Technology Education in Korea: Curriculum and Challenges

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As a separate subject and a part of general education, technology education (TE) began to be offered to secondary students in Korea in 1970 under the name of *kisul* (literally, technology). While it has provided technological knowledge and capability, there have been issues and challenges in curriculum, instruction, and teacher education.

This paper presents a brief history along with the status of TE as a part of general education in the Republic of Korea. The Korean educational system and the national curriculum are also described in order to present the challenges that face TE.

EDUCATIONAL SYSTEM

After World War II, the Korean educational system was radically changed from the traditional system. The Educational Law legislated and promulgated in 1949 reformed Korean education into a national, publicly funded, single-track school system. Emphasizing national identity and the idea of *hongik ingan* (meaning, being of benefit to all of humankind), the Education Law prescribes the ideals and goals of education and stipulates principles and criteria that guide the administration and management of the educational system.

The current Korean school system is a single-track, ladder-type 6-3-3-4 pattern. Figure 1 shows the structure of the formal Korean educational system. Education is compulsory for all children from 6 to 14 years old, and between these ages there is virtually 100% attendance at school. Elementary school lasts for six years and secondary education includes three years in middle school and three years in high school, for a total of six years. High schools are divided into academic high schools, vocational high schools, and other schools that do not fit the two categories.

The Education Law prescribes the minimum number of school days in the academic year. Elementary and secondary must have more than 220 school days a year with about 4 to 7 hours of instruction per day. The academic year consists of two semesters, the first beginning on March 1 and ending August 31, and the second spanning September 1 to the end of February (Ministry of Education [MOE], 1991, p. 48).

Educational Administration in Korea

The organizations responsible for administering education in Korea consist of the MOE at the national level, the municipal or provincial office of education at the regional level, and the district office of education. The following statement by Seho Shin explains these three organizations:

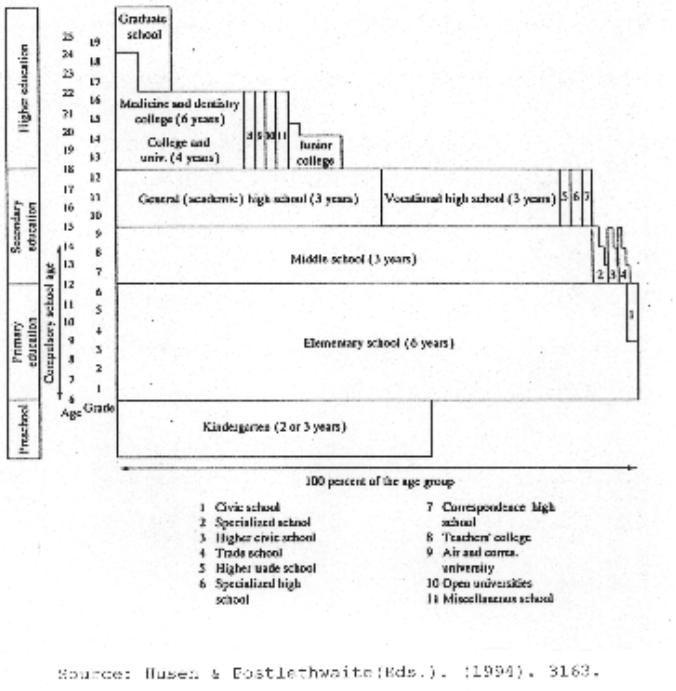
> The Ministry of Education . . . develops national educational plans; implements the plans; publishes and approves textbooks for elementary and secondary education; enacts laws related to education; executes the educational budget of the country; directs and coordinates subordinate agencies for educational policy planning and implementation and supervises the municipal or provincial office of education, the institutions of higher education, and other national schools. . . . The municipal and provincial offices of education are responsible for the administration of elementary and secondary education under their jurisdiction. . . . Offices of education are under the authority of the Board of Education as well as Ministry of Education. The boards of education are responsible for ordinances, budget approval, and auditing the office of education. . . . The district office of education is an educational administrative organization of a city or a county under the direction of the municipal or provincial office of education. (Husen & Postlethwaite, 1994, pp. 3165–3166)

Curriculum and Textbooks

Korea has had a strong national system of education since 1948. There is a mandatory prescribed common curriculum for each school level across the country. National curricula for each school "provide the framework, within which contents are organized by school or teacher, and criteria or the development of textbooks and instructional materials" (MOE, 1991, p. 50). As a matter of fact, most of the specific details of national curricula for each school level are determined by MOE. Therefore, school curriculum content and time allocation are uniform with a few variations at the regional and local levels. These curricula are revised every 7 to 8 years to cope with new educational needs and social changes. Suggestions for curriculum revision are made by a variety of committees that include curriculum specialists, university professors, classroom teachers, administrators of the MOE, members of local boards of education, and researchers of educational research institutes.

The present system of curriculum, known as the "sixth revised curriculum," was proclaimed in 1992 with the middle school curriculum becoming effective in 1995 and the high school curriculum effective in 1996.

Figure 1. Structure of the Korean formal education system



Source: Husen & Postlethwaite(Eds.). (1994). 3163.

Figure 1. **Structure of the Korean formal education system. (Husen & Postlethwaite, 1994, p. 3163)**

Table 1

Middle school curriculum. **(MOE, 1992a, p. 2)**

		Grade		
	Classification	**Seventh**	**Eighth**	**Ninth**
Required	Moral education	68	68	68
	Korean	136	170	170
	Mathematics	136	136	136
	Social studies	102	136	136
	Science	136	136	136
	Music	68	34-68	34-68
	Fine arts	68	34-68	34-68
	Home economics	68	34	34
	Technology-Industry	34	68	68
	English	136	136	136
Electives	Chinese classics, computer, environment, and others	34-68	34-68	34-68
Extracurricular activities		34-68	34-68	34-68
Total (Annual hours of instruction)		1,156	1,156	1,156

Table 1 outlines the current curriculum of the middle school. The hours shown in the table represent the minimum school hours allotted for 34 weeks per year with one teaching hour being 45 minutes. Middle school students study both technology-industry and home economics in the seventh through ninth grades.

Table 2 shows the current curriculum of the college-bound academic high school. A semester is 17 weeks long and a week is 5 1/2 days. When they are in the 11th grade, academic high school students choose one of three emphases: a humanities and social science course, a natural science course, or a vocational course. MOE prescribes the commonly required subject areas in the high school. Required subjects by courses are organized by the municipal and provincial offices of education, and elective courses of elective subjects are selected by each high school (MOE, 1992b, p. 2). Thus municipal and provincial offices of education may vary courses with the required subject areas. In general, while technology, industry, information industry, and others are offered for boys, home economics, homemaking, and others are offered for girls in high school.

Tables 2 and 3 show electives are selected by the school. "Once selected by a school, students attending that school have to study that subject: in this sense, these subjects are more appropriately called 'compulsory electives'"(Husen & Postlethwaite, 1994, p. 3167).

The Education Decree also prescribes three types of main textbooks to be used in each school level for each subject. The first type, mainly used in elementary school, are textbooks that are written by specialists appointed by the MOE. The MOE reviews, revises, and finally approves these textbooks. Textbooks in the second type are developed by private publishers and are inspected for quality and approved for use by "textbook review committees" organized by the MOE. Most textbooks used in secondary schools are of this second type. While only one kind of textbook is available for each subject of the first type of textbook, there is a large number of choices of the second type of textbooks for each subject, and schools select one that seems most appropriate for them.

The third type denotes those which are recognized by the MOE as relevant and usable in each school level. These types of textbooks are also revised in accordance with the revision of curricula (Husen & Postlethwaite, 1994, MOE, 1991).

TECHNOLOGY IN GENERAL EDUCATION

When MOE revised the curriculum in 1969, TE programs were provided for all secondary students. This was influenced by the expansion of knowledge, changes in the industrial structure, advances of industry and technology, and rapid economic growth in Korea. It was desirable to help students improve their competence in adapting to an industrialized society by learning fundamental knowledge and skills of industry (Ryu, 1987; Ryu & Yi, 1988). The newly organized TE began to be offered to all secondary students irrespective of sex in 1970. The TE goals included statements about career guidance and vocation, consumerism, and the study of industry and technology. More recently, TE goals reflect an increased emphasis on technological knowledge and capability as a component of literacy.

One of the most important issues related to goals in Korea has been between approaches: (a) to lay emphasis on understanding of industrial society and modern technology in a macroscopic manner, or (b) to lay emphasis on an understanding of the relationship between daily and home life and technology in a microscopic approach (Lee, 1986).

By 1970 goals, curriculum, subject name, and target students of TE for both middle and high school students have been changed in response to social and economic change. Table 3 outlines changes of the subject name and target students of TE in Korea.

Technology Education in Middle School

Table 3 also depicts the contending issues. The relationship between daily and home life technology in a microscopic approach comes under the subject name "life technology." But, in the fourth revised curriculum, understanding of industrial society and modern technology in a macroscopic approach is emphasized under the subject name "technology" in the fifth and the current sixth curriculum.

The current curriculum greatly changed the character of TE in the middle school. As shown in Table 3, its subject name in the new curriculum was changed from "technology" to "technology-industry." While the electives in the fifth curriculum such as agriculture, industry, commerce, fisheries, and homemaking for students in the ninth grade were eliminated, all middle school students must study both technology-industry and home economics, irrespective of sex, in the seventh through ninth grades. It is worth special mention that the target students of TE shown in Table 3 change from boys and some girls in the fifth curriculum to all boys and girls in the current curriculum.

Table 2

Academic High School Curriculum (MOE, 1992, pp. 3–4)

Subject Areas	Common Required Subjects	Required Subjects by Courses	Elective Subjects by Courses
Ethics	Ethics (6)		
Korean language	Korean (10)	Speech (4), Reading (4), Composition (6), Grammar (4), Literature (8)	
Chinese classics		Chinese classics I (6), Chinese classics II (4)	
Mathematics	Common mathematics (8)	Mathematics I (10), Mathematics II (10), Practical mathematics (8)	
Social studies	Common social studies (8), Korean history (6)	Politics (4), Economy (4), Society-culture (4), World history (4), World geography (6)	
Science	Common science (8)	Physics I (4), Physics II (8), Chemistry I (4), Chemistry II (8), Biology I (4), Biology II (8), Earth science I (4), Earth science II (8)	Select subjects among "required subjects by courses" excepting subjects which are selected as required subjects by courses already (8)
Physical education	Physical education (8)	Physical education (6)	
Military education		Military education (6)	
Music	Music I (4)	Music II (4)	
Fine arts	Fine arts I (4)	Fine arts II (4)	
Vocational education & Home economics		Technology (8), Home economics (8), Agriculture (6), Industry (6), Commerce (6), Fisheries (6), Homemaking (6), Information industry (6), Career guidance & vocation (6)	
Foreign languages	Common English (8)	English I (8), English II (8), Reading comprehension of English (6), English conversation (6), German I (6), German II (6), French I (6), French II (6), Spanish I (6), Spanish II (6), Japanese I (6), Japanese II (6), Chinese I (6), Chinese II (6), Russian I (6), Russian II (6)	
Elective of liberal arts			Select among Philosophy, Education, Psychology, Logic, Life economics, Environmental science, Religion, etc. (4)
Completion units	70	106	12
Extra-curricular activities	Class activities Club activities Group activities		

Note: 1 unit = a period of 50 minutes per week during one semester.

Table 3

Changes of Subject Name and Target Students of Technology Education

Period of Curriculum	Middle School		Academic High School	
	Subject Name	Target Students	Subject Name	Target Students
2nd ('69-'73)	Technology	All students (Boys and girls)	Technology	All students (Boys and girls)
3rd ('73-'81)	Technology	Boys	Technology	Boys
4th ('81-'87)	Life technology	Boys	Industrial technology	Boys
5th ('87-'95)	Technology	Boys and partial girls	Technology	Boys
6th ('95-)	Technology-Industry	All students (Boys and girls)	Technology	Boys

Middle school TE goals have included statements about the understanding of technology and the relationship between humans and technology, career guidance and vocation, becoming a wise consumer, the development of skills needed in life, applying tools, materials, and machinery safely and rationally, and the study of industry and technology. Recent TE goals reflect an increased emphasis on technological knowledge and capability as a component of literacy.

The goals of technology-industry for middle school in the current sixth curriculum are to help students to (a) learn fundamental knowledge and skills of technology and industry, (b) understand a world of work and occupation in relation to technology and industry, and (c) improve their competencies and attitudes that can be adapted to a highly technological, advanced industrialized society (MOE, 1992a). Thus, content was changed from technology and industry, cultivation, basic drawing, utilization of wood, and utilization of computers in the fifth curriculum to the current content of humans and technology, drawing, computers, utilization of materials, electricity, basic construction, occupations and careers, and other fields of industry such as agriculture, business and management, and fisheries technology. Table 4 depicts 30 years of TE subject matter change in the middle school.

Technology Education in Academic High School

Understanding of industrial society and modern technology in a macroscopic approach has been emphasized more for the high school students than middle school students in TE since 1970. The new high school curriculum being put into use since 1996 is also influenced by this approach.

It can be said that the transition of the high school TE program parallels trends in the middle school. The TE program in academic high school was offered to both boys and girls in the 1969 second revised curriculum. After that , TE was offered mainly for the boys while home economics was offered mainly for the girls in the high school since the third revised curriculum. This is due to a traditionally and socially accepted idea that social life is for man and home life is for woman.

The goals of high school TE have included statements about career guidance and vocation, skill development, understanding the importance of technology, study of industry and technology, and contribution to the development of industry and technology. Recent TE goals in high school also reflect an increased emphasis on technological knowledge and capability as a component of literacy.

Goals of high school TE of the current sixth curriculum are to help students to (a) improve their technological thinking ability and attitude by understanding and experiencing the character of technology; (b) improve their competence in order to adjust to a highly industrialized society by learning the knowledge and technology of energy and transportation, information communication, manufacturing, and construction; (c) understand a world of vocation for themselves by understanding the nature of various vocations in relation to the technological processes; and (d) improve competence that shapes their career in vocations in relation to the technological process (MOE, 1992b). Under the current sixth revised curriculum, TE in the academic high school covers technology and industry, energy and transportation, information communication, manufacturing, construction, and vocation and career guidance. Table 5 shows the changes in TE subject matter in the academic high school over the years.

OBSTACLES FACING TECHNOLOGY EDUCATION IN KOREA

As is true in many parts of the world, in Korea there is uncertainty about the meaning, components, scope, and nature of both technology and TE. There is also a lack of public understanding of the importance of TE in the field of education. The major problems of Korea TE stem from the fact that it was rapidly introduced to the school program as a separate subject without sufficient preparation such as research of curriculum and instruction, and education of technology teachers (Kim & Land, 1994; Lux & Lee, 1979).

Internal Obstacles

Uncertainty of curriculum, poor instruction, quality of technology teachers, and others are the challenges which confront Korean TE (Kim & Land, 1994; Lux & Lee, 1979). Since 1970, there have been issues and uncertainty about how the TE curriculum is conceptualized and organized and how instruction is delivered. Whenever the national curriculum was revised, the name, goals, and content of TE have been changed since 1969. This resulted from inconsistent criteria for establishing the basic framework of TE. The inconsistent criteria was due to the weak base and lack of specialists in the field of TE. Korean TE is still in need of experts on the research base of curriculum and instruction.

Korean TE instruction can be typically divided into lecture and practice (hands-on activity). In spite of the fact that TE requires

Table 4

Trends of Technology Education Subject Matter in Middle School

Contents	Period of Curriculum 2nd ('69-'73)	3rd ('73-'81)	4th ('81-'87)	5th ('87-'95)	6th ('95-)
Production & consumption			X	X	
Plastics technology			X	X	
Woods technology	X	X	X	X	
Metal technology	X	X	X	X	
Design & drawing	X	X	X	X	X
Machinery	X	X	X	X	X
Electricity & electronics technology	X	X	X	X	X
Industry & occupation/Career guidance	X	X		X	X
Relationship between human & technology			X	X	X
Computer				X	X
Housing construction					X
Agricultural technology		X	X	X	X
Marline & fishery technology			X	X	X
Manufacturing & construction industry					X
Commerce & management					X

Table 5

Trends of Technology Education Subject Matter in Academic High School

Contents	Period of Curriculum 2nd ('69-'74)	3rd ('74-'81)	4th ('81-'88)	5th ('88-'96)	6th ('96-)
Metalworking	X				
Engineering drawing	X	X			
Automobile	X	X			
Automatic control		X			
Management control		X	X		
Computer		X	X	X	
Industry & technology		X	X	X	X
Occupation & guidance			X	X	X
Manufacturing technology			X	X	X
Construction technology			X	X	X
Communication technology			X	X	X
Energy & power			X		X
Agricultural technology			X		
Marline/fishery technology			X		

laboratory and hands-on activity, the technology teachers have been heavily dependent on lecturing by textbook regardless of the characteristics of instructional objectives. Both the lecture and the practical instruction emphasize the second type (school selected) textbooks for instructional activities, and teachers virtually neglect hands-on activity. Obviously, a variety of appropriate types of teaching methods that stimulate motivation and learning are needed.

The poor instruction that exists is due to poorly qualified technology teachers, lack of instructional materials and facilities for practice, or both of these factors. Also, the quality and quantity of laboratory facilities need to be improved.

The lack of qualified technology teachers has been a constant educational issue. Secondary school technology teachers are educated in a four-year teachers' college. Technology teachers have been prepared at the Department of Technology Education in the Changnam National University since the department was established in 1981. The curriculum of the Department of Technology Education covers agriculture, commerce, and fisheries as well as industrial technology—

manufacturing, construction, energy and power, and communication (Changnam National University, 1991).

Unfortunately, 11 years of offering the TE program in secondary schools passed before the department was established. This caused serious problems in relation to the quality of technology teachers. In light of the fact that "quality of education can't surpass the quality of the teacher," it has been a major obstacle for the growth of TE. Before the department was established, the technology teachers in the 1970s were secured by various makeshift ways as follows: (a) short-term in-service retraining courses for teachers who taught similar subjects, such as agriculture, industry, commerce, fisheries, and home economics; (b) issuing associate teacher certificates to graduates of colleges of engineering; and (c) the designation by the school principal of technology teachers from those who seemed to have the qualifications to teach this subject (Kim & Land, 1994).

In order to solve the problem of the insufficient qualifications of technology teachers, Korean MOE had conducted in-service teacher education every year. In 1992, a second Department of Technology Education was established at the Korea National University of Education, and the shortage of qualified technology teachers is expected to be solved in the late 1990s.

External Obstacles

Large class size and the pressure of the national college entrance examination are two major external obstacles facing TE. Excessive class size has been a serious problem of not only TE but the entire Korean educational system as well. The average class size in Korea is 53 students for middle school and 55.1 for academic high school (Husen & Postlethwaite, 1994). Class size has been the greatest single factor that hinders effective instruction and blocks strategies to deal with individual differences of learning style and character development among students. More recently, this circumstance is improving with a gradual reduction of student population and financial support.

The national entrance examination for college (*taehak suhak nungryok sihom*) is very competitive. University graduates have more benefits than secondary school graduates in their economic and social life. Graduates of leading and prestigious universities have various advantages in their lifetime, and Korean parents support their children to begin preparing for the university entrance examination at an early age. As a matter of fact, most students who wish to enter a college prepare for this test for years in advance. The national college entrance examination covers language arts (including Korean and English), mathematics, science, and social studies. Because the entrance examination does not include content from TE, parents and students tend to make light of TE and other subjects not included on the entrance examination. In addition, examination-oriented school education neglects the broader and more fundamental function of TE.

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