Bringing Korean Educators' Experience to the Global Village: Innovations and Challenges of Korean Technology Education.

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Abstract Worldwide efforts to incorporate technology education into general education have resulted in significant curriculum development in recent years. Justifications for this endeavor differ from one country to another, but generally national economic concerns and the need to understand and control the influence of technology on individuals and society have been the primary motives for the shift from vocational to general technology education, accompanied by a widespread recognition of the importance of technological knowledge and capability.
The development of industry and technology and the rapid economic growth of Korea since the 1960s have led to the expansion of knowledge and changes in the nation's industrial structure. Extensive knowledge of technology is now vital for all citizens, regardless of age or gender. Consequently, technology education as a separate subject and integral part of general education began to be offered to Korean secondary students in 1970 under the name of '*kisul*'(literally, "technology") and has contributed significantly to the nation' technological knowledge and capability.
Although *kisul* has greatly benefited both Korean education and industry, from the beginning there have been problems concerning curriculum, instruction, and teacher education. Based on Korea's experience, this paper considers the history and status of Korean technology education and problems such as the controversy over the most appropriate universal curriculum for technology education, curriculum issues such as content versus process, the lack of public understanding of technology education, the separation of technology education from vocational education, and the shortage of qualified technology teachers.

Keywords Curriculum Development ? International Technology Education ?South Korea

Introduction

The educational system in South Korea follows a single track of the ladder type 6-3-3-4 and is based on a strong national curriculum. Since 1948, the seventh curriculum has undergone seven revisions in order to adapt to new educational needs and social changes. Technology Education (TE) was introduced in the second revision of the national curriculum in 1969 and was first offered to secondary students as a separate subject in 1970 under the name of *kisul* (literally, "technology"). Its purpose is to help students improve their competence in adapting to an industrialized society by learning the fundamental knowledge and skills needed by industry (Ryu, 1987; Ryu & Yi, 1998). Throughout the 37 year history of TE in Korea, there have been innovations and challenges in curriculum, instruction, and teacher education and it has faced new challenges and expectations whenever the curriculum is revised

This paper presents a brief review of historical trends in Korean TE and discusses the challenges it currently faces. The review of the historical trends examines how the technology

curriculum developed and analyzes the relevant national curriculum documents. Also, in order to provide a more understandable description of Korean technology education this paper describes the educational system and the issues that are currently causing concern in South Korea. As major contributors to contemporary research, studies conducted by the Korean Institute of Curriculum and Evaluation (KICE) and Yi, et al (2006) are reviewed to reveal distinguished characteristics in the curriculum development of Korean TE. Also, national curriculum documents ranging from the national curriculum document of 1969, when TE was first incorporated, to the most recent revision are analyzed to observe changes in the goals and contents of Korean TE.

The Educational System and Current Issues in South Korea

The Korean educational system and the national curriculum are described in this section to support an understanding of Korean TE. Korea has experienced a remarkable economic development since the 1960s through the implementation of a growth-oriented economic policy. According to 2006 World Bank statistics, Korea's GDP is now the thirteenth largest in the world (KEDI, 2007). Korea's astounding achievement is due to its human resources and enthusiasm for education, which has been the main driving force for this endeavor. Koreans' interests and efforts in education have been remarkable; for example, in the International Assessment of Education Progress (IAEP), administered by the Educational Testing Services in nineteen countries, Korean students have consistently achieved the highest mean scores in both mathematics and science. Also, an OECD-PISA (Programme for International Student Assessment) study indicated that Korean middle school students ranked 1st, 2nd, and 6th in science, mathematics, and reading, respectively, among the 32 OECD member countries (OECD, 2001). In spite of these achievements, however, the Korean educational system still struggles with several challenges, namely excessively concentrated score oriented achievement, college entrance-bound education, and gaps between teaching and learning. (Kim, 2003)

Educational Development and Systematization in South Korea

The Korean educational system developed rapidly as the social system underwent major transformations after World War II. Even though the legislation of the Educational Law was enacted in 1948, the concept of compulsory education was not implemented until 1953 due to the rehabilitation required for the Korea War. Once the war was no longer the major issue driving policy, the Korean government was able to focus on educational rehabilitation, with a particular emphasis on democratic, moral, and vocational education. With the rapid economic growth of the 1960s, significant transitions took place in many parts of Korea. The most outstanding features of the nation's educational development in the 1960s were its massive expansion in student population, education facilities, and the number of teachers. From the 1970s onwards Korean education has pursued qualitative developments such as the normalization and improvement of educational quality.

The school system in South Korea follows a 6-3-3-4 ladder pattern consisting of elementary school (six years), middle school (three years), high school (three years) and junior college, college and university undergraduate study (two or three, four or six years) as shown in Figure 1. Although in the current national curriculum, preschool education is non-compulsory, there are nine years of free compulsory education for all students from the first grade to the ninth grade, which is composed of elementary education and lower secondary education (middle

school). Secondary education consists of middle school and high school, and high schools are either general or vocational. There are also specialized high schools that focus on areas such as foreign languages, the arts, the sciences and athletics. This school system is mandated by law. The previous laws governing education was replaced by the Basic Education Act, the Primary and Secondary Education Act (dealing with all matters related to pre-school, primary and secondary education), and the Higher Education Act (covering everything related to higher education) in 1998 (KEDI, 2007).

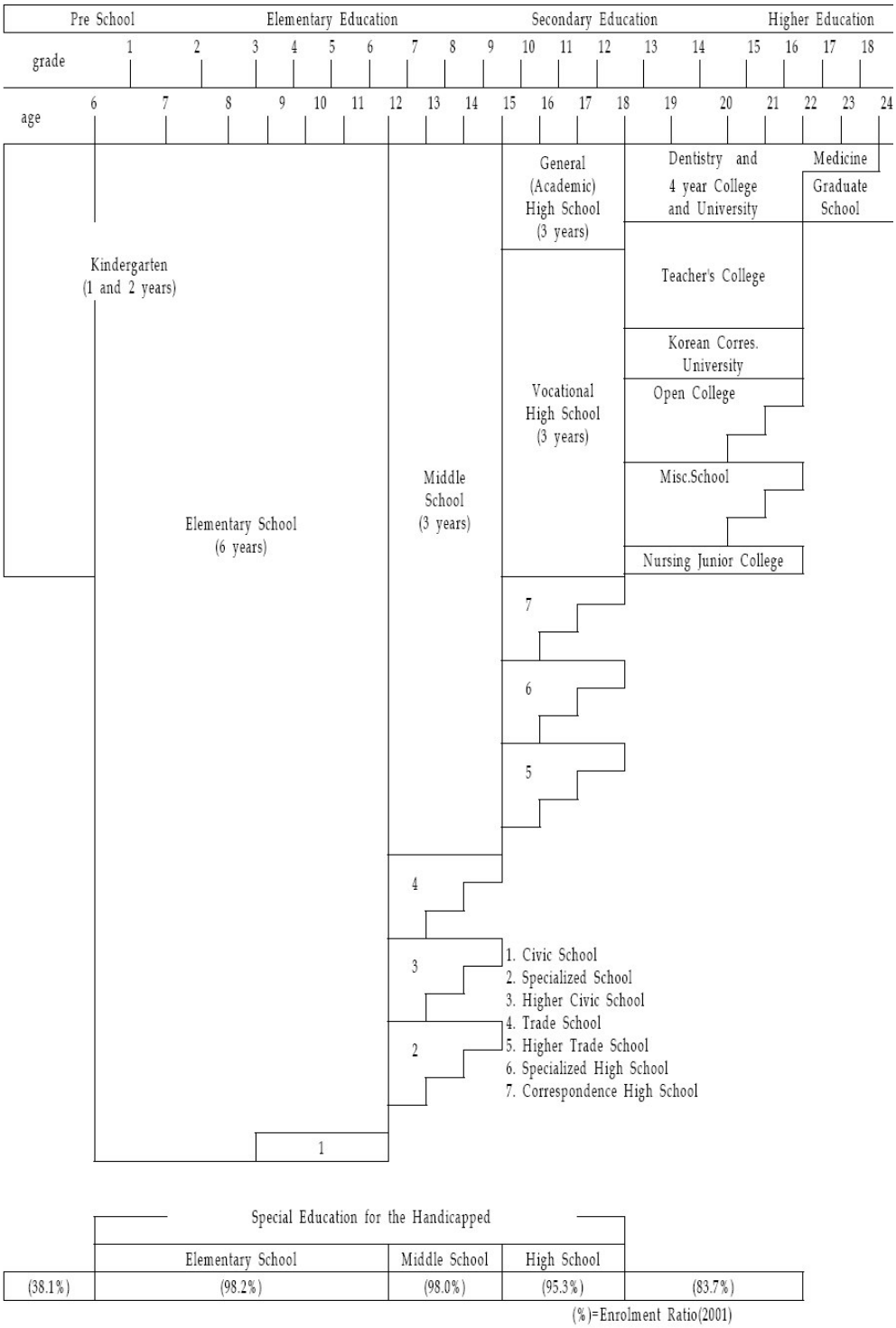

Figure 1. The Current South Korean School System (KEDI, 2007)

Korean students attend school for a minimum of 220 days a year in elementary school, middle school and high school. Each instructional period covers 40 minutes for elementary school, and 45 minutes for middle school and high school. As of 2007, all Korean schools are in a transitional period from a six-day school week to a five day school week.

Historical Review of Korean National Curriculum

Since the establishment of the Korean government in 1948, the Korean national curriculum has been revised seven times. Curriculum policy in Korea has been strongly centralized since the first national curriculum, with curricular developed and controlled by the government. The first revision of curriculum took place in 1955 and was laid out in MOE ordinances #35, #44, #45, and #46; the most recent revision took place in 1997 and is detailed in MOE notice #1997-15, #1998-10, #1998-11, and #1998-12. The transitional features of each successive national curriculum are shown in Table 1.

Table 1
Features of curriculum changes since 1945

Revision	Announced	Curriculum	Features
First	1955	Primary school Middle school High school	First curriculum designed by Korean educators
Second	1963		Emphasis on life experiences
Third	1973		Focus on academic enrichment
Fourth	1981		Emphasis on national spirit
Fifth	1987		Emphasis on economics education and regional characteristics
Sixth	1992		Improvement of organization and management system
Seventh	1997 1998	Primary/Secondary Kindergarten Special education Vocational high School	Basic national curriculum Selection based high school curriculum Differentiated curriculum Objective based curriculum Expansion of regional independence

This centralized system of education, with its emphasis on preparing students for the future, was successful in expanding Korean education in the 1990s. Also, with the advent of a knowledge-based society a new concept of human resources development emerged. The seventh revised curriculum was announced in 1997 triggered by findings of the Presidential Commission for the Educational Reform.

The new seventh national curriculum was first implemented in 2003. Its major feature is a student centered curriculum aiming to facilitate students' autonomy and creativity. As shown in Tables 2 and 3, the new curriculum consists of *National Common Basic Subjects* for Grades 1-10 and *Elective Courses* for Grades 11-12 (Ministry of Education, 1997). Every student is required to take the 10 National Common Basic Subjects until Grade 10, after which they can choose elective Courses from two levels of difficulty; general elective and intensive elective courses.

Table 2

The National Common Basic Subjects for Grades 1-12

School	Grade	Subject Area
Elementary	1	Korean Language, Mathematics, Disciplined Life Intelligent Life, Pleasant Life, We Are the First Graders
	2	Korean Language, Mathematics, Disciplined Life Intelligent Life, Pleasant Life
	3-6	Korean Language, Moral Education, Social Studies Mathematics, Science, Practical Arts,
Middle	7-10	Physical Education, Music, Fine Arts, English Korean Language, Moral Education, Social Studies,
High		Mathematics, Science, Technology-Home Economics
	11-12	Physical Education, Music, Fine Arts, English Elective Courses

Table 3
High School Electives for Grades 11-12 (MEHRD, 2007)

Subject Area	General Elective Courses	Intensive Elective Courses
Korean Language	Korean Language Life	Speech, Reading, Composition, Grammar, Literature
Moral Education	Civic Ethics	Ethics and Thought, Traditional Ethics
Social Studies	Human Society and Environment	Korean Geography, World Geography, World History
	Practical Mathematics	Economic Geography, Law and Society, Politics, Economics
Mathematics	Life and Science	Korean Modern and Contemporary History, Society and Culture
Science	Information society and Computer	Mathematics I & II, Calculus, Probability and Statistics, Discrete Mathematics
Technology-Home Economics	Gymnastics and Health Music and Life Art and Life	Physics I & II, Chemistry I & II, Biology I & II, Earth Science I & II Agricultural Science, Industrial Technology,
Physical Education	German I, French I Spanish I, Chinese I	Enterprise Management, Ocean Science, Home Science
Music	Japanese I, Russian I	Gymnastics Theory, Practice in Physical Education
Fine Arts	Arabic I	Music Theory, Practice in Music
Foreign Languages	Chinese Characters and Classics	Art Theory, Practice in Art English I & II, English Conversation, English Composition,
	Military Training	English Reading Comprehension, German II, French
Chinese Characters And Classics	Philosophy, Logic, Psychology, Education, Life Economy,	II, Spanish II, Chinese II, Japanese II, Russian II, Arabic II
Military Training	Religion, Ecology and Environment, Future	Chinese Classical Literature
Liberal Arts	Career and Occupation,	

Others

The Transition of Technology Education in South Korea

The purpose of this study is to analyze the transition of goals and/or objectives and contents of the technology curriculum at the secondary level in Korea. The goals and curriculum content are major issues that are drive curriculum development. Choosing the goals and the contents of the technology curriculum has been the subject of a vigorous debate amongst technology educators during the development of each revised curriculum (Chang et al, 2001; Yi & Kwon, 2002; Yi et al, 2006). Therefore, this study focused on the goals and contents of the technology curricula. Before the historical study could be undertaken, however, it was important to select the time periods on which the historical research would be based. In this study, only curriculum revisions that involved TE were used when identifying the goals/objectives and content of the technology curriculum. Therefore, the time periods for this study were driven into seven categories; period one, the second curriculum revision (1969); period two, the third curriculum revision (1974); period three, the fourth curriculum revision (1981); period four, the fifth curriculum revision (1987); period five, the sixth curriculum revision (1992); period six, the seventh curriculum revision (1997); and period seven: the partial revision of the seventh curriculum. In order to describe the transition of TE, this study therefore analyzed TE curriculum based on each revision of the national curriculum since 1969.

Characteristics of Korean Technology Education

The incorporation of TE into Korea's national curriculum has meant that it now permeates every school settings. Initially, Education laws 155 and 156 strongly supported the implementation of technology education within the area of practical arts education. These laws suggested that 10% of the whole middle school curriculum and 15% of the whole high school should consist of practical arts education. So, there was a strong emphasis on practical activity in the legislation of the Education law, but in reality there were several problems in implementing it due to unqualified technology teachers and experts, insufficient theoretical research on how the subject could best be taught, and a general lack of facilities and support. These problems led to a widespread misunderstanding of how TE should become part of vocational education.

Many technology educators or scholars have sought to identify the characteristics of technology education. For example, Lee (1986) suggested that technology education in the national curriculum should be 1) an independent subject with a unique knowledge system, 2) production technology rather than life technology, 3) taught as a general education subject, and 4) presented as a subject to meet the human manual skill needs through productive learning activities. Kim (1988) examined the characteristics that were considered important at the different stages of implementing TE and reported that in the initial stages fundamental knowledge and industrial skills were emphasized. TE consequently stressed the technology required for human existence in the early 1980s but then moved on to focus more on technological knowledge and industrial knowledge in the late 1980s as the subject became better established (Kim, 1990). Ryu (2000) identified five major characteristics of technology education: 1) a subject based on a technological knowledge system, 2) a subject aimed at the development of technological literacy, 3) a subject applying scientific knowledge to real life situations, 4) a subject that builds knowledge through practical activities, and 5) a subject that

increases opportunities for career exploration. In later work, he added a general education component to these characteristics.

Technology Curriculum: Present and Future

The Korean government decided to provide technology education programs for all the nation's secondary students in 1969. This was influenced by the rapid expansion of knowledge, changes in the industrial structure, advances in industry and technology, and rapid economic growth in Korea. Its purpose was to help students improve their competence in adapting to an industrialized society by learning the fundamental knowledge and skills of industry (Ryu, 1987; Yi, 1998). Due to its inclusion in the second revised curriculum, Korean secondary schools started to offer technology programs in 1970 that included educational goals such as career guidance and vocation, consumerism, and the study of industry and technology.

Table 4
Changes in the Names of Secondary School Technology Education Programs

Period	Middle School		Academic High School	
	Subject Name	Target Students	Subject Name	Target Students
Period 1	Technology	All students	Technology	All students
Period 2	Technology	Boys	Technology	Boys
Period 3	Life Technology	Boys	Industrial	Boys
Period 4	Technology	Boys & partial	Technology	Boys
Period 5	Technology & Industry	girls All students	Technology Technology	Boys
Period 6	Technology & Home	All students	Technology &	All students
Period 7	Economics Technology & Home Economics	All students	Home Economics Technology & Home Economics	All students

The contemporary technology curriculum for the secondary schools has the following characteristics 1) students learn *Technology-Home Economics*, an integrated subject from the 7th to 10th grades (Ministry of Education, 1997); and 2) in the 11th and 12th grades, students select from among *Information Society and Computers, Agricultural Science, Industrial Technology, Enterprise Management, Ocean Science, and Home Science.* Even though the seventh revision of the national curriculum treats *Technology-Home Economics* as an integrated subject, it does not in fact have any integrative goal and content but is instead a subject that merges two different disciplines, namely, *Technology* and *Home Economics*. Also, efforts to integrate technology with home economics physically are not rational because their disciplinary origins are very different. Current goals of technology education reflect an increased emphasis on technological knowledge and capability as a component of literacy.
Since 1970 the goals, subject name and target students of technology education for both middle and high school students have changed markedly in response to social and economic changes as shown in Table 4, in particular, the subject name has tended to reflect the characteristics of technology education since 1970. In period 5, for example, the understanding of industrial

society and modern technology is emphasized by the subject name “technology and industry”. Korean technology education is currently preparing for a new curriculum, a partial revision of the seventh national curriculum. The new curriculum was developed to correct perceived weaknesses of the seventh curriculum and to meet the needs of students, teachers, and society. During the contemporary curriculum, Korean TE teachers had been struggling with systematic problems such as insufficient class hours, difficulty in teaching and motivating students to learn technology, and the necessity to clarify the identity of technology education. Most technology teachers would prefer to teaching technology as an independent subject; its forced merger with home economics has a negative influence on the motivation and attitude of the entire educational community, including technology teachers, students, and parents.

The new curriculum emphasizes two major goals: 1) students’ practical and productive learning experiences and their needs, and 2) how students become technologically literate people with technological knowledge, creative thinking and problem solving abilities. The shift in emphasis should enable students to understand the concepts, principles, and significance of technology, as well as its evolution and development. Students should develop competency in applying technological knowledge and be able to assess the impact of technology on society.

Table 5
Transition in Educational Goals for Korean Technology Education

Categories	Educational Goals	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period7
Knowledge	Improved understanding on technological culture	O X	O X	O X	O X	O X		
	Obtaining knowledge by technological activities	O X	O X	O X	O X	O X		
	Understanding job world and individual traits	O		X	O X	X		
Attitude	Acquiring proper value system toward technology	O X	O X		O X	O X	O X	O X
	Occupational value system and career exploration			O	O	O X	O X	O X
Ability	Ability to utilize technological systems	O X	O X	O X	O X	O X		
	Creative problem solving ability related to technology	O	O			X		O X
	Ability to select, utilize, and assess technological product	O X	X	X	X	O		
	Ability for exploring career			O X	O X	O X	O X	O X

** O presents educational goals for middle school and X indicates educational goals for high school*

Transition in Goals of Korean Technology Education

This study employed the three categories, namely knowledge, attitude, and ability how the goals in Korean TE have changed as the initiative has matured. All the educational goals for TE presented in each successive revision of the national curriculum were analyzed in terms of these three categories for the periods listed earlier as shown in Table 5.

As Table 5 shows, the goals of secondary school technology education are designed to maintain a balance between technological knowledge, technological attitude, and technological ability. Also, it is interesting to note that when TE was first introduced technological knowledge was emphasized rather than attitude and ability. During Periods 6 and 7, the goals of middle school and high school are stated together because the technology curricula for those age groups span grades 7 to 10. The later periods also suffer from goal statements that are unclear and unbalanced due to TE having been merged with Industry or Home Economics. Teachers of TE consider that it would add clarity and simplify their task if the educational goals of TE were described independently.

Transition in Content of Korean Technology Education

To analyze the transition in the content of Korean technology education, this study divided it up into the large learning categories and corresponding sub-categories presented in every revised technology curriculum for all seven periods. The large learning categories are shown in Table 6 and a detailed breakdown for the current TE curriculum is given in Table 7.

Table 6
Transition in Learning Content of Korean Technology Education

Learning Contents	P1	P2	P3	P4	P5	P6	P7
Design and Drawing	O X	O X	O X	O	O	O	
Materials and their Processes	O X	O	O X	O	O	O	
Machines and Automobiles	O X	O	O X	O	O	O	O
Electricity and Electronics	O	O X	O	O	O	O	O
Computer Practice		X	X	O X	O	O	
Career and Industry (Agriculture, Industry etc)	O	O	O X	O X	O X	O	X
Introductory Technology	O	O	O X	O X	O X	O	O
Manufacturing Technology				X			O
Construction Technology				X		X	O
Transportation Technology				X	X	X	X
Communication Technology					X		O
Biotechnology						O	O
Technology and Invention							O

** O presents learning content for middle school and X indicates learning contents for high school*

As the table shows, the technology curriculum in secondary schools was steadily changing from an industry related content emphasizing learning areas related to vocational education to a more general education. Initially, the learning content of TE focused on vocational learning such as drafting, woodworking, metalworking and several industrial fields. As time went on these were reorganized into learning content aiming at knowledge, attitude, and abilities needed for manufacturing, construction, transportation, information and communication, and biotechnology, which are integral parts of TE as a general education. In terms of the middle school technology curriculum, there was no structured learning content until Period 7, although every period after Period 4 onward included technological systems (manufacturing, construction, transportation, and communication technology) as the primary learning content of TE in high schools. This trend toward utilizing technological systems in TE in Korea was strongly influenced by the curriculum content organizers suggested by Jackson's Mill Industrial Arts Curriculum Theory (Snyder & Hales, 1981).

The technology curriculum in Period 7 incorporates learning content based on technological systems and students' hands-on activities. Table 7 depicts the structure of learning contents for Grades 7 to grade 10 features two main characteristics: 1) a basic structure of learning content and sub-content as a minimum level is mandated and 2) a minimum level of knowledge and hands-on activity is specified. In particular, 'technology and invention', 'Korean traditional technology', and 'biotechnology' are new categories of learning content, introduced for the first time in Period 7.

Table 7
Technology Education Learning Content of New National Curriculum in Secondary School

Grade	7th Grade	8th Grade	9th Grade	10th grade
Learning Content	**Technological Development and Future Society** - Technological development in our lives - Understanding of traditional technology - Future technology **Technology and Invention** - Developing ideas - Technique and practice for invention	**Information and Communication Technology** - ICT in our lives - Application of ICT - Information protection and sharing in ICT **Manufacturing Technology** - Understanding of manufacturing technology - Designing manufactured goods - Constructing manufactured goods	**Electronics and Machine Technology** - Understanding electricity and electronics - Principles of mechanical work - Creating moveable mechanism or objects **Construction Technology** - Understanding of CT - Application of construction structure - Creating construction	**Vocation and Career Design** - World of job and occupation - Career planning and vocational ethics **Transportation Technology** - Creation and utilization of energy - Characteristics and utilization of transportation technology - Constructing transportation model

	structure model **Biotechnology** - Biotechnology in our lives - Application of BT

** Bold text indicates learning contents and normal text means sub-content*

Innovation and Challenges for Technology Education in South Korea

Technology education in Korea has developed through a combination of theoretical research and practice. Compared to its initial stages, the contemporary technology curriculum is the culmination of efforts to overcome the challenges faced in the early stages such as a lack of fundamental curriculum research, non-qualified technology teachers, and a deficiency of cognition of technology education. Korean TE has struggled to deal with these challenges, and this section introduces the innovation and challenges involved in developing an effective TE curriculum in South Korea

Content-based curriculum and process-based curriculum

As discussed earlier, TE was initiated in Korea in 1970 without a proper preparatory process that would enable the nation's schools to teach the new subject. Even though it was introduced to meet the identified needs of the Korean government, there were insufficient theoretical studies on technology curricula due to a shortage of experts in TE at that time. This led to two major problems: 1) TE content was biased toward vocational education because those teaching the subject in the early days had been trained in that area, and 2) the curriculum was organized by learning content. This latter point is important because if TE is focused on a content-based curriculum, this tends to neglect vital higher-order thinking skills including problem solving, decision making, and cooperation, and so on (Yi, 2001). Under a content-based curriculum, it is beneficial for the learner to understand technological systems comprehensively. Considering that there were not enough qualified technology teachers, Korean technology teachers were apt to use lectures in their classes, which is a limited teaching strategy that is inclined to cause learners to lose interests toward technology subject. To combat this tendency and to make Korean TE both productive and dynamic, a process-based curriculum is preferable. Consequently, the need to introduce a process-based curriculum for TE was suggested. Under this style of curriculum, the major concerns are technological design and problem solving in our social lives (Lewis, 1996; Wicklein, 1993). To implement process-based curriculum properly, Korean technology educators suggested the use of a curriculum based largely on hands-on activities (Yi, 2001; Yi & Kwon, 2003; Yi et al, 2006). As a result of this recommendation Korean TE has now been transformed from a content-based curriculum to a process-based curriculum through prominent curriculum research (KICE, 2002; Yi et al, 2006)

Curriculum development issues

Since 1970, the question of "How can Korean technology education develop technology curriculum systematically?" has been a dilemma for curriculum researchers. Historically, there

were gaps between educational goals and learning content in the technology curriculum (Chang et al, 2001).It was therefore necessary for curriculum researchers to identify and assess the current status of TE systematically.

To develop a technology curriculum capable of actively coping with today's rapidly changing society, KICE spent two years performing fundamental research on technology curriculum development. The resulting report was composed of a literature review, suggested framework for technology education, and a series of recommendations for the composition of the objectives and contents (KICE, 2002). The KICE study made two significant contributions to establishing the role of technology education in Korean society. First, the KICE study concentrated on the needs of students, teachers, education experts, and parents. Using a national survey system and Delphi methodology, KICE researchers identified the important characteristics of technology education and assessed society's education needs in this area. Second, the KICE study suggested a structural framework for TE objectives and learning content. In addition to the KICE study, Yi, et al (2006) and Chang (2003) advocated a fundamental curriculum model for technology curriculum development. The study included educational objectives, contents, learning assessment, teaching strategies, and facilities for technology education in that model. The major conclusions of the study were that in order to be effective, TE should include: 1) a systematic approach to curriculum development, 2) a strong relationship between objectives and content, and 3) a sequential structure for the technology curriculum. The new national curriculum has been strongly influenced by both of the above efforts.

Technology teacher education

The lack of qualified technology teachers has been an important education issue ever since the new technology curriculum was introduced. In Korea, secondary school teachers are graduates of a four-year teachers' college. In the early days of the program, technology teachers in secondary schools were trained by several methods: 1) short-term in-service training courses for qualified teachers in related subjects such as agriculture, industry, commerce, fisheries and home economics, 2) associate teacher certificates were issued to the engineering major graduates and 3) teachers designated as technology teachers by principals' recommendation (Kim & Land, 1994; Yi, 1997). In 1985, Chungnam National University graduated the first class of technology teachers who were qualified through four years of specialist technology teachers' preparation from the Industrial Technology Education Department. The Korea National University of Education graduated their first class of qualified technology teachers from Technology Education Department in 1996. Recently, Daebul University has also begun to produce qualified technology teachers.

The shortage of qualified technology teachers will thus be resolved through the efforts of these three university programs. However, Korean TE still needs talented technology teachers who have the ability to overcome systematic problems such as the lack of class weekly hours and laboratory facilities and are capable of engaging in innovative technology teaching and learning.

Summary and Conclusion

In South Korea, technology education as a general subject has been offered in secondary schools since 1970 under the name of *kisul*("technology") and the contributions of secondary school technology education to the Korean economy and industrial enterprises have been significant. However, teachers have had to deal with constant changes and new innovation, as well as many challenges, ever since technology education became part of the national curriculum.

This study focused on how Korean technology education has changed and developed by conducting a historical analysis of the technology sections of every national curriculum document issued from 1970 onwards. The curriculum is revised over a 7-10 year cycle in Korea. As this is a relatively new subject area, especially in the early years there was very little fundamental curriculum research on technology education, consequently the subject name, goals, and content for technology education have had to be modified whenever the national curriculum was revised as a better understanding of the subject gradually emerged leading to no less than seven major curriculum revisions including new technology curriculum that will be implemented in 2010. The primary goal of Korean technology education is to increase students' technological literacy including their technological knowledge, attitude and abilities.

The technology curriculum in the nation's secondary schools has steadily changed from an initial industry related bias emphasizing vocational education to a more balanced general education. The new technology curriculum that is about to be implemented has five content organizers of technological systems, namely manufacturing, construction, information and communication, transportation, and biotechnology. The emergent learning area of 'Invention', 'traditional technology', and 'biotechnology' are also incorporated. Korean technology education has developed through a combination of theoretical research and practice. Since it was first included in the national curriculum, contemporary technology education has overcome serious challenges such as a shortage of fundamental curriculum research, technology teachers who were not qualified to teach the subject, and a general lack of understanding of the importance of technology education. Korean technology education has emerged as a strong and vibrant subject area that is successfully educating students to take their place in today's technological society.

Reference

Chang, J. (2003). Modeling the directions on construction of Korean technology education curriculum based the recognition of experts.

Chang, J., Lee, S., & Yi, S. (2001). Analysis of technology education curriculum including objectives and contents with the change of times at the secondary level in Korea, *The Korean Journal of Technology Education, 1*(1), 147-161.

Kim, M. (2003). Teaching and learning in Korean classrooms: The crisis and the new approach. *Asia Pacific Education Review, 4*(2), 140-140

Kim, C. (1988). Identifying characteristic and improvement direction of technology education. The Korean Journal of Industrial Education, 13(2), 26-35.

Kim, C. (1990). *A study of the sequence of contents in Industrial technology from elementary school to high school.* Doctoral dissertation. Korea: Seoul National University.

Kim, C., & Land, M. (1994). Recent development of technology education in Korea. *The Technology Teachers*, January, 30-33.

Korea Institute of Curriculum and Instruction (KICE) (2002). *A study of the systemization of objectives and contents of school 'Practical arts' and 'Technology & Home Economics'*. Seoul: Korea.

Korean Educational Development Institute (KEDI) (2007). *Understanding Korean Education*, Seoul: Korea.

Lee, J. (1986). A history of technology education in middle school. *Journal of the Korean Institute of Industrial Educators, 11*(1), 3-9.

Lewis, T. (1996). Comparing technology education in the U.S. and U.K. *International Journal of Technology and Design Education, 6*(3), 221-238.

Ministry of Education (1997). *The school curriculum of the Republic of Korea.* Seoul: Ministry of Education

Ministry of Education & Human Resources Development (2007). *Education in Korea: 2007-2008.* Seoul: Korea

Organization for Economic Cooperation and Development (OECD) (2001). *Knowledge and skills for life: first results from PISA*. Paris: OECD.

Ryu, C. (1987). The curriculum trends of technology education in high school. *Journal of the Korean Institute of Industrial Educators, 12*(2), 40-47.

Ryu, C. (2000). Foundation of technology education. Daejoen: Korea

Ryu, C., & Yi, S. (1988). A history of vocational education subject area in middle school. *Journal of the Korean Institute of Industrial Educators, 13*(1), 41-49.

Snyder, J. F. & Hales, J. A. (Eds) (1981). *Jackson's Mill Industrial Arts Curriculum Theory*. Symposium Report.

Wicklein, R. C. (1993). Developing goals and objectives for a process-based technology education curriculum. *Journal of Industrial Teacher Education, 30*(3), 66-80.

Yi, S. (1997). Technology education in Korea: Curriculum and challenges. *Journal of Technology Studies, 13*(2), 42-49.

Yi, S. (2001). Challenges and improvement measure of Korean technology education to meet knowledge-based society. *Korean Journal of Technology Education, 1*(1), 15-29.

Yi, S., & Kwon, H. (2003). The development of hands-on activity based production technology curriculum by objective model at the secondary school. *Korean Journal of Technology Education, 3*(1), 18-32.

Yi, S., Lee, S., Chang, J., & Kwon, H. (2006). Directions and systems to reform technology education curriculum at the secondary school. *Korean Journal of Technology Education, 6*(1), 45-62.