

韓國高中科技教育的變遷

摘要

在南韓，科技教育是全國國定課程的科目之一。然而，高中科技教育仍然面臨了一些挑戰。韓國科技教育社群將克服這些挑戰列為優先事項。本研究的目標是檢視南韓高中科技教育的變遷。為達成此目標，本研究使用了韓國政府的「學校資訊系統」，並分析了忠清南道地區所有學校的課程文件。本研究蒐集並分析了 2018 至 2020 年的數據，用以了解高中科技教育的變遷。研究發現：（一）「科技與家政」科在共同選修科中佔比逐年減少；（二）職業選修科中，與科技教育有關的科目為「工程學入門」和「智慧財產入門」；這些科目大多在高中最後一年的專業課程中教授；高中科技教育在共同選修科中地位下降的趨勢相當明顯。韓國科技教育的專家應著力研究以提升高中科技教育在共同選修科中的佔比。此外，新設立的職業選修科有助於提升大家對高中科技教育的重視。未來的研究可進一步探究其他高中科技教育的傑出實例，並與其他科技教師分享。

關鍵詞：高中、科技教育、工程、課程

Transition of High School Technology Education in Republic of Korea

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Abstract

Technology Education (TE) has been one of the national curriculum subjects in South Korea. However, TE in high school has faced several challenges. Overcoming these challenges has been a priority to the community of Korean Technology Education. The goal of this study was to examine a transitional status of Korean high school technology education in South Korea. To accomplish the goal, this study utilized the School Information System operated by Korean government and analyzed all school curriculum documents in Chungnam Province. Data from 2018 to 2020 were collected and analyzed for identifying transitional status of high school TE. The findings are as follows: 1) Technology and Home Economics as a general selective subject has been decreased yearly. 2) TE related subjects as a career selective subject are Introductory Engineering and Introductory Intellectual Property. These subjects have been largely implemented in the concentration of the final year of high school. High school TE has had a clear trend of losing the place as a general selective subject. Korean TE professions should pay attention to progressive strategies for increasing high school TE in the perspective of general selective subject. In addition, new career selective subjects can be a good chance to get more attention from others in terms of high school TE. Further studies are needed to develop good cases of high school TE and share with other technology teachers.

Keywords: High School, technology education, Engineering, curriculum

1. Introduction

On September 4, 1964, Korea's technology education first appeared in the revised high school curriculum. Since then, the curriculum has been revised eight times. From the first curriculum to the fifth curriculum, the subject's title was Technology. In sixth curriculum, Technology and Home Economics are merged. The subject's title, Technology and Home Economics has been used so far. From the first curriculum to the third curriculum, the educational objectives of technology were to emphasize the acquisition of basic knowledge and skills. The fourth and fifth emphasized the technological literacy that could adapt to high industrialized society. From the sixth to the 2015 revised curriculum, developing technology literacy has been emphasized (Lee & Kwak, 2017).

In Republic of Korea, recent big changes in education are the implementation of the 2015 revised national curriculum and the high school credit system. The Ministry of Education (MOE) announced the 2015 revised national curriculum, a new curriculum, to foster creative people who can solve problems by converging knowledge (MOE, 2014). In 2020, the 2015 revised national curriculum is being implemented in all schools. The most concentrated transitions about the 2015 revised national curriculum are students' participation-based instruction and process-based assessment (MOE, 2017a).

In 2017, the MOE announced that high school credit system, which is a curriculum that allows students to select various subjects according to their career. Previously, subjects could not be chosen. Students graduated if they take a class according to the fixed timetable. However, if the credits you have completed reach the standard, students will graduate. It was initially planned to be implemented nationwide in 2022. But in the face of various problems at spot of education, such as the supply and demand of teachers and the development of curriculum, it was decided to implement in 2025 (Shin, 2019, Lee & Baek, 2019). The high school credit system organizes and operates elective courses that reflect students' demand, and guarantees students' choice as much as possible (MOE, 2018).

In high school, technology is an elective, not a compulsory subject. Since the sixth curriculum, Technology and Home Economics have been classified as general elective subjects (Lee & Kwak, 2017). In the 2015 revised high school curriculum, technology education subject was classified as a group (Technology and Home Economics/Second Language/Chinese Language). The most noticeable change in the 2015 revised technology curriculum is the creation of "Introductory Engineering" and "Introductory Intellectual Property" in career electives subjects (MOE, 2015a).

Introductory Engineering aims to understand and experience the various engineering worlds through the convergence with the basic principles of various engineering worlds, so students can predict future engineering and design their career (MOE, 2015b). Introductory Intellectual Property

aims to understand intellectual property and to cultivate creative thinking and attitude that can create new values in real life (MOE, 2015b).

Introductory Engineering and Introductory Intellectual Property have emerged in accordance with the needs of society in environment that technologies and engineering are rapidly emerging and developing. Introductory Engineering is based on the creative engineering design, and Introductory Intellectual Property is centered on the process of solving the invention problem (MOE, 2015b). Students can develop creative thinking skills and problem-solving skills. The two subjects have same value of Technology Education, technology literacy, based on the problem-solving process (Park, 2019).

Ahead of the implementation of the high school credit system, technology education is facing various demands to consider organizing and operating elective subjects in order to structure the high school curriculum (Lee & Baek, 2019, Park et al., 2020, Kwon & Lim, 2020). Therefore, it is necessary to figure out how technology education is currently being operated in the spot of education.

This study looks at the changes in the Technology Education curriculum of South Korean high schools to design curriculum suitable for the transitions. This study will look at the current status of Technology Education in South Korea high schools to be used as basic data.

2. Background

2.1 Types of Korean high school

High schools in Republic of Korea are classified as general high school, autonomous high school, specialized high school, and special purpose high school. General high school provides general education in various fields. Autonomous schools autonomously operate curriculum in accordance with the educational goals of schools. Autonomous high school has autonomous private high school and autonomous public high school. Special purpose high school provide professional education in the fields of science, art, physical education, and occupation. Special purpose high school is divided into science high school, foreign language high school, physical education high school, art high school, and Meister high school. Specialized high schools provide education for students who want to get a job after graduation. Meister high school also has the same target, but education is conducted with the aim of training professionals in more professional fields.

Depending on the type of educational purpose the types of subjects divided into ordinary subjects and specialized subjects.

Types of Korean high school

| | | Purpose of education | Types of subjects |
|--------------------------------|--------------------------------|----------------------|-------------------------|
| General high school | | General | Ordinary subjects |
| Autonomous high school | Autonomous private high school | General | Ordinary subjects |
| | Autonomous public high school | General | Ordinary subjects |
| . Special purpose high schools | Science high school | General | Specialized subjects I |
| | Foreign language high school | General | Specialized subjects I |
| | Physical education high school | General | Specialized subjects I |
| | Art high school | General | Specialized subjects I |
| | Meister high school | Vocational | Specialized subjects II |
| Specialized high school | | Vocational | Specialized subjects II |

2.2 Types of subjects: Ordinary subjects, specialized subjects

Usually, Ordinary subjects are divided into common and optional subjects. Common subjects are Korean, Mathematics, English, Korean history, Integrated society, and Integrated science (including scientific exploration experiments). All students developed a common subject consisting of what they must learn in high school and all students were required to complete it.

Optional subjects are divided into general elective subjects and career elective subjects. The optional subjects to support customized education based on students' aptitude, career and interest were divided into general elective subjects and career elective subjects. General elective subjects were organized based on the basic understanding of each subject required at the high school level. The career choice subjects consisted of subjects that could be converged between subjects, career guidance, advanced study and real life experience learning.

Specialized subjects are divided into specialized subjects I operated by special purpose high schools (except for Meister high school), and specialized subjects II operated by Meister and Specialized high school. Specialized subject I is about science, physical education, arts, foreign languages, and international categories. Specialized subject II is divided into specialized common subjects, basic subjects, and practical subjects according to NCS (National Competency Standards). A variety of optional subjects will be opened by developing career-selective subjects so that students can have advanced learning and career exploration experiences according to their career paths. This allows students to choose subjects based on their interests and careers.

Table 2

Subjects in Korean high school

| Field | Subjects (group) | Common subjects | Elective subjects | |
|----------------------------|--|--|--|--|
| | | | General elective subjects | career elective subjects |
| Basic | Korean | Korean | Speech and composition, Reading, Language and media, Literature | Practical Korean, Advanced Korean, Classical Reading |
| | Mathmatics | Mathmatics | Mathematics 1, Mathematics 2, Calculus, Probability and Statistics | Practical mathematics, Geometry, Economic mathematics, Math tasks |
| | English | English | English conversation, English 1, English reading and writing, English 2 | Practical English, English-speaking culture, Career English, English-American literature reading |
| | Korean History | Korean History | | |
| Exploration | Unified society | Unified society | Korean geography, World geography, World history, East Asian history, Economics, political and legal, Social and cultural, Life and ethics, Ethics and ideas | Travel geography, Exploration of social issues, Classics and ethics |
| | Integrated science Scientific exploration experiment | Integrated science Scientific exploration experiment | Physics 1, Chemistry 1, Life Science 1, Earth Science 1 | Physics 2, Chemistry 2, Life Science 2, Earth Science 2, Science History, Life and Science, Convergence Science |
| Physical education and Art | Physical education | Physical education | Physical education, Exercise and health | Sports, Exploration of Physical education |
| | Art | Art | Music, Art, Theater | Playing music, Listening to and criticizing music, Creating art, Appreciating and criticizing art |
| culture of life | Technology and Home economics | | Technology and Home economics, Information | Agricultural Life Sciences, Introductory Engineering, Creative Management, Marine Culture and Technology, Home Science, Introductory Intellectual Property |
| | Second language | | German 1, French 1, Spanish 1, Chinese 1, Japanese 1, Russian 1, Arabic 1, Vietnamese 1 | German 2, French 2, Spanish 2, Chinese 2, Japanese 2, Russian 2, Arabic 2, Vietnamese 2 |
| | Chinese character | | Chinese character 1 | Chinese character 2 |
| | Refinement | | Philosophy, Logic, Psychology, Pedagogy, Religion, Career and occupation, Health, Environment, Practical economy, Essay writing | |

3. Methods

3.1 Data

Among a total of 120 high schools located in Chungnam Province, this study analyzed 82 general high schools, except for specialized high schools aimed at vocational education. 82 schools are studied, as shown in Table 3.

Table 3

Selection of high school

| Types | | N | Selection |
|--------------------------------|--------------------------------|-------------|------------|
| Special Purpose High School | Science high school | 1 | ✓ |
| | Foreign language high school | 1 | ✓ |
| | Physical education high school | 1 | ✓ |
| | Art high school | 2 | ✓ |
| | Meister high school | 4 | |
| Specialized high school | | 32 | |
| Autonomous private high school | | 2 | ✓ |
| General high school | | 75 | ✓ |
| Etc. | | 2 | |
| | | 120 Schools | 82 Schools |

3.2 Data Collection

Documents required for analysis were collected using school information website (<https://www.schoolinfo.go.kr/>). According to the regulation of MOE, all schools in South Korea should announce their basic information like school yearly plan. At this study, we downloaded and analyzed the documents contained curriculum. Figure 1 is main shot of school information website. Table 4 is collected data.



Figure 1. School information website

Table 4
Collected item

| Category | | Number of item | Item |
|----------|-------------------|----------------|---|
| 3. | 2. Education Plan | 2-A | Matters concerning the organization, operation, and evaluation of school curriculum |

3.3 Framework of curriculum planning document's analysis

To analyze the current status of technology education in high schools in Chungnam Province, the curriculum planning documents was analyzed. The researchers gained knowledge of curriculum planning documents in advance and understood the analysis of curriculum planning documents. The items in analysis were confirmed by three technology education experts. The items collected for the survey are as shown in Table 5. Analysis table for the collected items is Figure 2.

Table 5
Collected items

| Category | Content of analysis |
|-----------------------------|--|
| 1. Basic school information | A. Location B. School Name |
| 2. Items about class | A. Status of adoption of elective courses in high school B. Status of operation by grade in elective subjects in high school C. Distribution of class time for elective subjects |

The analysis table (Figure 2) is a large grid with columns representing different categories and years (2020). The columns are grouped into: '기술가정' (Technical Home Economics), '정보' (Information), '공학 일반' (General Engineering), '지식 재산 일반' (General Knowledge Assets), '가정 과학' (Home Science), and '기타' (Other). Each group has sub-columns for 1.1, 1.2, 2.1, 2.2, 3.1, 3.2. The rows list various schools, such as '충청남도 공주시 충성고등학교' and '충청남도 공주시 공주중앙고등학교', with numerical data points in the cells. Some cells contain text like '14', '14', '신학' or '12', '12', '신학'.

Figure 2. Analysis table

3.4 Limitation of data analysis

Descriptive statistical analysis and average analysis were performed using Excel for statistical analysis of basic data of each school and the number of classes per semester. The analysis excluded schools that were the disclosure of school information. In addition, the analysis of this study was conducted on high schools in Chungnam Province and may have limitations in generalizing the results into situations in other cities and provinces.

4. Status and Issues of High School Technology Education

4.1 Status of adoption of general elective courses in high school

According to analysis on the selection status of general elective subjects about 82 general high schools in Chungnam Province, Technology and Home Economics are being implemented in 63 schools in 2018, 76.81% out of 82 schools. In 2019, 64 schools, 78.05%. In 2020, 60 schools, 74.04%. Information was conducted in 44 schools, 53.65% out of 82 schools in 2018, 46 schools in 2019, and 50 schools, 60.98% in 2020.

Table 6
Status of adoption of general elective courses in high school

| | 2018 | | 2019 | | 2020 | |
|-----------------------------|------|-------|------|-------|------|-------|
| | N | % | N | % | N | % |
| Technology & Home Economics | 63 | 76.81 | 64 | 78.05 | 60 | 74.07 |
| Information | 44 | 53.65 | 46 | 56.1 | 50 | 60.98 |

4.2 Status of operation by grade in general elective subjects in high school

Most of the classes are organized and operated in the first grade in 2018, 2019, and 2020. On the other hand, information classes were the most frequently conducted in the second year of 2018, with 40.91 percent out of 46 schools that implement information. But in the 2019 and 2020, they are evenly operated in the first, second and third grades regardless of the specific grade.

4.3. Distribution of class time for general elective subjects

Comparing the average number of times of Technology and Home Economics and information, there is not much difference in class time. The number of class times of Technology and Home Economics decreased from 2.44 in 2018 to 2.42 in 2020. Information has increased class time from 2.34 in 2018 to 2.4 in 2020. Of the 82 high schools in the humanities, there are more schools that adopt technical families than information, while the number of times in operation is greater than that of technology and families.

Table 7
Status of Technology and Home Economics operation by grade

| | Technology and Home Economics | | | | | |
|------------------------------|-------------------------------|------|------|-------|------|-------|
| | 2018 | | 2019 | | 2020 | |
| | N | % | N | % | N | % |
| 10 – 1 semester | 3 | 4.76 | 3 | 4.69 | 4 | 6.67 |
| 10 grade | 55 | 87.3 | 58 | 90.62 | 53 | 88.33 |
| 11 grade | 2 | 3.17 | 1 | 1.56 | 1 | 1.67 |
| 12 grade | 1 | 1.59 | - | - | 1 | 1.67 |
| 10 grade, 11 - 1 semester | - | - | 2 | 3.13 | - | - |
| 10 grade, 11 grade | 2 | 3.17 | - | - | 1 | 1.67 |
| | 63 | 100 | 64 | 100 | 60 | 100 |

Table 8
Status of Information operation by grade

| | Information | | | | | |
|-----------------------------|-------------|-------|------|-------|------|-----|
| | 2018 | | 2019 | | 2020 | |
| | N | % | N | % | N | % |
| 10 – 2 semester | 2 | 4.55 | 3 | 6.52 | 2 | 4 |
| 10 grade | 7 | 15.9 | 13 | 28.26 | 14 | 28 |
| 11 – 1 semester | 1 | 2.27 | 2 | 4.35 | 2 | 4 |
| 11 – 2 semester | 1 | 2.27 | - | - | - | - |
| 11 grade | 18 | 40.91 | 12 | 26.09 | 13 | 26 |
| 12 – 1 semester | 1 | 2.27 | 1 | 2.17 | - | - |
| 12 – 2 semester | - | - | 1 | 2.17 | 2 | 4 |
| 12 grade | 6 | 13.64 | 7 | 15.22 | 12 | 24 |
| 10 grade 11 – 2 semester | - | - | 2 | 4.35 | - | - |
| 10 grade, 12 grade | 3 | 6.82 | 2 | 4.35 | - | - |
| 10 grade, 11 grade | 2 | 4.55 | 1 | 2.17 | 2 | 4 |
| 11 grade, 12 grade | 3 | 6.82 | 1 | 2.17 | 1 | 2 |
| | 44 | 100 | 46 | 100 | 50 | 100 |

Table 9

Distribution of class time for general elective subjects

| | Technology and Home Economics | | | | Information | | | |
|------|-------------------------------|-----|-----|------|-------------|-----|-----|------|
| | Min | Max | Sum | Avg. | Max | Min | Sum | Avg. |
| 2018 | 0 | 5 | 295 | 2.44 | 0 | 4 | 232 | 2.34 |
| 2019 | 0 | 5 | 298 | 2.42 | 0 | 8 | 240 | 2.4 |
| 2020 | 0 | 5 | 273 | 2.42 | 0 | 6 | 242 | 2.4 |

**Hours for each week*

Table 10

Technology and Home Economics distribution of class time

| Semester Hr/week | 2018 | | | | | | 2019 | | | | | | 2020 | | | | | |
|---------------------|------|------|-----|-----|-----|-----|------|------|-----|-----|-----|-----|------|------|-----|-----|-----|-----|
| | 1-1 | 1-2 | 2-1 | 2-2 | 3-1 | 3-2 | 1-1 | 1-2 | 2-1 | 2-2 | 3-1 | 3-2 | 1-1 | 1-2 | 2-1 | 2-2 | 3-1 | 3-2 |
| 0 | 23 | 26 | 80 | 80 | 81 | 81 | 21 | 24 | 81 | 81 | 81 | 81 | 25 | 29 | 79 | 80 | 80 | 80 |
| 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 2 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 |
| 2 | 29 | 34 | 1 | 1 | 0 | 0 | 32 | 37 | 1 | 1 | 0 | 0 | 32 | 34 | 1 | 1 | 0 | 0 |
| 3 | 24 | 19 | 1 | 1 | 0 | 0 | 23 | 16 | 0 | 0 | 0 | 0 | 19 | 15 | 0 | 0 | 1 | 1 |
| 4 | 4 | 1 | 0 | 0 | 0 | 0 | 4 | 2 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 0 |
| 5 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| Sum | 148 | 135 | 5 | 5 | 1 | 1 | 155 | 137 | 2 | 2 | 1 | 1 | 139 | 123 | 3 | 2 | 3 | 3 |
| N | 59 | 56 | 2 | 2 | 1 | 1 | 61 | 58 | 1 | 1 | 1 | 1 | 56 | 52 | 2 | 1 | 1 | 1 |
| Avg* | 2.51 | 2.41 | 2.5 | 2.5 | 1 | 1 | 2.54 | 2.36 | 2 | 2 | 1 | 1 | 2.48 | 2.37 | 1.5 | 2 | 3 | 3 |

Schools that adopt Technology and Home Economics are organized and operated at two hours in most schools in 2018, 2019 and 2020. The total number of times in Technology and Home Economics was 295 in 2018, 298 in 2019, and 273 in 2020. The number of class hours increased by 3 in 2019 compared to 2018 but decreased by 25 in 2020 compared to 2019.

There are largest number of schools operated by organizing two hours of information classes in 2018, 2019, and 2020. The total number of times in information teaching continues to increase to 232 in 2018, 240 in 2019 and 242 in 2020.

Table 11
Information distribution of class time

| Semester Hr/week | 2018 | | | | | | 2019 | | | | | | 2020 | | | | | |
|---------------------|------|------|------|-----|------|------|------|------|------|------|-----|------|------|------|------|------|------|------|
| | 1-1 | 1-2 | 2-1 | 2-2 | 3-1 | 3-2 | 1-1 | 1-2 | 2-1 | 2-2 | 3-1 | 3-2 | 1-1 | 1-2 | 2-1 | 2-2 | 3-1 | 3-2 |
| 0 | 69 | 67 | 59 | 60 | 69 | 69 | 64 | 61 | 64 | 66 | 68 | 69 | 62 | 60 | 64 | 66 | 69 | 64 |
| 1 | 3 | 4 | 0 | 0 | 0 | 0 | 3 | 5 | 0 | 2 | 0 | 0 | 3 | 3 | 0 | 0 | 1 | 3 |
| 2 | 8 | 6 | 14 | 14 | 8 | 8 | 10 | 7 | 11 | 8 | 8 | 7 | 9 | 12 | 7 | 7 | 9 | 9 |
| 3 | 2 | 4 | 7 | 5 | 4 | 5 | 4 | 8 | 5 | 4 | 5 | 6 | 6 | 5 | 8 | 6 | 1 | 4 |
| 4 | 0 | 1 | 2 | 3 | 1 | 0 | 1 | 1 | 1 | 2 | 1 | 0 | 1 | 1 | 2 | 2 | 0 | 0 |
| etc | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8(1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6(1) | 6(1) |
| Sum | 25 | 32 | 57 | 55 | 32 | 31 | 39 | 47 | 49 | 38 | 35 | 32 | 43 | 46 | 46 | 40 | 28 | 39 |
| N | 13 | 15 | 23 | 22 | 13 | 13 | 18 | 21 | 18 | 16 | 14 | 13 | 19 | 21 | 17 | 15 | 12 | 17 |
| Avg* | 1.92 | 2.13 | 2.48 | 2.5 | 2.46 | 2.38 | 2.17 | 2.24 | 2.72 | 2.38 | 2.5 | 2.46 | 2.26 | 2.19 | 2.71 | 2.67 | 2.33 | 2.29 |

4.4 Status of adoption of career elective courses in high school

Engineering Technology implemented in the 2009 revised curriculum were implemented in 7 schools in 2018 and 7 schools in 2019. Introductory Engineering, which was first implemented in 2019, was implemented in 3 schools in 2019 and was adopted by 12 schools in 2020. Introductory Intellectual Property was adopted by 2 schools in 2019 and by 7 schools in 2020. In the case of Home Science, 8 schools in 2018, 10 schools in 2019, and 14 schools in 2020. Home Science is being implemented in 8 schools in 2018, 10 schools in 2019 and 14 schools in 2020.

Table 12
Status of adoption of career elective courses in high school

| | 2018 | | 2019 | | 2020 | |
|------------------------------------|------|------|------|------|------|-------|
| | N | % | N | % | N | % |
| Engineering Technology | 7 | 8.54 | 7 | 8.54 | - | - |
| Introductory Engineering | - | - | 3 | 3.66 | 12 | 14.81 |
| Introductory Intellectual Property | - | - | 2 | 2.44 | 6 | 8.64 |
| Home Science | 8 | 9.76 | 10 | 12.2 | 14 | 17.28 |

4.5 Status of operation by grade in career elective subjects in high school

Introductory Engineering is not being implemented in the first grade but in the second and third grades. Engineering Technology was the most frequently implemented in the third grade at 2018, in the second grade at 2019 and in the third grade at 2020. Introductory Intellectual Property was started in 2019. In 2019, it was operated at 100% of the second grade. In 2020, it is being conducted evenly among first, second and third graders. Home Science was conducted in the second and third grades in 2018. In 2019, it was conducted 30% in the second and third grades. In 2020, it was implemented in the first, second and third grades, and in particular, 57.14 percent in the third grade.

Table 13
Status of Engineering Technology, Introductory Engineering operation by grade

| | Engineering Technology, Introductory Engineering | | | | | |
|--------------------|--|-------|------|-----|------|-------|
| | 2018 | | 2019 | | 2020 | |
| | N | % | N | % | N | % |
| 11 – 1 semester | - | - | - | - | 1 | 8.33 |
| 11 – 2 semester | 1 | 14.29 | - | - | - | - |
| 11 grade | 1 | 14.29 | 5 | 50 | 2 | 25 |
| 12 – 1 semester | 1 | 14.29 | 1 | 10 | - | - |
| 12 – 2 semester | 1 | 14.29 | 1 | 10 | 1 | 8.33 |
| 12 grade | 3 | 42.86 | 3 | 30 | 7 | 58.33 |
| 11 grade, 12 grade | - | - | - | - | 1 | 8.33 |
| | 7 | 100 | 10 | 100 | 12 | 100 |

Table 14
Status of Introductory Intellectual Property operation by grade

| | Introductory Intellectual Property | | | | | |
|--------------------|------------------------------------|---|------|-----|------|-------|
| | 2018 | | 2019 | | 2020 | |
| | N | % | N | % | N | % |
| 10 – 1 semester | - | - | - | - | 1 | 16.67 |
| 11 – 1 semester | - | - | - | - | 1 | 16.67 |
| 11 grade | - | - | 2 | 100 | 1 | 16.67 |
| 12 grade | - | - | - | - | 2 | 33.33 |
| 11 grade, 12 grade | - | - | - | - | 1 | 16.67 |
| | - | - | 2 | 100 | 6 | 100 |

Table 15
Status of Home Science operation by grade

| | Home Science | | | | | |
|--------------------|--------------|------|------|-----|------|-------|
| | 2018 | | 2019 | | 2020 | |
| | N | % | N | % | N | % |
| 1 grade | - | - | 1 | 10 | 1 | 7.14 |
| 11 -1 semester | 1 | 12.5 | - | - | - | - |
| 11 – 2 semester | 2 | 25 | 1 | 10 | 1 | 7.14 |
| 11 grade | 2 | 25 | 3 | 30 | 3 | 37.5 |
| 12 – 1 semester | 1 | 12.5 | 1 | 10 | - | - |
| 12 grade | 2 | 25 | 3 | 30 | 8 | 57.14 |
| 11 grade, 12 grade | - | - | 1 | 10 | 1 | 7.14 |
| | 8 | 100 | 10 | 100 | 14 | 100 |

4.6 Distribution of class time for career elective subjects

Engineering Technology and Introductory Engineering are increasing the total number of class time counts, and the average of class time has also increased from 3.08 in 2018 to 3.18 in 2020. Introductory Intellectual Property is increasing the total number of class times, and the average number of times decreased from 4 in 2019 to 3.18 in 2020. The total number of times in Home Science is increasing, but the average time value has decreased from 3.71 in 2018 to 2.58 in 2020.

Table 16
Distribution of class time for career elective subjects

| | Engineering Technology, Introductory Engineering | | | | Introductory Intellectual Property | | | | Home Science | | | |
|------|--|-----|-----|------|------------------------------------|-----|-----|------|--------------|-----|-----|------|
| | Min | Max | Sum | Avg. | Min | Max | Sum | Avg. | Min | Max | Sum | Avg. |
| 2018 | 0 | 5 | 40 | 3.08 | - | - | - | - | 0 | 5 | 52 | 3.71 |
| 2019 | 0 | 4 | 42 | 2.8 | 0 | 4 | 12 | 4 | 0 | 4 | 63 | 3.15 |
| 2020 | 0 | 4 | 89 | 3.18 | 0 | 4 | 34 | 3.18 | 0 | 4 | 85 | 2.58 |

**Hours for each week*

5. Conclusion & Discussion

Recent technology education in republic of Korea faced into many transitions. New career elective subjects, Introductory Engineering and Introductory Intellectual Property are emerged by demand of society. With the implementation of the high school credit system that students can choose and take classes according to their careers, various curricula are needed. Overcoming these challenges, this study examined a transitional status of Korean high school Technology Education in South Korea.

The results of the analysis on Technology and Home Economics and information, which are career elective subjects, are as follows.

The number of schools choosing Technology and Home Economics is decreasing. In the other hand, the number of schools choosing information is increasing. Technology and Home Economics are often organized and operated in the first semester of the first year and the second semester of the first year, that is, the first year. Information is organized and operated evenly in the first, second and third grades, rather than in specific grades. There are many schools that have two hours Technology and Home Economics. When comparing the average time, the average time of Technology and Home Economics is higher than that of Information. But the average time is not much different.

The results of studies in career elective subjects such as Introductory Engineering, Introductory Intellectual Property and Home Science are as follows.

The proportion of career elective subjects is the highest in the order of Home Science, Introductory Engineering, and Introductory Intellectual Property. In 2020, only 17.28 percent, 14.81 percent, and 8.64 percent of all humanities high schools adopted Home Science, Engineering, and Intellectual property. But since its inception, more and more schools have chosen little by little.

This study would like to make recommendations based on the results of this study.

First, the general elective courses of high school are currently operated as Technology and Home Economics that combine into one. It is necessary to study whether technology is being operated according to the nature and characteristics of technology teaching at school.

Second, the number of schools to choose from has been increasing since the general subjects of engineering and intellectual property, which are career electives for technical departments, were implemented in 2019. It is understood that this was due to the demand of students who wanted to enter the engineering department. It is necessary to open more diverse career electives in technology subjects so that students can develop careers in engineering.

6. References

- Kwon, Y., Lim, Y. (2020). Status and demand of high school elective subjects for Technology and Home Economics. *Journal of Korean Home Economics Education Association*, 32(2), 179-192.
- Lee, S., Baek, S. (2019). Exploring the possibility of expanding the elective subjects of the high school credit system: Focusing on analyzing the current status and perception of subjects in charge of each teacher's major. *Korean Teachers' Education Research*, 36(2), 49-73.
- Lee, S., Kwak, Y. (2017). Changes in Curriculum for the Technology Education of High School in Korea. *Journal of Korean Technology Education Association*, 17(1), 18-35.
- Ministry of Education (2014). Major points of 2015 General Discussion on the Integrated Curriculum of Liberal Arts and Sciences Arts.
- Ministry of Education (2015a). A high school curriculum. Ministry of Education Notice No. 2015-74 [Attachment 4]
- Ministry of Education (2015b). Practical (Technology and Home Economics)/Information curriculum. *Ministry of Education Notice 2015-74 [Attachment 10]*
- Ministry of Education (2017a). Explanation about 2015 revised curriculum (High School).
- Ministry of Education (2017b). Direction of the High School Credit System and Plan of Research School Operation.
- Ministry of Education (2018) The Reform of the University Admissions System and A Direction of Innovation in High School Education in 2022.
- Park, K. (2019). Current Status and Tasks to Implement Intellectual Property Education in High Schools of South Korea. *Intellectual Property Research*, 14(1), 195-230.
- Park, M., Lim., Y., Kwon, Y., Lee, K. (2020). Technology and Home Economics Teachers' Perception of Participation in School Curriculum Organization and High School Credit System. *Journal of Korean Home Economics Education Association*, 32(1), 15-34.
- Shin, J. (2019). An Analysis of the Perception of High School Teachers on the High School Credit System. Master's thesis at the Graduate School of Education Policy at Korea National University of Education