South Korea's Information and Communication Technologies

Region: Asia/Australia

Book Chapter

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Introduction

This chapter will allow for an opportunity to explore the educational technology issues and advancements in South Korea throughout the last few decades. Although there is no agreed definition on Information and communication technology (ICT), Chen, McMurtrey, McCalman, Dominguez Castillo, and Ligon (2015) define ICT as the "skills around computing and communications devices, software that operates them, applications that run on them, and systems that are built with them" (p. 28). According to Grzybowski (2013), South Koreas first effort to implement ICT in their educational system was in 1995 with an initiative called the "Plan for the renovation of education 5.31". Since then, there have been many plans and projects implemented to ensure ICT is integrated within the Koreans educational system to enhance and improve teaching and learning. The Korean Ministry of Education is primarily responsible for building and developing the future educational system in South Korea to ensure it aligns with the demands of the country and the world. With the educational technology advancements South Korea has made, they are seeking to become the educational hub of Southeast Asia (Grzybowski, 2013).

Context

Geographic

According to the Central Intelligence (n.d.), South Korea is the southern portion of the Korean peninsula, to their north is North Korea. They are located in Eastern Asia and border the Sea of Japan and the Yellow Sea. The capital city is Seoul, located in the northern part of the country. Their terrain consists mostly of hills and mountains and the size of their country can be compared to Indiana or Pennsylvania. The climate includes all four seasons, with cold and long winters, short, hot, and humid summers, and heavy rain fall in the summer, known as monsoon

season. Their natural resources include coal, tungsten, graphite, molybdenum, lead, and hydropower potential.

Demographic

As of July 2020, the estimated population in South Korea is 51,835,110, with a nationality of Korean and their ethnicity is homogeneous (Central Intelligence, n.d.). Their population size is currently ranked 28th in the world.

Social Cultural

In the early 19th century South Korea was occupied and annexed by Japan until 1945, when they regained their independence, as Japan surrendered to the United States. During this time, a democratic government was established which was known as the Republic of Korea. The Korean war (war between North Korea and South Korea) lasted from 1950 to 1953 when armistice agreement was signed, separating the peninsula. South Korea's primary language is Korean (Hangul is the name of the Korean alphabet), and English is taught within their educational system (elementary, middle, and high school). According to the Central Intelligence (n.d.), there are several religions within South Korea, which includes Protestant (19.7%), Buddhist (15.5%), Catholic (7.9%), and 56.9% of the population have no religion.

One of the most important traditions in South Korea is family. They believe in a hierarchical structure and consider the father the leader of the family. They believe children are obligated to obey and follow their parents and show respect to the elderly. Koreans often bow instead of shaking hands (although accepted), to show respect and gratitude to another person. Most of the Korean dishes are based off rice, noodles, vegetables, and meats. One of the most popular traditions in South Korea is Seollal, which is considered their New Year's Day. The

Korean people take advantage of this day to spend time with family and pay respect to their ancestors (Globalization Partners, n.d.).

Economic

Since the end of the Korean War in 1953, the economy in South Korea has been on the up rise. According to the Central Intelligence (n.d.), as of 2017, South Korea is considered to have a well-developed economy with a steady growth rate of two to three percent annually, a Gross Domestic Product (GDP) of 2.035 trillion (14th in the world), and a GDP per capita of $39,500. Figure 1 shows a comparison from South Korea to some of the most developed countries located in Eastern Asia. A few of their most important companies and businesses in the country are Samsung, LG, SK, and Hyundai. South Korea currently have an unemployment rate of 3.7%.

Country	South Korea	Singapore	Japan	Taiwan	China
Gross Domestic Product	1,530,750,923,149 (2017)	323,907,234,412 (2017)	4,872,415,104,315 (2017)	590,000,000,000 (2018)	12,237,700,479,375 (2017)
Per Capita Income	26,341 (2017)	54,309 (2017)	48,294 (2017)	25,004 (2018)	7,150 (2017)
Population	51,096,415 (2017)	5,708,041 (2017)	127,502,725 (2017)	23,590,000 (2018)	1,421,021,791 (2017)
Annual Educational Budget	4.59% of GDP (2016)	2.85% of GDP (2013)	3.18 of GDP (2016)	903.31 Billion (2018)	1.88 of GDP (1999)
Educational Technology	SMART Education , Online/Mobile Learning, 21st Century Classrooms, Cloud Computing	Smart Nation, Online/Mobile Learning, 21st Century Classrooms, Cloud Computing	Online/Mobile Learning, 21st Century Classrooms, Cloud Computing	Artificial Intelligence in Classrooms, Online/Mobile Learning, 21st Century Classrooms, Cloud Computing	China Education Television, AI in Classrooms, Online/Mobile Learning, 21st Century Classrooms, Cloud Computing
Career and Technical Education	Vocational Education and Training	Polytechnics, Institute for Technical Education, Vocational Edu	Career and Technical Education	Technical Vocational Education	Vocational Education and Training
Learning System	Competitive, Stress, Social pressures to learning	6 Yrs Primary School 4 Yrs Secondary 3 Yrs Post Secondary	3 Yrs Kinder (opt) 6 Yrs Primary School 3 Yrs Lower Secondary 3 Yrs Upper Secondary	6 Yrs Primary School 3 Yrs Lower Secondary 3 Yrs Upper Secondary (optional)	6 Yrs Primary School 3 Yrs Lower Secondary 3 Yrs Upper Secondary

Figure 1: Comparison of Developed Countries in Eastern Asia

Political

South Korea is a well-established country that claimed their independence on August 15, 1945 from Japan, which is considered a national holiday and known as Liberation Day. Their government is democratic and a presidential system, which consist of the three branches, Legislative, Judicial, and Executive Branch. The president is elected by the people (popular vote) and serves a five-year term. The current president in South Korea is Moon Jae-in. One of the responsibilities of the president is appointing the prime minister and he has the authority to release him/her as well, which is something the country is trying to eliminate in order to control the power of the president (Qatar Embassy, n.d.). There are several political parties in South Korea, which include the Saenuri Party (172 seats), Democratic Party (82), Progressive Freedom Party (18 seats), Liberal Democratic Party (5 seats), and the Korea Renewal Party (3 seats). Their last passed and approved constitution by the National Assembly was on October 28, 1987. According to the Central Intelligence (n.d.), their legal system is a mixed of European Law, Anglo-American Law, and Chinese classic thought.

Education

South Korea has placed a great effort and dedication in their educational system in the last few decades, focused on their philosophy "People-centered Education of the Future" (Ministry of Education, n.d.). One of their primary goals is to create an educational system that is designed as personalized/individualized education and is able to meet the demands throughout the entire life cycle of an individual.

Brief History

According to the National Center (n.d.), South Korea is ranked seventh in reading and mathematics and eleventh in science. This was based off the results from the 2015 Program for

International Student Assessment (PISA). This was considered impressive achievement due to the fact that the country has restructured their educational system at the end of the 20th century. The restructuring was necessary as South Korea gained their independence at the end of World War II when the Ministry of Education was established in 1948. Since then, there have been many implementations, projects, plans, and changes to refine, improve, and enhance the educational system to remain globally competitive.

Major Reforms in the last decades

Prior to South Korea's independence, education was focused on educating leaders who resisted the intrusion of the Japanese. After their liberation in 1945, the government took responsibility of the educational system and the democratic education was established which expanded the basic education in the country. During this time educational polices were established and the educational law was enacted, which played a critical role in the reconstruction of the country after the Korean War. During the 1960s the Korean economy had a rapid growth. To ensure the educational system continued to develop, there was a major expansion during this time as well, which included the expansion of students, educational facilities, and teachers.

As South Korea was liberated from Japan, they had no teachers, no one with the level of education to become a teacher, and the country was about 80 percent illiterate (National Center, n.d.). Due to the dedication and efforts of the government, in a few decades, the country had developed an educational system that produced quality education and became a competitive country within Eastern Asia. According to the National Center (n.d.), in 2015, it was estimated that 98 percent of 25 to 34-year olds had completed upper secondary education, which is the highest in the Organization for Economic Co-operation and Development (OECD). This was

due to the restructuring of their curriculum to focus on creativity and building character, along with expanding training for teachers and restructuring vocational education and training to better fit the countries educational needs.

Current Situation

Individuals in the age of six to 18 are required to attend school in South Korea, which includes six years of primary school (elementary school), three years of lower secondary school (middle school), and three years of upper secondary school (high school). Upper secondary schools are divided into academic or vocational high schools. As prescribed by the Ministry of Education, primary and secondary schools must have 220 days of school for each calendar year which consist of two semesters. The first begins in March and the second begins in September. Additionally, South Korea offers free preschool for children in the ages of three to five, which have an enrollment rate above 90 percent (National Center, n.d.).

South Korea's educational system is a highly test-driven system. Often times, individuals are judged and viewed by which upper level of school or college they attended. Individuals are accepted to their secondary schools by lottery in accordance with their equality policy to reduce competition within the educational system. Parents work hard in ensuring their children do well in school and children try to please their parents by excelling academically, which puts a lot of stress on children. Education in South Korea is highly viewed and drives the people to do well.

Teacher's in South Korea are considered to be some of the best qualified in the world. They hold a high social status, have job stability, and are highly paid, as they are fully qualified and most hold a bachelor's degree (National Center, n.d.). Teachers can pursue a career field as a master teacher, principal, or an education specialist, depending on their experience in teaching (years and quality). South Korea has also developed and implemented a professional

development program to assist teachers in developing and improving their teaching skills, especially with the integration of ICT within education.

The schools in South Korea follow a framework provided by the Ministry of Education, which is reviewed/revised every 10 years. The last revision was in 2015, which added several key competencies to reflect the 21st Century skills. The six new competencies include, self-management, knowledge and information processing, creative thinking, aesthetic sensibility, communication skills, and civic competency (Cho and Huh, 2017). These six competencies focus on developing a creative, flexible, and integrative learner.

Vocational education and training (VET) is a program that Koreans have to focus on equipping young people with skills to fit in the labor market. These individuals are first introduced to VET in upper secondary schools. Upon graduation from the upper secondary school, Koreans have three options: 1) go directly to work, 2) apply to vocational programs at junior colleges, or 3) apply to a university. Currently only about 20% of the students take advantage of this program, this is due to the expansion and availability of higher education in South Korea (applying and attending universities in Korea). The current goal is to increase the percentage from 20% to 29% by 2022.

Educational Technology in this Country

South Korea is currently considered one of the most web-connected and technology advanced countries in the world (Lim, Ryu, Martindale, Kim, and Park, 2019). According to Grzybowski (2013), South Korea is consistently ranked second place on the highest national IQ scores worldwide, only following Hong-Kong or Singapore. Educational technologies used in South Korea play an important role in the educational system in an effort to transform the traditional/passive way of teaching and learning into a more interactive, engaging, creative

learning environment. This environment was not created overnight, but instead through years of effort, dedication, and commitment.

Brief History

According to Yi (1997), technology education was first introduced in 1970 and offered to Korean students in the secondary schools, known as kisul (technology). Technology education was influenced by the rapid economic growth, industry and technology advancements, and the expansion of knowledge. During this initial time period, technology education was primarily offered to boys as home economics was offered to girls. The reason for this focus was due to a Korean tradition of the idea that social life is for men and home life is for women. Throughout the years, this idea quickly changed, and technology education was provided equally to the entire nation.

South Korea has been working on several plans to integrate ICT within their educational system known as master plans. The initial master plan was initiated in 1987, which included building the infrastructure to include building a computer to student ratio of 5 to 1 with internet access. The first master plan was developed in 1996, which incorporated included ICT within each classroom (digital library systems and resource sharing systems). The second master plan was initiated in 2001, which focused on e-learning and the third master plan (2006) focused on mobile learning. Currently, South Korea is on the fourth master plan which included digitalizing textbooks. Figure 2 shows a graphic representation of the master plans timeline and main initiatives from the beginning to the current state.

Figure 2: Master Plan Initiative (Jang, 2016)

National Educational Technology Standards and Reforms

The South Korean government uses the top down approach when implementing educational polices and strategies. In the 1980s, there was a movement initiated to adjust technology in education. In 1995, the Korean plan that was proposed was the "plan for the renovation of education 5.31". In 2005, South Korea started to integrate ICT within their system. In 2010, the Ministry of Education developed a five-year plan to integrate ICT with education to gain a strategic global advantage and gain competitiveness in education (Grzybowski, 2013).

One of the major initiatives that the South Korean government is working is the plan for SMART Education. Although, this initiative was first introduced a few years ago, it is a program that is used to ensure the learning process is effective and efficient. According to Grzybowski (2013), each letter in SMART Education represents the importance of digitalizing the entire school curriculum to reflect the changes of the 21st Century. The "S" stands for self-directed, which means learning is initiated by the student. The "M" stands for motivated, which indicates the importance of making learning enjoyable and meaningful. The "A" stands for adaptation, which represents the teaching and learning process is by an individual's specifications (customized). The "R" stands for resources, which indicates the importance of using rich and valuable resources. The "T" stands for technology, which represents the

importance of incorporating and using ICT in education. The SMART Education program includes:

> The development and dissemination of digital textbooks and online evaluation systems, building an open environment for the public and facilitating the safe use of educational materials. Professional development will be enhanced by Smart education and an educational infrastructure will be created with Cloud Computing, meaning the (educating) resources being delivered as a service over the network like the Internet (Grzybowski, 2013, p. 4).

Major Projects

According to a recent Korean Society for Educational Technology (KSET) panel discussion, South Korea is in the process of implementing and executing the fourth Industrial Revolution (Cho, Cho, Grant, Song, & Huh, 2020). The fourth Industrial Revolution not only applies to industry, but to education as well. In education, the idea of the fourth Industrial Revolution is to transfer decision making and communication from technologies to humans, such as artificial intelligence, machine learning, Internet of Things, etc. In an effort to achieve this initiative, the establishments of smart schools need to be constructed. South Korea is currently working on developing and renovating school spaces, redesigning school curriculum, educational technology, and professional development support systems to align with the fourth Industrial Revolution initiative (Cho et al, 2020).

There are several countries in the Asian region who are continuing to evolve and incorporate ICT within their educational systems. South Korea is one of the countries aspiring to become known as the educational hub of southeast Asia (Grybowski, 2013). They are continuously trying to gain a global competitiveness in education by providing educational

services that attract students from other countries, along with meeting their national educational goals.

Current Situation

South Korea currently has made it an effort to ensure technology is available at all levels of education. According to the Ministry of Education (n.d.), the number of computers available to students is 5.5 computers per student. This includes elementary school (6.6 per student), middle school (6.1 per student), high school (4.0 per student), and special schools (1.8 per student). In addition to the availability of computers, South Korea also is considered to have one of the fastest internet connections in the world, this is mainly due to the dedication and effort to improve their infrastructure. With this amount of technology available, teachers and students have taken advantage by improving and enhancing teaching and learning. Teachers in South Korea are using educational technology in their classrooms today, for example, one teacher in South Korea is using OneNote and Skype to collaborate with other students and teachers around the world to teach students English (Gainor, 2018).

South Korea has developed and implemented several ICTs within their educational system. Some examples and explanation of these resources are listed below in Table 1.

Table 1: ICT Examples in Action	
Research & Information Service System (RISS)	Gateway that provides nationwide university libraries that are able to access journals, theses, and dissertations
Korea Open Course Ware (KOCW)	Free and open online lecture contents for higher education

Table 1: ICT Examples in Action "Continued"	
Online Educational Resources (OER)	Free available lesson plans, quizzes, syllabus, instructional modules, etc.
Massive Open Online Course (MOOC)	Free self-paced online courses, often used in flipped classroom model.
Cyber Home Learning System (CHLS)	Internet-based service that allows learners to supplement lessons for themselves (customized learning, self-study).
National Education Information Service (NEIS)	A Linux-style platform, is an information system that stores all academic information (for all schools in Korea). Gives access to parents to communicate with teachers and administrators and view their children's records (School Affair Services).

South Korea has also implemented several educational technologies within its educational system. Some examples include DICE+, which is a concept to entertain individuals while educating them by incorporating game controllers and games within education (gamification). They have also incorporated robotic systems, known as EngKey, to assist students in teaching students English. This system is a robot with a screen for teachers abroad to be able to teach and practice with students. The teacher appears on the screen and there is a two-way communication between the teacher and the student. Korea has implemented the use of cloud computing in order to make things easier and faster. Cloud computing allows data and information to be stored in an online server is it is accessible to anyone, at any time, and

anywhere. Another common educational technology used is the Internet Protocol Television (IPTV), which a service that is delivered over the internet and is able to broadcast lectures and lessons to students. These are a few examples of educational technologies currently used in South Korea as they focus on building better solutions in the future to prepare their people for the demands of the 21st Century.

Future Trends

One of the major educational technology projects South Korea is working is the implementation of Artificial Intelligence (AI) into the educational system. According to Kang (2019) the Seoul Metropolitan Office of Education announced the development of a new course on AI technology, along with using smartphones (or other platforms) to engage in English conversation with an AI avatar. Additionally, the Daegu Metropolitan Office of Education is working on developing an AI program that is able to analyze study patterns and achievement levels for each student to create individual educational content. Busan is working on opening a Center for Future Education that gives an opportunity for students to directly experience AI technology that is being developed and used in the country (Kang, 2019). According to Cho et al. (2020), AI will be integrated in educational research for learning performance profiling, learning path and pattern profiling, learner prediction modeling, and learner retention prediction. Figure 3 shows a visual representation of the developments in technology and the focus in South Korea as of 2016.

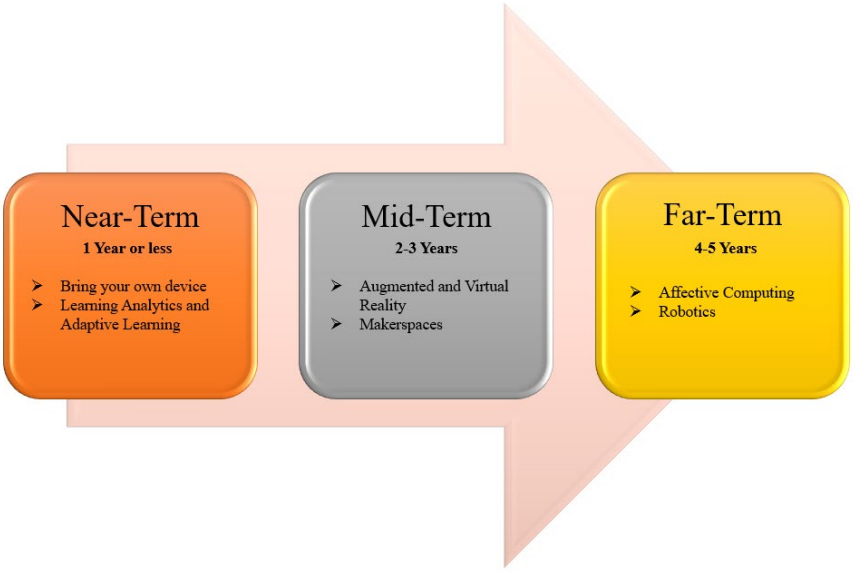

Figure 3: Developments in Technology (Jang, 2016)

Another major initiative South Korea is working for instructional design is Learning Analytics. Learning analytics is critical to understand how people learn and to improve instructional practices and learning environments (Cho, et al. 2020). The data collected from analyzing a learner's behavior help predict learning performance and provide the learner with the instruction that best fits each individual. Therefore, instructional designers will be able to develop instructions that fit a learner's behavior, thus enhancing and improving learning.

Strengths and Challenges

Probably one of the major strength South Korea has over several other countries is the amount of effort and dedication the Korean government has instilled into improving and enhancing education. Korea has made an effort to improve their infrastructure to set the conditions for integrating ICT within the educational system. All this effort and dedication has played a critical role in developing human capital. According to Jang (2016), South Korea's human capital was ranked sixth in the world.

Another major strength is digitalizing learning materials (digital textbooks, online resources, online courses, etc.), which allows individuals to access these materials from anywhere and at any time. This becomes a great advantage in the event of sickness, diseases (COVID-19), and/or disasters. Students can still complete their studies through online learning and benefit from not being able to attend class in person.

There are some challenges that affect the implementation of educational technology in South Korea. Educational Technology in South Korea is very advance but unfortunately not all of its population can take advantage of this opportunity. Koreans who live in a remote or low-income area do not receive the benefits of the technology advancements in education. Although teachers are very educated and certified, they often lack the professional development support to learn how to implement the new educational technologies. Students also need the skills and knowledge to be able to take advantage of the educational technologies to develop their own self-directed learning habits. Parents that do not support or understand the use of digital technology within the educational system can develop and have a negative attitude or belief towards educational technology, thus rejecting the use of this resource (Qualcomm Wireless Research, 2018).

Another challenge of online learning is the missed opportunity to interact (social learning) with other students, which does not build on team working skills needed later in life. Lastly, relying on online education and technology can become a problem if there is connectivity issues or technical errors, this can disrupt the instruction or lesson, causing learning to fail. Understanding these issues and knowing the educational technology resources available will assist in mitigating these foreseen issues.

Educational Technology Resources

The Ministry of Education in South Korea plays the major role in integrating and enhancing educational technology within their educational system. Under the Ministry of Education there are several organizations that are responsible for a certain part of integrating ICT within education. The Korea Education and Research Information Service (KERIS) is the primary organization that works on projects research related to ICT in education (all levels of education). The National Institution for Lifelong Education (NILE) is primarily responsible for providing learning opportunities to all Koreans throughout their lives. The Korean Educational Development Institution (KEDI) is one of the major organizations responsible for enhancing the quality of school education and creating innovative educational systems (KEDI, n.d.).
The Korea Institute for Curriculum and Evaluation (RICE) is responsible for improving and enhancing education by conducting research and evaluations in elementary and secondary schools (middle schools and high schools), focusing on developing and disseminating teaching and learning strategies. There are several internal organizations that contribute to the integration of ICT within education, but there are also global partners that have assisted and continue to assist in this process.

Global Partners

South Korea is heavily involved in the pursuit of improving and enhancing education at an international level. They are partnered with several international organizations including World Bank, which explore issues related to the use of ICT in education. The United Nations Educational, Scientific, and Cultural Organization (UNESCO), which provides global and regional leadership in education. The Organization for Economic Co-Operation and Development (OECD), which assist in improving policies (international level) for better lives.

University Programs

There are several information technology educational programs in colleges and universities in South Korea. The Korea Vocational College of Information and Technology, also known as Korea IT, is a vocational education and training program that specializes in information technology. This institution is providing the educated and trained professionals that play a critical role in Korea's information technology industry. Within the Korea University, is the Center for Teaching and Learning, which provides programs for teaching and learning and educational technology support. The Korea University of Technology and Education provides programs that focus on providing education and training to in-service teachers, along with technology transfer research and technology development.

Factors to Consider when working in South Korea

There are several factors to consider when working in another country or region. One must be able to understand the culture (living and work), economy, traditions, and customs within the country. According to InterNationsGo (2020), South Korea has the fourth largest economy in Asia, but many people are becoming overqualified for the jobs that are available. One of the most important factors to consider is being prepared to work in South Korea, which includes conducting your research, knowing the requirements, and knowing the living conditions. Furthermore, another important factor is communicating successfully with your colleagues and locals. Being prepared for a working/business environment includes knowing and following the traditions and customs. For example, it is often customary to have a third party introduce you for the first time, bowing and exchanging business cards is appreciated, scheduling events in advance, being on time (10 to 15 minutes early), and dressing conservative (dark colors and suits). These are just a few factors that will ensure one is prepared and

successful while working in South Korea. Knowing a countries history, customs, culture, and resources is critical when working within another region or country.

Conclusion

South Korea is a country that has had a very poor economy and educational system just a few decades ago to one of the best in the region and in the world. The Korean government takes pride within their nation and invest on several resources on their own human capital. Korea has been incorporating ICT within their educational system sine the 1980's and has been making tremendous improvements and enhancements in teaching and learning. Educational technology is incorporated in all of their educational levels, from elementary school to lifelong learning. Korea continues to develop and implement initiatives to improve their educational system and to meet the demands of the 21st Century knowledge and competency requirements.

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