Elementary School Technology Education in Taiwan: An Analysis of Implementing Policies

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The 20th century has been characterized by many unprecedented changes in every aspect of life. Education system has been reacted slowest to our rapid changing society. Traditional instructional methods and facilities made us feel awkward when we are dealing with fast global competition. Technology Education may be an alternative to meet this need.

The purpose of this research was to analyze the implementing policies of elementary school technology education in Taiwan. This research reviewed the related literature to answer the following questions: 1) What is the goals of elementary school technology education? 2) What should every child need at the elementary level relate to technology education? Then, 3) considering of the characteristic of learners and the background factors of the whole educational system in Taiwan.

Literature subjects and topics related to the establishment of this study are also discussed in this paper: 1) The Taiwan educational system; 2) Current status of Technology Education at all levels which include formal and informal education; 3) Technological policies at national level; 4) Basic nationalism literacy and technological literacy. In the finding, this study proposed some available policies and the possible implementing strategies.

Current Status of Technology Education at All Levels

For elementary school grade 1 to 2, there is a course of fine arts/craftwork provided 80 minutes per week. For grade 3 to 6, the course is 120 minutes per week. Except the subject of Music, all textbooks include some of the concepts of technological literacy (Lee, 1994). Ni (1995) pointed out that elementary teachers' technology literacy does not meet the requirement.

For junior high school grade 1 to 3, there is a course of industrial arts provided 2 hours per week. There is possible elective course of Industry provided 4–14 hours per week for grade 2 and 12–17 hours for grade 3.Because of the entrance examination of high school, some of the school shifts the hours for Industrial Arts to other courses required for entrance examination. For the same reason, some of the schools assign other course teachers to teach Industrial Arts.

The course of Industrial will shift to Living Technology and reduce half the time. This will happen on 1989.For senior high school grade 1 to 2, there is a course of industrial arts provided 2 hours per week. At his level, students have to pass entrance examination of University to get further study opportunity. The curriculum revised last year (1994).

At secondary level, it is not easy to promote technology education because of the abnormal teaching status.

There is a science and technology museum under construction. This is the place that will offer technology education in the form of informal education next April.

Basic Nationalism Literacy and Technological Literacy

All people have a need to be in control of their lives and to have at least some influence over the people and events around them. Our society structure depends on citizens who have confidence in their ability to make decisions about their own lives, and to influence decisions that are in the best interest of their communities. Basic nationalism literacy should be learned through our compulsory education.

Hamilton (1993) notes that several elements are essential if people are to have control of their lives:

> First, they must have sufficient knowledge. Without knowledge, they cannot analyze the problems, perceive possible solutions, and/or make viable decisions. Second, they must realize that real choices exist. Knowledge without the possibility of genuine choice leads to little action and much frustration. Third, they must want to act. The desire to act derives, in part, from the belief that their choices will make a relevant and desirable impact. (p. 135)

Our Education should be working toward empowering citizens. Doing things without any knowledge are to act irresponsibly. Considering the ubiquitous technology in our society, technological literacy is essential to empowering the citizen.

Society Change and Criteria for Curriculum Innovation

Premier Lien Chan declared" Building Taiwan into an Asia-Pacific Regional Operations Center is a major initiative for economic development by the Republic of China into the next Century". Over four decades, the Republic of China has been bent on developing Taiwan's economy and has achieved marvelous results. The success has brought prosperity to the island and greatly enhanced the country's international status. The secret behind this success is Taiwan's ability to keep pace with the vibrancy of the World and to fashion a stage-by-stage out-ward looking developmental strategy, which has enabled Taiwan to play to its full comparative advantages (EYE, 1995). As the world marches toward the 21st century, Taiwan is faced with a new set of internal and external challenges. In terms of Taiwan's economic structure, its scientific, technological and service industries are replacing the traditional industry in importance.

To meet the challenges at home and abroad, outperform our competitors , sustain the steady development of cross-Straits relations, and find a new international role for Taiwan, government consider the development of Taiwan into an Asia-Pacific regional operations center. According to evaluation by experts, Taiwan is most suited for developing manufacturing, cargo and passenger transportation and professional services. These advantages can be developed by establishing six specific operations centers, namely, the manufacturing, sea transportation, air transportation, financial, telecommunications, and media centers (GIO, 1995). From a educator view point, it is right time to innovate our curriculum for tomorrow's need.

Chung (1991) pointed out that our educational system is facing requirements of specialization, integration, and individualization. He illustrated that "the structure of curriculum is consisted of basic skills, groups of subject-based activities, problem-centered projects and inquires". Curriculum development should meet these criteria.

Characteristics of the Elementary School
Technology Education Program

The philosophies of the elementary school must blend with the program. The program should be characterized by the followings:

1. Utilizes the students' natural interests in activities and in manipulating materials and devices as a means for expressing themselves.
2. Ties the curriculum together.
3. Relates information taught in all areas.
4. Reflects the needs and interests of the students.
5. Integrates and reinforces existing curricular concepts through the technological component of our culture.
6. Applications oriented curriculum to complement the following areas: Civics & Ethics, Health Education, Mandarin, Mathematics, Social Studies, Natural Science, Singing & Playing, Physical Education, Fine Arts, Learning Disabilities, Multiple Handicapped, and Interdisciplinary Studies.
7. Proceeds from specific/concrete to general/abstract activities.
8. Implementing through existing elementary classroom teachers or a specialist.
9. Future and problem oriented curriculum.
10. Has high and particular value in the integration of community resources into the education environment.

The content of elementary technology education is integrated with existing subject areas (Figure 1).

T E C H N O L O G I C A L I M P A C T

Technology
Learning
Activities

T E C H N O L O G I C A L I M P A C T

Figure 1 is missing

Figure 1. Technology Education Curriculum Model

The model attempts to communicate how the study of technology relates to the areas of study generally associated with an elementary curriculum. The teacher will want to secure select activities that give relevance to the content.

By concerning the content area of existing subjects, instructional objects for grade 1–2 and grade 3–6 was drawn as followings.

The program for grade 1–2 will provide instruction in technological awareness as a vital force in everyone's life and instruction in life skill development. The instructional objectives are:

1. Compare how technology helps and hurts them and their world.
2. Recognize examples of technology.
3. Differentiate the resources used in technical systems.
4. Recognize standard technological signs and symbols used in society.
5. Show a willingness to risk using new technological materials and tools.
6. Demonstrate how to safely use simple tools.
7. Recognize and identify tools used to satisfy human needs.
8. Describe how to determine whether technology is helpful or harmful.
9. Create solutions to basic needs and wants identified by students and their world.
10. Identify how people use the computer as a tool to communicate.
11. Illustrate how adults use technology in their jobs.
12. Recognize and manipulate simple machines.
13. Illustrate how people use the computers as a general purpose tool of technology.

The program for grade 3–6 will provide following instruction areas:

1. Technology as the application of knowledge to extend human capabilities and to solve problems.
2. Critical thinking and problem solving skills
3. Lifelong learning through technological processes.
4. Societal impacts and consequences of technology on the society and individual.

The instructional objectives for grade 3 to 6 are:

1. Evaluate how technology systems convert raw materials into end products.
2. Contrast examples of the technology growth from historical point of view.
3. Show cooperation in problem solving under group situations.
4. Clarify ways in which technological developments have caused changes in our culture and society.

5. Define and apply the problem-solving model.
6. Explain a technological development by using a systems model.
7. Identify ways that technology will affect our society and how we can be well prepared.
8. Contrast advantages and disadvantages that a factory could have on a community.
9. Assess the advantages and disadvantages of automation.
10. Compare and contrast both positive and negative technologies effects on the quality of life.
11. Apply system model to illustrate the real world example.
12. Evaluate the technology evolving to meet human needs.
13. Evaluate the occupation changes caused by technology.

Conclusion

Technology permeates all societies and cultures. Regardless of their level of sophistication, people created technology to satisfy human needs and desires and to contribute to solving problems.

Technology plays a major role in human lives. It is responsible for the way people live, work, and play. Involving children early on in an action-oriented technology program is the key to achieving a goal of technological literacy.

Technology is always the core around which our daily living evolves. However, it can be misused like any tool or technique. The pollution of our environment and the depletion of natural resources emphasize the extremely important choices in how we use our technology.

The educational system in Taiwan had dramatic progress during last four decade. The economic condition of our society had progress, too. Technology is constantly changing and with it, so are society and environment. Facing all the changes, the curriculum of elementary education should alter so can achieve the goal of our education.

Technology education integrated into the elementary school curriculum promotes an understanding of the dynamic nature of technology by analyzing technological problems, issues, and trends and by engaging in technological problem-solving activities.

The study of technology should be an important aspect of learning at elementary level. It could be taught through an integration of existing subjects. Since technology is an integral part of our lives, weaving the thread of technology through the program of study most closely approximates reality.

Proposed Policies for Implementing Elementary Technology

1. Redefine the subject attribution of technology education.
Traditionally, each subject separates into single curriculum category, such as language arts, social studies, science, mathematics, and fine arts.. For a better placement, we need a new category, technology. Then, we can include computer literacy and environmental study into this new category. Facing the future, this category would tolerate most of the new demand. from our changing world.

2. Set the legal basis of technology learning for elementary level.
Technology education is general education. It could be taught through existing subjects. We need some kind legal basis to promote technology education for everyone and integrate technology into other subjects.

3. Core course movement.
We have to shift current core course from entrance single examination course to integrated courses, so the students could learn through more realistic way. Technology should be considered as part of core course.

4. Prepare teachers for new curriculums.
Technology education requires that teachers are able to know technology, do technology and teach technology. These new demands require both a new type of technology teacher education program and a in-service program for teachers already in the field.

5. Establish the indicator of technology education.
To deal rapid changing technology, we need a indicator system to show the big picture of technology, such as technology distribution, technology in demand, technology, the speed of technology transfer, technology literacy for different levels, and so on.

6. Create a set strategy for promoting technology education.
Although we use technology everyday, the term "technology education" still new to our society, educational administrators, elementary teachers, and parents. Most adults do not have this kind educational experience. It may be easy to promote since no one had bad experience. On the contrary it may be hard to promote because of wrong message. Anyway, we need careful planned strategies to systematically promote elementary technology education.

The importance of preparing today's students to live and to participate in a technology-based society applies to all students. We have technology education for junior high and senior high levels. Then, we are asking why we don't have technology education for elementary level. "What alliterate citizens should know" will no longer be a major concern. It is not possible to predict exactly the knowledge base required of productive citizens in the service-oriented information age. Technology education is the key for tomorrow's demand.

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