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Educational policy and curriculums of Korean school mathematics in the late 19th and early 20th century[1)]

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The purpose of this study is to examine obstacles to progress for 20th century Korean mathematics. In 1945, shortly after Korea was liberated from Japan, there were no Korean mathematics Ph.D. holders, less than ten bachelor degree holders, and only one person with a master's degree in mathematics. We investigate the reasons for this. Korea has to overcome such an unforgiving condition and rebuild quality education programs in higher mathematics over the last several decades. These debilitating circumstances in higher mathematics were considerable obstacles in developing a higher level of mathematical research for the mainstream of 20th century world mathematics. We study policy and curriculums of Korean school mathematics in the late 19th and early 20th century, with some educational and socio-political background.

1. Historical Background

Compared to some other East Asian countries, Korea was able to maintain the tradition of Korean and East Asian mathematics for a longer period of time [Jung, 1986]. Western mathematics was introduced in Korea in the 17th century but it was learned only by a small group of scholars and government officials. In fact, Western mathematics became available to all as a school subject only in the late 19th century [Park, 1982]. The period of the late 19th and

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early 20th centuries is one of those periods in Korean history that affected "Korea" in many ways, both good and bad. This was when Japan's interference in Korea became aggressive; Korea tried to keep itself distinct from Japan. However, Korea finally became colonized by Japan, that remained in Korea until 1945. Japan's colonization greatly affected many aspects of Korea [Horng, 2002] including education, especially in mathematics in particular. By means of a careful examination of available evidence Japan's colonial education policy may be seen as one of the most difficult obstacles that Korea had to overcome in order to progress to its current status in school and collegiate mathematics education, and mathematical research.

1.1 Socio-political background

In 1392, General SeongGye Yi (who became King Taejo) established the Chosun Dynasty in the Korean Peninsula (1392-1910) with Hanseong (formerly Hanyang; modern-day Seoul) being the capital. (For Korean history, the following references may be helpful to readers: [Byeon, 1999, 27] and [Lee, 1984].[2]) He adopted Confucianism as the country's official religion. Chosun experienced advances in science and culture; most notably the Korean alphabet Hangul, was invented by King Sejong in 1443 as an alternative to Chinese characters, which were previously the only system for writing. Traditional Korean mathematics was well developed and managed by government actuarial officials in the Chosun Dynasty.[3] (Such an official was called SanHakJa 산학자 算學者.)

During the 19th century, Korea tried to control foreign influence by closing the borders to all nations except for China, due to the wide spread of imperialism. Beginning in the 1870s, a rapidly modernizing Japan began to force Korea out of China's sphere of influence into its own. Japan forced Korea to open its ports. Japan successfully challenged the Qing Empire in the Sino-Japanese War (1894-1895), and in 1895 Japanese agents murdered Empress Myeonseong of Chosun. In 1897, Chosun was renamed as the "Korean Empire," Daehan Jeguk 대한제국, and King Gojong, who was the last king of the Chosun Dynasty, became Emperor Gojong. In 1905 Japan forced Korea to sign the "Eulsa Treaty" 을사늑약 making Korea a protectorate of Japan. Outright control by the Japanese began on February 1, 1906. The Residency-General for Chosun 조선통감부 was invested with authority in regard to Korea's diplomacy, domestic administration,

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2) http://www.asianinfo.org/asianinfo/korea/history.htm http://en.wikipedia.org/wiki/Emperor_Kammu, http://www.asianinfo.org/asianinfo/korea/history/colonial_period.htm.

3) The government system consisting of skilled mathematicians had been well kept throughout the Chosun Dynasty. Some interesting mathematical techniques, such as ChunWonSul 천원술, 天元術 of China, which was forgotten in China, were still well used in Korea. [Li et al., 1999]

and military affairs. In 1910, Japan fully annexed Korea, although neither the control nor annexation was considered to be legally valid [Tsurumi, 1977]. Korean resistance to the Japanese occupation was manifested in a massive nonviolent March 1st Movement[4] in 1919. After 1919, the Korean independence movement, coordinated by the Provisional Government of Korea in exile, was largely active in neighboring Manchuria, China, and Siberia [Byeon, 1999].

With the defeat of Japan in World War II in 1945, Korea was liberated from Japan. The United Nations developed a plan for a trusteeship administration by the Soviet Union and the United States, but the plan was soon abandoned. In 1948, new governments were established the democratic South Korea and the Communist North Korea, divided at the 38th parallel. The unresolved tensions of the division surfaced in the Korean War of 1950, when North Korea invaded South Korea. The war lasted about three years. A cease-fire was signed in 1953. This period also affected the society of Korean mathematicians. A demilitarized zone (DMZ) was set up between the North and the South, along the frontline, which closely followed the 38th parallel [Yang, 1994].

1.2 Mathematical background

The Ten Treatises of Mathematical Classics (TTMC) 산경십서 算經十書 (656 AD) of the Tang Dynasty were transmitted to the Korean Peninsula several times. Some of them used as mathematical textbooks for about 800 years in the Peninsula since they were selected as textbooks in 717 AD in Shilla (668−935 AD), one of the three kingdoms in the Peninsula. Some mathematical treatises studying the Ten Treatises of Mathematical Classics appeared in the Chosun Dynasty (1392-1910) in Korea. Chinese mathematician Zhu Shijie (朱世傑, c. mid-1200s-c. 1303) was the most influential in the development of mathematics in Korea and Japan. His textbook "Enlightenment of Mathematics," Suanxue Qimeng 산학계몽 算學啓蒙 was lost in China but reproduced several times in Korea. Those mathematics books that were printed in Korea were introduced in Japan at the end of the sixteenth century, and then copies with commentaries were published in 1658, 1672 and 1690 [Li., 1999]. The last one was commented on in detail by Takebe Katahiro (1664-1722). East Asian mathematics was called "Zhongsuan" (中算, Chinese

4) The "March First Movement," Samil Movement 삼일 운동: one of the earliest displays of Korean independence movements occurred on March 1, 1919. According to records [e.g., Han, 1988], until the movement was suppressed by the Japanese twelve months later, approximately 2,000,000 Koreans had participated in more than 1,500 demonstrations and 7,500 demonstrators were killed and about 16,000 wounded. Some 47,000 others were arrested by the Japanese police. At that time the Korean population was approximately 16,000,000.

mathematics), “Dongsan / Sanhak” (東算/算學, Korean mathematics) and “Hwasan” (和算, Japanese mathematics). According to the historiography of Chinese, the Dongsan and the Hwasan were taken as the transmitting and influencing results of “Zhongsuan” in Japan and Korea [Xu, 1999]. There were two major trends in Korean mathematics of the early nineteenth century: the first was “Dongsan / Sanhak,” literally “Eastern Mathematics,” which largely depended on the Chinese mathematics of the Song and Yuan periods by adopting counting rod calculations [Horng, 2003, 73-76]; the second trend was Western mathematics, which was transmitted by the Jesuits and their Chinese collaborators from the late sixteenth century. From the literature, there was a long history of mathematical exchanges, including ideas, books, and instructional programs, between Korea, China, and Japan in the area of traditional mathematics [e.g., Horng, 2002; Li et al., 1999]. For example, Shilla’s curriculum for studying Dongsan included courses that were also included in China’s SanHak curriculum (e.g., ChulSul 철술 綴術, GuJang 구장 九章) and courses that were uniquely included in Korea’s Sanhak curriculum (e.g., SamGae 삼개, YukJang 육장) [Shen, 1999]. These courses were transmitted to Japan and integrated into the curriculum of Japan’s Sanhak mathematics. It was observed that some traditional Korean mathematics books[5] that were transferred to Japan assisted Japan in developing its traditional mathematics, Hwasan, and contributed to a Japanese mathematician, Seki Kowa, developing the world’s first techniques for finding determinants [Cha, 2007].

In the Goryeo Dynasty (918-1392), a national university GookJaGam[6] 국자감 國子監 offered mathematics courses by mathematics professors. Korean history of mathematics and mathematics education has not been well represented to the world. In particular, there has been no history of mathematics written in English by a Korean author for the period of 1884-1945 [Xu, 2005]. There were some works in Korean that examined the history of Korean mathematics [Jung, 1986; KSHM, 1985-2008].[7] Among a few English-language works that were related to the history of Korean mathematics, most were written by foreign authors [e.g., Horng, 2002; Tsurumi, 1977]. We found one history paper that was written by a Korean historian. The paper [Jun, 2006] nicely presented the work and life of one Korean mathematician who lived during the Chosun Dynasty. It was not well known how Western mathematics was implemented in general education in Korea. We take, in this paper, a historical perspective to show what kinds of Western

5) Korean mathematics books of the Chosun Dynasty which were printed by copper-type printing plate, 조선간 동활자(銅活字)판 산학서.

6) http://mtcha.com.ne.kr/korea-term/goryo/term32-gugjagam.htm.

7) http://matrix.skku.ac.kr/E-Asia/examples/file1-48.htm and http://matrix.skku.ac.kr/E-Asia/examples/file1-1.htm.

mathematics Korea experienced during the period from the late Chosun Dynasty to the liberation of Korea through the period of the Japanese occupation. Also, we discuss how Japan's colonial education might have affected Korea's efforts in developing mathematics research during the second half of the last century.

2. Western Mathematics in Pre-1895 Korea

We begin this section with when and how Western mathematics was introduced in Korea. Western mathematics was introduced in Korea through China in the 1600s. In China, Western literature (including the book "Element") was reissued as a series of 20 books, which is referred to as "The First Collection of Heavenly Studies," Tianxue chuhan -ChunHakChoHam 천학초함 天學初函. This series was widely used and disseminated during the late Ming 명 明末 and Qing 청 淸 Dynasties of China and brought into Korea around that time. In Korea, Tianxue chuhan-ChunHakChoHam was extensively read by progressive Korean scholars. Mathematics books that were introduced in Korea at that time include Element, DongMunSanJi 동문산지 同文算指 (arithmetic), WonYongGyoEi 원용교의 圜容較義 (translated in 1608; geometry), CheukRyangBubEi 측량법의 測量法儀 (surveying technique), and EuropeSeoGyungRok 유럽서경록 歐羅巴西鏡錄. These books influenced Korean mathematics books that were developed and issued later, such as KuSuRyak 구수략 九數略 (including the orthogonal Latin square) by SukJung Choi (1645-1715) and GooIlJip 구일집 九一集 (including Pascal's triangle) by JungHa Hong (1684-?). DaeYong Hong (1731-1783) included topics relating to infinity in one of his writings, JuHaeSuYong 주해수용 籌解需用 (containing mathematics, astronomy, and trigonometry). ByungGil Nam (1820-1869) compared the western-style equation theory with that of the eastern style in his book (a research paper), MuEHae 무이해 無異解 (covering solutions of algebraic equations). From the record of the literature, it can be inferred that Western mathematics was introduced before the mid-Chosun Dynasty (1610s) in Korea. However, this "new" mathematics was delivered only to a small fraction of government actuarial officials and was not disseminated to the public until the late 19th century [Jun, 2006; Jung and Shim, 1987; KSHM, 1985-2008; Jung, 1931/1983].

2.1 Private schools

In 1875, the Japanese Government sent a naval warship "UhnYoHo," 운요호 雲揚號 to Korea (Ganghwa Island) and caused an accident. As a consequence, Japan forced Korea to sign "the

1876 Korea-Japan (Ganghwa-Island) Treaty", which was a discriminatory treaty. After the treaty, Japan forced Korea to open three ports, Wonsan, Busan, and Incheon for trade [NHCC, 2003]. As the Wonsan port became open in 1879, the local people saw the need to produce leaders that could compete with Japanese trading merchants in the Japanese new system and, to accomplish this, reformed traditional village schools, called Sodang 서당, private schools with a long history of the study of Korean philosophy through Chinese literature. This resulted in the establishment of a western-style school, Wonsan School 원산학사, in 1883. This school was the first modern, private school in Chosun. The number of students enrolled was about 250.[8] The curriculum of Wonsan School included astronomy, geography, electricity, arithmetic and algebra. Wonsan School was the first school that included Western mathematics as part of the curriculum [MOE, 2006; Jung and Shim, 1987].

After the 1876 Korea-Japan Treaty, Korea initiated a protection treaty 수호조약 with the United States in 1882 and with both the United Kingdom and Germany in 1883. Thus, by the 1880s, Korea had started again to exchange ideas with both Western and Eastern countries. More modern Western mathematics was introduced. Western civilization was transmitted naturally through the educational institutes of Korea. Also, the Chosun Government started to show its interest and put great effort into educational reform. With those efforts, many private and missionary schools appeared after Wonsan School.

Those schools led in education in Western mathematics and basic sciences. Subjects such as arithmetic, physics, and astronomy were taught at Paichai School 배재학당 and Ewha Women's School 이화학당[9], founded in 1885 and 1886, respectively [Jung and Sim, 1987]. See Fig. 1 for pictures of some private schools.

<Fig. 1> Pictures of Wonsan School, Paichai School, and Ewha Women's School (left to right).
(Reproduced with general permission from the schools)

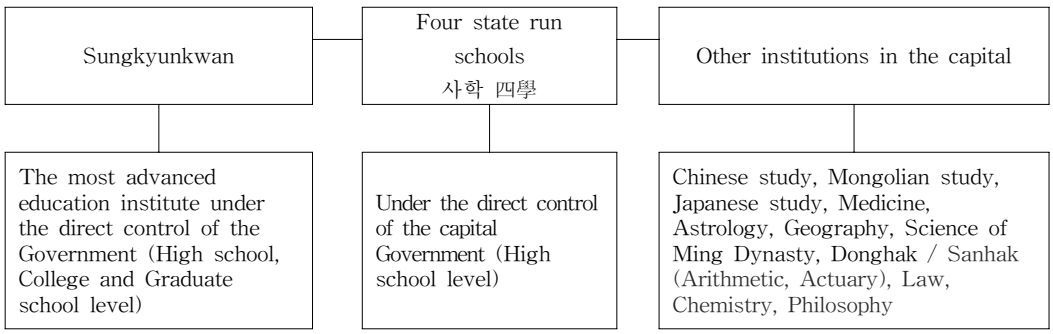
8) At that time, Sungkyunkwan (성균관), which was the largest higher educational institute running over a period of 5 centuries, had managed about 200 students.

9) Ewha Women's School, 이화학당, Ewha Haktang, the former body of the Ewha Womans University.

2.2 Public schools

As private schools appeared and started implementing western-style education, the Chosun Government also began to build modern schools, Dongmunhak 동문학, in 1883, and the Royal English School 육영공원 育英公院, in 1886. Dongmunhak, which was the first Korean Government institution, was an English Language Institute and taught basic Western mathematics unofficially. The Royal English School had Western mathematics in the curriculum, along with courses such as mathematics,[10] English, politics, economics, history, geography, biology, technology, and calligraphy. H.M. Hulbert, G.W. Gilmore, and D.A. Bunker were some of the teachers who taught at the school. At the school, science-related courses used English textbooks. The operating cost of the school was drawn half-and-half from the National Revenue Service 호조 and the Office of Supply and Welfare 선혜청. It took 3 years to complete the school. The school selected 112 freshmen each year [Encyber, 2002].

During the period of the Chosun Dynasty, a total of 1627 people passed SanHakChuiJae 산학취재 算學取材 (a national examination to be a government actuarial officer) to become government actuarial officers or mathematicians [AKS, 1990]. More than 40 government actuarial officers were appointed over 1886-1888 (29 in 1886, 18 in 1888). It thus seemed that some of them worked at the school as a teacher as well as foreign teachers to teach Western arithmetic and algebra during that time [Jung and Shim, 1987]. See Fig. 2 for the public school system in the capital city of Korea until 1894 [Choo, 1961].



<Fig. 2> Public schools in the capital (Seoul) of the Chosun Government until 1894.

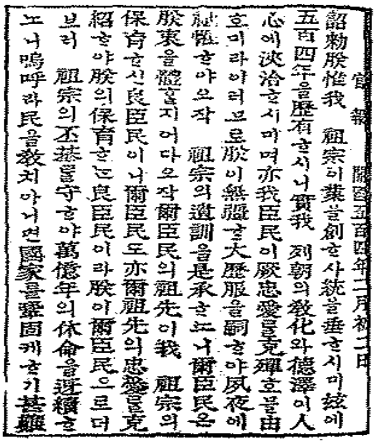
10) 산학 (Sanhak), 산소습산법 (Arithmetic), 대산법 (Algebra).

3. Mathematics in 1895-1910 Korea

During the period 1883-1894, Western mathematics and traditional mathematics were both taught in various schools. Korea announced the Gabo Reform 갑오개혁 (a reform plan) in 1894 to establish a new educational system that promoted drastic changes in elementary, secondary, and university education. The school system was changed to the western style and Western mathematics was adopted as the only mathematics to be taught at the schools at various levels [Jung, 1986].

As a consequence of the Gabo Reform Plan, King Gojong proclaimed an educational rescript in 1895 (see Fig. 3 for the first page of the rescript) and stressed the importance and role of education in a modern nation [Lee, 2000]. The rescript declared education as the driving force for national development and stated that education should be balanced to promote intelligence, health, and virtue, not just the study of traditional classical literature that was the main subject taught in the past. This rescript was thus seen as the initiation of the "new" education. What follows is a part of the rescript:

> *. . . Situations are changed; all systems need to be changed. Education is, however, the most urgent matter. Thus, first of all, the Government will build elementary schools and normal schools in HanSung 한성 (today, Seoul) and provide learning opportunities for all, without distinction of social standing. Be a dedicated student to become a competent man that the nation needs. Also, next, universities and technical schools will be built. [Park, 1982, 6]*



官報에 揭載된 敎育詔書

<Fig. 3> The educational rescript shown in a Government Official Gazette in 1895.

The 1894 Gabo Reform was a turning point for the Chosun Dynasty that led Chosun to become a modernized country. However, the promise to establish universities could not be implemented as a result of Japanese colonial intervention from 1906. Since the educational rescript of 1895, many laws and regulations about school systems and curricula were developed. See Fig. 4 for school ordinances announced between 1895 and 1904 [Jung, 1986]. In this figure, we can find dates that new regulations for Sungkyunkwan, normal school, elementary school, middle school, tertiary school and foreign school were made. Government and public schools were established in compliance with the new schooling system. The new schools began to make continuing efforts to introduce Western mathematics.

漢城師範學校官制	高宗 32年(1895) 4月 16日(勅令 第29號)
外國語學校官制	高宗 32年(1895) 5月 10日(勅令 第88號)
成均館官制	高宗 32年(1895) 7月 2日(勅令 第136號)
小學校令	高宗 32年(1895) 7月 19日(勅令 第145號)
漢城師範學校規則	高宗 32年(1895) 7月 23日(學部令 第1號)
成均館經學科規則	高宗 32年(1895) 8月 9日(學部令 第2號)
小學校教則大綱	高宗 32年(1895) 8月 12日(學部令 第3號)
補助公立小學校規則	建陽 元年(1896) 2月 20日(學部令 第1號)
醫學校官制	光武 3年(1899) 3月 24日(勅令 第7號)
中學校官制	光武 3年(1899) 4月 4日(勅令 第11號)
商工學校官制	光武 3年(1899) 6月 24日(勅令 第28號)
醫學校規則	光武 3年(1899) 7月 2日(學部令 第9號)
外國語學校規則	光武 4年(1900) 6月 29日(學部令 第11號)
中學校規則	光武 4年(1900) 9月 4日(學部令 第12號)
農工商學校官制	光武 8年(1904) 6月 8日(勅令 第16號)

<Fig. 4> A list of the school ordinances during 1895-1904 to set up the new educational system.

3.1 Mathematics in elementary education

With the new educational system beginning in 1895, school mathematics and mathematics education were reorganized in the western style at full scale. Sanhak began to be reduced in Korean mathematics history. Elementary education was designed to consist of a 3-year basic elementary course, called the Simsang[11] course 심상과 尋常科, and a 2- or 3-year advanced elementary course, called the Godeung course 고등과 by King Gojong. The graduates of the basic elementary course had to take an entrance examination to get into an advanced elementary course [Lee, 2000]. The goals and content of mathematics education in elementary school were defined :

11) Simsang 심상 尋常 means regular, ordinary, common, or average.

Its goals are to learn basic computations, develop a logical mind, and acquire essential knowledge. In the basic elementary course, students deal with numbers no greater than 10,000 and learn basic computations and decimal numbers; students calculate both by paper-and-pencil and on the abacus. However, the use of the abacus is determined based on the situation of the school. In the advanced class, students practice abacus calculation; students learn problems involving measurement, money, and time, and are expected to perform such problems by hand; students study simple proportions, usual fractions, and decimals. More complicated proportion problems may be taught if more time could be spent on the topic. The goals of the elementary school mathematics education are that students should be provided with opportunities to develop the ability to reason critically; use and apply "Simple Arithmetic," WoonSan 운산 運算, fluently; use appropriate language to explain procedures and their reasoning; and do mental computations. [Park, 1982, 14-15]

Since then paper-and-pencil and abacus calculations were widely spread through schools. There were 38 public elementary schools in 1896. Subjects taught in the basic elementary curricula included some required courses such as ethics, reading, writing, calligraphy, arithmetic, and gymnastics, and some elective courses such as Korean geography, Korean history, drawing, and foreign language. The advanced elementary curricula covered courses including ethics, calligraphy, arithmetic, Korean geography, Korean history, foreign history, natural science, drawing, and physical education. Before 1905, 60 new elementary schools were built in compliance with new legislation concerning elementary schools: 10 in Seoul and 50 in other regions [Park, 1982, 15; Kim, 1964]. However, no elementary schools 소학교 had advanced elementary courses except one, Gyodong Godeung Elementary School 교동고등소학교, which was established in 1894 in the place of the Royal English School in Seoul. In order to produce elementary school teachers, Hansung Normal School 한성사범학교 was founded in April, 1895.

The first head officer of Japan's Residency-General for Chosun, Itou Hirobumi 이등박문 伊藤博文, started to alter the educational system by Imperial Edict. The Japanese attempted to bring all schools under government management, to reduce the number of schools, to subordinate the content of education to their colonial policy, and to retard Korean education by lowering the level of academic content. Itou Hirobumi announced School Ordinance No. 23 for Common Schools on August 27, 1906 as soon as he took charge. Then, his office changed the name of all elementary schools 소학교 for Korean students to common school 보통학교 and shortened the period of education to 4 years from (5-)6 years. Common schools started to charge high tuition for common-school students [Nakamura, 1975; Shin, 1997]. Common schools were for children between 8 and 12 years old. The basic elementary and advanced curricula were combined in one four-year common school for Koreans. School Ordinance No. 23 for common schools in 1906

defined the goals and objectives of arithmetic education in a Common School (see Table 1 for mathematical topics taught):

- The Objective and Goal of Arithmetic Classes by School Ordinance No. 23 for Common Schools on August 27, 1906 (Article 9)

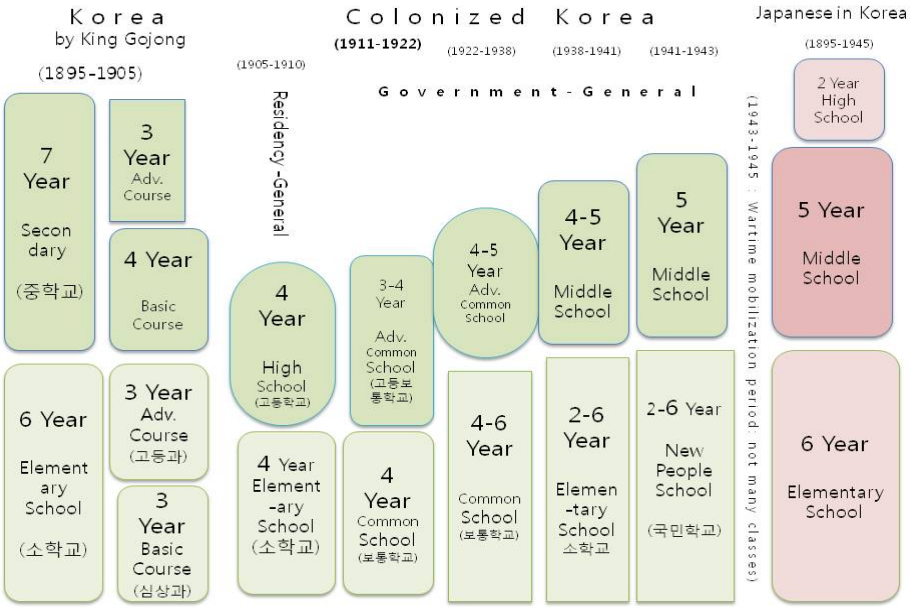
Students learn arithmetic and everyday-use computations to be equipped with the knowledge which is necessary to their lives, reason with numbers, and count accurately. Students begin to work on basic computations with easy numbers, then learn fractions, decimals, and methods of naming 호법 呼法 and writing 서법 書法 for four rules of arithmetic; addition, subtraction, multiplication, and division, followed by measurement and units / conversions of money and time. Although the abacus may be used, paper-and-pencil computation is the primary tool for calculation. Students should be able to understand reasons behind rules and procedures that they use, explain their reasoning, compute fluently in order for them to easily apply the rules and procedures, and be skillful at mental computations. Examples and problems should be chosen to be applicable to real-world situations and with consideration of what they learn in other subjects.

<Table 1> Mathematics topics with credit hours taught in common school during the early colonial period (1906-1911). Reproduced from [Park, 1982, 19].

Grade Level	Topics Taught	Weekly Class Hours	Monthly Class Hours
1	Counting, writing for the usual four rules of arithmetic : addition, subtraction, multiplication and division	6	28 (29 hrs for girls)
2	Usual four rules of arithmetic II	6	28 (29 hrs for girls)
3	Usual four rules of arithmetic III, measurement, and computations of currency and time	6	30 (31 hrs for girls)
4	Usual four rules of arithmetic IV, compound numbers, fractions, and calculation of percentage (revision in 1909)	6	30 (31 hrs for girls)

Japan started to run two different educational systems in Korea, starting in 1906: Japanese students who resided in Korea attended a 6-year elementary school, while all Korean students attended a 4-year common school. A Japanese elementary school in Korea was guided by a different ordinance, the “Elementary School Ordinance 소학교령”, not by the “Common School Ordinance 보통학교령.” This caused a severe discrimination, as we will see later. From the

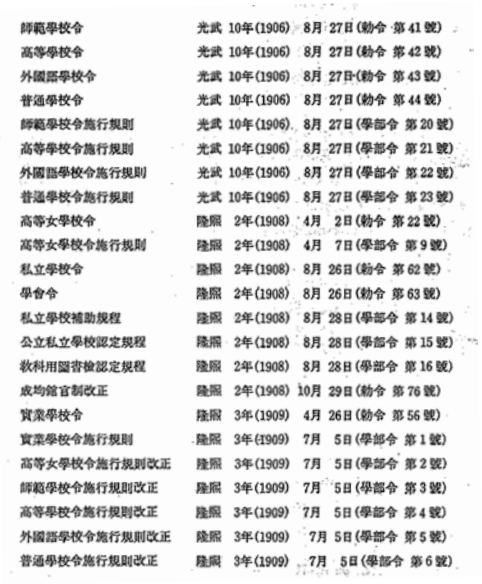
beginning of the colonial period, Japan wanted to provide only colonial education to Korea, just as they did in Taiwan [Tsurumi, 1977, 135; Hirotani, 1973; Lai, 2001]. The same subjects were taught at the new common schools as before, but Japanese language was added from an early grade [Park, 1982, 16]. While more than 73% of Japanese school-aged children attended elementary schools, common schools for the Korean students could only accommodate about 25% of the elementary-school-aged children. Also, the tuition for one student at such public elementary schools was more than 10% of the annual average income of an adult at that time [Cho & Jung, 1999]. Many students could not afford such expenses and therefore had to attend Sodang (traditional private schools in rural areas). In 1908, with School Ordinance No. 62 for Private Schools 사립학교령 promulgated by Japan's Residency-General for Chosun, the Japanese strengthened their control over private schools. Japan even controlled the private schools' budget and textbook selection process as well as curricula programs and, in fact, shut many of them down. Fig. 5 presents the different educational systems during 1906-1938 in Korea.



<Fig. 5> Different educational systems during 1906-1938 in Korea[1)]

In 1910 the complete annexation of Korea by Japan was announced, and for the following 35 years Japan tried to erase Korean culture. In doing so, school curricula were centered on Japanese language and history, with the intent of assimilation of the populace into becoming loyal subjects of the Japanese Empire [Tanaka, 1974, 61-96]. Fig. 6 displays the entire list of school

ordinances announced in 1906-1909. In this figure, we can find dates that revised regulations by Residency-General for Chosun were made for all level of schools in Korea.



師範學校令	光武 10年(1906) 8月 27日(勅令 第 41 號)
高等學校令	光武 10年(1906) 8月 27日(勅令 第 42 號)
外國語學校令	光武 10年(1906) 8月 27日(勅令 第 43 號)
普通學校令	光武 10年(1906) 8月 27日(勅令 第 44 號)
師範學校令施行規則	光武 10年(1906) 8月 27日(學部令 第 20 號)
高等學校令施行規則	光武 10年(1906) 8月 27日(學部令 第 21 號)
外國語學校令施行規則	光武 10年(1906) 8月 27日(學部令 第 22 號)
普通學校令施行規則	光武 10年(1906) 8月 27日(學部令 第 23 號)
高等女學校令	隆熙 2年(1908) 4月 2日(勅令 第 22 號)
高等女學校令施行規則	隆熙 2年(1908) 4月 7日(學部令 第 9 號)
私立學校令	隆熙 2年(1908) 8月 26日(勅令 第 62 號)
學會令	隆熙 2年(1908) 8月 26日(勅令 第 63 號)
私立學校補助規程	隆熙 2年(1908) 8月 28日(學部令 第 14 號)
公立私立學校認定規程	隆熙 2年(1908) 8月 28日(學部令 第 15 號)
敎科用圖書檢認定規程	隆熙 2年(1908) 8月 28日(學部令 第 16 號)
成均館官制改正	隆熙 2年(1908) 10月 29日(勅令 第 76 號)
實業學校令	隆熙 3年(1909) 4月 26日(勅令 第 56 號)
實業學校令施行規則	隆熙 3年(1909) 7月 5日(學部令 第 1 號)
高等女學校令施行規則改正	隆熙 3年(1909) 7月 5日(學部令 第 2 號)
師範學校令施行規則改正	隆熙 3年(1909) 7月 5日(學部令 第 3 號)
高等學校令施行規則改正	隆熙 3年(1909) 7月 5日(學部令 第 4 號)
外國語學校令施行規則改正	隆熙 3年(1909) 7月 5日(學部令 第 5 號)
普通學校令施行規則改正	隆熙 3年(1909) 7月 5日(學部令 第 6 號)

<Fig. 6> List of school ordinances during 1906-1909 (Residency-General for Chosun). New and Revisions on the new educational system

3.2 Mathematics in secondary education

3.2.1 Public schools

As the next level of education after elementary education, secondary-level education was institutionalized by King Gojong's 11th rescript on April 4, 1899. The course of study in the secondary school was designed to be completed in 7 years: 4 years on the basic secondary course, followed by 3 years on an advanced secondary course. The rescript stated that individuals who completed an advanced secondary school course would be hired as governmental officers with a decent ranking, called Panim-gwan 판임관.[11] One secondary school opened with a Korean principal, 7 instructors, and 85 students on October 3, 1900. It offered only a basic 4-year course. The next step was to set up a 3-year advanced secondary school 중학교 고등과. Unfortunately,

11) Panim-gwan, 판임관 判任官(-officer): These division, which were in turn divided into three sub-divisions, namely, the Chigim-gwan (rank 1 to 2), the Juim-gwan (rank 3 to 6), and the Panim-gwan (rank 7 to 9).

Gojong's rescript was never fully effective due to Japanese intervention in the education policy through the 1905 Korea-Japan Treaty. In 1906, the Japanese Residency-General for Chosun only changed the name of this middle school basic course to (State-Run) HanSung High School (관립) 한성고등학교, but no changes were made other than to the name. The school also offered a 4-year program and had the same curriculum that was used in the middle school, although it was named as a high school. Japanese intervention became greater in the Middle School-HanSung High School, so it became unfavorable for Korean students and most students went to private schools instead. This secondary school admitted 85 students in 1900 and only 20 students graduated in 1904; the remaining 65 withdrew from the school as they realized that there was no advanced secondary school to enter after graduating. In 1902, 35 students entered the secondary school but only 6 graduated. In 1903, 39 students entered and all but one dropped out of the school in 3 years. The high drop-out rate continued until 1909. Instead of going to the secondary school, many good students chose to go to private schools and normal schools for the following several years [Lee, 2000]. As time goes education became a primary instrument of Japan's colonization process. Some public (state-run, 관립) schools were used to serve this purpose throughout the colonial period, including normal schools. Japanese had a particular interest on the full control of normal schools in Korea.

In that process, Japan tried to give special benefits to these schools, such as free tuition and a guaranteed governmental job after graduating, for the students attending these schools, and offered 2-year supplementary remedial classes for students entering without proper preparation. The name of HanSung High School was changed to Gyungsung Advanced Common School (경성고등보통학교), which means advanced elementary school (not high or even middle school) under the control of the Japanese Government-General in Chosun, and 8 Japanese teachers were allocated there just after colonization in 1910, as well as to other secondary schools. In April 1912, Japanese Motoske Oka was appointed as the Principal of Gyungsung Advanced Common School. He was the advisor on secondary education to the Japanese Government-General in Chosun [Lee, 2000]. The Japanese had a very special interest in this secondary school as education became a primary instrument of Japan's cultural assimilation in the colony and they started to indoctrinate the Korean youth elite with Japanese imperialism in their particular way.

3.2.2 Private schools

As Korean students preferred to attend private schools, Japan started to control private schools by issuing School Ordinance No. 42 for High Schools in 1906. Many private schools at the

secondary level, both academic and vocational, did not accommodate the ordinance and thus many of them were forced to close down.

There were various private schools and semi-public schools for students of middle school age. For example, foreign language schools for foreign language translators were in demand: the Japanese language school (founded in 1891), the English language school (in 1894), the French language school (in 1895), the Russian language school (in 1896), the Chinese language school (in 1897), and the German language school (in 1898). Many other private schools emphasized Korean nationalism (that is, national spirit against Japan's colonial education and cultural assimilation) and women's education. These schools played an important role during Korea's Opening Era 개화기, the period when Korea opened its doors to many other countries.

Some private secondary schools such as Paichai School, founded in 1885, offered mathematics and science education, including astronomy and physiology. Ewha Women's School, founded in 1886, also covered arithmetic and science education. Mathematics courses taught at some other private secondary schools are shown in Table 2.

<Table 2> Early mathematics courses taught in some private secondary schools.

School	Course	
YangJung School 양정의숙 (4 year)	Year 1	Arithmetic
	Year 2	Finance
	Year 3	Monetary economy
BoSung Middle School 보성 중학교 (4 year)	Mathematics, Bookkeeping	
WhiMoon School 휘문의숙 (4 year)	Year 1	Arithmetic
	Year 2	Mathematics
	Year 3	Algebra, Geometry
	Year 4	Algebra, Geometry
OSan School 오산학교	Arithmetic	
DaeSung School 대성학교	Mathematics	

3.3 Mathematics in teacher education

Promulgated on August 27, 1906 as Rescript No. 41, the Normal School Ordinance 사범학교령 stated that Koreans must have a common school graduation diploma to enter a normal school and the mathematics education in a normal school would be equivalent to the secondary school level. From then, graduates from a normal school were the only ones who were allowed to teach at an elementary school. There were advanced normal schools 고등사범학교 in Japan, as well as normal

schools, that trained secondary school teachers, but there was no advanced normal school in Korea. The Colonial Government only focused on 4-year elementary education in Korea and thus turned a secondary school into an advanced common school 고등보통학교 or "advanced elementary school." No secondary schools officially existed in Korea since 1911. This is why there was no normal school that trained secondary school teachers in Korea. A few Koreans went to Japan to attend advanced normal schools to get a secondary teaching certificate. By the Normal School Ordinance, Hansung Normal School, founded in 1895, was restructured by the Colonial Government [Park, 1982, 34] and more normal schools were established: 10 normal schools up to 1945, including Pyeongyang Normal School 평양사범학교. The Colonial Government never allowed any private normal school until the end of World War II.

Normal schools had a 2-year regular program and a condensed 6-month program at the beginning. At the beginning, mathematics was not included in the entrance examination, but it became a part of the examination later. The curriculum changed over time. It changed to a 3-year program, then to a 6-7 year program (2 years on the basic course 예과, 3 years on the regular course 본과, and 1 or 2 years on a seminar course (teaching focus 강습과 or research focus 연구과). Mathematical topics taught in the regular course of a normal school are presented in Table 3. After Korea had become colonized, the normal -school curriculum was drastically changed to contain Japanized courses (see Table 4 for details).

<Table 3> Normal school regular course 본과 mathematics curriculum and weekly hours.

1906 Offerings			
	Year 1	Year 2	Year 3
Weekly hours	3 (34 hours total)	3 (34 hours total)	4 (34 hours total)
Topics covered	Integers, Fractions, Decimals	Continuation of Year 1, Computations involving proportion and percentage	Introduction to Algebra and Geometry
1907 Revised Offerings			
	Year 1	Year 2	Year 3
Weekly hours	6 (34 hours total)	2 (33 hours total)	2 (31 hours total)
Topics covered	Arithmetic	Algebra, Geometry	Introduction to Algebra and Geometry

<Table 4> DaeGu Normal school 대구사범 basic course - preparatory course curriculum (1939).

Year	1	2	3	4	5	Total
Ethics	2	2	2	2	2	10
Colonial Citizenship	-	-	-	1	1	2
Pedagogy	-	-	3	4	4	11
Korean Literature	8	8	6	5	5	32
Korean / Chinese Letters	4	4	4	4	3	19
English	(2)	(2)	(2)	(2)	(2)	(10)
History / Geography	3	3	3	3	3	15
Mathematics	3	3	3	3	3	15
Sciences	2	2	3	3	4	14
Vocational Education	3	3	3	3	3	15
Art Education	3	3	2	2	2	12
Music	2	2	2	1	1	8
Gymnastics	3	3	3	3	3	15
Total weekly class hours	33(35)	33(35)	34(36)	34(36)	34(36)	

Note: English was an elective course; weekly class hours including English are shown in parentheses.

3.4 Mathematics in vocational education

The start of technical education in Korea dates back to 1899 when the Government of the Yi Dynasty (1392-1910) first established the Commercial and Technical School 상공학교.[12] The Commercial and Technical School Regulations and Agricultural School Regulations were added in 1904. By the Korea-Japan 1905 Treaty, Korean schools including a school of mines, a school of postal service, and a school of electricity were closed. When the Vocational School Ordinance 실업학교령 was announced in 1909, the curricula of common schools, normal schools, high schools, and girls' high schools 고등여학교 were also revised. Vocational schools offered 3-year programs.

12) http://www.phy.duke.edu/~myhan/b_winds.html, Early Winds in Science and Technology in Korea, 1995.

All vocational schools taught arithmetic, algebra, and geometry. Some schools had additional courses according to the purposes of the schools. For example, the Technical School had trigonometry and bookkeeping and the Agricultural School taught the abacus [Park, 1982, 38]. Mathematics courses taught in some vocational schools are presented in Table 5.

<Table 5> Vocational school mathematics curriculum and weekly hours (1909).

Agricultural school			
	Year 1	Year 2	Year 3
Weekly hours	5 (30 hours total)	4 (30 hours total)	4 (30 hours total)
Topics Covered	Arithmetic, Geometry	Algebra, Geometry	Algebra, Geometry
Commercial School			
	Year 1	Year 2	Year 3
Weekly hours	5 (34 hours total)	4 (34 hours total)	3 (30 hours total)
Topics Covered	Arithmetic, Abacus	Algebra, Geometry	Algebra, Geometry
Technical School			
	Year 1	Year 2	Year 3
Weekly hours	5 (35 hours total)	5 (36 hours total)	5 (36 hours total)
Topics Covered	Arithmetic, Geometry	Algebra, Geometry	Algebra, Trigonometry, Bookkeeping

3.5 Mathematics textbooks

British, American, and French mathematics books (on arithmetic, algebra, geometry, and trigonometry) were translated between 1871 and 1880, as well as Chinese and Japanese books. Later, approximately 40-50 Korean mathematics textbooks began to come out. The Korean textbooks that were written in Korean and published included [Park, 1982, 126]:

1900	“New Arithmetic,” SanSulSinSeo Vols. 1 and 2 산술신서 상・하, 算術新書 “Selective Arithmetic,” JungSunSanHak Vol. 1 정선산학/정선수학 精選數學
1901 -1905	“New Selective Arithmetic,” SinJungSanSul Vols. 1, 2, and 3 신정산술
1907	“Selective Arithmetic,” 2nd Edition of JungSunSanHak Vol. 1 정선산학 상/재판, 精選算學 “Secondary School Arithmetic,” JungDungSanHak Vols. 1 and 2 중등산학 상・하, 中等算學 “New Arithmetic,” SanHakSinPyun 산학신편 算學新編
1908	“Elementary Arithmetic Textbook,” ChoDeungSanSulGyoGwaSeo Vol. 1 초등산술교과서 상 “Contemporary Arithmetic,” ChoiSinSanSul Vols. 1 and 2 최신산술 상・하 “Elementary Modern Arithmetic,” ChoDungGunSeSanSul Vol. 1 초등근세산술 전, “New Arithmetic Textbook,” SinSikSanSulGyoGwaSeo Vol. 1 신식산술교과서 전
1909	“Comprehensive Arithmetic,” SanHakTongPyun 1st, 2nd and 3rd editions (1908) 산학통편 초판, 재판, 3판, 4th edition (1909) “Common School Arithmetic,” BoTongGyoGwaSanSulSeo Grades 1 and 2 보통교과 산술서 제1학년용・제2학년용 “Arithmetic,” SanSulJiNam Vol. 1 산술지남 상 “Modern Algebra,” GeunSeDaeSu Vol. 1 근세대수 상

Among these, being written by a Korean mathematician Sang-Seol Lee 이상설 (who was President of Sungkyunkwan in 1894-1896) in Korean, SanSulSinSeo 산술신서 was a well edited version of an 1888 Japanese mathematics book “Modern Arithmetic,” GeunSeSanSulSeo, which was written by Ueno Giyoshi 우에노 기요시/상야청 上野淸 with influence from Britain and the United States. SanSulSinSeo was used as the mathematics textbook at Hansung Normal School and secondary schools until the country was colonized. SanSulSinSeo included topics such as enumeration of permutations ($_nP_r$). The use of the letter n for any natural number was seen in this book for the first time in Korea. One thousand copies of this book were printed in 1900. JungSunSanHak was also written in Korean. This was an edited version of another Japanese mathematics book “New Math,” SinSuHak 신수학, which was, in turn, an edited version of European mathematics. Topics included were basic computations, geometry, trigonometry, measurement, etc. The general structure of JungSunSanHak was similar to that of SanSulSinSeo, but SanSulSinSeo contained more advanced mathematics. Il-Sun Ryu 유일선, who published Korea’s first mathematics magazine, Math Bulletin 수리잡지 數理雜誌, wrote elementary mathematics text ChoDeungSanSulGyoGwaSeo. SanHakSinPyun was a secondary school mathematics textbook. This book included topics related to measurement, time, repeating decimals, proportions, percents, finance/tax, square roots, cube roots, arithmetic and geometric series, ideas involving area and volume, plane geometry, and so on. SanHakTongPyun was another two volume mathematics textbook used at the secondary school level. This book covered topics such

as fractions, primes, proportions, extraction of a square root, arithmetic and geometric series, measurement, and so on. Formal proof was not a part of the content. The mathematics during that time included "newer" topics influenced by Western mathematics but its approach was still traditional with a tendency to emphasize computations rather than formal proofs. Other than SanSulSinSeo, most of the above listed books were oriented toward computations. Theories and proofs were mostly excluded. After 1910, Korean mathematics textbooks were mostly abandoned by the Japanese Colonial Government and Koreans had to use Japanese books [Oh and Kim, 2000, 75-89; Park, 1982; Rim, 1960, 85-92]. This meant that Korean students had to learn Western mathematics in the Japanese language.

3.6 Mathematics in higher education

3.6.1 State-run institutions

During the late Chosun Dynasty (the 17th-19th centuries), formal education was provided at the nation's highest educational institute Sungkyunkwan 성균관 成均館, and "four secondary schools" Sahag 사학 四學 in Seoul, and "local educational institute of Confucius" Hyanggyo 향교, "local public schools" Seowon 서원, and many private schools Sodang 서당 in the provinces. These institutes provided traditional education based on "the Four Books (of Ancient China)," SaSeo 사서 四書, as follows : "The Great Learning" Daehag 대학 大學, "The Doctrine of the Mean" Joongyong 중용 中庸, "The Analects (Discourses) of Confucius" Noneo 논어 論語, and "The Works of Mencius" Maengja 맹자 孟子. However, at Sungkyunkwan, some progressive scholars were interested in learning Western culture and advanced sciences including mathematics and astronomy. They added Western mathematics courses such as arithmetic into the curriculum [Lee et al, 2006; SKKU, 1998].

Sungkyunkwan was established as the nation's highest educational institute in 1398. Sungkyunkwan was founded to provide an education to foster the nation's leaders, scholars, and governmental officers. It admitted only the very best young men who were selected from all over the country via a formal entrance examination. It had about 200 students enrolled each year and offered a variety of courses including Literature, Oriental Philosophy, Politics, and Confucianism. Since 1895, Sungkyunkwan's functions were divided into two divisions: one a religious institute, and the other an educational institute. The Educational Institute in Sungkyunkwan was called "The Study of Classics Department," Gyunghak-Gwa 경학(經學)과, and was announced as having a 3-year curriculum of higher education at Gyunghak-Gwa that included Mathematics (more

likely arithmetic) as one of five required courses, together with reading, writing, history, and geography. A modern system of professorship, entrance exam, graduation exam, semesters, and credit hours was all adopted. The Educational Institute at Sungkyunkwan was classified as having Gyunghak-Gwa and other departments (history, geography, and mathematics) in 1908. The 3-year curriculum included arithmetic, algebra, and geometry together with physics and chemistry. Sungkyunkwan adopted the Western academic standard of modern college education [SKKU, 2006, 1998].

The Chosun Government established a law school in April 1895 and a medical school in August 1899. Mathematics was included in the curricula. The mathematics taught was at the level of college mathematics. Both schools selected students through an entrance examination with mathematics as one of the subjects in the examination [Seo, 1994, 49-56; Watanabe, 1986].

3.6.2 Private institutions

Starting from the mid 1880s to the end of the 1910s, many private schools were founded by Korean nationalists, religious leaders, dedicated people, and Western missionaries. The missionary schools included the Yongsan Seminary (Catholic) and Chosun Presbyterian Seminary (Protestant), both of which were to foster Christian missionaries. There was also the Myungjin School for Buddhist education, which was opened in 1906 by a Buddhist organization and closed in 1944 by the colonial government.

Among the schools for general modern higher education, there were several schools that were founded and managed by religious organizations. For example, Paichai School-college division (1895), SoongSil School-college division (1905) in Pyongyang, and Ewha Women's School-college division (1910) with 15 students were founded by Western religious organizations and provided modern Westernized higher education to the general public. (By 1901 there were five hundred missionary primary schools in Pyongyang and its suburbs [Kim, 2000, 152].)

Paichai School was opened with two students in 1885 and quickly thrived to accommodate 200 students whose tuition was compensated by national scholarships by the year 1895. English, geography, mathematics and science courses were taught. In the earlier years, Paichai offered a 1-year preparatory program, a 3-year junior-high program, and a 4-year college program. The college division consisted of theology and liberal arts programs. Theology was a 4-year program and the curriculum of the liberal arts section included physics and chemistry. However, the college division was closed in 1917. Even the name of the school, which was dedicated by King Gojong, could not be used from 1925 by orders of the colonial government [Lee, 1989]. Ewha

Women's School was a school that was founded in 1886 by an American woman missionary Ms. Mary Fletcher Scranton (1832-1909). It offered middle school and high school programs for women. The high school curriculum included algebra, geometry, trigonometry, astronomy, geography, physics, chemistry, history, and physiology. Starting from April, 1910, it also offered a college curriculum and was devoted to providing higher education to women. The college division at SoongSil School was established in 1905 and then changed its name to Union Christian College in 1906. This college, in 1908, became SoongSil College (Soongsildaehak), which was the first modern college with official accreditation from the Department of Education of the Chosun Government. It adopted a 4-year college program. Its curriculum included mathematics, physics, and other natural sciences, such as zoology, biology, and astronomy.

There were 5 or 6 other professional schools, including Gwangheung School 광흥학교, which was founded in 1898 as a 3-year professional school and which taught arithmetic, Japanese, English, law, geography, and history. Most of the professional schools included arithmetic, algebra, and geometry as part of the content of their entrance examinations. However, all of the above college departments in private and state-run schools again lost their accreditation and were closed by the Japanese Government-General for Chosun 조선총독부 just after the complete annexation of Korea by Japan in 1910.

Most private post-secondary schools were founded in early 1910 before Japan's colonization of Korea, mostly by patriots, nationalists, and leaders of the independence movement. Those schools were primarily geared to an educational enlightenment movement and were places where youngsters were inspired with the spirit of patriotism against Japanese control over Korea [Fischer, 1928]. However, all of these schools lost their college status and many had to close down in 1911 which was just after Korea became colonized by Japan. For example, some schools were closed by the colonial government since the school refused to worship at Japanese Shinto shrines which were built in Korea to make Koreans bow and worship the Emperor of Japan. The college division of Paichai School was also closed in 1917. The opportunity of Koreans to gain higher education was lost since then.

4. Mathematics in 1910-1945 in Colonized Korea

Korea became colonized in 1910 and remained so until 1945. This period has been referred to as the "Period of Assimilation" and "Korean Cultural Erasures", etc. From 1910, Japan ruled over the whole of the educational administration through the education department 학부 學部 of Japan's

Government-General for Chosun, the colonial government organ. This government's education became primarily an instrument of assimilation ("Imperial Citizen Forming") for the construction of Japan's Colonial Empire. Beginning from elementary school, the colonial government focused mostly on teaching the history of the Japanese Empire and glorification of the "Heavenly Emperor Hirohito 천황." Korean students were made to worship at Japanese Shinto shrines and swear an oath of loyalty to the Japanese Emperor (Fig. 7 displays pages from an elementary ethics textbook that show rules for worship) [Hirotani, 1973; Lai, 2001; Lee, 1958; Moon, 1965]. Teachers at all public schools including elementary schools, dressed in military uniforms and carried swords to enforce the intimidation of the students. All classes were taught in Japanese, and later students were academically penalized for the use of the Korean language at school. In 1937, because of the requirement for worship at a Japanese shrine at every school, many private schools including Soongsil and Paichai Schools closed voluntarily in order to avoid doing so. Japan's colonial education policy was quite simple. Tadao Yanaihara state it in [Yanaihara, 1938]: "It is intended that Japanese-speaking Koreans shall find work for them Japanese industrial needs; and the ultimate aim of our education is the Japanization of Korea." Japan made Korean schools adopt Japanese curricula and textbooks for the corresponding grades but they had to shorten the years of schooling at all levels [Watanabe, 1986]. This system resulted in less education for Koreans. Not only did this shortening of the school duration cause less education for Koreans in Korea, but it also disadvantaged those Koreans who wanted to pursue advanced education abroad in Japan, as they were not allowed to attend an advanced level school through the regular admission process, because of the unequal education that they received in Korea [Lee, 2000].

The colonial Japanese Government revised the original Chosun (Korea) Education Ordinances 조선교육령 four times with a particular purpose for each renewal: the first renewal (1911-1922) was to establish the fundamentals of colonial citizenship for the Japanese Emperor (황국신민 皇國臣民) (see Fig. 7); the second renewal (1922-1938) was to reinforce conciliation with national spirit disruption between the Korean people; the third (1938-1943) was to implement their assimilation policy (내선일체 內鮮一體); and last, the fourth was to obliterate the spirit of Korean tradition (1943-1945) [NAPS, 1945; Tsurumi, 1977]. The colonial government abolished existing post-secondary institutions and allowed only Japanese style 4-year elementary schools to open in Korea. This blocked the development of post-secondary education in mathematics. Higher education in mathematics for Koreans, public or private, was wholly lacking for most years during this period.

<Fig. 7> Rules for worship shown in an elementary ethics class textbook.
Taken from HanGyeoRe 한겨레newspaper[13].

4.1 Mathematics in elementary education

The Japanese Residency-General for Chosun increased the number of colonial public common schools as a gradual means of ethnocide. From 1906 until the colonial government implemented the third Chosun Educational Ordinance in 1938, elementary education was conducted at Common School for Korean students and at Elementary School for Japanese students in Korea [Ahn, 1993; Oh, 2000; Yu, 1992].

At the same grade level, the Japanese elementary schools and the Korean elementary schools adopted the same curriculum and used textbooks written in Japanese. Korean elementary schools had one additional course, Korean language, for a while. After Japan's colonization of Korea in 1910, the Korean language course became an elective course; Korean history and Korean geography were completely dropped; and "History" and "Geography" became "Japanese History" and "Japanese Geography." Fig. 8 shows some Japanese textbooks used at elementary schools for Korean students.

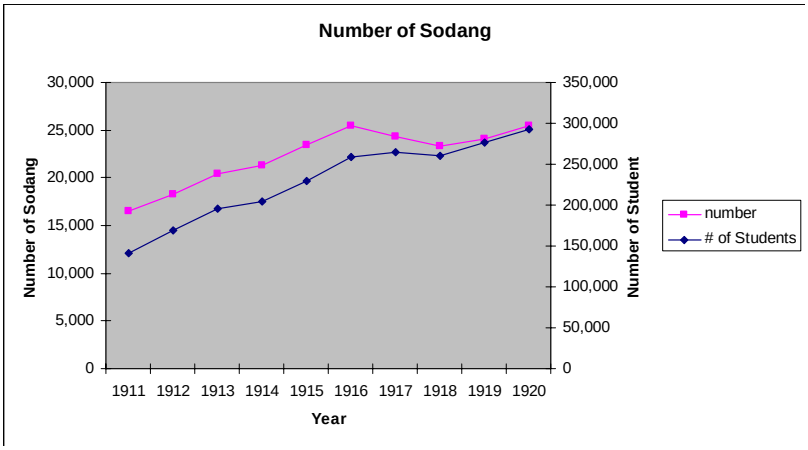
Mathematics Japanese Science book in the colonial period

<Fig. 8> Japanese textbooks used for Korean elementary students which were published by the office of the Chosun Government General 조선총독부.
(Source: personal collection of Sin-Won Kang; photos taken by the first author).

13) Note : Korean students were made to worship at Japanese Shinto shrines and swear an oath of loyalty to the Japanese Emperor Hirohito at 8 AM and noon.

By 1938, Japan had changed the name of Common School back to Elementary School, so that Japan could argue that Koreans and Japanese were then treated the same. Although the same name was given to elementary schools both for Koreans and for Japanese, schools for Japanese students and schools for Korean students were still different in administration and curriculum. Japan's ostensible reason was their assimilation policy as addressed in the third Chosun Educational Ordinance in 1938, but the actual reason was to find a pretext for mobilizing Koreans in World War II.

In early Government-General policy, strict regulations governing controls were not put on Sodang until 1929. In part, this tolerance was a function of an official policy of reconciliation and respect toward Confucian learning and scholars, but there was a very practical reason for it too. Japan employed Sodang as makeshift substitutes for common schools for regions where public schools did not exist. Government-General records report that the number of Sodang increased from 16,540 in 1911 to 23,441 in 1915 but began to decline after 1920. Fig. 9 presents the change over time.



<Fig. 9> The number of students and Sodang 서당, local private schools, from 1911 to 1920. (The Korean population at that time was about 15-17 million.)

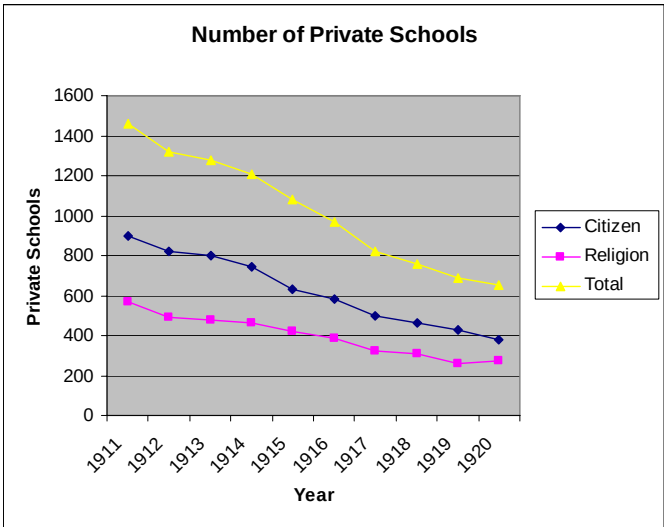
However, there were no mathematics courses in Sodang. Many students who attended Sodang studied mathematics by themselves and later became good mathematics teachers [KMS, 1998; Tsurumi, 1977, 166].

Finally, all elementary schools were designed to a 6-year program from 1938, but many Korean elementary schools remained 4-year schools. Elementary schools used only textbooks

written by the Japanese Department of Education and published by the Japanese Government-General for Chosun. The colonial government assigned Japanese teachers who were also military members to all schools to monitor any independence movement. There was no compulsory elementary education until after the liberation of Korea.

4.2 Private schools

The number of private schools, both elementary and secondary, decreased from 1462 to 653 because many private schools were forced to change to public schools by the 1911 Private School Rule. Fig. 10 shows the changes in the number of private schools during 1911-1920.



<Fig. 10> Number of private schools in 1911-1920.

This resulted in an increase in the number of public schools. In fact, before the increase, there were 100 public elementary schools which accommodated about 2.88% (about 40,000) of the whole population (1,385,944) of Korean elementary school-aged children in 1910 [Dong, 1973, 157]. This gradually increased to 3.3% [Yanaihara, 1938, 198-207].

4.3 Secondary schools

Once Japan was shortened Korean elementary schools to a 4-year program from a 6-year program, existing secondary schools were restructured and renamed as advanced common school

고등보통학교, meaning “advanced elementary school” in 1911. In 1920 there were twenty-one advanced common schools (fourteen boys’ schools and seven girls’ schools); by 1930, there were thirty-four schools (twenty four boys’ schools and ten girls’ schools) [Dong, 1973, 158]. Advanced common schools (grades 5-8 or 9) were supposed to be at the secondary level but taught an elementary level curriculum, as the school name suggested. Although Japan insisted that this school was an equivalent program with the middle school (grade 6 or 7-11) for the Japanese students in Korea, the curricula of Japanese middle schools were advanced to 2 or 3 years ahead of the Korean advanced common school. Thus unlike Japanese students, Korean students from advanced common schools had many disadvantages in continuing to study at the next level. This discrimination caused many complaints.

4.4 Higher education

Post-secondary mathematics courses began to be offered in 1917, partially through the Mathematics and Physics Major at Yonhee Professional School 연희전문학교 (junior college), which was founded by missionaries [Underwood, 1926]. There was no college in Korea until 1926. The colonial government only allowed some technical high schools or vocational schools in Korea (고등공업학교, 전수학교, 전문학교), although many Korean people very much desired to create colleges and have college education. As the people’s complaints against Japanese educational policy grew stronger, the colonial government decided to build a strictly controlled state-run college. The college created a preparatory division in 1924 and taught some high-school mathematics. It was the only school in Korea where Japanese and Koreans could study together.

4.4.1 State-run institutions

The colonial government controlled all schools by imposing various rules and ordinances throughout the colonial period. The government established four state-run professional schools in the Seoul area from 1916 to 1918. They were Gyungsung Law School, Gyungsung Medical School, Gyungsung Industrial School, and Suwon Agricultural School. In addition to these, four other public professional schools opened later. All the students who were to be admitted to any of these schools were required to obtain police clearance as a background check. However, the school systems and academic years of these schools were much different from those in Japan until 1922, when the second Chosun Educational Ordinance was issued. Besides these professional schools, there was not a single public high school or college in Korea until 1924.

After the declaration of independence in 1919, the subsequent massacres, and continuing anti-Japanese rallies, the colonial government decided to establish a state-run college in 1922. This was an attempt to close off all efforts to open a college by the citizens[14] of Korea [Lee, 1989]. The colonial government opened the college preparatory school in 1924, and later, in 1926, this school became the first state-run college, the Imperial College at Seoul (Gyungsung Imperial University, Keijo Imperial University, 경성제국대학). The Imperial College was the sixth Imperial University of Japan, founded inside or outside Japan, during the period of Japanese rule. It was the only school (in Korea) which both selected Koreans and Japanese attended together. A main purpose of the establishment of the college was not to provide higher education to "Korean people," but to "the Japanese who resided in Korea." In fact, more than two-thirds of the students enrolled in the college were Japanese [Jun, 2005]. Another purpose of such establishment was to indoctrinate the Korean youth elite with Japanese imperialism. In his study [Park, 1991], NoBo Park 박노보 noted that the allocation of educational expenses in Chosun's annual budget since the 1919 March 1st independence movement was 1% on average; more than half of the 1% was spent on the newly built Imperial College at Seoul, where more than 2/3 of the student population were Japanese.

The Imperial College at Seoul began with two departments: Law-and-Literature and Medicine, and it had no other departments. In the spring of 1941, for the first time, some 3-year applied science and engineering programs were introduced at this college. This was to foster engineers and scientists who would be useful for the war in Manchuria and China [NHCC, 2003]. As the college was mainly for Japanese students, the admission policy for the college was restricted for Korean students. All other established institutions of higher learning were downgraded to three-year non-degree-granting institutions [Jun, 2005].

In 1941, a physics department was established in the Imperial College at Seoul. There were neither colleges nor professional schools that had mathematics departments or offered mathematics programs until 1945 [KMS, 1998]. This brutal circumstance allowed the field of mathematics to become more barren than any other disciplines. This also made a big difference in early higher education between mathematics and physics in Korea after World War II. Until 1945, there were about 10 college mathematics degree holders in Korea who earned their degrees in Japan, except for one from the U.S. Not surprisingly, Japan's 35-year colonial policy resulted in a lack of Korean professionals who were qualified to teach college-level mathematics.

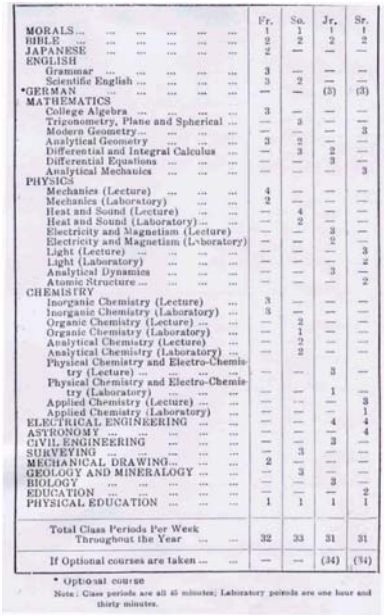
14) Hundreds of thousands of Koreans signed up and donated money and land to build a university because the colonial government did not show any interest in building one.

According to [Jun, 2005], at the Imperial College at Seoul there was no Korean faculty out of 44 members in the faculty. There were 44 Korean students, out of a total of 168, in 1926. There was only one Korean faculty out of 140 and 216 Korean students out of a total of 611 in 1941. Starting from 1941, the Imperial College at Seoul began to offer a few college-level mathematics courses in its newly established physics department. ImHak Ree, who was a graduate of that department, recalled that there was a class on elliptic functions, but he had to study mathematics by himself [KMS, 1998; Home, 1990].

4.4.2 Other higher-education institutions

Arithmetic, algebra, and geometry were usually included in the content of entrance examinations for all professional schools. Some mathematics courses were included in the curricula of technical schools. Some arithmetic and calculation of interest and tax were taught in the business and economics division of some professional schools.

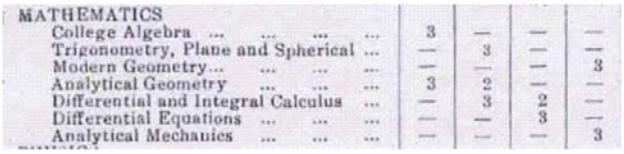
The colonial government declared a new Professional School Act 전문학교 규칙 and Revised Private School Act 개정 사립학교 규칙 in 1915. Under the new 1915 Professional School Act, the former Yonhee Professional School was established in April, 1915 by missionaries. Although the government intended to create a modern university, the colonial government did not allow missionaries to open a university in Korea. Yonhee Professional School was approved to open as a private professional school in 1917. The academic programs and school organization of Yonhee Professional School were close to those of a modern university system. It was perhaps considered as the first modern university in Korea as its academic program consisted of departments of humanities and letters, theology, mathematics/physics, agriculture, and applied chemistry. It not only adopted a university system for the first time in Korea, but also had a mathematics and physics department in the program for the first time. This was due to an American missionary and physicist, Arthur Lynn Becker, who was deeply involved in the establishment of the school from the beginning. Calculus and differential-equation courses were taught in the department according to the course catalog and curriculum published in 1921 at Yonhee (see Fig. 11 for the mathematics curriculum of Yonhee). However, the mathematics and physics department and the other departments, except for the humanities, theology, and business departments, were closed under the new rules of the second of the Chosun Education Ordinances by the colonial government in March 1923. Due to Becker's efforts, the math/physics department was reinstated in April, 1924 and remained until 1944, when all private schools were either closed or taken over by the colonial government.



	Fr.	So.	Jr.	Sr.
MORALS	1	1	1	1
BIBLE	2	2	2	2
JAPANESE	2	—	—	—
ENGLISH				
Grammar	3	—	—	—
Scientific English	3	2	—	—
*GERMAN	—	—	(3)	(3)
MATHEMATICS				
College Algebra	3	—	—	—
Trigonometry, Plane and Spherical	—	3	—	—
Modern Geometry	—	—	—	3
Analytical Geometry	3	2	—	—
Differential and Integral Calculus	—	3	2	—
Differential Equations	—	—	3	—
Analytical Mechanics	—	—	—	3
PHYSICS				
Mechanics (Lecture)	4	—	—	—
Mechanics (Laboratory)	2	—	—	—
Heat and Sound (Lecture)	—	4	—	—
Heat and Sound (Laboratory)	—	2	—	—
Electricity and Magnetism (Lecture)	—	—	3	—
Electricity and Magnetism (Laboratory)	—	—	2	—
Light (Lecture)	—	—	—	3
Light (Laboratory)	—	—	—	2
Analytical Dynamics	—	—	3	—
Atomic Structure	—	—	—	2
CHEMISTRY				
Inorganic Chemistry (Lecture)	3	—	—	—
Inorganic Chemistry (Laboratory)	3	—	—	—
Organic Chemistry (Lecture)	—	2	—	—
Organic Chemistry (Laboratory)	—	1	—	—
Analytical Chemistry (Lecture)	—	2	—	—
Analytical Chemistry (Laboratory)	—	2	—	—
Physical Chemistry and Electro-Chemistry (Lecture)	—	—	3	—
Physical Chemistry and Electro-Chemistry (Laboratory)	—	—	1	—
Applied Chemistry (Lecture)	—	—	—	3
Applied Chemistry (Laboratory)	—	—	—	1
ELECTRICAL ENGINEERING	—	—	4	4
ASTRONOMY	—	—	—	4
CIVIL ENGINEERING	—	—	3	—
SURVEYING	—	3	—	—
MECHANICAL DRAWING	2	—	—	—
GEOLOGY AND MINERALOGY	—	3	—	—
BIOLOGY	—	—	3	—
EDUCATION	—	—	—	2
PHYSICAL EDUCATION	1	1	1	1
Total Class Periods Per Week Throughout the Year	32	33	31	31
If Optional courses are taken	—	—	(34)	(34)

* Optional course

Note: Class periods are all 45 minutes; Laboratory periods are one hour and thirty minutes.



MATHEMATICS				
College Algebra	3	—	—	—
Trigonometry, Plane and Spherical	—	3	—	—
Modern Geometry	—	—	—	3
Analytical Geometry	3	2	—	—
Differential and Integral Calculus	—	3	2	—
Differential Equations	—	—	3	—
Analytical Mechanics	—	—	—	3

<Fig. 11> Math/Physics Department's Mathematics Curricula with credits in Bulletin of Yonhee Professional School (1921).

Towards the end of World War II, under the Japanese wartime state-of-emergency plan, the colonial government conscripted many students and sent them to the front line of the war. The government also used many private facilities and school buildings to train people whom it needed. The Yonhee Professional School was changed to become the Gyungsung Industrial Management Professional School 경성공업경영전문학교, an industrial and manufacturing school which trained students to become skilled technicians needed in the manufacture of military equipment. By 1944, most foreign faculty members were fired and sent to their home country when the school was taken over by the colonial government. Many Korean faculty members were also fired.

In summary, according to the 1944 Census data, the proportion of Korean people who had the opportunity to start any junior high level of education was less than 1% of the whole population, while it was over 70% for Japanese people [KEDI, 1999]. The Japanese colonial government had no interest in educating Korean people. All levels of state-run schools under the colonial

government were mainly designed to educate Japanese people who migrated to Korea. For example, Koreans who attended the government's junior colleges made up only 26.9% of the entire population enrolled in government junior colleges [Dong, 1973, 161]. These education policies, together with other forms of suppression of Korean culture and language practiced by the colonial government, eventually led to a revival of Korean nationalism and Korean students' protests. In July, 1945, there were 257 teachers and 2,382 students in 21 tertiary schools and the whole Korean population was about 26 million [NCB, 1999].

Unfortunately, college mathematics programs were never offered and college-level mathematics education was never provided in Korea at all. As a result, only a few people had a college education in mathematics or had experience of some college courses in mathematics, such as calculus and differential equations at most. Consequently, in 1945, there were no more than 10 people with a bachelor's degree in mathematics. There was only one master's degree holder in mathematics and there were no mathematics doctorates in the Korean Peninsula.

5. Conclusion

We have discussed the development of the educational system, policy, leadership, and curriculum, with a particular focus on mathematics, in late 19th and early 20th century Korea (including Korea's period of colonization by Japan). We have seen school curricula containing Western mathematics that Korea experienced in the early 20th century. We drew the following conclusions: (1) There had been a small but unbroken tradition of scientific research in mathematics by a group of governmental actuarial officers throughout the Chosun Dynasty (1392-1897); (2) There were many sources and much desire to introduce and learn the Western cultures, mathematics, science, and technology in the late 19th century among the royal circle of the dynasty, officers, social elite, and intellectuals in Korea; (3) Many foreign missionaries who entered Korea began to establish private educational institutions beginning in the 1880s; (4) However, a long tradition of mathematical research and all the westernization reform in education in higher-level mathematics that had grown in the 1880s were slowly but completely demolished. Only elementary and some secondary mathematics education were provided during the Japanese colonization period. All state-run schools for higher education and college divisions of many private schools were closed or downgraded by the colonial government or changed to schools for different purposes. Virtually no advanced mathematics beyond the secondary level was taught in Korea during the Japanese colonial period from 1910-1945. As a consequence, when Korea was

liberated from Japan in 1945, there were only a handful of Koreans who had college degrees in mathematics, all of whom were educated abroad. During the Japanese occupation, most professional jobs in Korea were taken by Japanese. For instance, as of 1942, the number of officers hired by the colonial government reached 150,000, among whom more than two-thirds were ethnic Japanese [Dong, 1973, 164]. Thus, when Korea was liberated from Japan, there was a serious shortage of professionals in all professional areas in Korea.[15] The result of colonial mathematics education was that there was no one left in the Korean Peninsula who had research experience in modern mathematics.

After the liberation, many colleges were founded and a large number of mathematics departments were established [Kim, 1985]. Many mathematics faculty positions were filled by practicing teachers who had learned mathematics by themselves, or teachers who graduated from a normal school, or graduates in science and engineering-related majors. Most faculty members in many newly built mathematics departments had received 10 to 13 years of education. Some faculty members had received only 7-9 years of formal education [KMS, 1998]. The situation of shortage of scholars and professionals became worse when Korea was divided into North and South Korea. Among the available science and engineering professionals, many went to North Korea due to disagreement on the 1946 New National University Plan (국대안 파동)[16]. This plan was drawn up to make a National University of (South) Korea from the Japanese Imperial College at Seoul by the American Military Administration governing South Korea [Lee, 2006]. Many of the remaining professionals were also missing or dead during the brutal Korean War between 1950 and 1953. Almost all universities offered graduate programs in mathematics as soon as they started to have their own graduates. Mathematics faculty members had to teach themselves college mathematics in order to teach undergraduate students in the 1950s, and had to study graduate mathematics by themselves in order to teach at graduate schools in the 1960s. People who had gained advanced mathematics degrees from abroad began to return to Korea, starting in the late 1960s.

These circumstances, along with Japan's half-century long interference and the North-South conflict, were the main barriers to the advancement of research level mathematics for most of 20th century Korea. We found that a mathematical research tradition in Korea started to be born again in the late 1970s.

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15) In 1937, Japanese occupied 6.5 % of the jobs available in Korea. In 1936, Japanese occupied 4.9 % of the jobs available in Taiwan [Tsurumi, 1977; Dong, 1973].

16) http://neo.urimodu.com/bbs/zboard.php?id=club_educa&page=8&sn1=&divpage=1&sn=off&ss=on&sc=on&select_arrange=headnum&desc=asc&no=361.

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1895년부터 조선은 초등, 중등교육기관과 근대 고등교육기관을 설립하면서 꾸준히 새로운 교육과정을 도입하며 근대 수학을 받아들이고 전수하는 부단한 노력을 기울였다. 그리고 이 노력은 1897년 8월 대한제국으로 국호를 바꾸면서 더욱 적극적으로 추진된다. 그러나 이러한 노력은 1905년(광무년). 한국의 외교권을 박탈한 을사늑약 이후 1908년 일제의 사립학교령, 1911년 학부령등을 통하여 조선통감부와 조선총독부가 기존의 고등교육기관을 폐지하고, 조선에서의 교육을 식민지 보통교육에 초점을 맞추고, 특히 수학분야의 고등교육은 방기하여 한반도에는 1911년에서 1945년 사이에 수학과는 대학과정의 고등교육기관에는 존재하지 않았다. 이런 식민지 수학교육정책의 잔해는 20세기 한국이 세계 수학의 주류에 진입하는 과정에서 큰 장애물이 된다. 본 연구는 이 시기의 교육정책과 수학교육환경 그리고 한반도에서 교수된 근대 수학의 내용과 교육과정을 심도있게 연구한다.

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