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The Status of Primary Technology Education in Taiwan

Chia-Sen Jimmy Huang
National Taichung Teachers College in Taiwan

Abstract
In order to cope with the change and keep pace with the development of modern technology, Taiwan’s government has adopted a series of large innovations in all aspects of technology in recent years. One of the purposes is to compare the specifics of both the 1975 and the 1996 National Primary Curriculum of technology education in Taiwan, as well as the essence of its goals, time distribution, and contents. In addition, the characteristics of the 1996 new curriculum will be depicted. Literature reviews and analysis formulate the basis of the research method of this study. Accordingly, a brief development history of the National Curriculum of primary technology education in Taiwan will be introduced. Furthermore, this study also discusses the pre-service teacher training system for primary technology education in Taiwan. Finally, the future trends in primary technology education in Taiwan will be explored.

Keywords
technology education, Taiwan, primary school, National Curriculum, teacher training

Introduction
The nine-grades-coherent new curriculum standards will be set into action by the Ministry of Education in Taiwan from 2001. In the primary and secondary grades, nature and technology will be one of the seven integrated subject groups which includes language, health and athletics, social studies, arts and humanities, mathematics, nature and technology, and recreational activities incorporating the new curriculum standards (Ministry of Education, 1998). This study compares both the 1975 and the 1996 National Curriculum standards regarding the developmental history, goals, time distribution, contents, characteristics at the level of primary technology education in Taiwan. Finally the teacher training system and future trends on primary technology education in Taiwan are explored.

Evolution of primary technology education
The evolution of craft-industrial arts technology education in Taiwan reflects the social movement based on the agricultural world of the past and the industrial/technological world of today. The history of technology education in Taiwan can be traced back to the Ching Dynasty, when China was still in the feudal system. ‘Handicraft’ was the earliest course in the history of technology education in China, and was elective in school programs. The subject became compulsory in 1911. Later, in 1923, the content was expanded as ‘industrial arts’, however the title was changed to ‘work education’ in 1932 and was used again in 1968. In 1975, work education was combined as ‘arts and handicraft education’. In 1996, it was changed as ‘fine arts and technology education’ at primary school level (Huang & Jen, 1999). From 2001, the title of ‘nature and technology’ will be used. The detailed title change and content focus are illustrated in Figure 1.
<table>
<thead>
<tr>
<th>Year</th>
<th>Subject</th>
<th>Title</th>
<th>Contents Focus</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1902</td>
<td>Handicraft</td>
<td>Paper sculpture, ceramics</td>
<td>A transition from apprenticeship to schooling</td>
<td></td>
</tr>
<tr>
<td>1911</td>
<td>Handicraft</td>
<td>Chinese knotting, ceramics, herb weaving</td>
<td>Required subject, Curriculum was mandated</td>
<td></td>
</tr>
<tr>
<td>1923</td>
<td>Industrial Arts</td>
<td>Knowing and using materials, career education</td>
<td>Focus on how to improve living</td>
<td></td>
</tr>
<tr>
<td>1932</td>
<td>Work Education</td>
<td>Industrial Arts(paper, wood, bamboo, ceramics, metal) Agriculture Arts(gardening, horticulture, animal raising) Home Economics(food and nutrition, clothing and grooming, housing, and maintenance)</td>
<td>Focus on developing hobby and handyman interests and abilities</td>
<td></td>
</tr>
<tr>
<td>1968</td>
<td>Handicraft</td>
<td>Observation and Appreciation(painting, pictures, architecture, ornamentation, housing, and schooling) Workshop(industrial arts, agriculture arts, home economics, and design) Research(proper use of tools and materials, explore interests which may influence the choice of further education)</td>
<td>Focus on occupational preparation</td>
<td></td>
</tr>
<tr>
<td>1975</td>
<td>Arts and Handicraft Education</td>
<td>Observation and Appreciation Design Industrial Arts Discussion(tools, knowledge, and skills)</td>
<td>Agriculture Arts and Home Economics were eliminated</td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>Fine Arts and Technology Education</td>
<td>Presentation area: a combination of arts design and industrial arts. Appreciation area: observation, sensation, understanding, evaluation, and judgement. Living Application area: a combination of aesthetics and technology.</td>
<td>Contents were based on visual arts</td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>Nature and Technology</td>
<td>The ability to use technology The ability to implement information and computer. Environment control.</td>
<td>Craft will be replaced by technology. Technology will separate from arts and integrate with nature.</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 1: Evolution of Taiwan’s primary technology education.**

**Goals of primary technology education**

The goals of 1975 National Curriculum were manipulative based. The contents of 1975 National Curriculum placed emphasis on learning by doing that was a combination of arts and crafts, whilst the goals of the 1996 National Curriculum were cognitive-affective-manipulative based. The contents of the 1996 National Curriculum placed emphasis on visual arts. The 1975 National Curriculum aims at three areas:

1. observation and appreciation
2. workshop
3. research.

Each area includes some scopes introduced at Figure 1. The 1996 National Curriculum aims at three areas:

1. presentation
2. appreciation
3. living application.

The statements of the 1996 National Curriculum goals in three areas are: (Ministry of Education, 1993)
1. presentation: to use various materials to shape; to enjoy creativity; and to foster the ability of presenting
2. appreciation: to recognise the value of arts; and to elevate art literacy
3. living application: to expand the vision of applying arts; to adopt living technology; to foster beauty literacy; and to refine life quality.

Goals are also classified into three groups – the lower graders, the middle graders, and the higher graders. Each grade group has its own goals in three areas. The tasks of each area and the features of three levels are illustrated in Figure 2.

<table>
<thead>
<tr>
<th>Area</th>
<th>Goals</th>
<th>Lower Level</th>
<th>Middle Level</th>
<th>Higher Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presentation</td>
<td>Implement materials, experience creation, develop the comprehension of presentation</td>
<td>Lead to imagination, Participate activities, Enjoy the creation</td>
<td>Understand the characteristics of materials and tools, Develop the presentation skills and creation</td>
<td>Explode the elements of design, Organize work contents, Select materials and tools</td>
</tr>
<tr>
<td>Appreciation</td>
<td>Appreciate arts, Experience the value of the arts Promote aesthetically literate</td>
<td>Present the personal opinions and respect others' ideas</td>
<td>Understand the elements of aesthetics, Develop the sense of aesthetics</td>
<td>Appreciate the value of visual arts</td>
</tr>
<tr>
<td>Living Application</td>
<td>Integrate arts and technology, Develop aesthetically attitudes, Advance living quality</td>
<td>Enjoy the beauty of nature and artificial works</td>
<td>Preserve cultures, Protect environment</td>
<td>Understand technology literacy, Decorate house, campus, and classroom</td>
</tr>
</tbody>
</table>

**Figure 2 The 1996 Goals of Primary Technology Education**

**Time distribution of primary technology education**

Within six years of primary education, children were provided with 11 subjects, 376 credit hours with no exceptions. The subjects and time distribution are illustrated in Figure 3. For the lower-grade group, there are two sessions for a total of 80 minutes weekly, while for the middle-grade group and the higher-grade group, there are three sessions for a total of 120 minutes. The 1996 National Curriculum allows teachers to arrange the teaching time either two and one session or three sessions per week. Also it is flexible for teachers to adjust the continuous teaching time (over three sessions per week) with the other subjects.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Grade 1</th>
<th>Grade 2</th>
<th>Grade 3</th>
<th>Grade 4</th>
<th>Grade 5</th>
<th>Grade 6</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mandarin</td>
<td>20</td>
<td>20</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>112</td>
</tr>
<tr>
<td>Mathematics</td>
<td>6</td>
<td>6</td>
<td>8</td>
<td>8</td>
<td>12</td>
<td>12</td>
<td>52</td>
</tr>
<tr>
<td>Social Studies</td>
<td>4</td>
<td>4</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>32</td>
</tr>
<tr>
<td>Science</td>
<td>6</td>
<td>6</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>44</td>
</tr>
<tr>
<td>Ethic and Health</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>24</td>
</tr>
<tr>
<td>Music</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>24</td>
</tr>
<tr>
<td>Physical Education</td>
<td>4</td>
<td>4</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>32</td>
</tr>
<tr>
<td>Fine Arts and Technology Education</td>
<td>4</td>
<td>4</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>32</td>
</tr>
<tr>
<td>Social Activities</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Council Activities</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Local Activities</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Sum</td>
<td>52</td>
<td>52</td>
<td>66</td>
<td>66</td>
<td>70</td>
<td>70</td>
<td>376</td>
</tr>
</tbody>
</table>

**Figure 3 The 1996 Primary Education Curriculum Subjects and Time Distribution**

**Content outlines of primary technology education**

Several amendments were undertaken for the content. The curriculum of technology education was amended in 1975 and in 1996. Although these two versions of the content are different, they are similar
in their content structure. The 1975 contents of the National Curriculum focus on observation and appreciation, workshop (industrial arts, home economics, horticulture, designing, sculpture, and painting) and research (colour, skill, frame, and use of tool and materials). While the 1996 version contains three areas:

1. presentation
2. appreciation
3. living application.

In the presentation area, mental and functional presentations are two components, in which three aspects are included:

1. scope
2. materials
3. skills.

Consequently, the content structure is subject to change according to the grade. In the appreciation area, two components are included – art cognition, appreciation and evaluation. As for the living application area, only the statements are described in behavioural terms.

Following is the contents focus from the first grade to the sixth grade. The first graders begin their arts lessons from games. Constructing various materials into shapes, along with the imagination of the children, allows students a great freedom to create their own shaping. By means of sensory perception, children start getting to know that a lot of shapes exist in the nature and in surrounding environments. They organise materials and objects and arbitrarily rearrange them into new shapes, which encourage children to develop their unique creativity. By games, students are encouraged to actively involve in the learning activities. Such realisation and recognition will raise student attention to the beauty surrounding them. For the second graders, they learn to arrange the objects into new shapes in a planned manner. They choose their favourite colour and have more experience in shaping. In addition, they are more sophisticated in skills. As a consequence, they will select the colour to fit in their dressing and to decorate their environment with objects. For the third graders, the content has more emphasis on motivation and theme of works. Basically, students will review the skills concepts that were acquired in the previous semester. Students expand their view of arts from two dimensions to three dimensions. However, they are not sophisticated in multi-dimensional observing. Instead, students will be more sophisticated in colouring. Field trip gives students another experience in aware of the natural arts. At this stage, producing objects is not just for fun, instead, there is more emphasis on considering the functions and the meaning represented by the objects. In the fourth grade, students are able to produce art works by three dimensions. At this stage, the content prepares students to use formal and advanced tools. Skills in using tools become a very important technique in art production. For the fifth and the sixth graders, cultural significance will be analysed so as to rebuild the conception of art in their traditional arts. The content has embraced the knowledge of art creativity, art criticism, and history of arts (Jiau, 1998).

The characteristics of 1996 primary technology education

A great difference exists in the 1975 and the 1996 National Curriculum. The purposes of the 1975 curriculum are traditional and art orientated. Creativity serves as one of the most important abilities in the old curriculum. In addition, mind-and-hands integration ability and independent thinking ability are other focuses in the old curriculum. However, the 1996 National Curriculum focuses are beauty, quality, and art oriented. The focuses of the new curriculum have been shifted toward the recognition and application of visual arts. A recognition of ‘environment’ serves as the basis of art initiation. A macro-recognition of art appreciation becomes the purpose of the new curriculum. The content of the new curriculum also focuses on the recognition of material characteristics, abilities of mental image presentation and functional presentation. The core learning outcome is to develop the learner’s ability of self-designing and living application. The approach of teaching is of a great encouragement to teachers in that art appreciation is necessarily included in art education, which may encourage students to apply their knowledge, skills, and art appreciation in their daily lives.
As the foregoing context illustrates, the current 1996 National Curriculum of primary technology education in Taiwan has the following characteristics: (Huang, 1999A)

1. Humanistic – emphasising normal teaching according to the students’ psychological development.
2. Applicable – suggesting students’ work applies to their daily lives.
3. Prospective – corresponding to the current trend of technology education in the world.
4. Flexible – being flexible in teaching in terms of the time, the unit arrangement, textbook selection, and contents design.
5. Interesting – offering diversified teaching materials and strategies to students.
7. Artistic – students’ works are requested to correspond to the artistic principles.
8. Integrated – the curriculum structure is designed in accordance with Tyler’s three principles of instruction: (1) continuity, (2) sequence, and (3) integration. Also, the curriculum arrangement can be designed and integrated among several subjects by teachers.

Teacher training at primary technology education
In recent years, the elementary technology teacher education programs in Taiwan have been challenged by the following two developments:

1. elementary teachers are expected to hold bachelors qualifications
2. calls for diversifying pre-service teacher education tracks (Lee, 1997).

The first development is to promote the elementary teachers to have bachelor degrees. From July 1987, the nine teacher colleges were changed to be the National Teacher Colleges by the Taiwan government. This important policy of educational reform affected the elementary education system deeply. Recently all the nine Teacher Colleges have established the department of fine arts and technology education. The main purpose of the department of fine arts and technology education in Taiwan is to cultivate the pre-service elementary teachers at fine arts and technology education programs. The second development in technology teacher education programs in Taiwan – calls for diversifying pre-service teacher education tracks – comes from amending the Teacher Education Statute prepared by Ministry of Education, the Teacher Education Statute Amendment reflects the loud calls for teacher education reform. At present, elementary school teachers are prepared in nine teacher colleges and some universities where they have teacher education programs. Every teacher college or university provides a one-year program for those who graduated from universities, passed a competitive entrance examination, and wish to enter elementary school teaching. Accordingly, the following emphases have been put on the Teacher Education Statute Amendment:

1. diversifying elementary pre-service teacher education tracks
2. enforcing student teaching practice in elementary schools
3. constructing teacher certification systems
4. providing students with financial aid.

Technology teacher education is one realm of teacher education. The diversification of pre-service teacher education tracks and the new teacher certification systems will challenge technology teacher education to restructure its programs. Facing the above two developments, technology teacher education in Taiwan has to reform or reconstruct a new and effective teacher preparation system that can contribute to technology education. Certainly, to make intelligent decisions on what to reform and how to reconstruct, information search and construction of alternatives is imperative (Huang, 1999B).
Future trend
Currently, an educational innovation has been undertaken as part of the national innovation project for the year of 2001. In this educational innovation, the curriculum of primary school education and that of middle school education will be combined into a nine-year free education system. In such new system, the conceptual framework will equip students with such abilities, such as (1) humanistic cultivation; (2) integrating abilities; (3) democratic literacy; (4) local and international perception; and (5) life-long learning abilities. The goals of the new curriculum are focused on fostering students’ perception of the relationship between the individuals and the group, the individual and society, and the individual and the nature. In the area of natural science and technology, there combines the natural science and technology education. In a sense, technology education will play an important role in the area in terms of the methodology. Since them will be focused on utilisation of tools, skills, natural resources, and solutions of problems. However, it can be predicted that technology education will be integrated with the natural science and the other subjects.

References