

means and tools to deal with the course development, delivery, and communication problems. The future will provide an assortment of tools for graphics, automation, streaming video, and interactive communication for instruction and testing. Much advancement has been seen in the creation of CourseInfo, WebCT, and E-College for course delivery. One area needing further study is in the use of software such as RealPlayer, Windows Media Player, and Quicktime for streaming

media as well as Ivisit and Netmeeting for interactive video. As with the topics we teach, an educator must experience and use these technologies first hand to be current in the future. With the immense amount of information available and ease of access via the Internet, educators can no longer be merely disseminators of information, rather, they must become guides and facilitators to the development of knowledge, critical thinking, and lifetime learning skills.

*Dr. Ronald C. Woolsey is an Assistant Professor in the Department of Manufacturing and Construction in the College of Applied Science and Technology at Central Missouri State University. He is a Member-at-Large of Epsilon Pi Tau.*

*Dr. John Sutton is Professor and Chair in the Department of Manufacturing and Construction in the College of Applied Science and Technology at Central Missouri State University.*

#### Endnotes

1. The Consortium of Doctoral Studies in Technology includes of the following university charter members: Indiana State University, Texas Southern State University, East Carolina University, Bowling Green State University, University of Wisconsin-Stout, North Carolina A&T State University, and Central Missouri State University.



## The New "Living Technology" Curriculum in Taiwan's Elementary Schools

(Chia-Sen) Jimmy Huang and Yen-Shun Wei

Elementary technology teacher education programs in Taiwan have been challenged by the following three recent developments: (a) Elementary teachers are expected to hold bachelor degrees, (b) the traditional craft-work (fine arts and industrial arts) curriculum has shifted to technology education, and (c) preservice teacher education tracks have needed to diversify (Lee, 1992).

Few research studies have proposed a formula for technology teacher education in Taiwan to cope with the above three developments. This leads to two interrelated problems: Although technology teacher education reform in Taiwan is underway, there is no coherent and rational guide to reform, and the lack of objective information leads to

criticism of future reform as arbitrary judgments (Wei, 1993).

Despite the lack of a coherent plan, several changes have occurred in the field of technology teacher education programs as well as in the certification requirements for technology teachers.

The first development is that elementary teachers have been encouraged to obtain bachelor degrees. Since July 1987, the nine teachers colleges were changed to the National Teachers Colleges by the Taiwan government. Recently, all the nine national teachers colleges have established a department of fine arts and technology education. The main purpose of the department is to cultivate preservice elementary teachers into

elementary fine arts and living technology educators.

The second development results from a revision of the elementary curriculum standards administered by the Ministry of Education. In 1996 new national curriculum standards regarding craft-work were initiated: (a) The name was changed to "living technology" or "technology education"; (b) the goals are to provide an understanding of the presentation, appreciation, and practical application of the arts; (c) the curriculum contents cover the knowledge and skills of craft-work and relate these ideas to the students' daily lives; (d) each course lasts two hours per week for first and second grades, and three hours for third

through sixth grades; (e) the principle methods of instruction include hands-on experience, audio-visual media, and field trips; (f) instructional strategies are to provide comprehensive and systematic activities ranging from basic introductions to in-depth analysis; and (g) evaluation should emphasize process, results, and students' attitudes and performances as team workers. The Ministry of Education, 1993.

Most living technology teachers in elementary schools graduate from the departments of fine arts and living technology education at Taiwan's national teachers colleges. That curriculum must prepare technology teachers who are capable of meeting these revised curriculum standards. Naturally, this new "living technology" or "technology education" affects technology teacher education programs throughout Taiwan. Liang, 1993.

Taiwan's Ministry of Education has also called for diversifying preservice teacher education tracks. The Teacher Education Statute Amendment mandates educational reform. Currently, elementary school teachers are prepared in nine national teachers colleges and some universities that have teacher education programs. Every teachers college or university provides a one-year program for those who have bachelor degrees and an interest in teaching at elementary schools. Candidates for these programs must take an entrance examination. Accordingly, the Teacher Education Statute Amendment emphasizes diversifying elementary preservice teacher education tracks, enforcing student teaching practice in elementary schools, constructing teacher certification systems, and providing students with financial aid. Lee, 1994.

#### The Why and How of Our Study

We wanted to identify and analyze the basic technical competencies that the living technology teachers need in Taiwan as a basis for supporting the living technology teachers' preservice and in-service training programs, certification examination, and self-

evaluation for teachers' professional development at Taiwan elementary schools. We sought to answer three questions:

1. What is the current content of new living technology programs at Taiwan elementary schools?
2. Why is it important to establish living technology teachers' technical competencies at Taiwan elementary schools?
3. What existing living technology teachers' technical competencies enable them to cope with the new national curriculum standards?

Then, we offer our interpretation regarding the implications of what we learned. To answer the first question, we analyzed the literature concerning the new national curriculum standards of elementary living technology programs in Taiwan. For the second and the third questions, we conducted a survey to determine the technical competencies of living technology teachers.

We contacted two categories of individuals: (a) 332 in-service teachers of elementary living technology programs and (b) 70 local consultants of elementary living technology programs. Of those contacted, 74.7% of the in-service teachers and 95.7% of the local consultants responded, providing returned questionnaires from 248 in-service teachers and 67 local consultants.

We also assembled a draft of survey items, mainly from publications, interviews, and individual experiences, that addressed living technology teachers' technical competencies at Taiwan elementary schools. This provided a fundamental scheme for further classification. To provide a systematic, logical framework for this instrument, the development of the items fell into three categories: (a) presentations, (b) appreciation, and (c) practical applications. The final instrument included nine demographic items and 27 technical competency items. A 5-point Likert-type scale was used to determine the level of agreement of respondents about the statements.

The survey items were revised by a

panel including elementary teachers and consultants, and scholars of National Taiwan Normal University whose comments were incorporated to improve the instrument's content validity. These items were also pilot tested on 50 living technology elementary teachers who also suggested minor modifications. For this study, the result of each item reliability was very high. These coefficient alpha values (over 0.97) were considered to be reliable for this survey instrument.

The data analysis involved an examination of the demographic data and the testing of hypotheses. Descriptive statistics were calculated on all variables for the total sample to obtain demographic data to study the distribution of variables. Frequencies and percentages were used to report demographic data and the scale of results in general while the means were drawn to generally report how teachers and consultants perceived the technical competencies in terms of the 27 items. Furthermore, a Spearman rank correlation and a t test were employed to further analyze and test the hypotheses, which determine differences between teachers' and consultants' mean scores regarding the living technology technical competencies at Taiwan elementary schools.

#### What the Survey Revealed

First, teachers and consultants strongly believed that it is necessary to have seven technical competencies in the aesthetic area, which are: (a) understanding how students learn about visual development, (b) appreciating students' creative works, (c) understanding the basic principles of shape, (d) understanding the basic principles of color, (e) familiarizing the students with concepts of aesthetics, (f) familiarizing students with art history of Oriental and Western cultures, and (g) understanding famous art work and their characteristics. The mean values of consultants (from 3.84 to 4.66) were higher than the mean values of teachers (from 3.51 to 4.32). Thus it appears consultants emphasized a greater need for the seven

technical competencies in the aesthetic area than the classroom teachers. Possibly, teachers may not have enough materials when they teach.

Second, teachers and consultants strongly believed that technical competencies must have practical implications in the following competencies: (a) directing students to appreciate the works of their living environment and (b) applying art literacy into daily life. The mean values of consultants (from 4.48 to 4.51) were higher than the mean values of teachers (from 3.99 to 4.10). Again, consultants felt sure that these literacies were more crucial than the teachers.

Third, both teachers and consultants believed that 18 technical competencies are important in making presentations, which are: (a) familiarizing the varied skills of sketch, (b) familiarizing the basic skills of color drawing, (c) familiarizing the basic skills of paste drawing, (d) familiarizing the basic skills of Chinese painting, (e) familiarizing the varied skills of print, (f) familiarizing the basic skills of sculpture, (g) familiarizing the basic principles of design, (h) familiarizing the basic concepts of paper material, (i) familiarizing the two-dimension skills of paper material, (j) familiarizing the three-dimension skills of paper material, (k) making the simple work drawing, (l) familiarizing the basic skills of wooden arts, (m) familiarizing the basic skills of metal arts, (n) familiarizing the basic skills of ceramics arts, (o) familiarizing at least three types of skills of folk arts, (p) directing students to create their works by groups, (q) understanding the basic management of home economics, and (r) understanding the basic skills of horticulture. The mean values of consultants (from 3.43 to 4.28) were higher than the mean values of teachers (from 3.03 to 3.93). Thus the consultants demonstrated a greater necessity for the 18 technical competencies embedded in presentations.

Finally, teachers and consultants

alike listed seven other skills as crucial:

1. Understanding the skills of waste reproduction.
2. Familiarizing students with at least three skills of local traditional folk arts.
3. Integrating all of the 27 technical competencies.
4. Understanding the art history of Taiwanese culture.
5. Understanding that living technology education can play an important role of protecting the environment.
6. Familiarizing the students with technological products (such as computer graphics and photography).
7. Understanding the skills of maintaining and managing tools.

In consideration of the preceding data we drew the following conclusions:

1. The technical competencies we have cited can be used by the Taiwan Ministry of Education to design a new national elementary living technology curriculum, a preservice teacher education program, in-service teacher education, a qualification examination for living technology teachers, and self-evaluations for living technology teachers.
2. It is important for Taiwan elementary living technology teachers to teach students according to each student's psychological learning developmental stage.
3. It is crucial for living technology teachers to have the 27 technical competencies they wish to train their students.
4. Likewise, Taiwan living technology teachers must cultivate their own fine arts skills in watercolor, paste drawing, Chinese painting, print, sculpture, and design.

5. Taiwan living technology teachers also need to cultivate their industrial arts skills in paper working, work drawing, wood working, metal working, ceramics, horticulture, home economics, and traditional folk arts.
6. Students should experience using used material to make creative works at Taiwan elementary schools.
7. It is suitable for elementary living technology teachers to introduce technological products (such as computer graphics and photography) to students at Taiwan elementary schools.

Finally, four recommendations are offered as follows:

1. Educational authorities should hold seminars to introduce the 27 technical competencies of living technology programs to Taiwan elementary teachers.
2. This list of technical competencies can be used as a reference for modifying the new Teacher Education Statute in the near future.
3. Qualitative and quantitative studies need to be conducted by scholars of living technology education to develop apt criteria for Taiwan's educational reform.
4. This study could serve as a basis for modifying the 2001 new national elementary curriculum standards regarding the "science and living technology" program in Taiwan.

*Dr. (Chia-Sen) Jimmy Huang is a full professor in the Department of Fine Arts and Technology Education at National Taichung Teachers College, Taiwan. He is a member of Alpha Xi Chapter of Epsilon Pi Tau.*

*Mr. Yen-Shun Wei is a lecturer in the Department of Fine Arts and Technology Education at National Taichung Teachers College, Taiwan.*

- Lee, L. S. (1992, December). *A comparison of technology teacher education programs in the U.S.A. and Taiwan*. Paper presented at the American Vocational Association, St. Louis, MO.
- Lee, L. S. (1994, March). *Technology education and related international exchange programs in Taiwan*. Paper presented at the annual meeting of the International Technology Education Association, Kansas City, MO.
- Liang, S. Y. (1993, July). *The prospect of the development of teacher education in the Republic of China-An explorative analysis from a statutory viewpoint*. Paper presented at the World Assembly of the International Council on Education for Teaching, Washington, DC.
- The Ministry of Education. (1993). *The national elementary curriculum standards in Taiwan*. Taipei, Taiwan: Author.
- Wei, Y. S. (1993). *A study of the elementary school craft-work teachers' technical competencies*. Unpublished master's thesis, National Taiwan Normal University, Taipei, Taiwan.

