

Technological Literacy Education and Technological and Vocational Education in Taiwan

Lung-Sheng Steven Lee
President/Professor, National United University (NUU);
Professor, Department of Technology Application and Human Resource
Development, National Taiwan Normal University (NTNU)

Introduction

Considered as “utilizing abundant resources and making useful things”, technology is highly valued in Taiwan. For example, power tillers, also called “iron buffalos”, were introduced from the United States and Japan to Taiwan in 1950’s. They solved the problem of insufficient water buffalos and relieved manpower from heavy-loaded work. It increased farm productivity and allowed many farmers’ children to receive more education. Apparently, the inventions, innovations, introductions and applications of the power tiller are technology.

Technology education in Taiwan is categorized into the following two types: (1) technological literacy education (TLE)—the education for all people to become technological literates; and (2) technological specialty education (TSE)—the education for specific people to become technicians and professionals for technology-related jobs. This paper describes TLE, and technological and vocational education (TVE). The former is a realm of general education, while the latter is a part of TSE.

The present education structure in Taiwan supports 22 years of formal study. Completion times are flexible, depending upon the needs of students. Normally, the entire process consists of 2 years of optional preschool education, 9 years of compulsory education (6 years of primary school plus 3 years of junior high school), 3 years of upper-secondary school including senior high school (SHS), vocational high school (VHS) and comprehensive high school (CHS), 4-7 years of college or university, 1-4 years of a master’s degree program, and 2-7 years of a doctoral degree program (MOE, 2008). TLE is mainly offered in Grades K-12 and TVE is mainly offered beyond lower-secondary level. The purpose of this paper is to introduce TLE and TVE in Taiwan.

Technological Literacy Education (TLE)

The goal of technology education in elementary, junior high school and senior high school is to assist students to develop the ability to be aware of, explore, understand, use and manage technology in order to adapt to current and future technological society. The technology education for all students in grades 1-12 is mainly implemented through Living Technology (LT) course or sub-learning-area, prescribed in the national curriculum in Taiwan that all students are required to learn. As shown in Figure 1, LT is embedded in the “Life” learning area in grades 1-2 as well as in the Natural Science and Living Technology (NS<) learning area in grades 3-9, respectively; and a stand-alone course in grades 10-12.

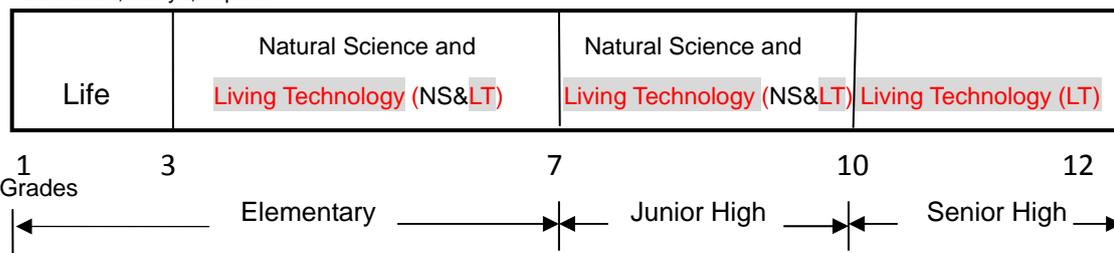


Figure 1. LT is defined as a sub-learning-area or a stand-alone course in national curriculum

Source: Lee, 2009.

In grades 1-9, the learning area of NS< is implemented based on competence indicators. Its technology part focuses on the integrative ability of the following aspects: food, material, mechanical application, electricity and its application, information and information communication, residence, transportation, the exploitation and utilization of energy, originality and fabrication, as well as technological civilization. In senior high school (grades 10-12), LT includes a core/required subject "Technology and Life" (2 semester credits) and an advanced/optional subject (2-4 semester credits) which consist of the following five themes: Communication Technology, Construction Technology, Manufacturing Technology, Transportation Technology, as well as Energy and Power. All students have to take 2-6 semester credits among them.

Teacher Education of teachers at kindergartens, elementary and secondary schools is governed by the regulations of Teacher Education Law. According to the law, those prospective technology teachers who complete required credits in general, specialty and pedagogical areas has to experience a half year of internship, pass the teacher certification and seek a teaching job to become a technology teacher.

At present, a professional association, a periodical, and some promotion activities support technology education of elementary and secondary schools. The Industrial Technology Education Association is located in the Department of Technology Application and Human Resource Development (TA&HRD), National Taiwan Normal University (NTNU). Its goals are to conduct research studies, keep close liaison with all members, and help to advance industrial technology education. It holds an annual convention, coordinates activities to encourage research of Technology Education and cooperation with international academic groups, and give awards to people who have outstanding performance in this field. It is also one of the seven founding members of the International Conference on Technology Education in the Asia-Pacific Region (ICTE). Living Technology Education Journal is also electronically published by TA&HRD to communicate ideas, practices, and messages of living technology education so as to improve quality of technology education. In addition, some promotion activities of technology education have been made. For example, the living technology performance contest is held annually in Taipei city. Students from public and private junior high schools form their own teams while their teachers coach them. Its goals are to arouse students' interests in exploring questions about living technology, to encourage them to brainstorm and work in a team, and to learn how to solve daily problems with knowledge learned in technology education. Teachers can also have a chance to observe, demonstrate, and compete with each other, and exchange their experiences in this interschool activity.

Because the national curriculum of elementary and secondary schools will be revised soon, technology educators in Taiwan have increasing concerns about the future development of TLE. Some emerging issues, such as green technology, are also discussed.

Technological and Vocational Education (TVE)

As shown in Figure 2, TVE in Taiwan spans from applied arts programs in junior high schools (JHS's), vocational high schools (VHS's) and junior colleges of technology (JCT's) to colleges and universities of technology (CT's and UT's). In the 2007-2008 school year, the number of students in both vocational high schools (VHS's) and the occupational programs of comprehensive high schools (CHS's) is larger than the number of students in both senior high schools (SHS's) and the academic programs of CHS's (see Figure 3). Beyond 9 years of compulsory education, TVE is parallel to academic education (AE). In 2008, the number of accredited post-secondary institutions in Taiwan was 164 which included 93 TVE institutions. At the post-secondary level, AE institutions mainly recruit students from SHS's while TVE institutions from VHS's. There are two north-southward national freeways in Taiwan. TVE is often called the second national freeway in Taiwan's education system while academic is the first one.

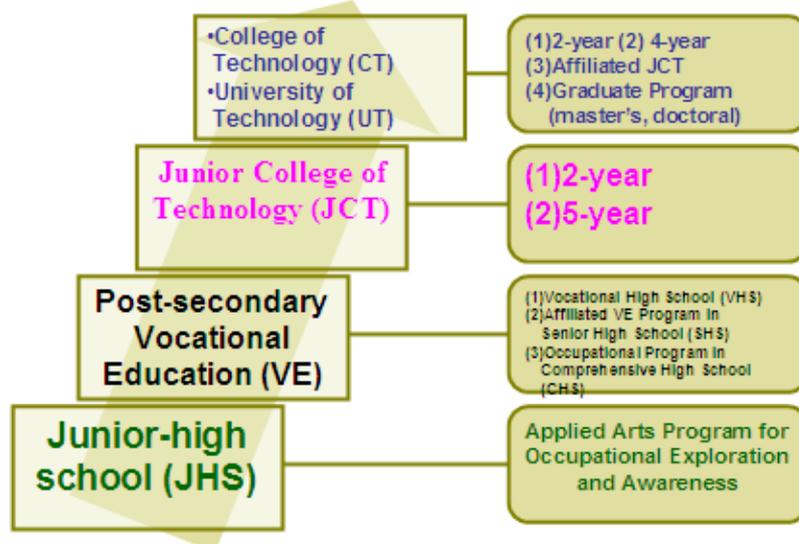


Figure 2. TVE institutions in Taiwan

Source: Chen, 2008.

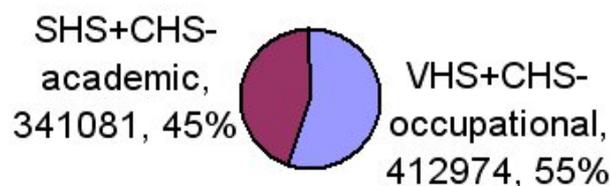


Figure 3. At the upper-secondary level, students in occupational programs are more than students in academic programs

Source: Chen, 2008.

The disciplines of TVE include agriculture, industry, commerce, fishery

and marine technology, medicine and nursing, home economics, hospitality and tourism, and language. TVE has dedicated itself to meet the needs of various kind of workforce demand in national economic growth and technological advancement. In addition, a number of students are enrolled in private TVE institutions. At upper- and post-secondary levels, respectively, more than 60% and 80% of TVE students are in private institutions.

The main features of TVE in Taiwan include:

1. A throughout system

It is offered from lower-secondary to doctoral level.

2. Multiple disciplines

There are a variety of disciplines in TVE system to be selected.

3. Positive commitments from private bodies

Private institutions are the majority in TVE system.

4. Highly value pragmatism

To meet the quality and quantity demand in industries is the top priority.

5. Increasingly promote school-industry partnership

TVE institutions or programs have been required or encouraged to establish partnership with industries to ensure social relevance.

Although having already made significant contributions by supplying a large workforce for Taiwan's economic development, TVE, facing global competition and industrial transformation, was reexamined and some challenges were encountered as shown in Figure 4. In order to resolve the challenges, "Technological and Vocational Education Reform Project - Expertise Training" was launched in 2009. The project aims at improving the practicability of TVE and enhancing training of students in specialized competencies. It is hoped that implementation of this project will produce specialized workers with the competencies to perform, meet job requirements and compete in related fields (MOE, 2009).

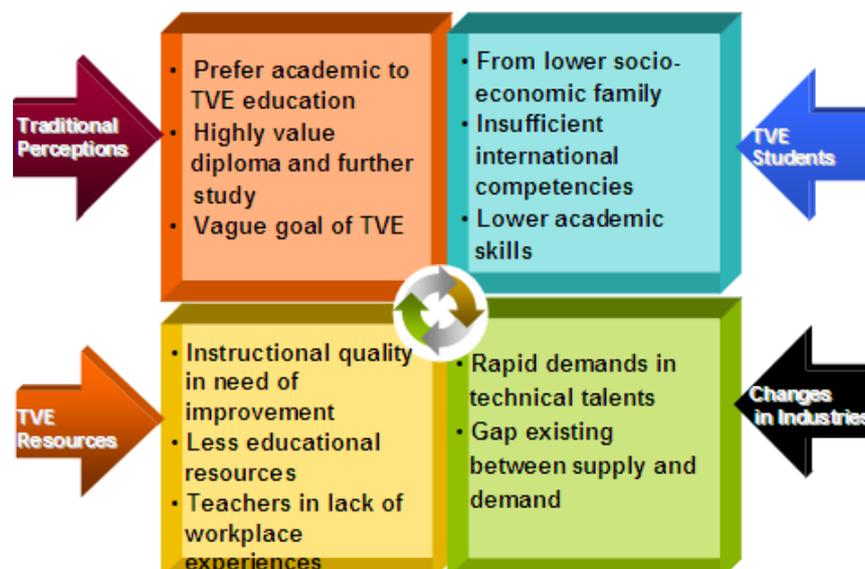


Figure 4. Challenges facing TVE in Taiwan
Source: Chen, 2009.

As shown in Figure 5, the three goals of this project include improving instructional environment, strengthening school-industry link, and preparing

quality specialists. The 10 strategies to attain these goals are shown in Figure 6 and listed as follows:

1. Conduct thorough talent preparation in 5-year JCT's;
 2. Set up a talent selection mechanism based on practicability;
 3. Strengthen teachers' practicum teaching competencies;
 4. Introduce resources from industries to support instruction;
 5. Broaden joint talent preparation models between schools and industries;
 6. Carry out students' off-campus practicum programs;
 7. Improve facilities and equipment in VHS's to increase quality;
 8. Create distinctive fields in post-secondary institutions;
 9. Build evaluation mechanism to fit the needs of post-secondary institutions;
- and
10. Strengthen professional licensure/certification system (Chen, 2009).

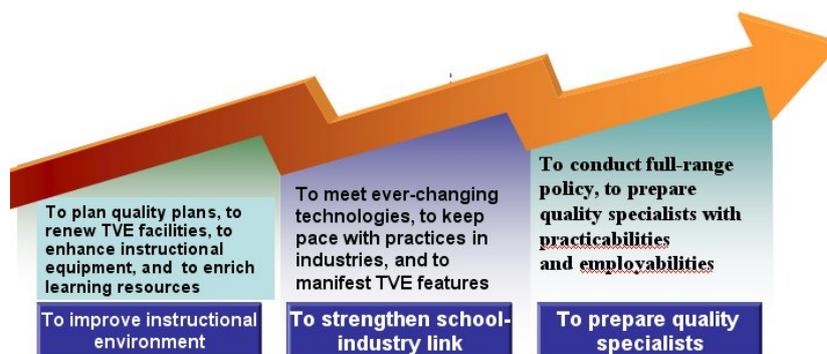


Figure 5. Three goals of "Technological and Vocational Education Reform Project-Expertise Training"
Source: Chen, 2009.

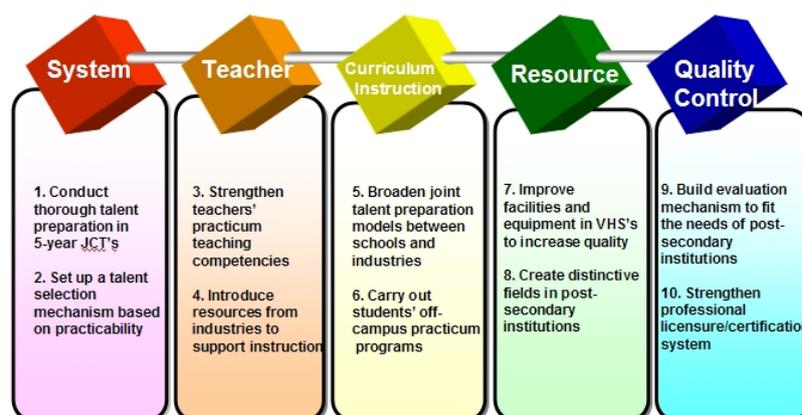


Figure 6. Ten strategies of "Technological and Vocational Education Reform Project-Expertise Training"
Source: Chen, 2009.

Each strategy is designed to maximize practicabilities of TVE students and shape TVE programs, curriculum and instruction to meet the demands of

industries. Implementation measures and expected objectives are also designed to ensure each strategy. Figure 7 indicates the main measures and objectives of Strategy 3.

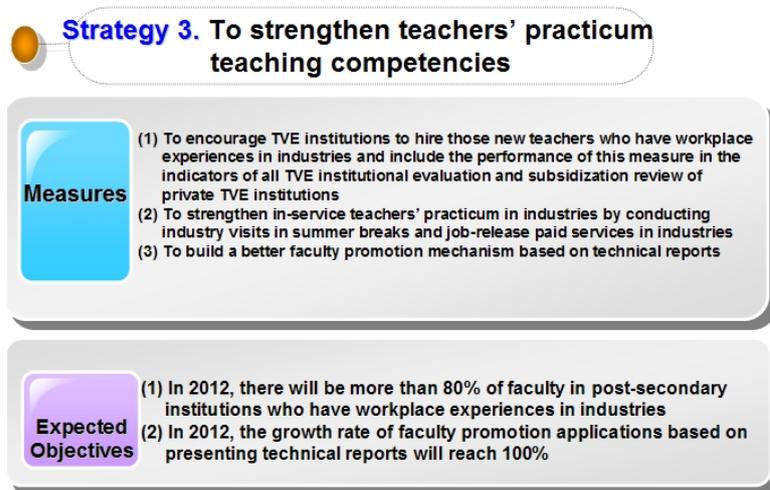


Figure 7. An example of measures and objectives designed to ensure strategies of "Technological and Vocational Education Reform Project-Expertise Training" Source: Chen, 2009.

To sum up, both TLE and TVE in Taiwan are on track. However, the proverbs such as "Slow progress means falling behind" and "Followers can only see the back of the leader" remind TLE and TVE educators in Taiwan to continuously reexamine and redefine their fields. The will to innovate is also an aspect of technology.

References

- Chen, M. Y. (2008, November 18). *The development of technological and vocational education*. Retrieved February 10, 2010, from <http://cfte.stut.edu.tw/activity/Files/a4/001.ppt>.
- Chen, M. Y. (2009, May 14). *Technological and Vocational Education Reform Project - Expertise Training*. Retrieved February 10, 2010, from http://www.edu.tw/files/.../技職教育再造方案_%20培育優質專業人力.ppt.
- Lee, L. S. (2009). *Challenges and opportunities facing technology education in Taiwan*. Paper presented at the International Conference on Technology Education in Asian and Pacific Region (ICTE 2009), Taipei, Taiwan, November 11-12, 2009. (ERIC Document Reproduction Service No. ED 507 762)
- Ministry of Education (MOE). (2008, December 3). *The educational system*. Retrieved August 1, 2009, from <http://english.education.edu.tw/ct.asp?xItem=4133&CtNode=2348&mp=12>.
- Ministry of Education (MOE). (2009, June 4). *Technological and Vocational Education Reform Project - Expertise Training*. Retrieved February 10, 2010, from <http://english.moe.gov.tw/ct.asp?xItem=11137&CtNode=504&mp=1>.