, most of these individuals will be employed in the agricultural sector with the majority of the Chinese people. With the development of technology education in the future, those students, who are not able to enter colleges and universities, could also be technologically literate. By providing technological literacy, technology education prepares our youngsters to function as knowledgeable citizens in a changing and increasingly technological world. Obviously, technology education plays an essential and highly valuable role in both the education curricula and societal needs.

Although science, technology, industry and agriculture are progressing rapidly in China, many facilities, equipment, and tools in these areas, especially in agriculture, are very old. Some agricultural tools used in some areas of China today were used several centuries ago. If Chinese citizens in the countryside were well educated about contemporary inventions and developments in agriculture, they too would benefit from technology education.

Reform and development of China's agriculture are one of the most important goals in the eighth Five-year Plan (1991-1995), which pushes Chinese technology education forward. Technology education also has a positive impact on industry and other sectors. By helping students apply creative abilities and problem-solving techniques, technology education opens students' minds to ac-

celerate the development of technology in China, increases the rate of improvement of worker productivity (which is the key to a higher living standard), and promotes technologies into productive forces. As a result, the citizens of China will live better than they do now. Technology education can be considered as a way to change and improve living standards in Chinese society. To improve living standards of 1.1 billion people is not only a great contribution to the Chinese nation, but also to the whole world where technological advances are so pervasive and competitive.

Technology education will promote the modernization of science and technology, agriculture, industry, and national defense in China. These four modernizations are the current goals which the communist party, government, and people of China are struggling to realize by the end of this century.

Conclusion

Technology education, as currently implemented in the United States and some other advanced countries, does not exist in China's educational systems. It is obvious that a great potential for technology education exists in China. Technology education in China will improve the technological literacy and capability of Chinese citizens. Technology education will also transform technology into productive forces quickly, improve the living standards of China nation, enhance the nation's defense, and maintain the world's peace.

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