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ABSTRACT

High school students in Taiwan are currently required to take 144 hours of industrial arts (IA) or home economics weekly in grades 10-12. As a result of a comprehensive curriculum revision project, the following changes in IA programs in Taiwan's high schools will soon become effective: (1) IA will be called "living technology" (LT) to reflect the philosophy that its focus should be on equipping students with living skills; (2) all students (regardless of sex) in grades 10-11 will be required to take LT and home economics (approximately 72 hours of each instead of 144 hours of 1 course); and (3) problem solving will serve as a key instructional strategy in the LT curriculum. Unlike the existing IA curriculum, which focuses on introducing students to industrial technology knowledge and developing their industrial skills, the new LT curriculum will focus on equipping students with technological literacy and developing their ability to use technological skills to solve problems and continue further study. The following four domains are assigned in the new LT curriculum: technology and life; information and communication; construction and manufacturing; and energy and transportation. The new LT curriculum has been developed through a systems analysis approach, and principles underlying a variety of other curriculum theories, including human development, social reconstruction, and postmodernism, have been infused into it.
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in Taiwan, R.O.C.

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**FROM INDUSTRIAL ARTS TO LIVING TECHNOLOGY:
SENIOR-HIGH-SCHOOL TECHNOLOGY EDUCATION CURRICULUM TRANSITION
IN TAIWAN, R.O.C.**

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**1. "INDUSTRIAL ARTS" WILL HAVE A
NAME CHANGE AND WILL TEND TO
MARRY TO "HOME ECONOMICS"**

In Taiwan, current senior-high-school students (10-12 graders) in grades 10 and 11 are required to take two teaching hours of industrial arts (IA) or home economics (HE) weekly, but most schools assign boys to IA programs and girls to HE. At present, a revision of the senior-high-school curriculum standards has almost been completed. The revised standards are meant to be promulgated this year (1995) and implemented in 1998.

In the new curriculum standards, there will be the following three apparent changes: (1) IA will have a name change to "living technology" (LT) to reflect the philosophy that this subject field should focus on the study of technology to equip youth with living skills. (2) All male and female students in grades 10 and 11 will be required to take LT and HE (two hours a week in total); that is, the current IA total teaching hours--some 144 hours--will be cut in half for new LT, about 72 hours. (3) Problem-solving will serve as a key instructional strategy.

The purpose of this paper is to discuss the objectives and contents of the current IA curriculum and the new LT curriculum, and the main problems/issues associated with

IA and LT curricula. However, it should be noted that in this paper technology education (TE) is a pervasive term covering IA and LT.

**2. CURRENT IA CURRICULUM
OBJECTIVES, CONTENTS AND RELATED
PROBLEMS**

The current IA curriculum standard was promulgated in 1983 and implemented in 1984. In the current IA curriculum, three objectives and five content areas are prescribed. These three objectives are: (1) to introduce students to industrial technology knowledge and develop their industrial skills to conform to industrial life and further study; (2) to motivate students' interest in design and creativity, to provide them with opportunities to explore industrial technology, and to encourage their interest in research and development; and (3) to develop good working habits and attitudes in students. The five content areas are: (1) project planning and drafting, (2) industrial materials, (3) power and energy, (4) information industry, and (5) automation. In addition to this required subject, some elective courses are classified as IA: drafting, metalworking, woodworking, electricity, ceramics, etc. A survey result (Lee et al., 1994) indicated the following descending order in terms of the popularity of content areas: (1) project

planning and drafting, (2) information industry, (3) industrial materials, (4) automation, and (5) power and energy. The same survey results also indicated that the two main barriers which hindered the implementation of the current IA curriculum standard were the scarcity of IA instructional facilities and equipment, and the overabundance of material presented in IA textbooks.

Before revision of the current IA curriculum standard began, a study, funded by the Ministry of Education, was conducted to determine the appropriate objectives and content organizers for junior-high and senior-high schools LT (Meng et al., 1993). Employing a Delphi technique, this study suggested a spiral structure for articulating junior-high and senior-high LT curricula. In this study, the following four senior-high-school LT curriculum objectives were suggested: (1) to understand the nature, meaning, evolution, and trends of technology, and the influences of technology on individuals and society; (2) to effectively apply technological processes and to safely use various tools and materials; (3) to analyze the uses of technology in daily life, industrial production, education and training, and recreation; and (4) to develop the living and problem-solving skills needed in technological society. In addition, technology and life, information and communication, construction and manufacturing, and energy and transportation were suggested as four possible content areas for both junior-high and senior-high LT curricula. The suggestions

of this study were then infused into the study mentioned earlier (Lee et al., 1994) to survey the opinions of in-service IA teachers on the coming LT curriculum standard. Most of the 163 questionnaire survey respondents valued the suggestions and highly regarded the following nine content organizers: (1) computer applications, (2) the relationship between technology and life, (3) the utilization and maintenance of home appliances, (4) the utilization and production of daily devices, (5) introduction to information and communication, (6) electronic communication, (7) blueprint reading and drafting, (8) graphic communication, and (9) the evolution of technology. Obviously, this indicates that the two areas, information and communication as well as do-it-yourself (DIY), were highly valued. To the author's knowledge, the people of Taiwan generally feel that DIY such as home appliance maintenance and plumbing should be stressed in both junior-high and senior-high TE curricula. This concern is consistent with the views of in-service IA teachers.

3. THE NEW LT CURRICULUM OBJECTIVES, CONTENTS AND RELATED ISSUES

Curriculum aims and objectives cannot be dissociated from their human, social, economic, academic, and political context. Having considered their context and the suggestions of these two studies (Lee et al., 1994; Meng et al., 1993), the LT curriculum aims to equip students with technological literacy, which is considered a realm of functional skills, and the objectives are

to enable students to: (1) comprehend technology and assess its influence on people, society, the environment and human civilization; (2) develop the ability to use technological skills to solve problems and continue further study; and (3) cultivate appropriate perceptions of and attitudes toward technology and inspire interest in studying technology. Additionally, the following four domains are assigned in the new LT curriculum standard: technology and life, information and communication, construction and manufacturing, and energy and transportation. Definitely, these four domains are consistent with those suggested by Meng et al. in their study (1993). Compared to the current IA curriculum, the new LT curriculum objectives and contents have at least the following three features: (1) they are more student-centered, (2) they shift the focus from industrial technology to living technology, and (3) they are broader in scope.

However, at least two issues come with these features. Firstly, some question whether or not the LT curriculum standard is too lofty (i.e., "high beat but hard to dance"). As Carson stated, "a curriculum plan should be seen as an opening up of possibilities that enable learning, rather than as the management of expected outcomes" (cited in Pinar et al., 1995); it is widely realized that the almost-completed new LT curriculum standard in Taiwan should be further interpreted by well-designed exemplary technology learning activities (TLA's) and effectively disseminated through

seed teacher training and textbook production.

The second issue is whether or not the content base of TE is too broad. In the IA curriculum currently implemented, students' experiences/activities are often built around individual and group projects, and instruction often relies on lecture, demonstration, and practice. In the new curriculum, LT is the study of selected technology which should itself cover secondary-level technology (construction and manufacturing) and tertiary-level technology (communication and transportation). Obviously, LT is more post-industrialized and futuristic than IA. Since either IA or TE is only a subject taught in schools, it is questionable whether the content base is too broad. A child's hand is suitable for picking up several of his/her preferred candies, but if he/she tries to grasp too many, the best may be lost. In the same way, if we try to include too many subject areas in LT, a time-limited subject, the most important ones may be ignored. Thus, by employing a modular approach and by emphasizing problem-solving strategies in instruction, technology educators in Taiwan have been able to design interdisciplinary TLA's for LT teachers. Each TLA is expected to cover as many content organizers from sub-technology (e.g., communication, manufacturing) as possible. That is to say, the scope of the curriculum objectives shown in Figure 1 has been carefully considered when the technology educators in Taiwan design the LT TLA's.

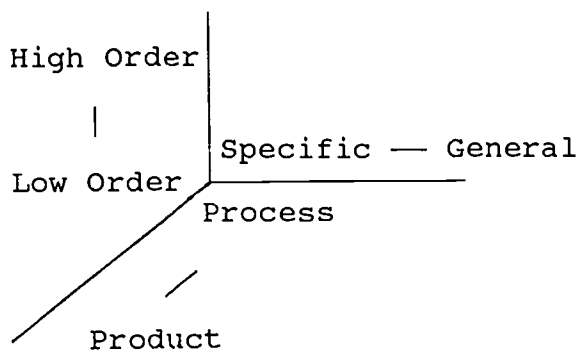


Figure 1. The Scope of the Curriculum Objectives
Source: Slightly modified from Morrison & Ridley, 1988, p. 58.

4. CONCLUSION: TOWARD A CURRICULUM THAT WILL BE WELL DESIGNED AND PRAGMATICALLY IMPLEMENTED

A curriculum should be carefully designed and pragmatically implemented. As Dugger et al. (1985) stated, a TE curriculum should provide all students with knowledge, skills, and attitudes to intelligently create and control their environment. Objectives which reflect program goals should be utilized for each course, and the course contents should reflect the intent of the course objectives. Basically, the almost-completed new LT curriculum standard, which is a kind of written curriculum, in Taiwan reflects the above ideals.

In Taiwan, the development of elementary-school and secondary-school curriculum standards is nationally centralized and relies on a top-down approach (i.e., administrative model). This has been criticized on the grounds that school teachers tend to passively implement curriculum standards when curriculum development is centralized. To facilitate the

alignment of the curriculum as it is implemented and written, the author and various other technology educators in Taiwan have been encouraging in-service IA teachers to develop their own school-based curriculum with reference to the LT curriculum standard soon to be promulgated. We hope that the integration of a top-down approach (i.e., administrative model) and a bottom-up approach (i.e., grass-root model) will enable our TE curriculum to be well designed and implemented.

Unquestionably, the commitment of teachers to change is the only guarantee of successful curriculum transition from IA to LT.

In addition, the LT curriculum standard in Taiwan has been mainly developed through a system analysis approach. As Zuga (1992) pointed out, this approach reflects a cultural reproduction theory (related to the positivism paradigm) of technology education. Thus, it is also expected that greater infusion of a variety of other curriculum theories, such as human development (related to the phenomenology paradigm), social reconstruction (related to the paradigm of critical theory), and postmodernism, should be considered in designing future TE curriculum standards and school-based curricula.

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