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AN OVERVIEW OF SOUTH KOREA'S K-12 EDUCATION DURING COVID-19 PANDEMIC

RESEARCH ARTICLE

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Abstract:

Although the human history has witnessed different pandemics before, the countries were still unprepared for COVID-19. As a high-developed country; South Korea was no exception. While the government is fighting against COVID-19, there has been a sudden shift to online classes as a new method of education. In this study, the researchers implemented qualitative content analysis method in cooperation with archival research technique to portray K-12 education in South Korea during COVID-19, from the first implementation of online education practices to the reopening of schools. The results were grouped into five categories; (i) emergency policies, (ii) government guidelines for online learning, (iii) hardware and software preparation for online learning, (iv) teachers' competence enhancement for online learning, and (v) efforts to return to offline education. The results showed that South Korea has shifted K-12 education to online relatively easier than many other countries due to its citizens' high ICT knowledge, skills and abilities, robust Internet infrastructure and high ICT device ownership. South Korea has also loaned ICT devices and supported Internet expenses for the disadvantaged students, and made mobile internet free for visiting governmental education websites offering instructional contents. This paper suggests that similar immediate actions should be granted by other countries to provide the continuity of education and the sustainability of digital learning solutions.

Key Words: South Korea, K-12, COVID-19, Online education, Student, Teacher.

COVID-19 SALGINI SIRASINDA GÜNEY KORE'NİN K-12 EĞİTİMİNE GENEL BİR BAKIŞ

Öz: İnsanlık tarihi daha önce birçok salgın hastalığa tanık olmasına rağmen, günümüz ülkeleri hala COVID-19 için hazırlıklı değildi. Gelişmiş bir ülke olarak; Güney Kore de bu duruma bir istisna değildi. Devlet bir yandan COVID-19'a karşı savaşırken, bir yandan da eğitimin yeni bir yöntemi olarak çevrimiçi derslere ani bir geçiş yapıldı. Bu makalenin araştırmacıları, COVID-19 sırasında Güney Kore'deki K-12 eğitimini ilk çevrimiçi ders uygulamalarından okulların yeniden açılmasına kadar geçilen süreçleri tanımlamak ve izah etmek amacıyla arşiv araştırma tekniği ile işbirliği içinde nitel içerik analizi yöntemini bu çalışma içerisinde kullanmışlardır. Elde edilen sonuçlar beş kategoriye ayrılmıştır; (i) acil durum politikaları, (ii) çevrimiçi öğrenim için devlet yönergeleri, (iii) çevrimiçi öğrenim için donanım ve yazılım hazırlığı, (iv) öğretmenlerin çevrimiçi öğrenim için yetkinliklerini artırma ve (v) çevrimdışı eğitime geri dönme çabaları. Sonuçlar, Güney Kore'nin vatandaşlarının yüksek BİT bilgisi, becerileri ve yetenekleri, sağlam İnternet altyapısı ve yüksek BİT cihaz sahipliği nedeniyle çevrimiçi K-12 eğitimine diğer birçok ülkeden nispeten daha kolay geçtiğini göstermektedir. Güney Kore ayrıca BİT cihazlarını ödünç verdi ve dezavantajlı öğrenciler için İnternet harcamalarını destekledi. Eğitim içeriği sunan devlet eğitim web sitelerini ziyaret etmek için mobil interneti ücretsiz hale getirdi. Bu makale, eğitimin sürekliliğini ve dijital çözümlerin sürdürülebilirliğini sağlamak için benzer acil eylemlerin diğer ülkeler tarafından da verilmesi gerektiğini önermektedir.

Anahtar Kelimeler: Güney Kore, K-12, COVID-19, Çevrimiçi Eğitim, Öğrenci, Öğretmen

Introduction

The world has faced one of the most vital problems ever in the history of humankind; COVID-19 pandemic. When China announced the first cases from Wuhan, countries were shocked with its unpredictable effects. The interconnected structure of today's world which we have been proud of lately has become a nightmare. COVID-19 has suddenly become an issue of entire planet as a result of human mobility among states or cities. COVID-19 has impacted all the humans no matter the race, ethnicity, gender, income level and so forth (Schleicher, 2020). Moreover, every part of people's daily lives have been adversely affected due to the COVID-19 crisis amid the measures and precautions taken and regulations employed, and education was no exception.

The pandemic forced most of the countries to shut all schools and discontinue their instructional activities. Although the numbers of students affected from the school

shutdowns are not identified clearly, it is projected that between 1.2 billion (Li & Lalani, 2020) and 1.6 billion (Education during COVID-19 and beyond, 2020) students (94% of entire world students) have stayed away from the classrooms as a minimum of ten weeks (Schleicher, 2020). Additionally, the United Nations estimated that nearly 24 million students will drop out their schools due to the economic effects of COVID-19 (Education during COVID-19 and beyond, 2020). Since the timeline and long term effects of COVID-19 have been ambiguous, countries have been dedicating more investments on health sector from their fiscal year budgets which will decrease financial support of educational activities for the public (Schleicher, 2020).

After the first shocks, countries have realized the inevitability of innovative approaches to education. Many governments have responded to this urgent demand by offering distance/online education solutions to provide the permanence of educational activities (Education during COVID-19 and beyond, 2020). Consequently, the education has suddenly evolved toward more digital side. Nevertheless, that new period has triggered other essential problems and challenges; teachers' vital training needs for the uses of new digital platforms and solutions (Schleicher, 2020), digital divide which unfolded students' unequal access opportunities to the Internet and mobile devices (García & Weiss, 2020), the bandwidth problem linked to existing ICT infrastructures (Li & Lalani, 2020) and the sustainability of the provided digital solutions for near or far future (Education during COVID-19 and beyond, 2020).

When these problems and challenges considered cautiously, one particular country has seemed to provide required solutions, not only from budget and regulation supportive dimension but also their real life implementations; South Korea. South Korea has been providing an exemplary educational framework with its success stories even pre COVID-19 pandemic times. South Korean students are always showing high scores in international academic achievement evaluations. These South Korean students are always ranking the top in the global tests like PISA (Programme for International Student Assessment) and TIMSS (Trends in International Mathematics and Science Study). This paper discloses South Korea's K-12 educational journey during pandemic times so that it can provide a model for other countries' educational efforts during and even after pandemic.

An Overview of COVID-19 in South Korea

South Korea is located on Korean peninsula in East Asia surrounded by Yellow Sea, East Sea and North Korea as only physical neighboring state. South Korea's landmass is around 100,210 square kilometers with a population of 51.63 million (according to last census on 01 November 2018). South Korea has a 6-3-3 education system consisting of 6 years elementary school, 3 years middle school and 3 years high school. Elementary and middle schools are free and compulsory for all students and the government is now pursuing free high school education. Children start school at the age of six. Enrollment rates are 48.7%, 98.7%, 96.7% and 91.3% for preschools, elementary,

middle and high schools, respectively. High schools are categorized as general high schools, specialized high schools, and special purpose high schools (for foreign languages, art/music/physical education, and science). Unlike the many countries, the first semester starts in March and the second in the end of August. The K-12 school types of South Korea is described in the following Table 1 (Ministry of Education, 2020i).

Table 1. General K-12 school types in South Korea

Age	Category	Schools
3~6	Early Childhood Education	Kindergartens
6~12	Elementary Education	Elementary schools Miscellaneous schools
12~15	Secondary Education	Middle schools Open middle schools Middle schools connected to industry Special classes (Industry-based) Miscellaneous schools
15~18		High schools Open high schools High schools connected to industry Special classes (Industry-based) High-tech schools Miscellaneous schools

Due to the country's geographical closeness to the center of epidemic (Wuhan, China) and its tight economical and touristic connections to China, South Korea has been affected from COVID-19 from the early days of the outbreak. The Korean government has put Korea Center for Disease Control (KCDC) in charge of action plans regarding COVID-19 crisis. Similarly, The Ministry of Education has taken school related decisions based on KCDC consultations.

While COVID-19 spread rate has been decreasing, KCDC suggested the delay for starting new school year from 23 March to 06 April (another addition of two weeks to previous three weeks suspension from 03 March). Schools postponed three more days (April 06, 07 and 08) after this decision and decided to start on 09 April. The government postponed the schools reopening several other times under the suggestions of KCDC and finally the plan was implemented from May 20 gradually. Moreover, the Ministry agreed on starting schools with online lectures in stages where each schooling level was given a week of preparation.

Additionally the Ministry of Education has decided to subtract the number of official holidays (initially 10 days) from the required days for school instruction for this semester (190 days for elementary and middle schools, 180 days for kindergartens) and to decrease class instruction hours per day. Moreover, the Ministry of Education has kicked off a local financial support (253.4 billion KRW = 205 million US$) to cope with COVID-19 related issues, such as operational expenses of online instruction, buying masks and sanitizers and emergency childcare program (MOE Decides to Postpone the New School Year, 2020; The New School Year Begins with Online Classes, 2020).

As the number of COVID-19 positive people has amplified and the schools have suspended, Korean families' (especially from rural areas) worries about the shortage of childcare has increased. Because of nation-wide emergency surveying for childcare, four ministries (the Ministry of Education, the Ministry of Health and Welfare, the Ministry of Employment and Labor, and the Ministry of Gender Equality and Family) have established an action plan for daycare centers, kindergartens, and elementary schools. Initially, the Ministry of Education has started offering a special childcare plan for 71353 kindergartens, 48656 elementary school students, and 395 students with special needs. The plan has emphasized the healthiness of students and teachers as a foremost priority including the daily health monitoring (especially fever control twice a day), setting an emergency procedure with a contact person among school staff, sterilizing school facilities, offering free masks and sanitizers within school buildings. Finally yet importantly, the Ministry of Education decided to assign an experienced teacher to each of these schools in childcare plan to reassure families about their concerns and to provide specific guidance for new kindergarten/elementary school students (The Government will Provide Safe and Solid Emergency Childcare Program, 2020).

Although the number of new patients per day dropped below 50 in South Korea, the KCDC has warned about the likelihood of second sudden outbreak, which happened in Singapore. Therefore, KCDC is still vastly skeptical about students' physical return to their classrooms (More elementary school students set to resume classes online amid pandemic, 2020). Once more, KCDC has extended social distancing (2-meter separation among people) strategy until 05 May 2020, which has also affected schooling activities all over country (Updates on COVID-19 in Republic of Korea, 2020).

However, on 06 May 2020, social distancing policy has changed its structure and become "Daily Life Distancing Policy" (S. Korea Shifts to 'Distancing in Daily Life', 2020). This new policy allows social events and meetings which provides the following five quarantine requirements; wearing masks all the time, sanitizing the hands regularly, keeping socially distanced (2 meter) sitting plans, refreshing the air for indoor facilities frequently and staying at home if feeling sick. Moreover, the government gives consents to civic facilities starting from museums, national parks and galleries in stages (similar approach to school reopening).

South Korean government has been designing a detailed action plan to offer a smooth and safe transition period from online education to offline education as a result of controlling COVID-19 cases and patients in the country. That action plan has many simple but vital requirements regarding schools' management; checking students' health conditions in each school day, cleaning the desk every morning with disinfectants, maintaining classroom air with ventilation (especially via opening windows), making sure of wearing masks all the time (except lunch time where the students are separated from each other with barriers on the table) and washing hands at least for thirty seconds, keeping the students away from school once they report feeling ill and reporting school nurses once a student shows disease related symptoms.

While the government has been observing irregular COVID-19 outbreaks, the government has been persistent on finalizing the transition from online to offline education. One of these outbreaks was occurred in nightlife district of capital city, Seoul; called Itaewon. While the daily new cases in South Korea were near to zero, that sudden outbreak created a big tension and suddenly became the center of attention from the first week of May. Seoul with a population of nearly 10 million people (20% of the entire South Korean population) was become another wide cluster of infection after city of Daegu which had been the peak point of the pandemic. It was predicted that 5700 people were visiting those clubs on the days of infection. Many people changed their ideas on reopening the school after that outbreak, especially when it was publicized that 57 school teachers and managers were also visiting Itaewon night clubs during those outbreak days. Fortunately, all of these school teachers and managers were initially quarantined and tested for the COVID-19 where all the results were negative (Schools reopen for high school seniors amid lingering virus fears, 2020).

According to one of the recent interviews with Seoul's Education Chief Cho He-yeon, South Korea has comprehended the urgent necessity of revolutionizing the educational system. Moreover, the country has also proved that it is possible to offer safety and quality in education during pandemic times. He was also commenting on online education is like a medallion with two surfaces; enriched personalized learning opportunities (such as individual student feedback, improved student participation by overcoming offline classroom shyness, augmented instructional quality via improved school culture) on the bright side and increased digital divide and lack of social interactions with peers and teachers on the dark side. As a result of this new perception and understanding, he believed that blended education will be the new form of South Korean educational system based on fifty-fifty online and offline instructions (COVID-19 speeds up revolution in education, 2020).

Last but not least, South Korean government was released a special budget of 287 billion KRW (234 million US$) for supporting all the education related actions during COVID-19 pandemic. Table 2 summarizes how this huge budget was distributed to different categories.

Table 2. Additional Budget to Support Education during COVID-19 (Ministry of Education, 2020a)

Category	Description	Amount
Financial support for local education	• To be used for local K-12 schools to take measures against COVID-19, including; ▪ ordinary grant (2,522 billion KRW), ▪ special grant for regional issues (400 million KRW), ▪ special grant for disaster and safety management (100 million KRW), ▪ and special grant for national policies (700 million KRW)	252.5 billion KRW ($205.9 million)
One-time support for kindergarten operation	• To alleviate the burden on parents who have to pay tuition fees for kindergartens even if they do not send their children to kindergarten due to the delay in school opening	32 billion KRW ($26 million)
Online course support for universities	• To designate and operate a distance education operation support center for the universities who need online lectures urgently due to COVID-19 crisis • To provide public infrastructure and content for the universities that are unable to be prepared for online lectures, including; ▪ university content support for South Korea National Open University (1.2 billion KRW), ▪ designation and operation of a distance education operation support center by KERIS (4.5 billion KRW), ▪ and the infrastructure expansion of K-MOOC (National MOOC service of South Korea) (1.5 billion KRW)	1.8 billion KRW ($1.5 million)
Total	Total additional budget allocated to support education during COVID-19	287,2 billion KRW ($234,1 million)

This paper aims to portray the South Korean educational efforts during COVID-19 pandemic for K-12 schooling. The authors aim to present what preparations made for online education transition, what educational alternative opportunities provided for K-12 during COVID-19 and how transition from online to offline education managed. Additionally, the authors highlight significant issues such as safety precautions, teacher and family supports and digital divide challenges.

The reason why South Korea's case has been examined in this study is due to the fact that South Korea quickly moved to online education amid COVID-19 pandemic. That rapid shift was triggered by having a well-developed ICT infrastructure and knowledge and skills. South Korea is one of the top ICT countries, where the smartphone ownership is 95% (PEW Research Center, 2019) and the Internet usage rate is 91.5% (Statista, 2019). Besides, 71% of South Korean teachers were already ready before the COVID-19 crisis to support students' learning through the use of digital technologies such as computers, tables and smartboards, which is quite higher than the average of OECD countries (OECD, 2019). Thus, this study striving to provide an education experience in the days of COVID-19 issue from a pioneer country to others.

Method

Since the major of this manuscript is to depict the context of K-12 education in South Korea during COVID-19 outbreak, the researchers decided to implement qualitative content analysis method in cooperation with archival research technique. Content analysis has a wide range of execution for instructional research contexts where the researchers analyze societies with an unobtrusive approach through any communication medium, such as reports, newspapers, bulletin boards, online posts, etc. The researchers applied archival research technique where they utilized interpretive empirical methods on all accessible and plausible primary and secondary data sources of existing document records about COVID-19 in South Korea by filtering content analysis data to their research scope.

As an initial step, the researchers developed a sampling plan for content analysis with a purposive sampling approach. Since the manuscript explains rules and regulations during COVID-19 pandemic days, the researchers focused intentionally on governmental sources (especially Ministry of Education (MoE) and Korea Center for Disease Control (KCDC)) which were the decision-makers of any action for K-12 education. Additionally, academic databases (such as EBSCO and KCI) were also scrutinized as other sources. These databases were specifically selected where KCI is an official Korean Academic Database with Korean studies and EBSCO includes educational related academic studies.

In subsequent to the decisions on sources, the researchers made a list of keywords to utilize for revealing the data. In order to access the right data, the researchers conducted their searches both in Korean and English. The keywords are "교육(education)" AND "COVID-19" OR "코로나(Corona)", "교육정책(Educational Policy)" AND "COVID-19", "온라인 교육(Online Education)" AND "COVID-19", "교육 예산" AND "COVID-19", "ICT" AND "교육" AND "COVID-19", "교사훈련(teacher training)" OR "교사 역량강화(Teacher Competence Enhancement)" AND "COVID", "면대면교육(face-to-face education)" AND "COVID", "온라인교육(Online Education)" OR "원격교육(Distance Education)" AND "COVID" . Moreover, the source search for the documents was delimited between January 20 (first official COVID-19 case in South Korea) and June 20 (where the researchers collected their data based on schools' reopening announcement), 2020.

The identified documents were gathered in a folder and thoroughly and entirely read by the researchers. Afterwards, the researchers classified the documents as governmental (ministries and deputies) and non-governmental sources (newspapers, blog posts, and etc…). Non-governmental sources were double checked with governmental sources for their trustworthiness in order to add them to entire data pool. Non-governmental sources which were contradicted to governmental sources were excluded from the data. The underlying reason why governmental official sources were mainly preferred to include in this study is that the South Korean education system is dominantly managed by the state. In other words, any educational decision could only be taken by South Korean government and related ministries.

The obtained data were analyzed qualitatively to unfold categories which were explained by the actions engaged and supported by examples. Both content analysis method and archival research technique have the advantage of providing an unobtrusive research context (Fraenkel, Wallen & Hyun, 2012; Yin, 2009) where the effects of observing researchers decrease to zero level.

Since the researchers are able to communicate in Korean and English, even though reliability and validity are rarely checked in content analysis (Fraenkel, Wallen & Hyun, 2012), in order to increase the reliability/validity of the content analysis, the researchers compared any related text, news or announcement in Korean (as a primary source) and in English (as a supportive source).

However, it is an essential remark that there is always a drawback of archival research whether all of data sources covered (Bordens & Abbott, 2008; Fraenkel, Wallen

& Hyun, 2012). Therefore, the researchers searched all the governmental sources in a daily base from January 01 and June 01, 2020. This regular checks and knowing both languages have brought strengths to the possible drawbacks of the study.

Results

The major research question of this study is about how South Korean K-12 education responded to COVID-19 pandemic. To serve that purpose, the researchers employed the Four in Balance Model that suggests ICT is successfully integrated into schools if the four elements are in balance, which are 1) vision, schools' vision on ICT integration; 2) expertise, teachers' knowledge and skills required for ICT utilization; 3) digital learning materials; and 4) ICT infrastructure (Brummelhuis & van Amerongen, 2011). For this study, the Four in Balance Model was adapted from school scale to country-scale. Accordingly, the findings of this study are categorized as follows: (i) emergency policies employed, (ii) teacher guidelines provided, (iii) hardware and software preparation for online learning, (iv) teachers' competence enhancement for online learning, and (v) efforts to return to offline education. Hence, the revealed data from the sources was placed under each of these five categories and shared accordingly.

1. Emergency policies employed

The South Korean Government firstly has postponed the beginning of the new semester as online for several times in order to complete the preparations including securing hardware and software and taking measures against the pandemic in schools in order to carry out online education. The government has created 253.4 billion KRW (205 million US$) budget for administrative-financial support to be used to promote emergency childcare programs, including to increase the number of programs and employees and to check cram schools with respect to disease prevention and management measures, to buy disease control and prevention products such as mask and sanitizers and to realize online learning environment including establishment of online learning platform, procurement of ICT devices and ensuring sufficient networks and servers. Some amount of this budget is allocated for families to reduce their economical burdensome due to kindergartens.

Besides, the government has established "New Semester Preparation Bureau" where the head is the Vice Minister of Education and its roles are designated as to inspect disease control and management activities, learning support measures in schools before the online semester starts. This bureau consists of various units as follows: Disease Control and Prevention Unit (including General Support Team, Goods Support Team, Situation Check Unit) where the head is Director of Learning Support Bureau, Student Learning Support Unit (including Learning Support Team, Emergency Childcare Support Team, and Private Cram School Management Team) where the head is Director General for Curriculum Policy and Online Education Support Unit where the head is Director of Lifelong and Future Learning Bureau. Moreover, the government

has distributed disease control and prevention guidelines for schools and implemented policies to reduce learning gap through establishing systematic and fair online learning for everyone. Accordingly, the government has not only constructed learning platforms, but also secured ICT devices and covered internet expenses for the information disadvantaged students and initiated "school-owned smart device rental system" (Ministry of Education, 2020a; Ministry of Education 2020b).

2. Teacher guidelines provided by the government

Another action the Korean government has taken is to provide several guidelines to teachers in order to carry out online classes smoothly. First, it has provided online course operation guidelines. This guideline provides information on four types of online course operation, which are real-time interactive lesson, content-based lesson, assignment-based lesson and other type lesson. Real-time interactive lessons are video conferencing lessons where real-time video lectures are carried out by the teacher and instant feedback through real-time discussion and communication is available. The government recommends using various videoconferencing tools including Naver Line Works, Gooroomee, Google Hangout, MS Teams, Zoom and Cisco WebEx. Another online class type is content-based lessons including two styles: lecturing style and lecturing plus activity style. In lecturing style content-based lessons, students learn with pre-recorded lectures or other learning contents assigned by teachers and teachers check students' learning progress and provide feedback for them. In lecturing plus activity style content-based lessons, online discussions are carried out by writing comments and responses after watching learning videos or learning via other contents. Such lessons can be carried out by utilizing EBS (South Korea Educational Broadcasting System) courses or teachers' own contents. The third type of online class recommended by the South Korean government is assignment-based lessons. In these lessons, students perform self-directed learning activities and teachers provide assignments and give online feedbacks according to the national achievement standards of each subject. Thus, students are able to check their self-directed learning progress. Last type is any other type defined by the Education Offices based on the school conditions (Ministry of Education, 2020c).

Another guideline provided for online education is related to attendance check and student assessment and evaluation. It is obligatory for South Korean teachers to record students' attendance status on National Education Information System (NEIS) whether the lesson is offline or online. Therefore, the government has provided detailed information on how to take attendance online by platform and lecture type. Accordingly, teachers can use any of those attendance methods based on their online lesson type as shown in Table 3 (Ministry of Education, 2020d). For instance, if a teacher performs a real-time interactive lesson using Zoom, he or she can take attendance as real-time, manually, during the live class. If the teacher carries out a content-based lesson using an LMS provided by the government, he or she can take attendance by looking at the access log of students.

Table 3. Guidelines provided by the Korean Government for teachers to take attendance in online lessons

Lesson Type	**Attendance Check Method**								
	Real-time check by teacher	Using Learning Management System (LMS)					Other ways to check attendance		
		Start date of learning	Progress rate	Access log	Learning time	Upload assignment	Social Media	Text messaging	Document submission
Real-time interactive lesson	✓			✓			✓	✓	✓
Content-based lesson		✓	✓	✓	✓	✓	✓	✓	✓
Assignment-based lesson				✓		✓	✓	✓	✓
Attendance recording period	*Same day*	*Same day or in one week (7 days)*							

Similarly, the government has provided a number of assignment methods in order to evaluate and assess students' learning in an online learning environment. According to this guideline, first, schools can implement offline paper-based examinations in order to check students' learning achievements after offline education started, and Municipal Education Offices and schools can adjust the effect and ratio of grading items. Second, teachers can assess students' learning performances and enter those grades to School Record System by observing students' learning progress and outcomes in an online lesson. Third, teachers can assess students by observing them during an offline lesson where teachers carry out lessons using students' performance assig-

nments created in online lessons before. During online lessons, teachers can assess students through performance videos of athletic or artistic activities in music or sport lessons, assignments provided via online platforms, real-time discussions and debates, online presentations, reports, essays and comments and messages written in Social Media platforms such as South Korean most popular messaging app KakaoTalk (Ministry of Education, 2020d).

3. Hardware and software preparation for online learning

In addition, the South Korean government has secured the required hardware and software to operate online education nationwide. The government has been already operating EBS (South Korea Educational Broadcasting System) for online learning to supplement offline learning. EBS websites are already providing various learning contents for self-learning. However, EBS enlarged its services due to COVID-19 crisis. In order to provide live courses, EBS has arranged different channels for each school level and enabled live courses not only on normal TV channels but also through video sharing platforms like YouTube and Naver TV, cable TV channels, and IPTV channels. Besides, it has quickly established an LMS named EBS Online Class (https://oc.ebssw.kr/) as the quick response to the needs of online learning platforms for the implementation of K-12 online education. Another LMS (https://cls.edunet.net/) has been developed by KERIS (Korea Education & Research Information Service) (Figure 1) to promote K-12 online education and reduce the load of EBS Online Class LMS. Nevertheless, there were technical issues like server overloads, unstable networks and functional issues in those LMS systems at the beginning of the online education due to the fact that a huge number of users tried to connect to one system at the same time (Sarah, Nam & Jeon, 2020).

Therefore, in order to reduce the server load and enable to simultaneous access to the system for the great number of users, the number and capacity of servers have been increased and those LMS systems are duplicated and separated in the servers for each region or city. For instance, KERIS e-Learning Site is www.cls1.edunet.net for the elementary and middle schools in Seoul city and https://www.cls2.edunet.net for the schools in Busan city. Other technical issues were solved within time. Currently, those two LMS systems are working fine without any critical malfunction (Kim, 2020). According to the recent report published by the government, those two LMS systems are available to access by 3 million users simultaneously and provide teachers to utilize almost 50,000 contents including video lectures, audios, learning materials, e-books and digital textbooks where some of them were paid contents normally (Ministry of Education, 2020h).

Figure 1. KERIS E-Learning Site for the middle schools in Seoul region (https://cls1.edunet.net)

Besides, the government has enabled digital textbooks online (https://webdt.edunet.net) (Figure 2) and a social media type LMS called Wedorang (http://rang.edunet.net/) (Figure 3) for students and teachers. Even a comparison table showing the functional differences of learning platforms including national and international platforms consisting of Google Classroom and Microsoft Teams has been provided by the government to teachers as shown in Table 4. On the other hand, in order to decrease the information gap among low-income families' children, the government has been working on providing ICT devices and Internet cost and making mobile data free for education purposes. The government has secured around 316000 ICT devices including smartphones, Tables PCs and notebooks where 36000 devices are sponsored by Samsung and LG, to rent to low-income students free of charge.

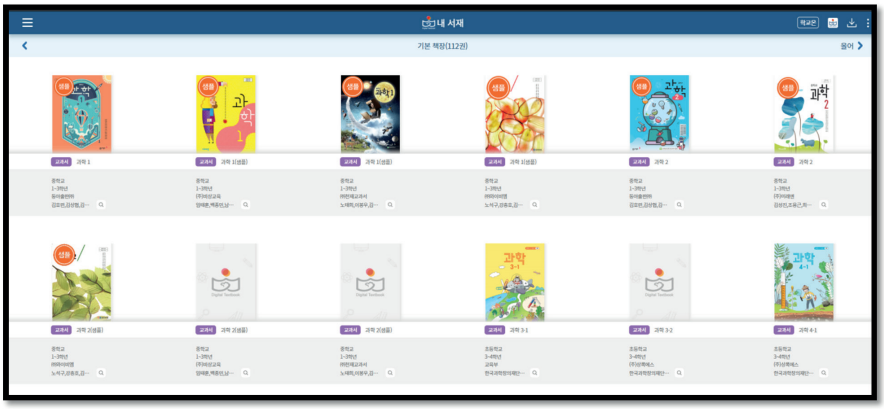

Figure 2. Digital textbook website (https://webdt.edunet.net)

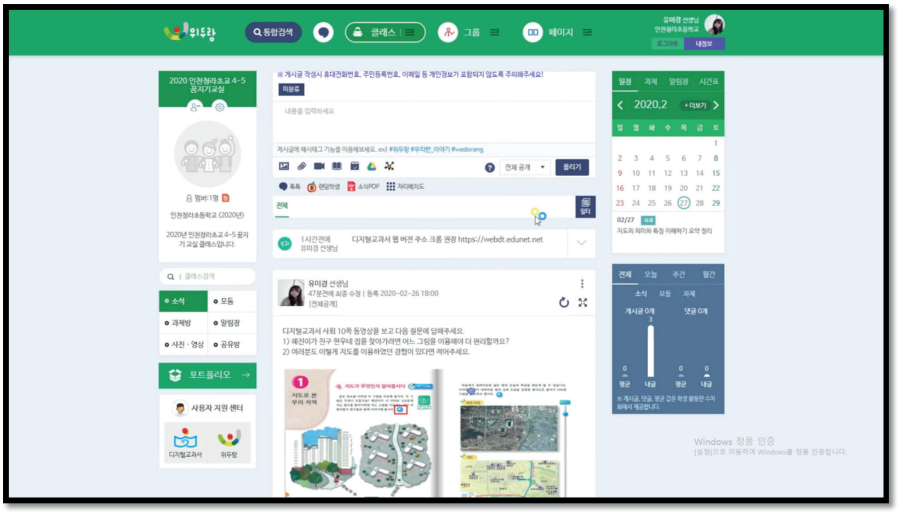

Figure 3. A classroom page in Wedorang, a social media-type LMS (Online Class, 2020)

Table 4. Comparison table provided by the government to show the main differences of learning platforms available for Korean teachers (Ministry of Education, 2020f)

Platforms/ Functions	KERIS E-learning Site	Wedorang	EBS Online Class	Google Classroom	Microsoft Teams
Links	https://cls.edunet.net/	http://rang.edunet.net/	https://oc.ebssw.kr/	https://classroom.google.com/	https://www.microsoft.com/en/microsoft-365/microsoft-teams/group-chat-software
Attendance check	Auto-attendance when entering to course page	Attendance check using survey or assignment functions	Attendance check through comments	Attendance check through comments or Hangout/Meets	Attendance check through comments or Teams
Completion Progress check	-Progress check for each video -Not able to skip in a video -Auto completion of links and assignments when they are opened	-View/download learning activity records for each student (posts, comments, assignment submission, group activity, etc.)	-Progress check for each video -Able to adjust video speed -Able to skip in a video, but recognized as "not-completed"	-No progress check for each video	-View learning activity records for each student (posts, comments, assignment submission, group activity, etc.) -Progress check for each video

Platforms/ Functions	KERIS E-learning Site	Wedorang	EBS Online Class	Google Classroom	Microsoft Teams
Create Assignment	Create assignment	-Create classroom/group assignment -Assignment grading by giving stars -Able to view people list showing who sent or not	Create assignment	-Create assignment -Collaborative assignment	-Create classroom/group assignment -Rubric, assignment grading -Able to view person who sent the assignment
Size of video uploaded	Less than 300mb	Less than 1GB (taking time according to encoding)	Less than 400mb/20min	No restriction	No restriction
Video conferencing	Not available	Not available	Not available	Hangout/Meet	Teams
Mobile support	Mobile web	Mobile web & app	Mobile web	Mobile web & app	Mobile web & app

4. Teachers' competence enhancement for online learning

With respect to teacher training on sudden transform to online education, the government and Metropolitan and Provincial Offices of Education have took various actions to enhance ICT competences of teachers. The government fully operates a teacher community website (Figure 4) named School-On (http://onschool.edunet.

net/) in order teachers to explore and share best teaching practices with each other to promote ICT competence enhancement of teachers (Ministry of Education, 2020e). In this website, teachers are able to create and share a variety of learning activities and resources with their colleagues.

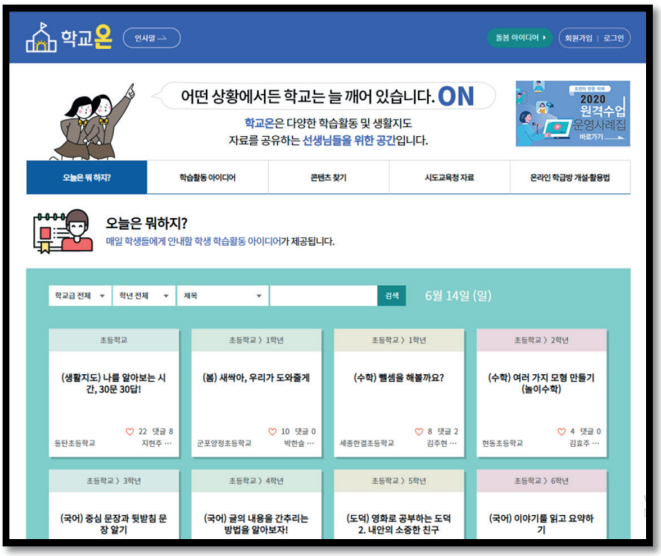

Figure 4. Homepage of School-On website

Apart from this community, there are various online teacher communities available operated by different Municipal Education Offices, schools and individual teachers. For example, GEG South Korea, a COP (Community of Practice)-based teacher community, helps South Korean teachers how to use Google products such as Google Classroom, Google Slides and G Suite for education purposes through online and offline meetings, webinars and bootcamps (training programs to help acquire education-related Google certificates). During COVID-19 crisis, this community has been playing a critical role of teaching how to use Google products effectively to operate K-12 online lessons by carrying out continuous webinars in different level and forms. Also, the government has decided to provide live teacher trainings using Ministry of Education's TV channels with regards to how to prepare online lessons (Ministry of Education, 2020d). Moreover, Municipal Education Offices conduct teacher training programs as online, offline and blended to increase teachers' ICT competences required to carry out online classes. For example, Gyeonggi-do Training Institute of Education has provided "Smart Education Competence Enhancement to Prepare for Online Semester" training

curriculum from March 31 to April 2, before the new semester starts as online. This training curriculum has consisted of four courses including Google tools use, Microsoft Teams use, video recording with a smartphone and its use, and understanding and preventing infectious diseases training courses (Im, 2020). Municipal Education Offices have provided not only training programs but also manuals explaining how to use various tools including both government's learning platforms and content providers and corporate-based solutions like Zoom, Google Hangout, KakaoTalk, YouTube, Naver Band and Microsoft Teams. Along with the ICT competence enhancement programs of teachers, Municipal Education Offices are designated to provide health care trainings for teachers, school administrators and healthcare employees working in school to prepare against possible COVID-19 infections in schools, as one step further to return to offline education.

5. Efforts to return to offline education

Currently, South Korea is attempting to return offline, face-to-face education step by step along with taking a number of measures against the spread of COVID-19 in schools. As the priority step, the government has initiated offline education on May 20 for 12th graders (senior high-schoolers) who are in the most critical year when there is a South Korean SAT exam waiting for them at the end of the academic year. Out of 2363 high schools, 2289 schools have started to provide offline education. As the next steps, it intends to open offline education for kindergartens, first, second, ninth and eleventh graders on May 27, third, fourth, eighth, tenth graders on Jun 3, fifth, sixth, seventh graders on June 8, as shown in Table 5. Those measures taken to ensure the safety of students and school environments are (i) to decrease the density of students in schools; (ii) to take preventive measures against the epidemics; (iii) to adjust the childcare centers of elementary students to offline and online courses; (iv) to prepare kindergartens and elementary schools for offline education and provide operation support for those schools; and (v) to reduce the workloads of teachers to operate offline and online together.

Table 5. Dates to open offline education for each grade level

Grade Level	Date to open offline education
High school 3rd grades (12th grades)	May 20
High 2nd, Middle 3rd & Kindergartens	May 27
High 1st, Middle 2nd & Elementary 3rd & 4th	June 3
Middle 1st & Elementary 5th & 6th	June 8

First, in order to minimize the concentration of students in schools, the government ordered to divide the students coming to schools by grade level and class, perform online and offline courses concurrently and operate offline courses as morning

and afternoon classrooms separately by grade level. Accordingly, Metropolitan and Provincial Offices of Education are preparing detailed plans to divide students for each school based on its conditions. A sample method showing how to divide students is presented in Table 6.

Table 6. Sample to the operation of offline courses by grade ('O' is for the grades attending schools for that week and 'X' is for the non-attending grades)

Grade Level	May	June				July					Remarks
	W4	W1	W2	W3	W4	W1	W2	W3	W4	W5	
Middle & High 3rd grades	O	O	O	O	O	O	O	O	O	O	
Middle & High 2nd grades	O	X	O	X	O	X	O	X	O	X	10 days offline education
Middle & High 1st grades	X	O	X	O	X	O	X	O	X	O	

Second, as preventive measures against COVID-19, the government has initiated a health check system to daily check and record people's health status and international travel status and whether having any family member who is in a self-quarantine. Similarly, school bus drivers' health status is also checked and recorded daily. If there appear any suspected symptoms on any person, the all school is closed down. Besides, students are provided training for self-hygiene and COVID-19 prevention one week before starting the offline courses. Inside schools, students and school employees have to wear masks, get temperature checks at the entrance or schoolyards, put social distancing to others, cannot move chairs and use goods with others, ventilate the classrooms often, and so on.

Third, the government will continue to provide childcare services for elementary school students based on conditions of the schools and regions in connection with the operation way of the classes. Furthermore, the government will secure support personnel and space for the children of families who need care, such as single-income and single parent families.

Four, in order to prepare kindergartens and elementary schools for offline education, the government intends to bridge the educational gap by continuing to provide EBS contents free during offline classes and by providing blended instructional models and strategies. Moreover, it aims to provide psychological counseling for students who have difficulties with anxiety and depression due to long-term online classes.

Various measures are taken to ensure social distancing in kindergartens as well as in school buses.

Five, in order to reduce the workload of school employees like teachers to effectively operate online and offline courses together, the government removes their external tasks like trainings, meetings, events, business trips, which are not directly related with the classroom teaching, for a while. Besides, the government will place additional 30.000 human resources, who are after school activity teachers, retired teachers, part-time teachers and volunteers, for K-12 schools in order to help on taking preventive measures, performing learning activities and guiding in daily life (Ministry of Education, 2020g).

Discussion & Conclusion

The education environment of South Korea before COVID-19 crisis was not securely ready for moving education online nationwide. Therefore, the government took various necessary steps before initiating the semester online. It has secured hardware and software required for online education by establishing/promoting learning platforms and content providing websites, lending ICT devices and supporting for internet expenses for the information disadvantaged students, and making mobile internet free of charge for visiting government-based education websites. Besides, the government promoted teachers' ICT competence enhancement by conducting teacher training programs in various forms through Municipal Education Offices and MOE's TV channels, operating online COP-based teacher communities to support teachers' ICT skills, and providing a number of guidelines such as course operation and evaluation and assessment methods in online classes and manuals explaining how to use digital tools and software to operate online classes.

Unlike the other countries where the role of online course operation completely belongs to the government and teachers have no any critical role, in South Korea, teachers are not only responsible for designing and operating of online classes but also in charge of recording and reporting of students' learning progress, performance and attendance to the official systems. Accordingly, South Korean teachers have used government-owned systems like EBS Online Class or commercial platforms such as Google Classroom to operate online courses and utilized various kind of contents either provided by the government or created by themselves.

Because of high ICT device ownership, strong Internet infrastructure and technological experience, knowledge and abilities, it seems that South Korea has easily moved to online K-12 education. Another reason is teachers who have high level of ICT competencies since they have to create own digital contents and operate online courses using digital tools and platforms. Needless to say that families' understanding and cooperation has played a crucial role on conducting online education. Besides, the existence of COP-based professional teacher communities helping teachers prepare

and operate online class activities, resources and environments and report and record learners' performances and participation have had an indispensable part on successfully implementing K-12 education online.

Nevertheless, South Korea had a number of challenges on transforming education online. First, despite having high level of IT experience and skills, South Korea encountered network and software errors and downs in government-owned services in the first days of online education. That might be the reason why the government has implemented the first several days of online education as "orientation days", where learning activities are not recognized officially, in order to test the government-owned systems and give time to students to get accustomed to the online learning platforms and tools used. Second, despite the fact that South Korea is one of the top ICT countries, South Korea encountered digital divide issue during conducting education online. Therefore, the government had to secure more than three hundred thousand ICT devices and bear internet expenses to enable online education for the information disadvantaged students. Third, there are still some worries related to the effectiveness of online courses and the assessment methods of students' learning performances in online lessons due to its unfamiliarity despite the fact that government published related guidelines.

After all, South Korea has become a worthy example for other countries by making considerable efforts to enable K-12 education online. In some countries like Turkey, the government moved education online in such a way that there is neither official grading nor attendance whereas online lessons have been conducted via TV channels, videoconferencing tools or government-owned learning systems (MEB, 2020). Hence, students might not have taken online lessons seriously, and the attendance might have been less than a normal face-to-face lesson since teachers do not make exams and take attendance online. The reason for why there is no grading and attendance might be because of low-income families' students who cannot afford to have ICT devices or Internet to participate in online courses. However, South Korean case demonstrated this problem is not unsurmountable. South Korea has made attendance and grading compulsory for online lessons by providing sufficient guidelines for how to take attendance and make assessment and by loaning ICT devices and providing Internet for the disadvantaged students.

Even if South Korea has implemented online education successfully, it did not completely give up on returning offline, face-to-face education. While online education is in progress, the government did remarkable efforts to enable offline education. The government not only provided health equipment like masks and disinfectors, but also implemented teacher trainings as precautions against to any COVID-19 contamination in schools. Moreover, the government provided guidelines on how to tackle with COVID-19 crisis for teachers, students and other school stuff, including advises on making social distancing in schools and directions what to do in the case of any

COVID-19 suspect or diagnosis. Besides, the government published various instructions on decreasing the density of students in schools and made compulsory to check and record school stakeholders' health status in order to enable offline education in a safe and COVID-19 free environment. Those measures taken by the South Korean government could be considerably helpful for the countries who desire to go back to offline education.

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