

Building and sustaining national ICT/education agencies:

Lessons from Korea (KERIS)

*World Bank Education, Technology & Innovation:
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**Youngsun Kwon and Sanghyun Jang
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1818 H Street NW, Washington DC 20433 USA

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Executive summary

Information and communications technologies (ICTs) are developing fast and triggering fundamental changes in education system. This case study focuses on institution building, which can manage such a fundamental transition in education system on a national scale. Following a short introduction, a theoretical framework is discussed. The birth, major tasks, and growth of the Korea Education and Research Information Service (KERIS) are explored, and the roles of KERIS in planning and implementing the Cyber Home Learning System (CHLS) policy in cooperation with the Ministry of Education, Science and Technology (MEST) and regional offices of education are explored. The case study concludes by highlighting useful implications derived from this case study on KERIS.

From this organizational ecology perspective, this case study attempts to investigate the birth and growth of KERIS and explores the role of KERIS in planning and implementing one quite prominent strategic initiative to introduce innovative practices within the Korean education system—the CHLS. The objective of this case study is to find out key factors that the government needs to consider for successful institution building and those that determines the accomplishments of the missions assigned to KERIS. Using the CHLS policy case, in addition, we explore how KERIS implemented the CHLS policy in cooperation with regional offices of education, which are autonomous and in charge of education policy in each region in Korea. This case study, we believe, will provide rich experiences that policy makers can refer to when they plan to build a similar institution or restructure an existing one.



1. Introduction: Background and Context

Many people in Korea feel that information and communication technologies (ICTs) will trigger a fundamental transformation of the traditional education system, which in Korea has been teacher and lecture-centric. Like that of many other industrialized societies, the traditional Korean education system has been one of 'mass education,' providing standardized instruction and knowledge to students at a classroom during the same class hour, regardless of their differences in abilities and eagerness to learn. Today, however, the changes and opportunities being brought about by a variety of new technologies— from the abundant knowledge on the Internet that can be accessed and shared quickly to the increasingly ubiquitous network connections available at affordable costs that offer instantaneous channels of communication— are enabling a variety of new, innovative practices in the Korean education system, and many hope that a more student-oriented, needs-based approach to lifelong learning will be realized in the near future in Korea.

The role of government is seen as critical in introducing ICT-assisted innovations in the Korean education system, given that the country's traditional education practices have been so deeply ingrained in its culture, economy, and politics. In Korea, establishing and supporting a new institution to draw up and implement new education policies in changing environments is seen as a key first step in realizing innovation in education. KERIS was established as such an institution in Korea in 1999.

As recognition in Korea grew about the potential strategic importance of ICTs, the government considered whether to create a new bureau inside the Ministry of Education to oversee the roll-out of new technologies within the education system, or establishes an external public institution outside the ministry, or does both. In Korea as elsewhere, whether to establish an internal bureau or to create an external public institution depends on many factors, such as the level of expertise required to perform tasks, the degree of client homogeneity, transaction cost, accountability, coordination efficiency, etc. (Garnett, 1984; Thomas, 1993). According to organizational ecology theory, an institution, once built, adapts to changing environments by reorganizing its structure, redefining its mission, lobbying stakeholders, and acquiring other institution as living organisms often do. The case of KERIS illustrates such an organizational evolution.

2. KERIS: Its Birth and Management

Building a Quasi-Public Institution in Korea

In Korea, when the government needs to implement new projects that it has never experienced before, it first collects information and data by examining the experiences of advanced countries. In the past, Korean government officials typically would refer to experiences and lessons from advanced countries such as the U.A., European countries, and Japan. In addition, because officials in Korean ministries usually are hard pressed by routine work obligations and have little time to develop long-term plans, government often establishes working groups to mobilize external experts in formulating new projects. Sometimes government officials directly lead such working groups; other times they just attend their meetings as observers. The participation of government officials in such working groups is important in Korea because this allows them to learn from experts in the field and to communicate their ministries' interests and concerns to the working group, while at the same time not being obliged to report a completed project plan prematurely to their bosses. This arrangements allows ministry staff to advise ministers and director generals on new projects with confidence because they themselves participated in conceiving the new projects. In addition, ministry staff participation improves efficiency in developing new projects and increases the probability of successful implementation of the projects because they are the ones who obtain budget and allocate it to public projects.

While making a new project plan, a working group typically considers a system to guide project implementation. In the case of the potential wide scale use of ICTs in the education system in Korea, two alternatives were considered: a new bureau inside a ministry or a new external, quasi-public institution, funded and supervised by government but largely autonomous in how it manages its day-to-day activities. If a new initiative is not a 'one-off' endeavor, but rather is something where external expertise is continuously needed over time, government often decides to establish an external, quasi-public agency. Examples of such quasi-public agencies of relevance to the education system in Korea include the Korea Educational Development Institute (KEDI); KERIS, which is responsible for ICT/education related initiatives; and the Korea Development Institute (KDI), which was built to assist government ministries in developing long-term, innovative plans. If it is decided that a new project is a largely 'one-off' task, or if it is felt that a bureaucratic organization can better manage the related activities, the ministry can create a bureau or a task force inside a ministry to oversee the new project.

Even though the necessity of creating an external quasi-public institution may be widely acknowledged, it can actually take a long time to launch it because of two important political processes: making a special act *or* revising an existing act to include a clause for establishing the institution and acquiring budget for running it. Ministries in Korea play their functions, commissioned by laws, and they can propose revision of acts within their purview of task. Therefore, a ministry can, if need be, initiate creating a quasi-public institution by creating a new act or revising an existing act.¹ In Korea, if an institution is established by a law, then budget naturally follows it because of the system of cost estimate on the bills. The process for budgeting and allocating funds is thereby institutionalized, which helps ensure that the National Assembly or line ministries do not enacting laws imprudently by forcing them to check if budget can be secured for the tasks stated in laws. In other words, the system secures the successful establishment of an institution by guaranteeing budget for the institution. Therefore, providing a sound legal foundation for an institution is critically important. A firm legal foundation also determines the life time of the institution because an organization, once built, develops its own 'survival instinct,' and committee members of the National Assembly, overseeing a ministry to

¹ All acts are made by the National Assembly (NA) in Korea, so ministries can only propose making new acts or revisions of existing acts to the NA.

which the institution belongs to, have an incentive to protect the institution in order not to lose their political power. Once it is established, the growth and survival of a quasi-public institution depends on many factors, such as its leadership, organizational efficiency, effectiveness in fulfilling clients' needs, and the capacity of its staff.

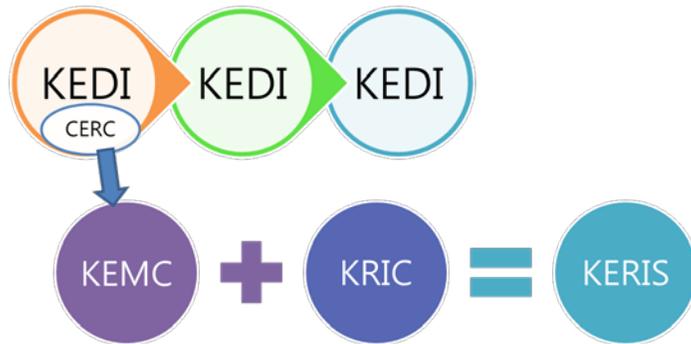
Birth of KERIS

The Korea government established two important quasi-public research institutions in the early 1970s: KDI and KEDI. KDI has supported the Economic Planning Board in drawing up Five-Year Economic Development Plans and various macroeconomic policies, while KEDI has assisted the ministry of education in modernizing Korean education system. KEDI, for example, implemented the first project that used computers and networks for distance learning in cooperation with Korea Telecom (KERIS, 2010a). This project, which ran for two years, developed a new process for creating educational content and a prototype for online distance learning. KEDI also carried out many pilot projects for informatization of educational services, such as computerization of education administration, library networking, building educational content database, and standardization of computer education facilities. Those early experiences paved the way for the nationwide implementation of informatization policies in the mid-1990s.

In Korea, even though national level informatization plan was conceived as early as 1992, it kicked into high gear in 1995 when the Ministry of Information and Communication (MIC) was established (MIC, 1996). As the MIC led national level informatization projects, the MEST also drew up the first Master Plan for informatization of educational services in 1996. The first Master Plan was effective for five years (1996-2000) and focused on building educational information infrastructure. It announced a number of very clear, measurable goals, such as one PC per teacher; one PC per five students; and one PC and Internet connectivity for each classroom. In order to accomplish these objectives, the MEST established two specialized institutions: the Korea Multimedia Education Center (KMEC) and the Korea Research Information Center (KRIC) in 1996². KMEC inherited the tasks of the Computer Education Research center (CERC), part of KEDI which studied and developed education informatization policies and ran EDUNET, an online education content service for elementary and secondary schools. KRIC was established to digitalize existing research and education information, construct a national research information database, and provide an information retrieval service. KRIC launched the first version of this research information service system in 1998.

² The KRIC was initially part of the National Research Foundation of Korea before being an independent organization in 1996.

The MEST established KERIS in April, 1999 by merging KMEC and KRIC after KERIS Act was enacted in January 1999 in order to facilitate informatization of educational service more comprehensively and actively on a national scale. KERIS functions both as a think tank, helping the MEST in its planning processes, as well as an organization carrying out education informatization projects under the MEST.



Initially, KEDI, the research institution for general education policy, housed CERC, which was soon separated as an independent institution. Innovations in education driven by ICTs can be disruptive and are often in conflict with, and indeed can undermine, existing education system processes and policies. Put differently, it was felt that the mission of CERC was likely to be

in conflict with that of KEDI, especially in the long run, and thus the separation of CERC from KEDI was a necessary step.

KEDI and KERIS are quasi-public institutions in cooperation with the MEST: KEDI is more pedagogical research-oriented, while KERIS is more oriented toward the development and implementation of education informatization policies. KEDI assists the Policy Planning Bureau of the MEST, while KERIS assists the ministry's Education Information and Statistics Bureau, although in theory and practice any bureau of the MEST can request assistance from either institution. The minister of the MEST appoints the presidents of the two institutions and the MEST controls the budget and the number of staff of the two institutions. The successful survival and growth of these two quasi-public institutions thus heavily depend on the degree to which they assist, and are useful to, the MEST.

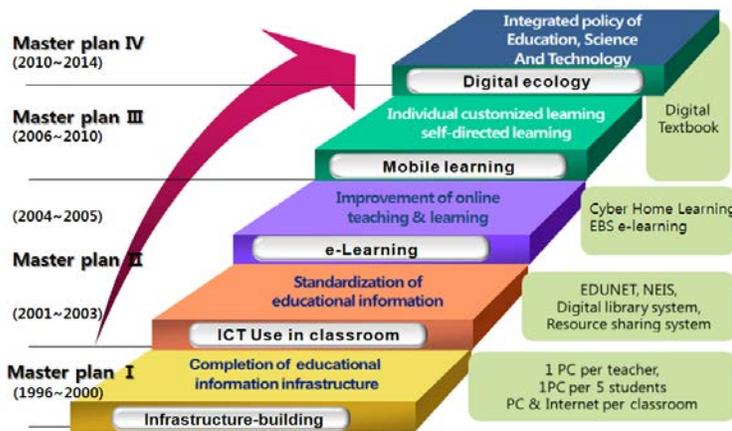
Master Plans for Education Informatization and Key Projects Implemented by KERIS

The mission of the KERIS is to enhance education and research competitiveness of Korea by innovating traditional education and knowledge sharing system using ICT. The major tasks of KERIS have included:

1. operation of a cyber-home learning support system through the EDUNET,
2. building ecosystem for digital text books,
3. management of the National Education Information System (NEIS),
4. establishment and operation of administration and finance system of regional offices of education,
5. supporting informatization of school libraries,
6. operating research information sharing system,

7. standardizing and certifying digital content and managing copyrights for digital content,
8. operating education cyber security center.

Since its inception in 1999, in close cooperation with the MEST, KERIS has drawn up three master plans for education informatization as shown in Figure 3. These master plans reflect the dynamic development of the use of ICTs within the Korean education system and tried to utilize better ICTs for innovation in education. KERIS completed the first master plan by networking schools and universities, supplying PCs to teachers and students, and providing Internet



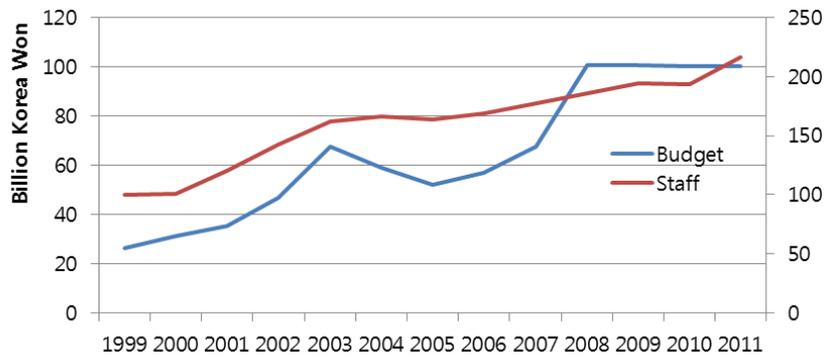
connection to classrooms by 2000. KERIS drew up the second master plan in 2000 and implementation began one year later. The plan targeted strengthening computer education in schools, standardizing multimedia content for education, building digital library system, facilitating online learning at home by providing multimedia contents created by the

Korean Education Broadcasting System (EBS) through the Internet, and boosting teachers' capability to use ICT for education. In addition, KERIS launched the National Education Information System (NEIS) in 2002 to integrate and help manage the education information created by elementary and secondary schools. This project enabled the public, the MEST, and researchers to know students' and schools' performance at national level promptly and reduced administrative burdens of teachers and parents greatly.

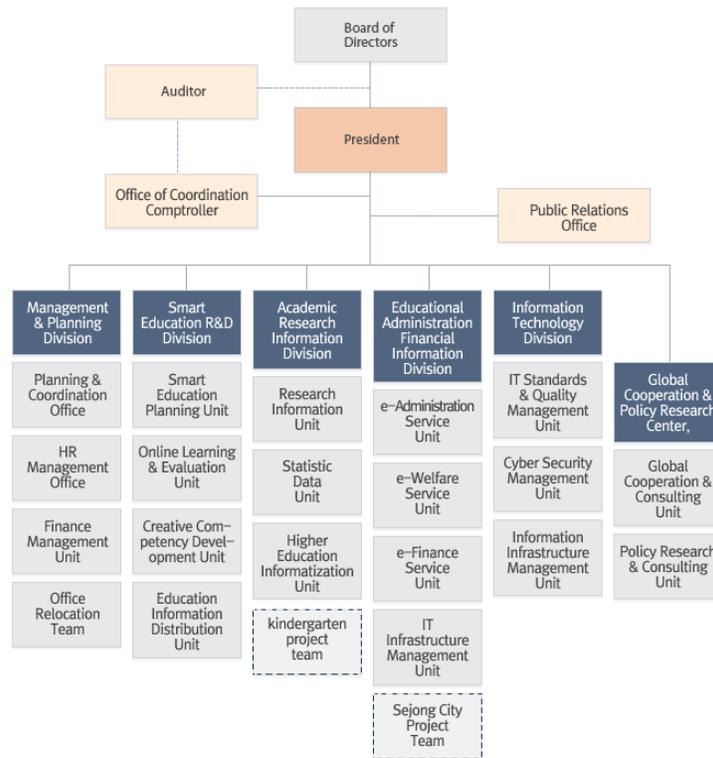
The third master plan tried to upgrade education informatization policy by introducing mobile ICTs to e-learning. In addition, KERIS built a 'self-learning' management system that evaluates students' knowledge level on-line, proposes customized learning paths to students, and keeps students' record of studying. Today KERIS is focusing on implementing the Smart Education Plan (SEP) announced in 2011, which coexists with the fourth master plan promulgated in 2010. As the SEP rolls out, Korean students will be able to choose the learning paths which best suit their individual needs, and teachers will play roles not as knowledge transferors but as facilitators or mentors who will evaluate individual student's needs, give advice, and suggest alternative learning paths.

Growth of KERIS

KERIS and the MEST first focused on building infrastructure and creating digital content for the informatization of education, and later began to support innovating teaching and learning processes to realize more individualized learning. This transition in the focus of education informatization policy has been directly reflected in the leadership appointment of the KERIS. Since the inception of the KERIS in 1999, seven presidents (including the present incumbent) were appointed. Among seven presidents, four presidents majored in computer science, two in management, and one in pedagogy. Appointing ICT experts who knew the ICT 'ecology' in Korea to lead KERIS enabled the organization to manage education informatization projects effectively. Reflecting changes in its mission, the sixth president, appointed at the end of 2009, was the first president who majored in pedagogy.



As informatization of education has progressed, the number of staff and the size of budget have grown considerably over the decade as shown in Figure 4 (right y-axis count the number of staff). For the past decade, the budget of KERIS has grown about five times (1,000 Won equals approximately one U.S. dollar) and the number of staff has doubled.

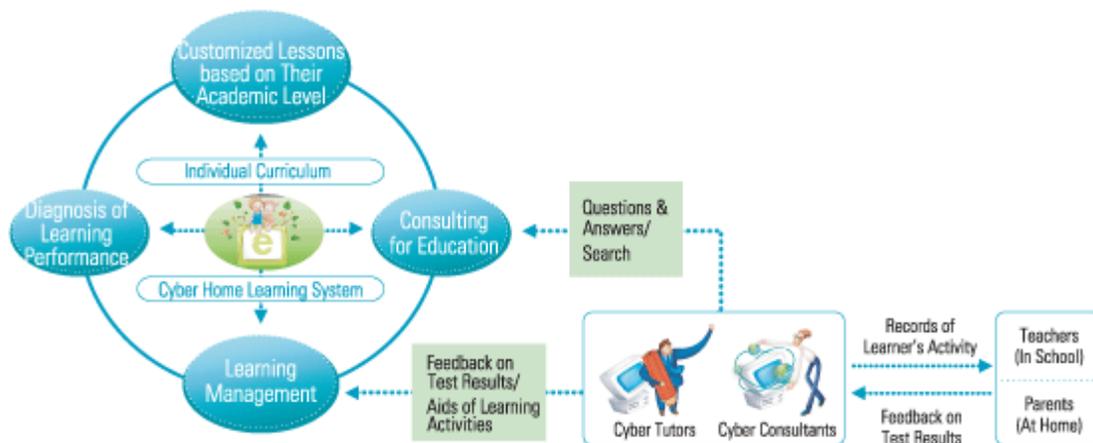


3. Planning and Implementing the Cyber Home Learning System

An examination of the role of KERIS in planning and implementing the Cyber Home Learning System (CHLS) provides insight into how KERIS functions in practice.

Planning the CHLS

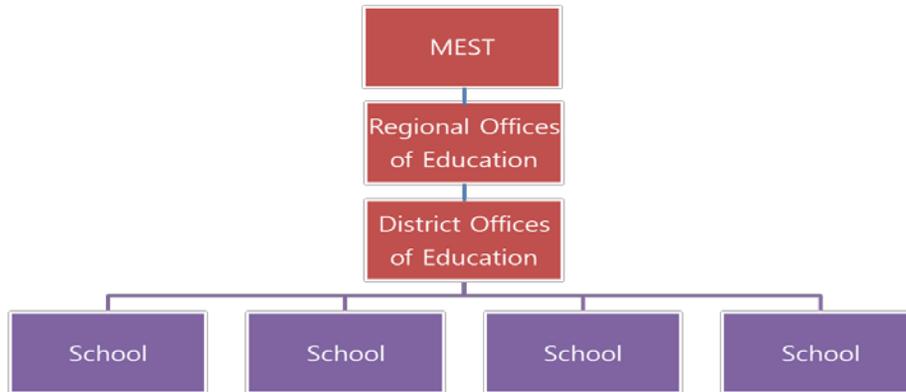
Household Internet subscription rate in Korea rose to 85.7% in 2004 (OECD, 2010), the digitalization of educational content has progressed, and students have got accustomed to using computer and the Internet. Recognizing these realities, the MEST implemented a pilot project to build the Cyber Home Learning System (CHLS) on a national level in cooperation with KERIS and 16 regional offices of education to facilitate e-learning at home in Korea. Two main reasons of facilitating e-learning at home in Korea were to reduce household expenditure on private education (Korean families traditionally spend large sums on private tutoring for their children)



and to reduce the educational achievement gap among provinces (KERIS, 2004).

The schema of the CHLS illustrates the logical structure of the CHLS. The CHLS has four modules: Diagnosing module to evaluate students' needs, consulting module to advise on students' learning paths, learning module for students' learning, and learning management module to keep students' learning records. Students can capitalize on cyber tutors to get more detailed explanation on a specific problem and cyber consultants to get information on learning paths as well as future career paths. Teachers and parents can also monitor students' learning activities and their progress in learning and communicate with cyber consultants.

In the hierarchy of Korea education administration (Figure 6), the MEST formulates nationwide educational policy in cooperation with KEDI and KERIS, and then, 16 regional offices of education, supervising district offices of education, make detailed implementation plan of the national policy and district offices of education actually implement the policy (KERIS, 2010b). In Korea, 16 regional offices are autonomous offices, so they do not have to accept the MEST policy even though the MEST can induce them to follow its policy by offering subsidy. Therefore, when KERIS was formulating the CHLS policy with the MEST, it assisted the MEST and when it was implementing the policy, it had to assist also regional offices of education.



Implementing the CHLS

When building the CHLS on a nationwide scale, KERIS assisted the regional offices of education to develop a learning management system (LMS), set standards for content development, and developed the service reference model to provide the cyber home learning service to students. The MEST simultaneously offered funds to regional offices of education to induce them to participate in the national project. The 16 regional offices of education across Korea have been running the CHLS, supported by KERIS.

Even though the implementation process went smoothly, it was not without its difficulties. One major challenge was to coordinate different preferences of 16 regional offices of education with regard to developing LMS. Some regional offices of education, which were relatively superior to others in personnel capacity and available funds, preferred building their own CHLS to using a standardized one developed by KERIS; other regional offices preferred the opposite approach. In the end, KERIS allowed regional offices to develop their own LMS individually because each region, it was argued, had different educational needs. Even though regional offices disagreed on developing a unified LMS, they agreed that each regional office would create educational content for different subjects and for different grades in a coordinated way in order to prevent duplication of efforts.

After the CHLS service started in 2005, KERIS and the regional offices of education realized the necessity of tighter coordination in managing learning management systems and creating educational content. If learning management systems of regional offices were the same, content development could become more cost effective. In 2008, the regional offices of education agreed to develop an advanced, standardized LMS and in 2009, they also agreed on assigning the development of educational content to KERIS. Even though 16 regional offices are still running their CHLS with their unique features at their websites, compatibility of LMS and educational content across Korea has been much improved since 2010.

Outcome of the CHLS

The Cyber Home Learning System is considered a flagship initiative of KERIS and is widely considered to be a success, both within Korea and abroad (KERIS, together with the MEST, won the first UNESCO-King Hamad Bin Isa Al-Khalifa prize for ICT in education in 2007, and the CHLS was cited as a primary reason for this honor). The number of users of the CHLS has grown rapidly for the past six years, from about 0.8 million in 2005 to 4.2 million in 2011. In addition, students' level of satisfaction has grown gradually, from 69% to 75% point on a 100 point scale (Figure 7). Elementary school students evaluated the CHLS most highly; the level of satisfaction declines as grade goes up, with high school student satisfaction levels the lowest. The low

satisfaction of high school students is attributed to the fact that high school education in Korea has been focused on the nationwide university entrance examination, and the CHLS is not designed specifically to prepare students for such tests. As a result, since 2010 the CHLS service has begun to target elementary and middle school students.

According to KERIS' s 2011 survey, about 86% of students who had used the CHLS evaluated positively the CHLS. After beginning to use the CHLS, 12.7% of respondents could improve their academic achievement, 18.2% of them could improve self-learning habit, 11.9% could gain more confidence in learning subjects, 24% could become to like learning subjects more, and 19.2% mentioned other benefits.

The CHLS is evolving continuously to satisfy students better and accommodate fast improving ICTs. Since 2011, KERIS has been innovating its centralized and supplier-oriented content development process. Teachers are those who have field experience and know best students' needs, and so it has been determined that they should lead the educational content development process. Acknowledging this, KERIS started pilot projects with three regional offices of education in 2011 to allow teachers to create, edit, and modify learning content.



4. Conclusion

The MEST established KERIS in 1999 in order to accelerate the informatization of Korean education more comprehensively and aggressively on a national scale than had occurred previously. Even though the MEST has had KEDI as its right arm to develop pedagogical education policy since 1972, it established KERIS as its left arm to develop and implement innovative education policy for the 'future education of the information age'. Since its inception, KERIS has led the implementation of various policies to build ICT infrastructure in schools, connect them via the Internet, create online learning content, develop learning management and education administration system, and train teachers to be able to use computer, the Internet, and educational software. The Cyber Home Learning System is a notable successful KERIS-led initiative.

Innovating educational practices in Korea through the use of ICTs would have not been feasible if household broadband penetration rate were not high. According to OECD (2010), Korea has been the first among OECD countries in terms of household broadband Internet penetration rate. Notwithstanding that unique favorable feature of Korea, several useful implications can be drawn from this case study. These are:

1. When establishing an institution for facilitating ICT use in education, the government should lay a firm legal foundation for the institution.

In drawing up master plans for innovation in education, government officials of ministries can utilize experts of academics and industries and have to attend all working group meetings. Their attendance improves communication between working group and ministries, and enhances the possibility of successful implementation of new plans.

2. It is better to build new institution rather than to use an existing institution for innovation in education using ICTs.

The MEST built KERIS even though it already had KEDI because the KEDI was built as an institution to assist the MEST in modernizing education in industrial society. The use of ICTs can challenge and even undermine an educational system tailored for mass education of industrial society, which means that, in the Korean context, they have the potential to undermine the foundation of KEDI. In other words, it was felt that KERIS, with its clear, focused mission to innovate mass education system using ICTs, would be better placed than KEDI, which had a stronger stake in the traditional education system, in devising and implementing innovative policies utilizing ICTs.

3. ICT infrastructure building for education should be implemented together with content development, computer supply, and teacher training for ICT use.

It is better to implement four policies together on a regional scale rather than one policy on a national scale if budget is limited.

4. When regional offices of education are autonomous, it is not easy to implement innovation in education using ICTs on a national scale because of coordination problems.

Some regional offices of education in Korea insisted on building their own LMS and the MEST finally accepted that approach. However, three years later, all regional offices of education acknowledged the efficiency and necessity of building LMS and creating content on a national scale. This centralized approach was needed, especially at the initial stage of building e-learning system on a national scale, to save costs and overcome differences in readiness and willingness to use ICTs among regional offices. Once basic infrastructure for ICT use in education is set up, the government can induce regional offices or teachers to add or modify content for localization and customization.

5. **Leadership of an institution is a key factor that determines successful growth of the institution.**

KERIS had been run by the presidents who majored in computer science or were ICT experts, not by those who majored pedagogy, for about a decade since its inception. Especially in the early stage of ICT infrastructure building for education, those who understand ICT ecology should lead the institution for innovation in education by using ICTs.

When building an institution for innovation, the government should see the whole picture of ecology surrounding the institution and assign clear mission to the institution. Then, institutions without regard to differences in surrounding environment try to survive and grow by adapting to changing environment or modifying it.



Appendix

KERIS: Timeline of Key Events

- 1996** Korea's first comprehensive educational information service, "EDUNET", was launched.
- 1998** Nation's first service for enhancing national research competitiveness, the "Research Information Service System (RISS)", was launched.
- 1999** The Korea Education and Research Information Service Act was enacted. KMEC and KRIC were consolidated into the KERIS. First president appointed.
- 2000** KERIS set education guidelines for elementary and secondary schools on the use of ICT.
- 2001** The KERIS designated as "National Education and Research Information Center" by the Ministry of Information and Communication. Second president appointed.
- 2002** The KERIS designated as the national operation center for the "National Education Information System (NEIS)" by the Ministry of Education and Human Resources Development. EDUNET subscribers reached 5 million. "National Educational Resource Sharing System" launched by the KERIS. "National Digital Library Support System" launched by the KERIS.
- 2003** 100% of all universities and research institutes in Korea joined the RISS.
- 2004** Third president appointed.
- 2005** 16 regional offices of education launched the Cyber Home Learning System.
- 2007** Opening of the u-Class. Fourth president appointed.
- 2008** Opening of the Education Cyber Security Center (ECSC). Fifth president was appointed.
- 2009** Sixth president appointed.
- 2010** Established a next-generation education administration information system.
- 2011** Announced and started the Smart Education Plan. Seventh president appointed.

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